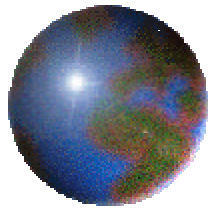


A satellite-style map of the Mediterranean region, showing the sea in dark blue and the surrounding land in various shades of green and brown. The text is overlaid on the map.

Republic of Turkey  
Ministry of Environment and Forestry  
Ankara Climate Change Conference  
1-3 September 2004

Session VII: Commitments, Mechanisms and Political Challenge of UNFCCC

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*Climate Change and Long-term*  
*Impacts in the*  
*Mediterranean Region*  
*Environmental Security, Conflicts and*  
*Conflict Avoidance*



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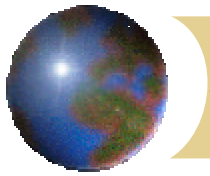
*Climate Change and Long-term Impacts  
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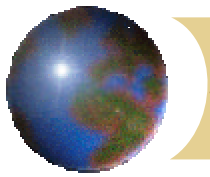
**Republic of Turkey, Ministry of Environment and Forestry**

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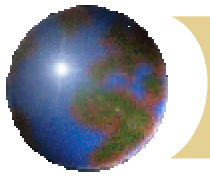
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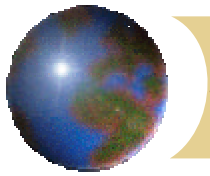
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# *Contents*

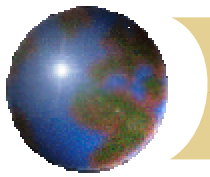
- **Introduction and Question**
- **Security Perspective on Climate Change**
- **Model: Global Environmental Change and Fatal Outcomes**
- **Global Climate Change and Greenhouse Effect**
- **Past Climate Change Impacts: Hydro-meteorological hazards**
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- **Demand Side Patterns: Population Growth, Urbanisation, Food**
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- **Climate Change and Security: National vs. Environmental Security**
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- **Active Climate Policy as a Conflict Avoidance Strategy**



## *1. Introduction and Question*

I would like to address these key questions:

- **Did climate change have impacts on the Mediterranean, also on civilisations on the territory of Turkey?**
- **What are the possible & likely impacts of climate change for the Mediterranean during the 21<sup>st</sup> century?**
- **What possible socio-political implications of global environmental change for security and conflicts may be foreseen for the Mediterranean region?**
- **What are the most efficient and optimal strategies for coping with these implications to prevent proactively a violent escalation by anticipatory learning?**



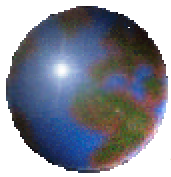
## 2. Security Perspective on Climate Change

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

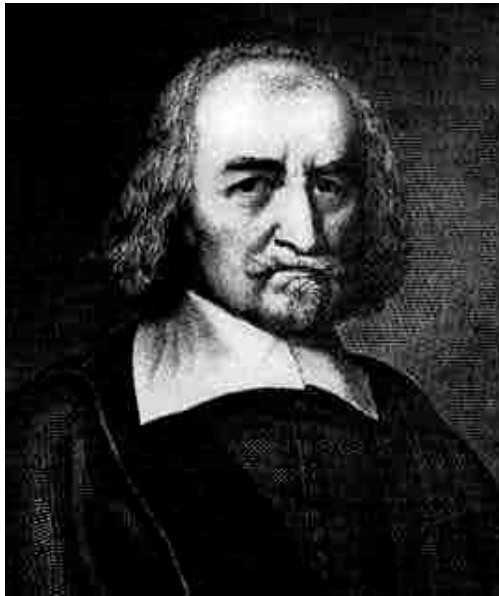
„Security, in an *objective sense*, measures the absence of threats to acquired values, in a *subjective sense*, the absence of fear that such values will be attacked.“

- ? Security perception depend on the worldviews and traditions of the analyst and on the mindset of the policymaker and their advisers.
- ? Security perceptions and knowledge are socially constructed.

Security dimension? ? Level of interaction	Mili- tary	Political	Economic	Environ- mental	Societal
Human individual ?				victim	
Societal/Community				??	
National	MENA region			??	
Internat./Regional				??	
Global/Planetary ?				GEC	



## 2.1. English School: Hobbes, Grotius & Kant



**Hobbes (1588-1679)**

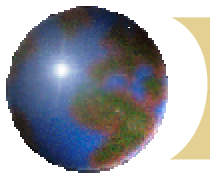
**Grotius (1583-1645)**

**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**





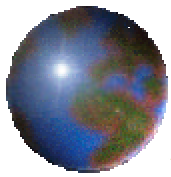
## 2.2. *Narrow Security Concept in Turkey*

### **Mediterranean: competing concepts of territory & security**

- ? EU: since 1990: wide security concept (dimensions), process of de-territorialisation (post-modern, post-national constellation)
- ? Middle East and in Eastern Mediterranean („modern“ sovereignty): adherence to a narrow national political & military security concept
- ? The Hobbesian security concept used by the elites in the Eastern Mediterranean constrains the perception of env. challenges.

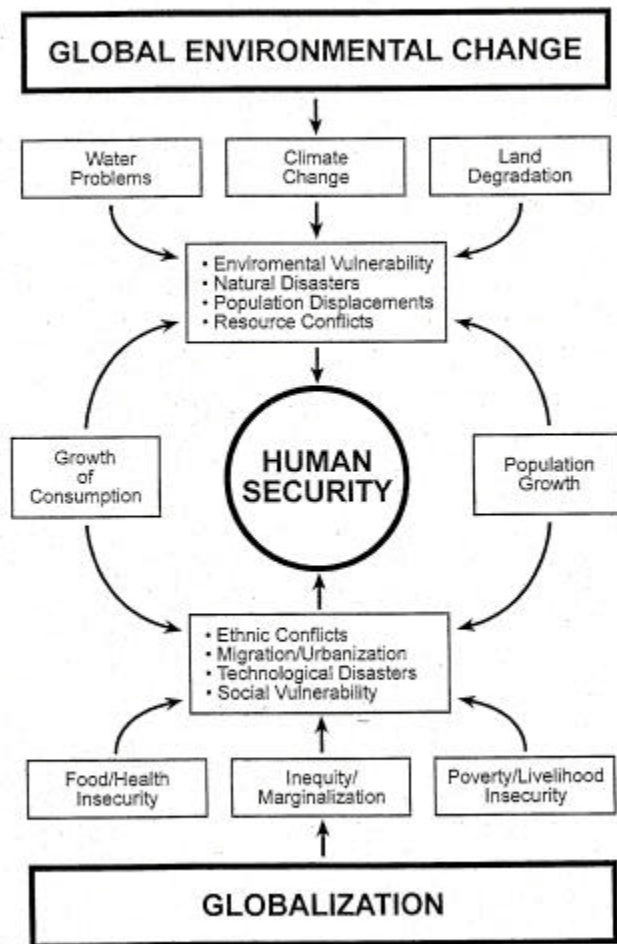
**Table: Expanded Concepts of Security (© Bjørn Møller, 2003)**

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



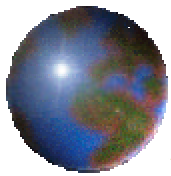
## 2.3. Dual Global Challenge: GEC & Globalisation

### Global Change and Human Security



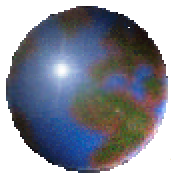
### Human Security Perspective

- ? **referent:** individual & mankind
- ? **value at risk:** human survival
- ? **threat:** nature, GEC & globalisation
- **GEC > environm. vulnerability > disaster > migration > scarcity**
- **Globalisation > inequity > social or societal vulnerability**
- **Key questions for Middle East**
  - ? How will **GEC & globalisation** affect the individual, society, countries?
  - ? Can the global **environmental security challenges (GEC)** be solved by hard security concepts and means?

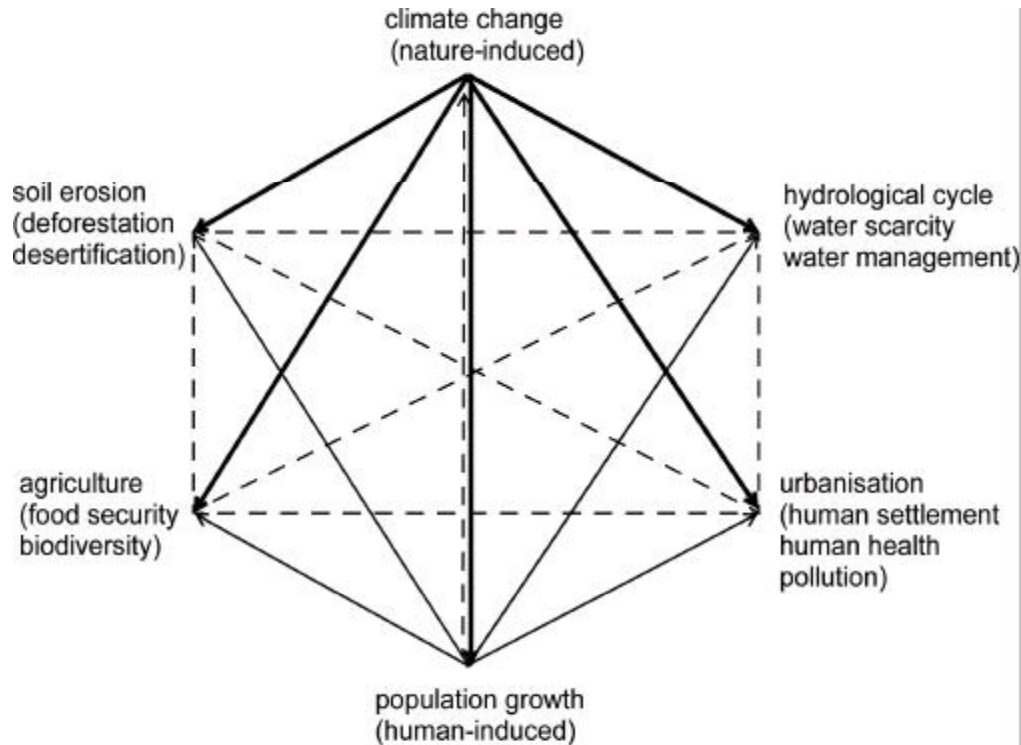


### 3. Model: Global Environmental Challenges, Environmental Stress & Fatal Outcomes

Causes (Hexagon)	Effect (Interaction)	Environmen- tal Stress	Probable Outcomes
<b>↗ → → → → Extreme Weather Events → → → ↘</b>			
<p><b>Climate change</b></p> <p>→ direct impact of nature-induced „root cause“: climate change on five factors  → direct impact of human-induced „root cause“: population on four factors  - - - complex interaction among four structural factors: urbanisation, water scarcity, soil erosion and desertification and food scarcity and agricultural policy</p>	<p><b>environmental</b></p> <p>→ <b>degradation</b> (soil, water)</p> <p>↓ ↑ →</p> <p>→ <b>scarcity</b> (water, food, housing)</p>	<p>global cond.</p> <p>↓</p> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>Environ- mental stress</b> </div> <p>↑</p> <p>nation. cond.</p>	<p><b>disaster</b> <b>conflict</b> avoidance</p> <p>↗ ↘</p> <p>→ <b>Crisis</b></p> <p>↙ ↘</p> <p><b>migration</b> <b>conflict</b></p>

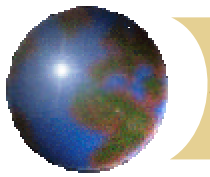


## 3.1. Wider Security Focus: Non-military Challenges

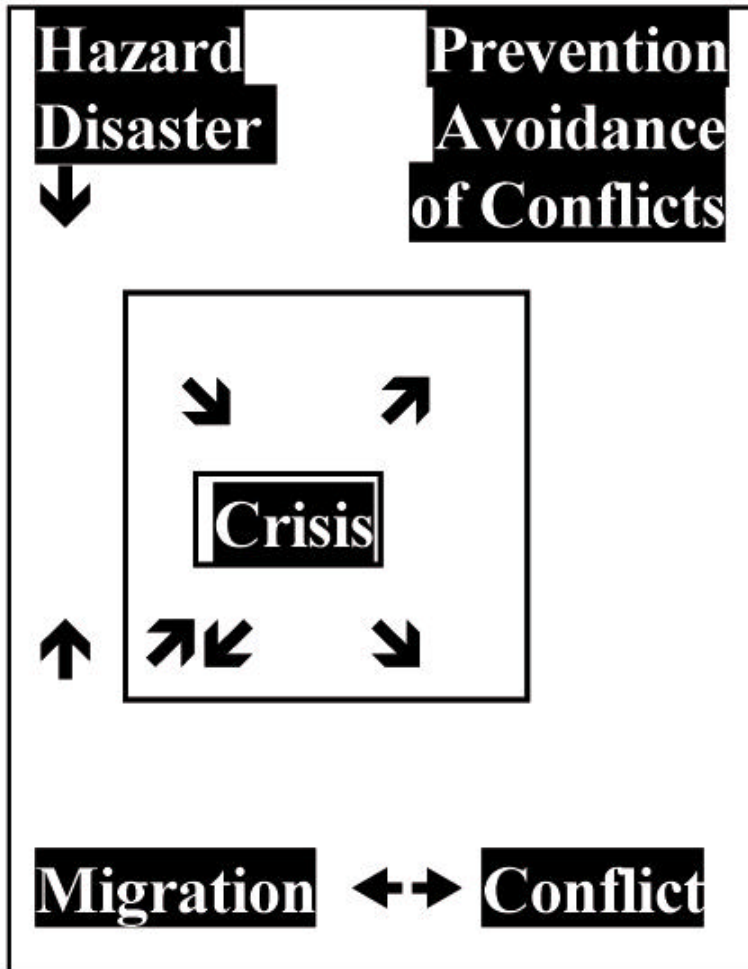


Environmental security in the Middle East is affected by Global Environm. Change

- **Human-induced factors**
- ? Population growth
- ? Urbanisation
- ? Food & Agriculture
- **Nature & human-induced**
- ? **Air: Global climate change**
- ? **Soil: deforestation, degradation, desertification**
- ? **Water: hydrological cycle, pollution, scarcity**
- ? **Economic production & consumption patterns (impacts of economic globalisation) on Global Environmental Change (GEC).**



## 3.2. 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

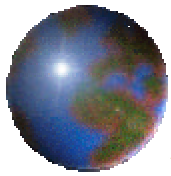
? Famine & environm.-ind. migration

? Conflicts & conflict-induced migration

Lack of knowledge on societal consequences:crises/conflicts

? Domestic/internat. crises/conflicts

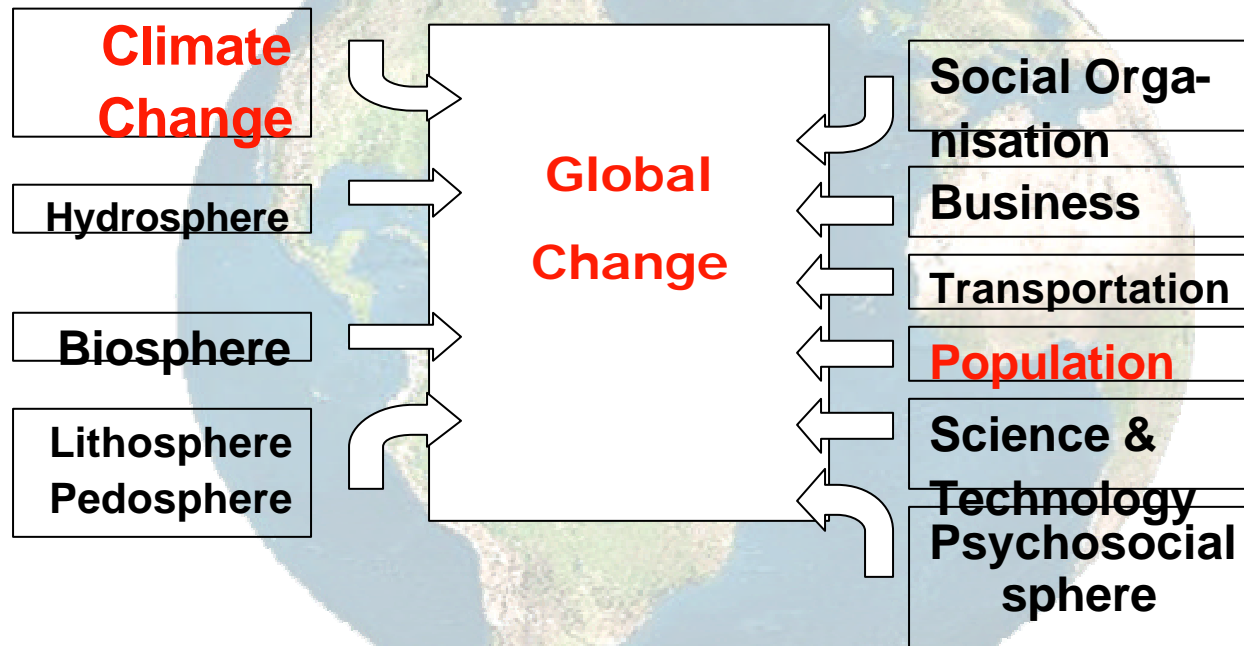
? Environmentally or war-induced migration as a cause or consequence of crises and conflicts

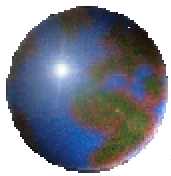


### 3.3. Global Environmental Change

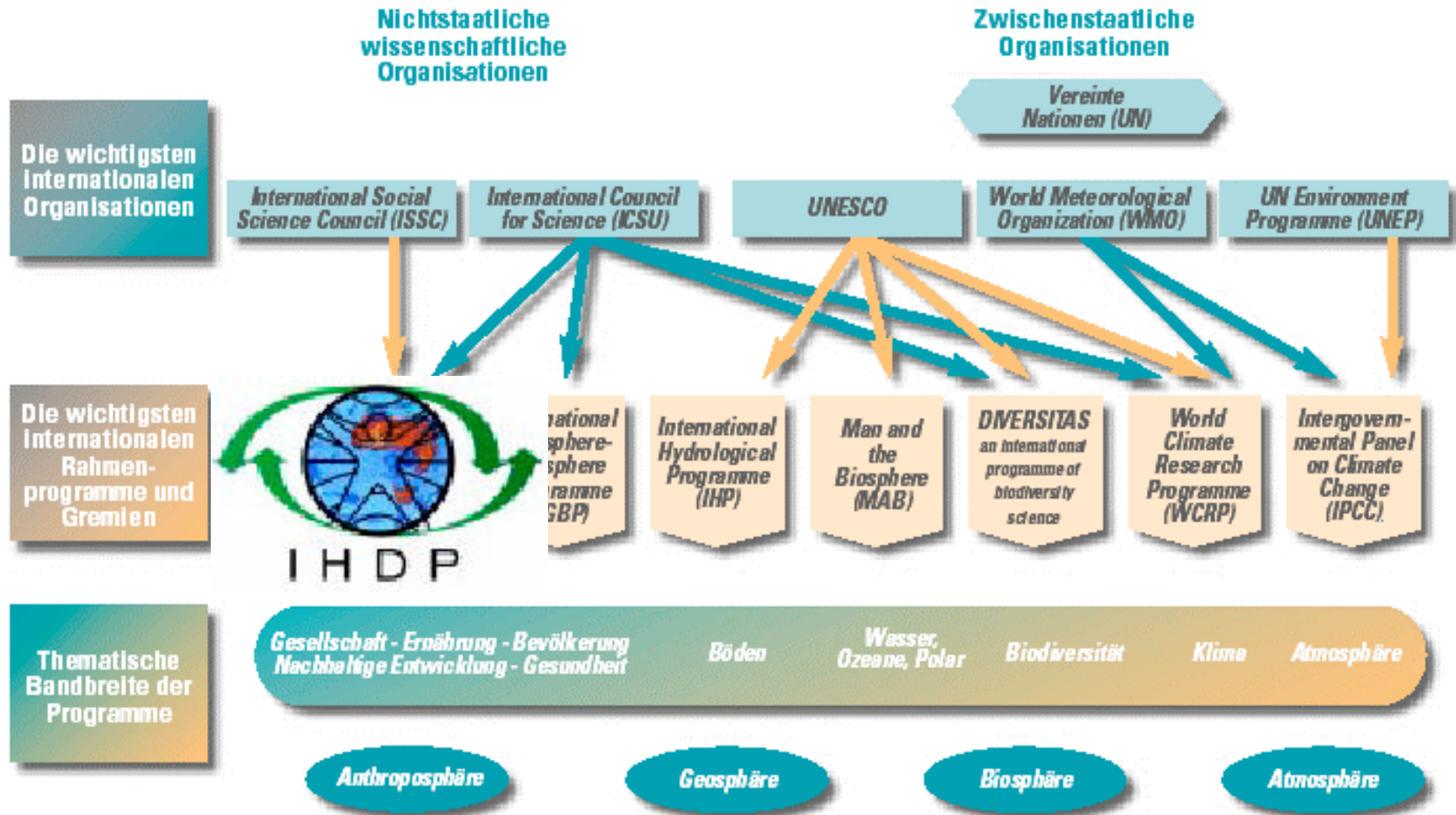
Natural sphere

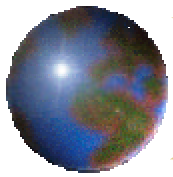
Antrophosphere



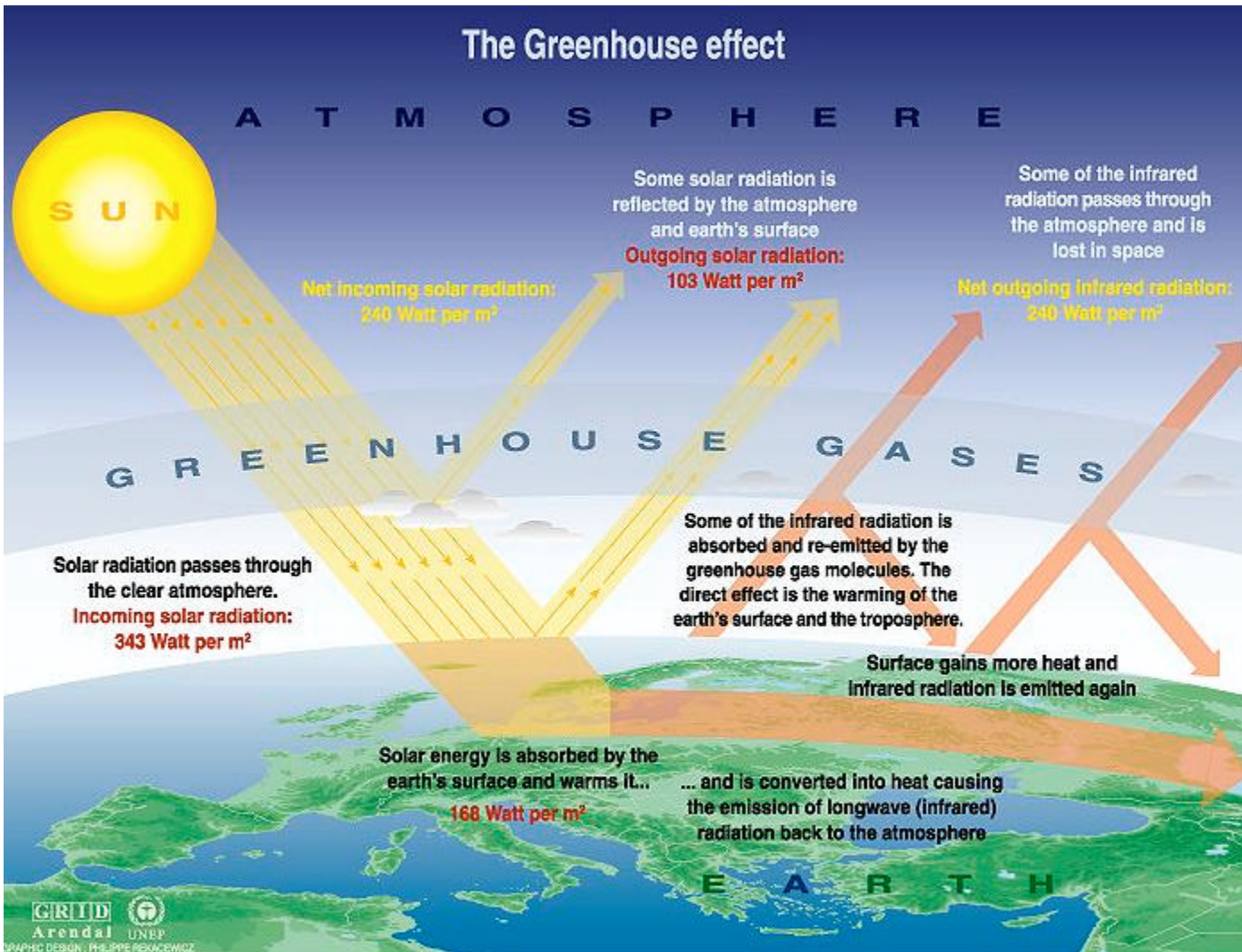


# 3.4. Scientific Programmes on GEC



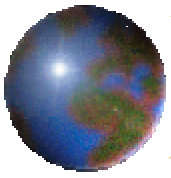


## 4. Global Climate Change: Greenhouse Effect



- Burning of hydrocarbons (coal, oil, gas) increases the concentration of CO<sub>2</sub> in the atmosphere
- Results in increasing aver. temperature & sea level rise
- Serious impacts: precipitation, desertification & food yields





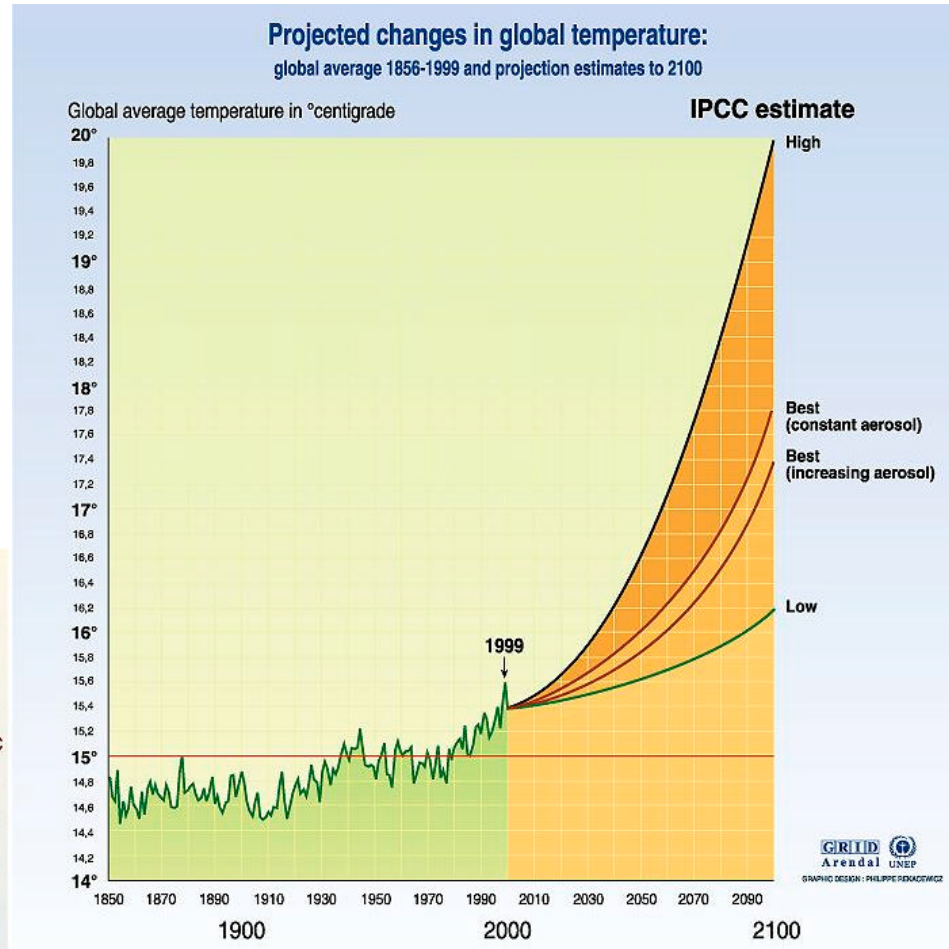
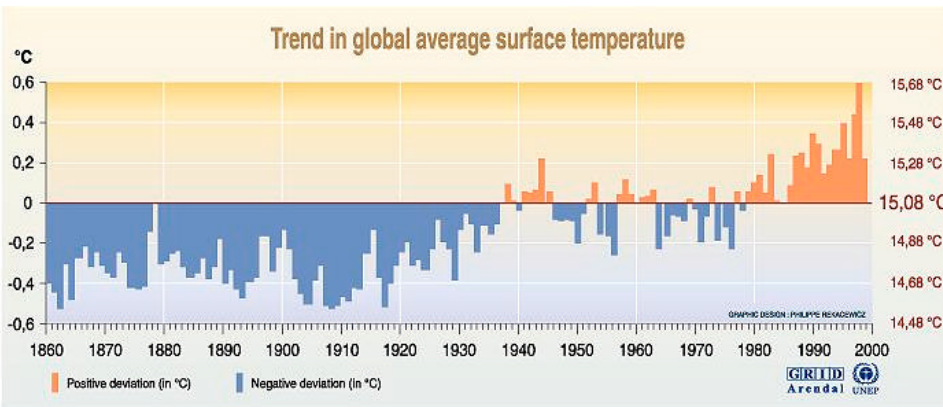
# 4.1. Global Climate Change: Temperature Increase

## 2 Climate Change Impacts:

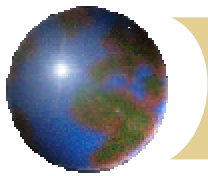
? Global average temperature rise in 20<sup>th</sup> century: **+ 0.6°C**

? Proj. temperature rise: **1990-2100: +1.4 – 5.8°C**

Sources: IPCC 1990, 1995, 2001



Source : Temperatures 1856 - 1999: Climatic Research Unit, University at East Anglia, Norwich UK. Projections: IPCC report 95.

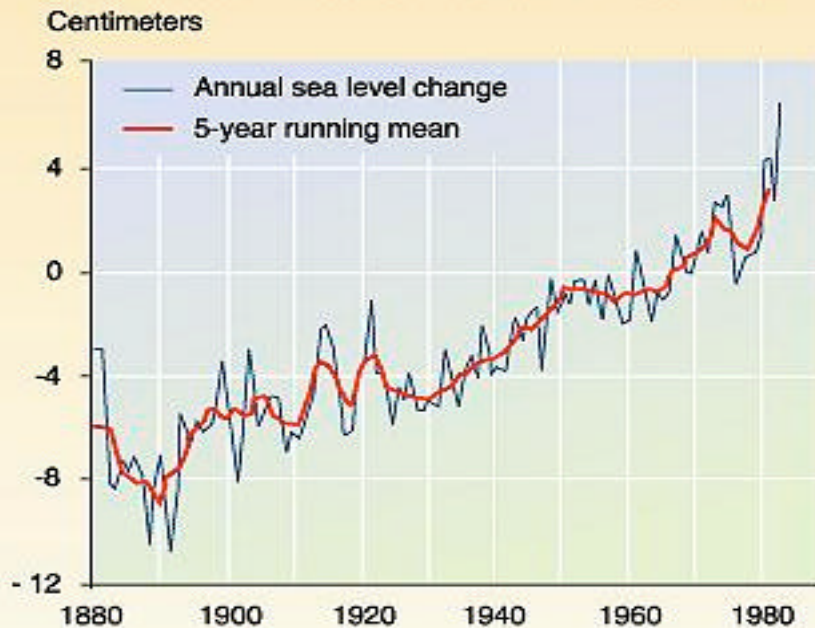


## 4.2. Global Climate Change: Sea level rise: 1860-2100

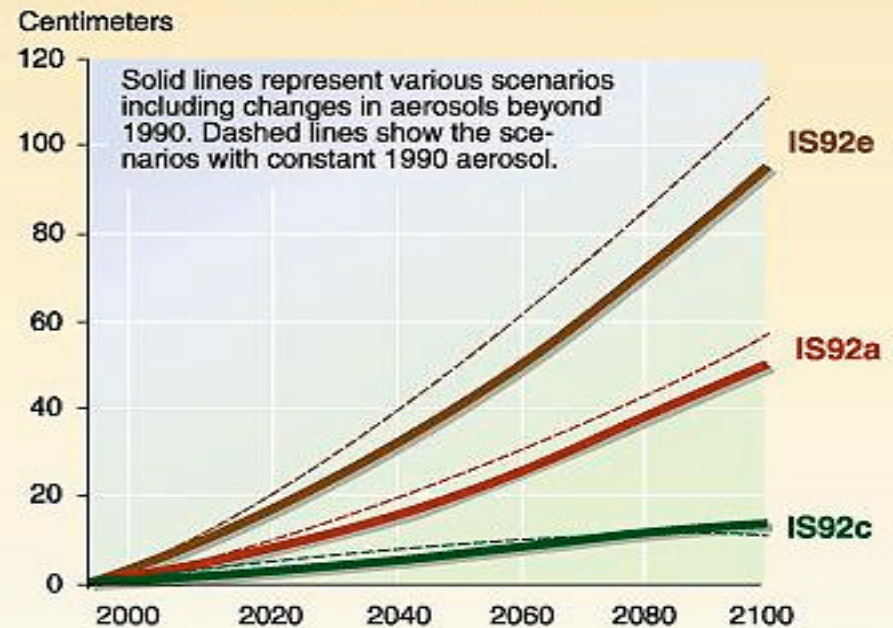
IPCC, TAR, WG 2 (2001): Sea level rise 1860-2000: **0.1 – 0.2 m**; sea level rise: 1990-2100: + **0.09 - 0,88 m**

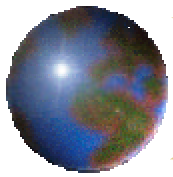
### Sea level rise due to global warming

Sea level rise over the last century



Sea level rise scenarios for 2100





## 4.3. Effects of Climate Change for Egypt & Nile Delta

Population: 3 800 000  
Cropland (Km<sup>2</sup>): 1 800



Population: 6 100 000  
Cropland (Km<sup>2</sup>): 4 500



### Climate Change Impacts for Egypt:

- Nil Delta: 50cm sea level rise will affect: 2 mio. persons, 214.000 jobs will be lost.
- Temperature for Cairo to 2060: + 4°C
- Decline in yield of wheat (by 2050: -18%)

### Climate trends in Mediterran. by 2080

- Higher temperature increase in summer
- Decline of precipitation in summer.

### Population Growth in Med. (2000-2050):

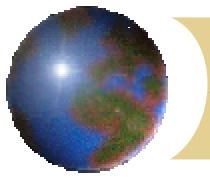
- North (South Europe: P, E, F, I Gr): - 23 Mio.
- South (MENA-Region): + 181 Mio.

### MENA: Increase in Food Insecurity

- FAO 2003: 1995-2030: +150% (42ffl 16 Mio.t)
- SSR: 1964: 86%, 1995: 65%, 2030: 54%

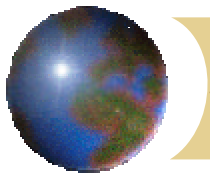
Dramatic Increase in Cereal Imports due to

- population growth & climate change



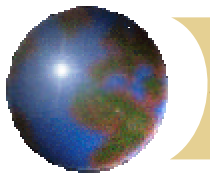
## *5. Past Climate Change Impacts on Civilisations*

- In January 2001, **Weiss and Bradley** wrote in *Science* that the demise of some civilisations was climate-driven:
- ‘We find a very precise coincidence between the abrupt climate changes and the archaeological record of collapse.’
- Sediments from Lake Titicaca ... reveal that South America has endured alternating periods of **heavy rainfall & severe drought** over 25,000 years.
- Societies from Classic Maya of the New World to the prehistoric hunting and gathering Natufians of **southwest Asia** were drastically affected by **sudden, prolonged & intense temperature and rainfall changes** which disrupted agriculture. ... The demise of Classic Maya society in the 9th century AD coincided with a prolonged and severe **drought** of the millennium.
- **Egypt, the Akkadian empire of Mesopotamia**, and Early Bronze civilisations of Palestine, Greece and Crete all peaked in 2300 BC, then **declined when catastrophic drought and cooling struck** a decade or so later.
- The late **Uruk society** that flourished in southern Mesopotamia in 3500 BC **collapsed between 3200 and 3000 BC, again due to drought.**



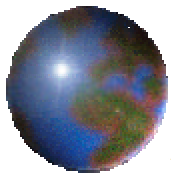
## 5.1. Climate Change and History

- **N. Brown: *History and Climate Change* (2001)** asked “whether climate variation is a fundamental **trigger** mechanism from which other historical sequences develop, decisive only when a ... society is poised for change”.
- He focused on the **impact of extreme weather events, e.g. cold and warmth, of floods and drought**, and its outcomes of **famine and epidemics on pivotal historical events**, such as the **pressure of the Huns on the Romans**, of the *large migration of people's*, on the **prophet Mohammed and the spread of Islam**.
- Brown argued that the **impact of climate change** appeared **more local & regional than continental**. He reviewed the debate among historians between the **climate determinist Huntington and the climate sceptic Gibbon, pointing to the persisting uncertainties and to short-term climate fluctuations**.
- He pointed to **chaotic factors** have in the shorter term, “in human affairs and in geophysical”, but he hoped that “**discourse, informed by historical perspective, will prove in the final analysis to have been self-defeating prophecy**”.
- **For the 21<sup>st</sup> century it cannot be ruled out that climate change could well become “a prime generator of instability and conflict”**. Brown sees several reasons “that a climate crisis could induce a fundamentally irrational response”.

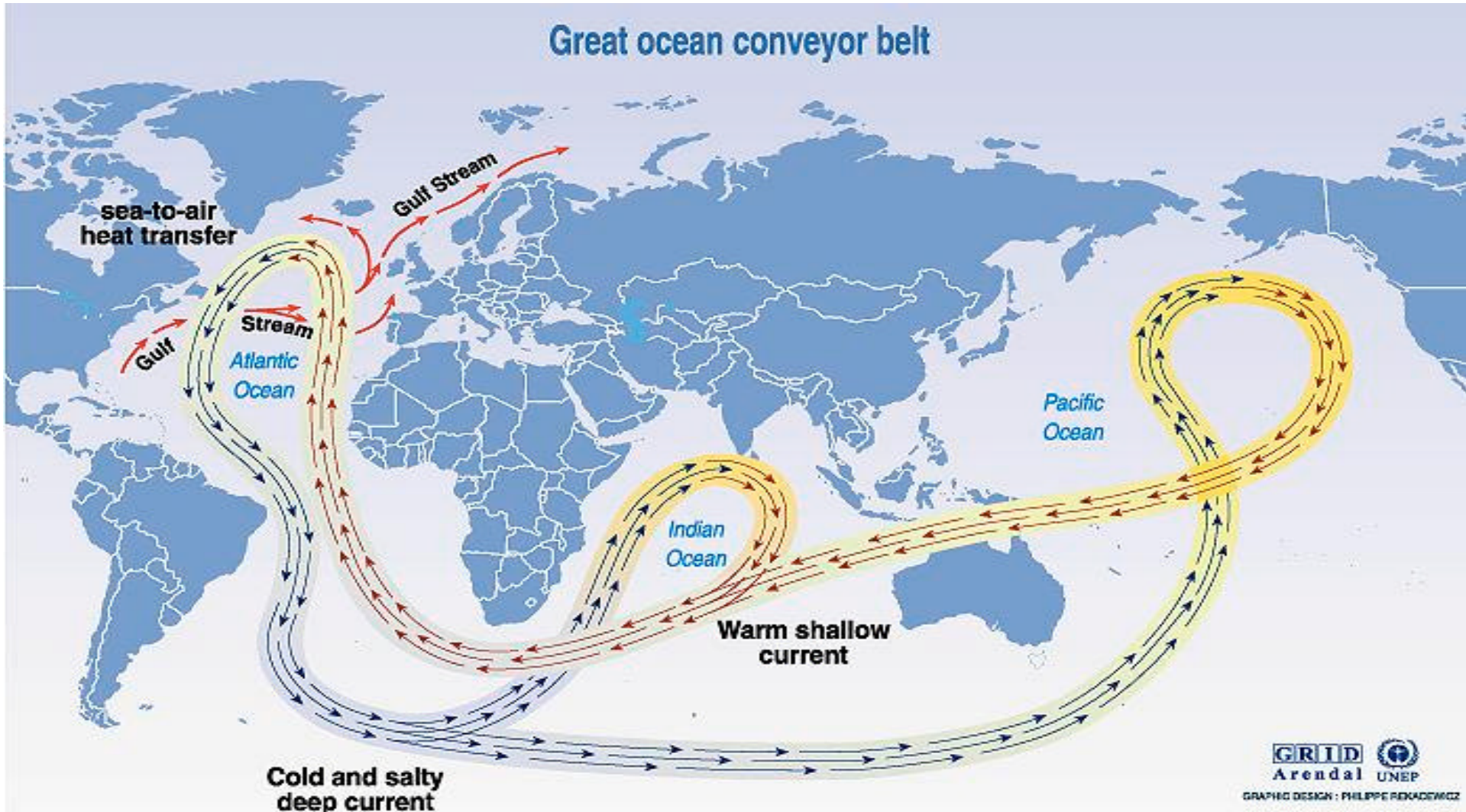


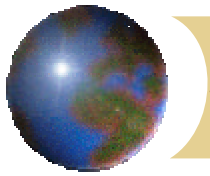
## 5.2. Abrupt Climate Change Hypothesis

- **US Nat. Research Council: *Abrupt Climate Change* (2002):**
- „An abrupt climate change occurs **when the climate system is forced to cross some threshold, triggering a transition to a new state** at a rate determined by the climate system itself and faster than the cause. **Chaotic processes in the climate system may allow the cause** of such an abrupt climate change **to be undetectably small.**“
- E.g. 11.500 years ago, a major change occurred over a few years that affected temperature and rainfall
- **Short cooling 8,200 years ago that lasted 200 years.**
- Question whether **anthrop. influences will trigger** abrupt climate change
- **Gradual change:** plants and animals may adjust but not abrupt change.
- **Ecological systems are vulnerable to abrupt climate change**, have low adaptive capacity. **Effects will increase when CC causes ecological systems to cross thresholds.**



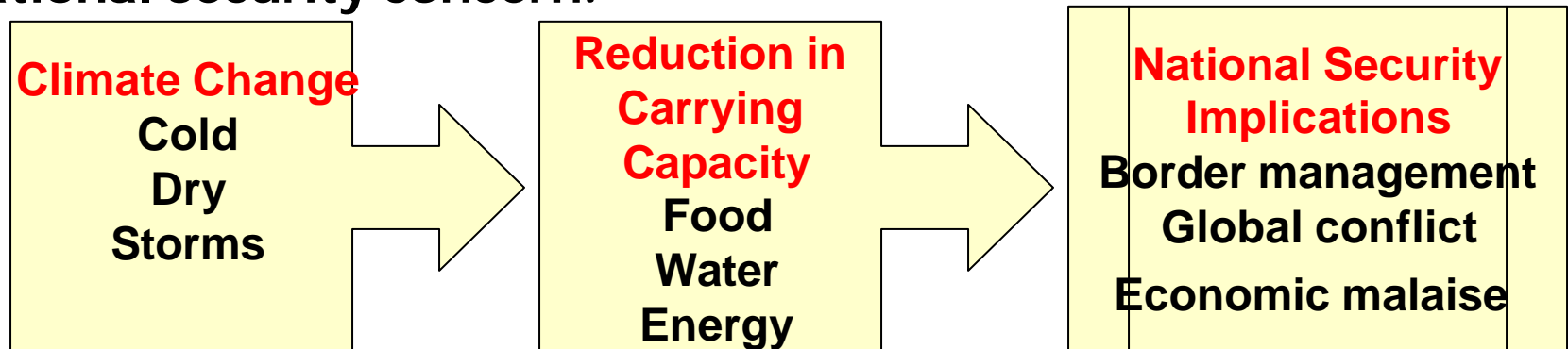
## 5.3. Change in Conveyor Belt & Gulf Stream



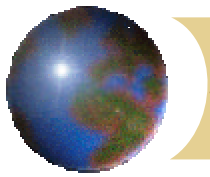


## 5.4. Peter Schwartz and Doug Randall: US-DoD *Climate Change as a U.S. Security Concern*

- Indications today that global warming has reached the threshold where the **thermohaline circulation could start** to be significantly impacted. These indications include observations documenting that North Atlantic is increasingly being freshened by melting glaciers, increased precipitation, and fresh water runoff making it substantially less salty over the past 40 years.
- **Report suggests that, due to potential dire consequences, the risk of abrupt climate change, although uncertain & quite possibly small, should be elevated beyond a scientific debate to a U.S. national security concern.**

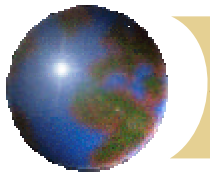






## 6. IPCC: Analyses on Future Regional Impacts of Climate Change to 2100

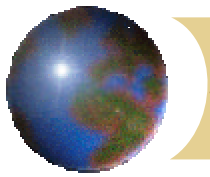
- **IPCC did not assess climate change impacts in the Mediterranean**
- References to **Egypt** in the **first assessment** of the impacts for agriculture and forestry, natural terrestrial ecosystems, hydrology and water resources, for human settlements and oceans and coastal zone (IPCC 1990).
- **SAR (IPCC 1996a)** more details on impacts, adaptation options & assessment of mitigation options.
- **IPCC (1998) *Regional Impacts*** study, Mediterranean is covered as Africa, Europe & Middle East & arid Asia. Division of the Mediterr. as **periphery** of 3 continents prevents a systematic assessment of climate change impacts.
- **TAR (IPCC 2001a), African chapter** deals with climate change impacts on water, food security, natural resource management, human health, settlements, infrastructure and desertification (IPCC 2001a: 525).
- **Asian chapter** deals with physical & ecological features, scenarios for future climate change and key variables for sensitivity and adaptability.



## *6.1. IPCC: Future Impacts of Climate Change for European Mediterranean to 2100*

- **European chapter** covers future European climate change scenarios that: were placed in the context of model estimates of natural variability of European climate. The baseline period selected was 1961-1990; changes in mean 30-year climates were calculated for the periods centred on the 2020s (2010-2039), the 2050s (2040-2069), & the 2080s (2070-2099). ... For each scenario, season, variable, & time-slice, two maps were constructed. One map shows the median change from the sample of eight standardized and scaled GCM responses, the other map shows the absolute range of these eight responses (IPCC 2001a: 653).
- On **GHG emissions per capita** there is a clear **North-South** differentiation between Northern and Southern Mediterranean countries.
- **European chapter** foresees for the Mediterranean due to rising temperature & declining summer precipitation **increasing risks of forest fires**.
- The risk of **severe water shortages** in the Mediterranean would also have severe effects on **fresh water ecosystems** (IPCC 2001a: 666).

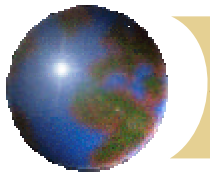




## *6.3. IPCC: Socio-economic Effects of Climate Change for the European Mediterranean*

### On migrations the IPCC chapter notes:

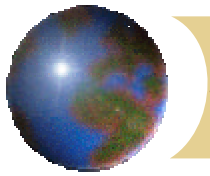
- **Migration caused by soil degradation** is a very important issue in the Med. region, the **southern part of which is mostly arid and vulnerable to climate change**. 24% of total drylands in Africa are in the process of desertification & 0.3% of the African population permanently displaced largely as a result of environmental degradation, consequent migration pressures on neighboring regions such as southern Europe can be substantial (IPCC 2001a: 672).
- **European chapter** foresees losses & gains due to climate change, for the Med. increases in the variability of water flows with summer flows reduced & in coastal areas, risks of **flooding & erosion** will increase substantially.
- **Southern Europe will be more adversely affected than northern Europe**. A shift in climate-related resources from south to north may occur in sectors such as tourism, agriculture, and forestry. In particular, the **Med. region appears likely to be adversely affected by increased variability of river flow**; increased **flood risk**; decreased summer runoff and recharge of aquifers; reduced reliability of public water supply, power generation, and irrigation. **Increased fire hazards** affecting populated regions and forests and heat stress on humans, crops and livestock may occur. There is greater vulnerability in southern than in northern Europe (IPCC 680).



## *6.4. Lack of systematic knowledge on impacts for Med*

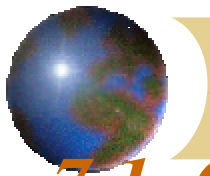
### **IPCC lacks systematic knowledge on climate change impacts for the Med..**

- **EU- networks** on regional climate models & socio-econ. impacts for the Med..
- **ECLAT-2** reviewed “construction & application of climate change scenarios in regional-scale impacts assessments”. It covered “the use of Regional Climate Models in regional scenario construction, the achievement of consistency between point, local and regional-scale scenarios, & integration of climate impacts results across regions”.
- **Ali Harzallah** pointed to weaknesses in scenarios for climate change on the Med.: a) lack of analysis of systematic errors, b) poor evaluation of climate variability, c) simulation of short periods, no organised databases for regional model outputs, d) lack of simulation using ocean-atmosphere coupled regional models on the Medi.
- **Harzallah** suggested to evaluate present simulated climate and climate variability from GCMs & RCMs on Med., to use rigorous spatial statistics, multi-model ensembles of high resolution scenarios, to define targeted sub-regions of the Medi. area for impact studies & to educate stake holders on deficiencies & uncertainties.
- **Serge Planton** stressed: “The most critical sensitivity of the socio-economy of the Medi. area regarding the impact of climate appears to be linked to the issue of **water supply**.” a huge need for regional integrated assessment forr Med.. A common project involving climate & impact communities, associating stakeholders, should be developed“.

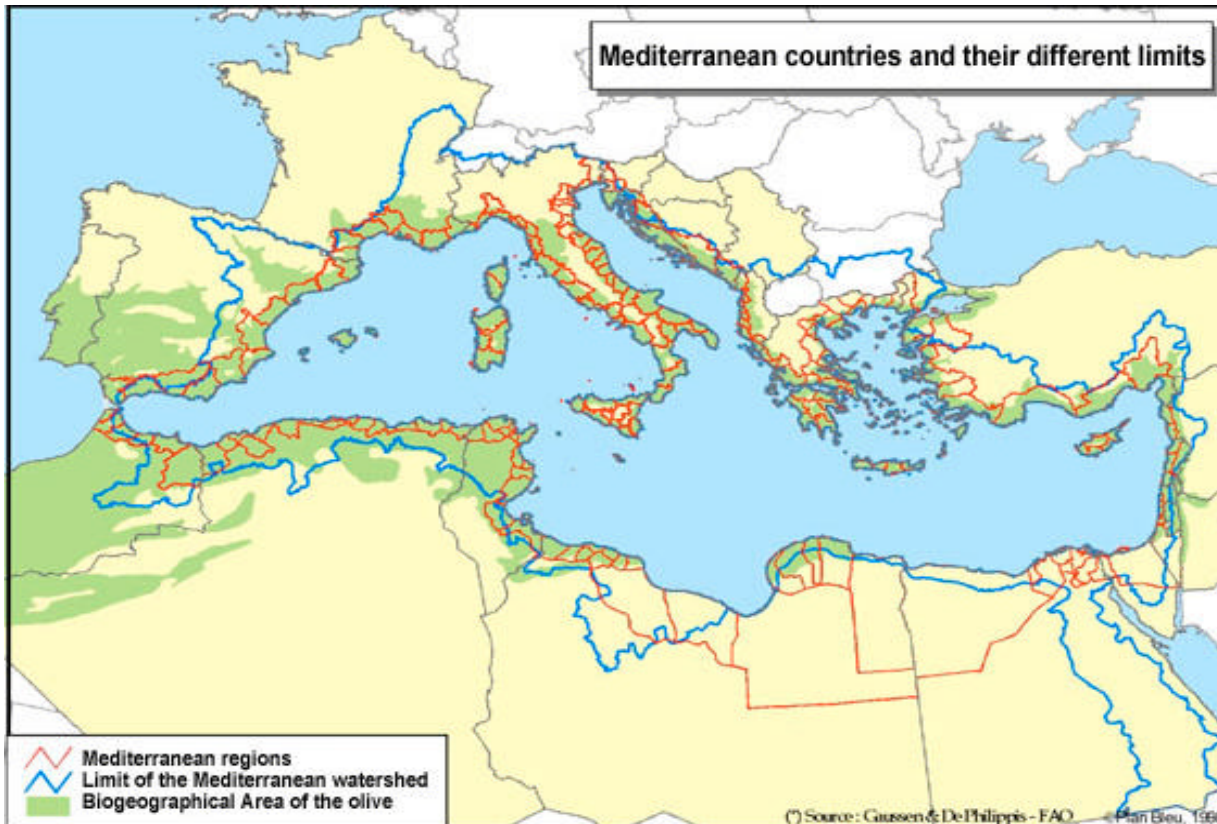


## *7. Regional Impacts for the Mediterranean Environment: Common Area-Different Trends*

- **Climate Change impacts similarly on supply side in Northern & South. Med.: soil (desertification) and water.**
- For the 21st century the **trends differ fundamentally** for demand side: **popul. growth, urbanisation, agricultural production & food needs.**
- **Climate change may have significant impacts on precipitation, soil erosion and desertification.**
- Climate related factors will have an impact on **agricult. prospects: on the availability of arable land** and on yields.
- Many IPCC studies indicated these six factors of the survival hexagon cannot be separated nor can the impacts of climate change on future security policy be analysed in isolation.

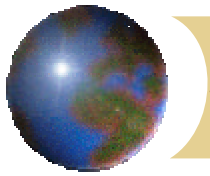


## 7.1. Common Environmental Challenges until 2100



- **Geoecological commonalities**
    - ? **Climate change** (extreme weather events: hazards)
    - ? **Soil erosion**: deforestation, desertification
    - ? **Water**: precipitation (scarcity, degradation) (drought, forest fire)
  - **Socio-economic differences**
    - ? Population growth
    - ? Urbanisation
    - ? Food needs
- Coping capacity for  
Adaptation & mitigation

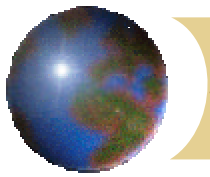
**Mediterranean coastal zone (Blue Plan)**  
vulnerable to rapid onset hazards: **drought & forest fires, storms, flash floods, mudflows**;  
vulnerable to slow onset hazards: **sea-level rise and temperature increase (climate change)**



## *8. Different Demand Side Patterns: Population Growth, Urbanisation, Food*

- In the Northern Mediterranean: population will shrink, urbanisation stabilise, no food needs
- In the Southern Mediterranean: population will continue to grow, urbanisation will continue & in shanty towns, food import dependence will rise & contribute to indebtedness of the region.
- These divergent trends will have many socio-political implications among them: migration.





# 8.1. Global Population Trends: 2050, 2100 to 2300

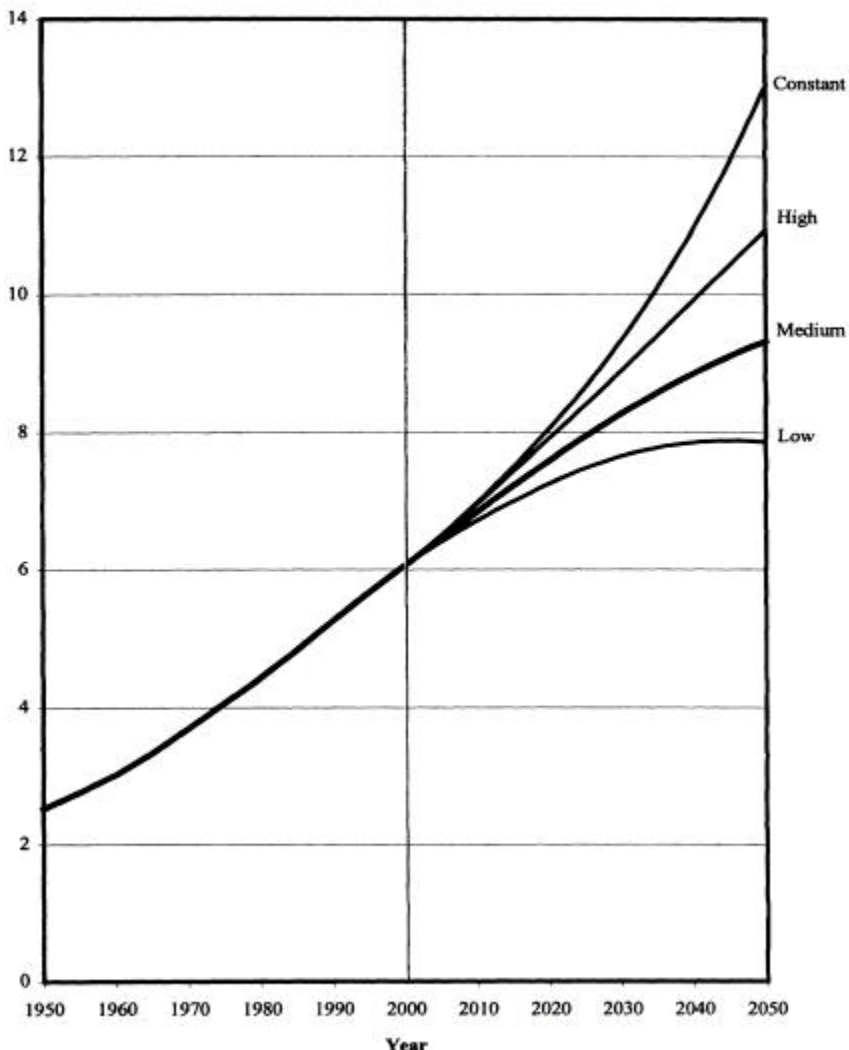
? World Population, Medium Scenario 2000-2150 (UN, 1998 Rev.)

	2000	2050	2100	2150
<b>Total</b>	6,01	8,91	9,50	9,75

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

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

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





## *8.2. Population Growth & Urbanisation in the Mediterranean Region (1850- 2050)*

**Trends in Population Growth (1850-2050) in million**

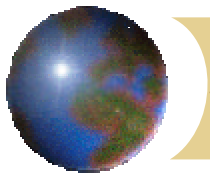
	1850	1900	1950	2000	2050
<b>Southern Europe</b>	83.0	103.5	132.9	177.3	154.1
<b>North Africa</b>	13.1	22.3	44.1	142.8	239.4
<b>Eastern Med. &amp; Turkey</b>	12.45	16.05	29.2	89.5	173.9

**Trends in Urbanization (1950-2030) in %, Growth of Urban Centres**

	1950	1980	2000	2010	2030
<b>North Africa</b>	24.7	40.4	48.9	53.4	63.3
<b>Western Asia</b>	26.7	51.7	64.7	67.2	72.4

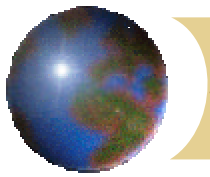
	1950	1960	1975	1990	2000	2010	2015
<b>Istanbul</b>	1.08	1.74	3.60	6.54	8.96	10.72	11.36
<b>Algiers</b>	0.50	0.81	1.57	1.91	2.76	3.74	4.14



## 8.3. 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

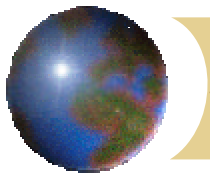


## 8.4. Population Growth: South & Central Europe

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

Source: UN Populat. 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
<b>USA</b>	<b>24.0</b>	<b>76.0</b>	<b>157.8</b>	<b>283.2</b>	<b>346.8</b>	<b>397,1</b>	<b>+239,</b>	<b>+50,30</b>

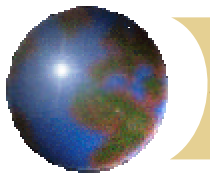


## 8.5. Population Growth: Eastern Mediterranean

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

Source: UN Popul. 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
<b>Turkey</b>	<b>10.0</b>	<b>13.0</b>	<b>20.81</b>	<b>55.67</b>	<b>86.61</b>	<b>98.82</b>	<b>78.01</b>	<b>43.15</b>
East. Med.	12.5	16.1	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



## 8.6. Population Growth: Eastern Mediterranean

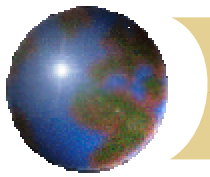
**Table: UN World Population 2300 (Dec. 2003), in million**

**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
<b>Turkey</b>	<b>68.28</b>	<b>97.759</b>	<b>90.323</b>	<b>87.452</b>	<b>91.593</b>	<b>2055</b>	<b>98.064</b>
Egypt	67.78	127.41	131.82	117.85	124.715	2075	136.28

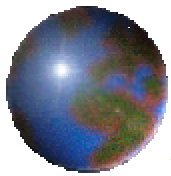


## 8.7. Urbanisation in Eastern Mediterranean

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

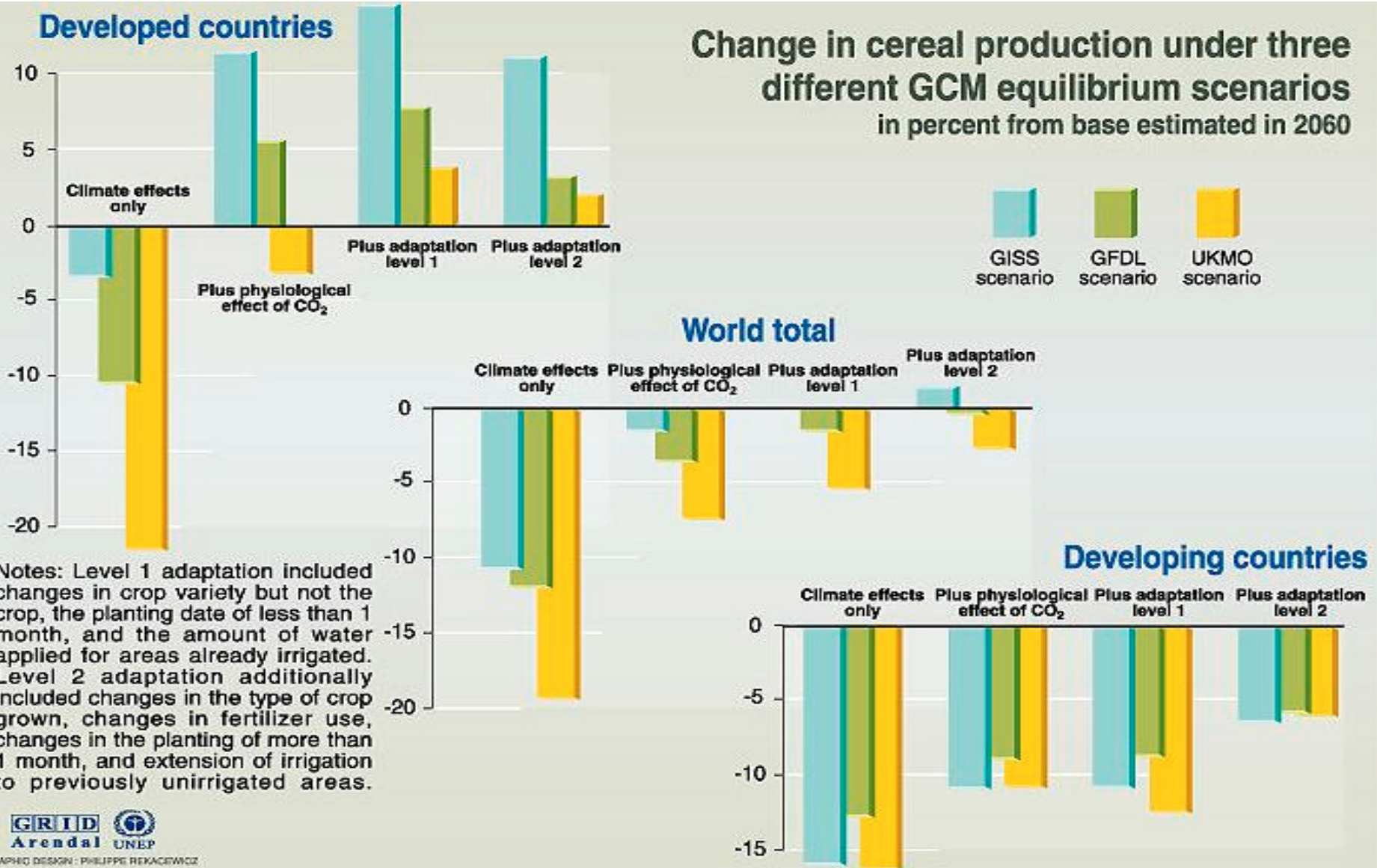
Source: UN Populations Division: World Population Prospects (2002)

	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



# 8.8. Climate Change Impacts on Agriculture

Change in cereal production under three different GCM equilibrium scenarios in percent from base estimated in 2060







# *ffi High Potential for Food Crisis (1901-1995)*

*Alcamo/Endejan 2002: 143*



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

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

Alcamo/Endejan 2002-143

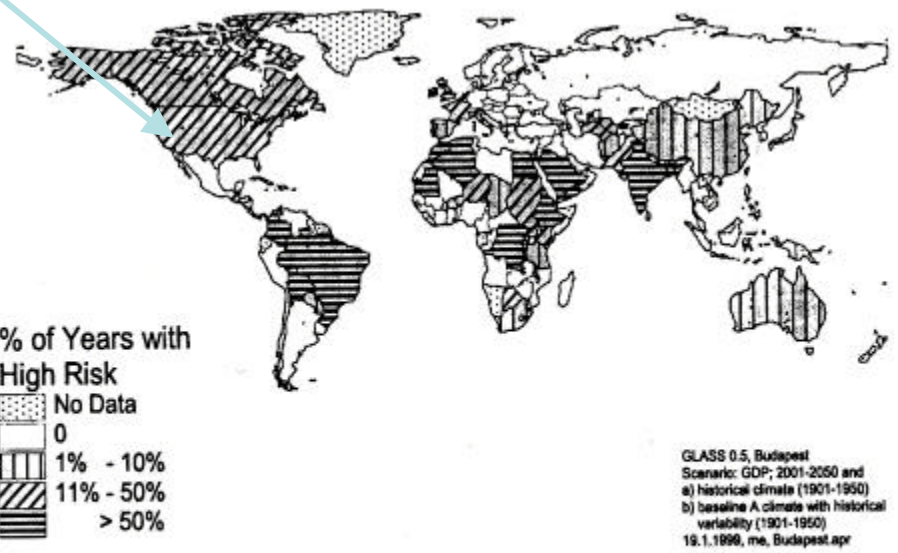
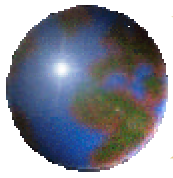


Figure 6. High Potential for Food Crisis 2001-2050 – with GDP Increase and Climate Change.

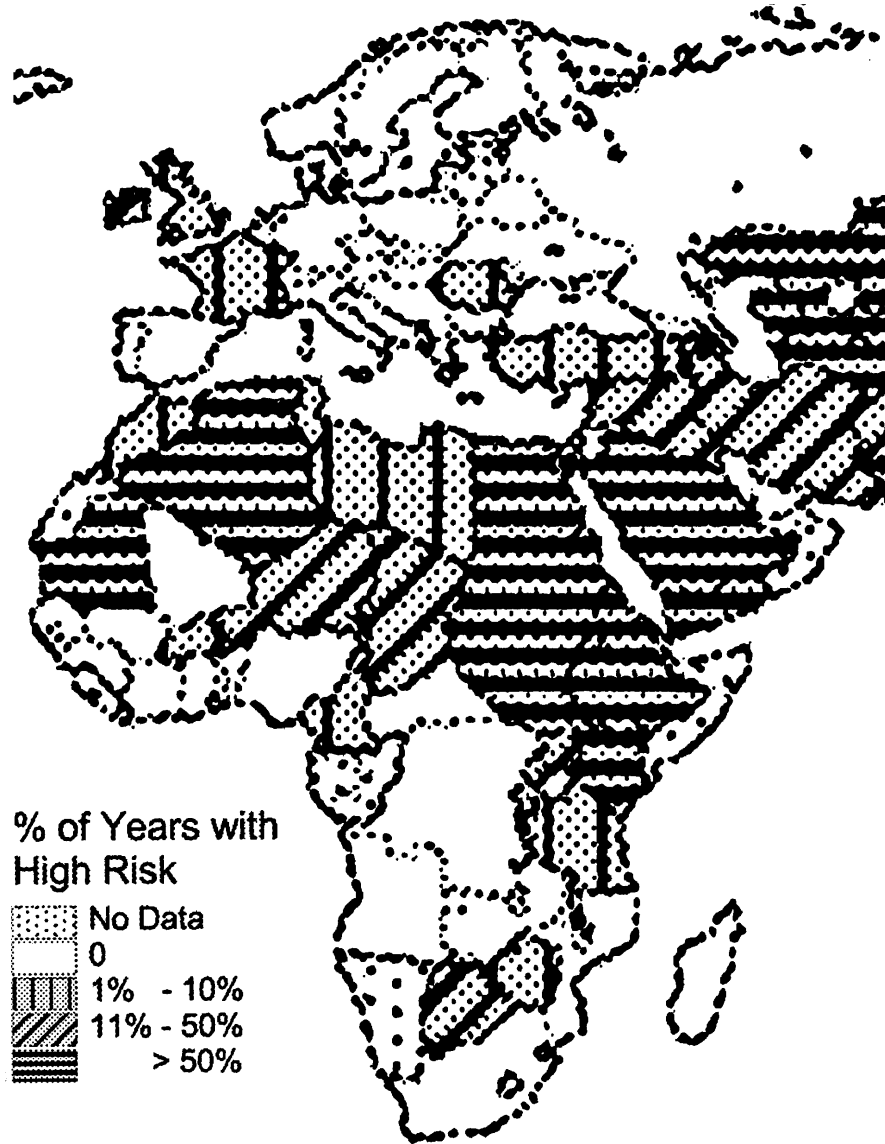


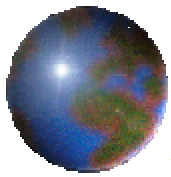
## 8.10. High Potential for Food Crisis 1990-2050

### ? Food Crisis: 1900-1995

Source:Alcamo/Endejan (2002)

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

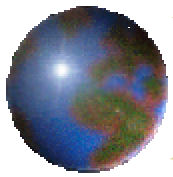




## 8.11. Food Security in the MENA Region

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

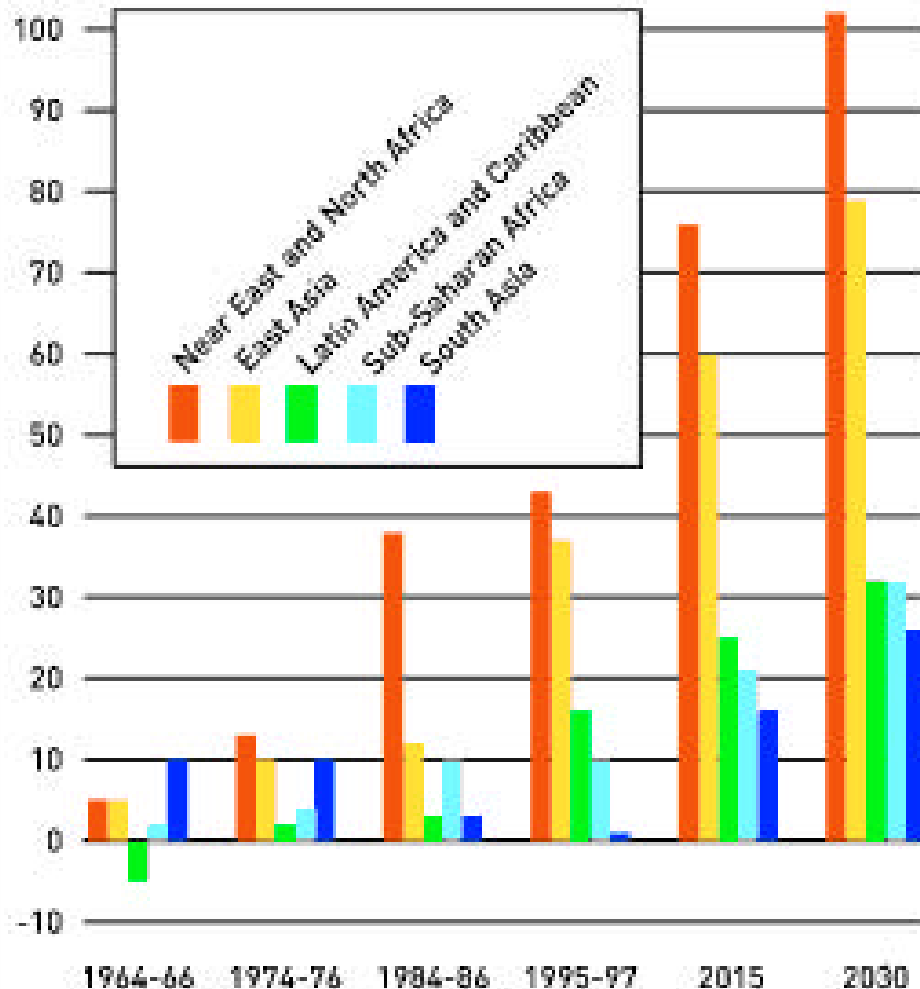
19	Demand				Pro- duc- tion	Net tra- de	Self- suf- fic. rate %	Growth rates, % p.a			
	Per caput (kg)		Total (mio.tons)					Time 19... /20..	Dem and	Pro- duc- tion	Po- pula tion
	food	All uses	food	All uses							
64/66	174	292	28	47	40	- 5	86	67-97	3.6	2.4	2.7
74/76	190	307	40	64	55	- 13	85	77-97	3.1	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



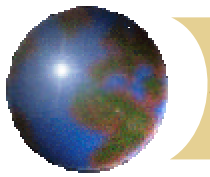
## 8.12. FAO (2000) Increase in Cereal Imports

### Net cereal imports in developing countries

millions of tonnes



- **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.**



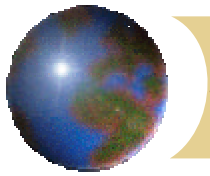
## *8.13. Different Socio-Economic Challenges*

### **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**

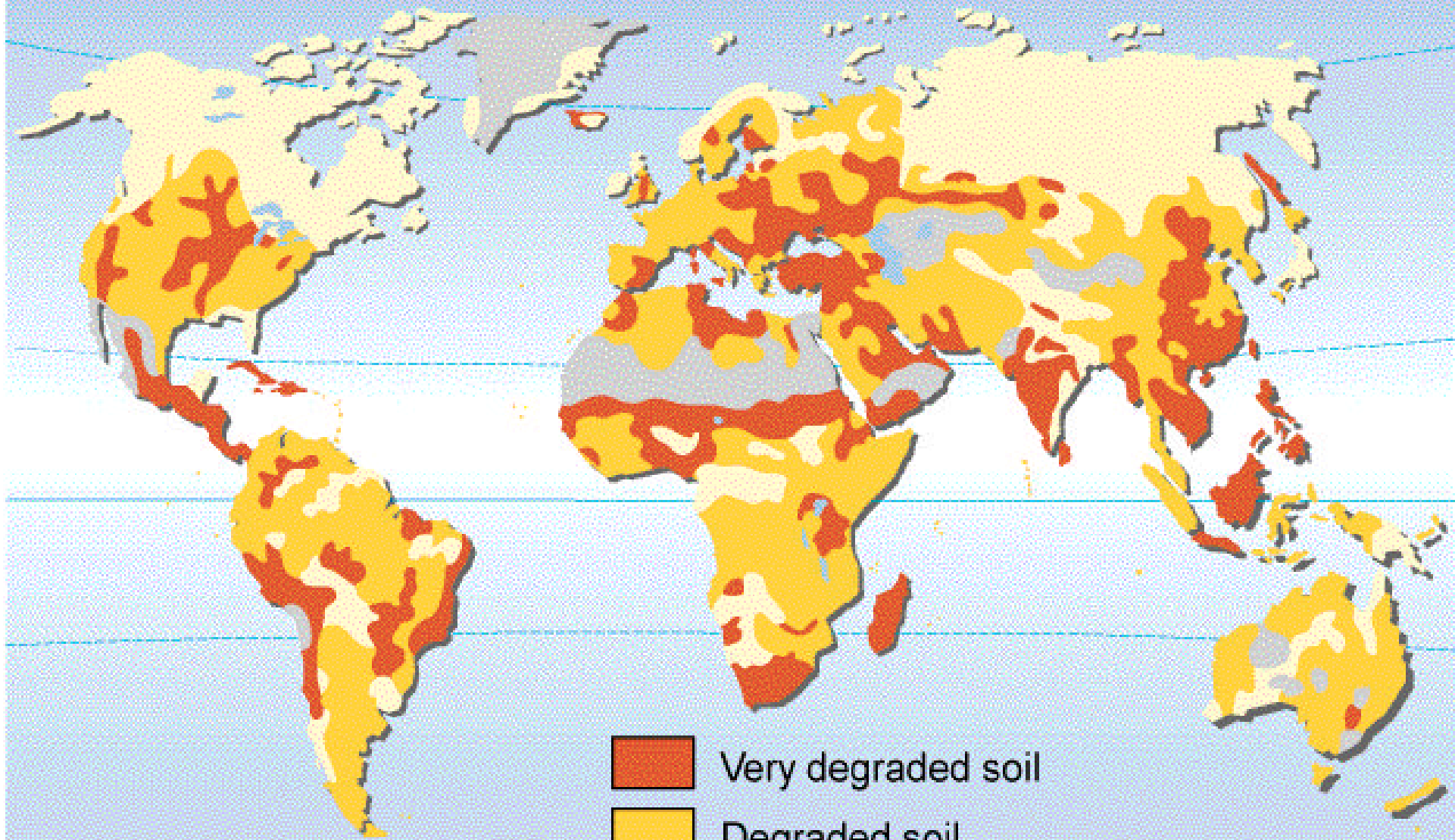
- **Population**
  - ? **High growth & youth bulges:** declining fertility, increase in life expectancy, rapidly rising job needs
  - ? **Pressure to emigrate increases**
- **Urbanisation**
  - ? **Continued rapid increase**
  - ? **All population growth in cities:** slums, bidonvilles grow rapidly
-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



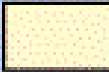
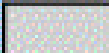


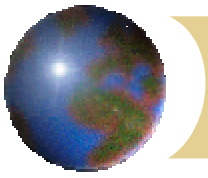
## *9. Supply Side Impacts of Climate Change on Desertification & Water Scarcity*

- The linkages between **climate change & population growth & urbanisation** have been addressed by IIASA (O'Neill/Mac Kellar/Lutz 2001), but they have not systematically been assessed by the IPCC for all regions.
- **IPCC impact analyses** addressed the potential interaction between climate change & water, climate change & soil (including impacts of deforestation, soil erosion, desertification, climate change & agriculture).
- **IPCC has also not yet assessed** the potential linkages between **climate change on environmental stress as a potential cause for conflicts** that have often been solved peacefully on the national or regional level.
- In some cases the **victims of severe environmental stress** were a **cause** or **object of violence** by individuals or ethnic & religious groups that feel threatened by people that have been displaced by extreme weather events or who **fled for their own survival** and those of their families.

# Soil degradation



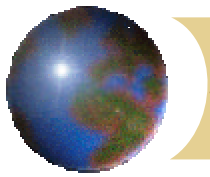
-  Very degraded soil
-  Degraded soil
-  Stable soil
-  Without vegetation



## *9.2. Climate Change and Desertification Linkages*

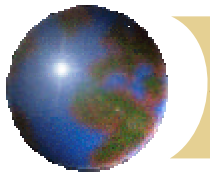
- WG II assessed the implications of **climate change impacts on forests, rangeland, deserts, land degradation and desertification, mountain regions, non-tidal wetlands and on coastal zones and small islands.**
- **On the impact of climate change on deserts, IPCC stated with certainty:**
  - ? Most **deserts are likely to become even more extreme** due to climate changes
  - Most **desert regions are expected to become hotter** & not significantly wetter.
  - ? If changes in the frequency or intensity of the rainfall events occur, they are likely to cause changes in flora & fauna. ...
  - ? Any reduction in the intensity of rainfall could also be detrimental to this set of organisms due to false starts in their life cycles.
  - ? Opportunities to **mitigate greenhouse gas emissions** in desert regions are few.
  - ? **Human-induced desertification** may counteract any ameliorating effect of climate change on most deserts unless appropriate management actions are taken.





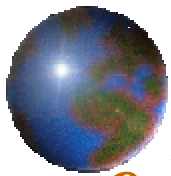
## *9.3. Climate Change and Desertification*

- On interactions between **climate change, land degradation & desertification**, IPCC argued that both **processes must be considered in parallel. Unsustainable land-management & climate change** often interact & produce negative cumulative effects on soil.
- Fundamental soil properties & processes ... will be influenced by changes in climate.
- Desertification arises from human abuse of land & from adverse climate conditions. Climate factors such as increased drought can lead to an increase in the vulnerability of land to desertification and to the escalation of the desertification process.
- Reversing desertification is more difficult for drier environments with shallower soils.
- Changes in frequency & intensity of precipitation will have the greatest direct effect on soils via erosion by water. ...
- Future erosion risk is likely to be related more to increases in population density, intensive cultivation of marginal lands, & use of resource-based & subsistence farming techniques than to changes in precipitation regimes. ...
- Where conditions become more arid, salinization and alkalinisation are likely to increase because evapotranspiration and capillary rise will be enhanced. ...



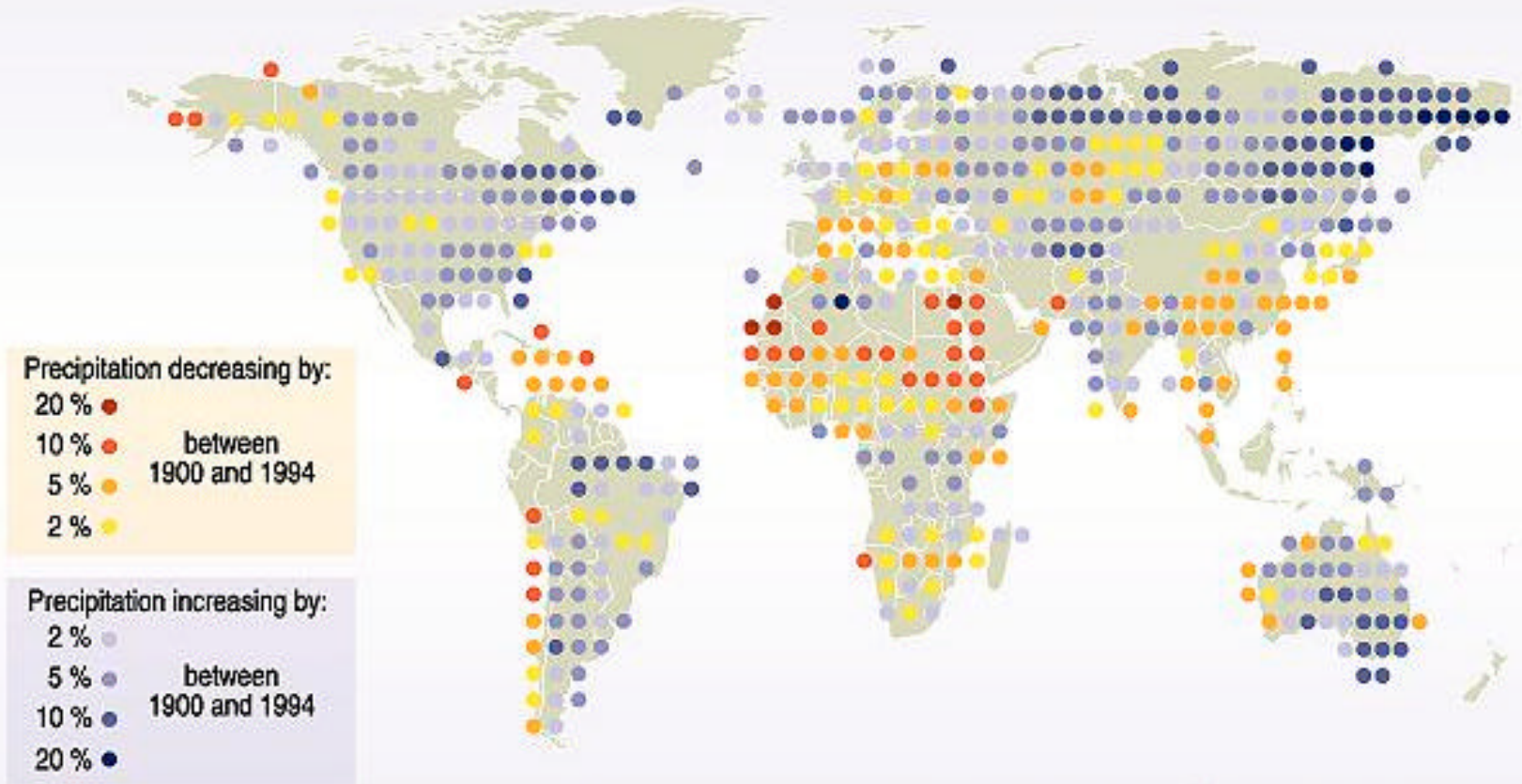
## *9.4. Climate Change and Desertification*

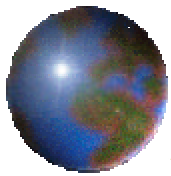
- ? **Predicted warming may lead to higher evaporation rates, leading to drier soils & more frequent episodes of severe wind erosion.**
- Arid & semi-arid land ecosystems have little ability to buffer the effects of climate variability ... They are particularly vulnerable to climate change. ...
- **Adaptation to desertification will rely on conventional strategies.**
- **These projected effects are relevant for all MENA countries on the Southern and Eastern shores of the Mediterranean, and will be affected most by the effects for coastal zones due to sea-level rise.**
- **The interactions between desertification and climate are covered in the literature as has been the potential impact of desertification on migration.**
- **However, more inter- and multidisciplinary research is needed on the fatal outcomes and their potential (violent) societal implications.**



# 9.5. Climate Change Impacts on Precipitation

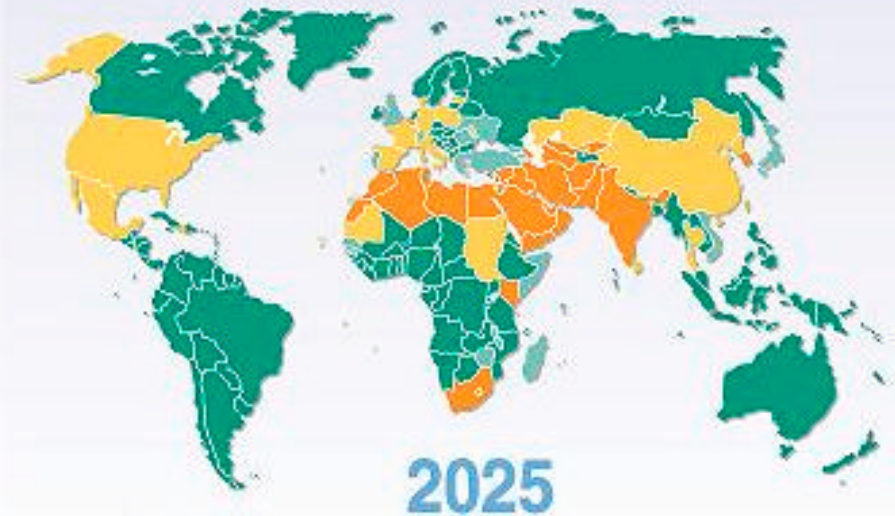
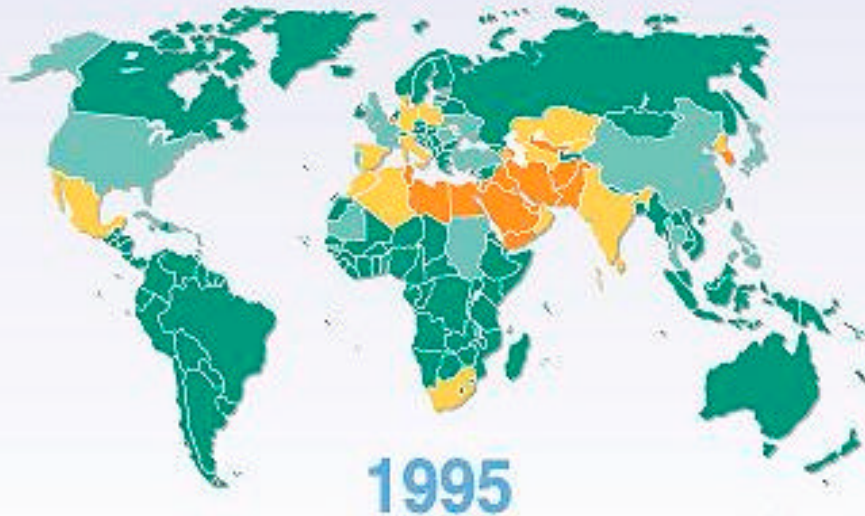
## Precipitation changes: trend over land from 1900 to 1994





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

### Freshwater stress



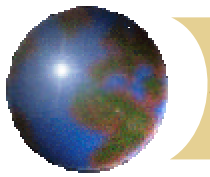
water withdrawal as percentage of total available

more than 40%	20% to 10%
40% to 20%	less than 10%

GRID  
Arendal  
UNEP  
GRAPHIC DESIGN: PHILIPPE REKACEWICZ

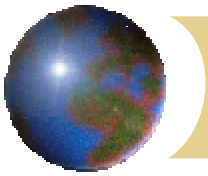
Source: Global environment outlook 2000 (GEO), UNEP, Earthscan, London, 1999.

- 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).



## *9.7. Climate Change and Precipitation (Water)*

- **WG II devoted a chapter on “hydrology & water resources” to the state of our knowledge on the linkages at the global level:**
- There are apparent trends in streamflow volume ... in many regions. These trends cannot be definitely attributed to changes in regional temperature or precipitation. ...
- **Effect of climate change on streamflow & groundwater recharge varies regionally.**
- Peak streamflow is likely to move from spring to winter in many areas. ....
- Glacier retreat is likely to continue, and many small glaciers may disappear.
- Water quality is likely to be degraded by higher water temperature, but this may be offset regionally by increased flows. ...
- **Flood magnitude and frequency are likely to increase in most regions, and low flows are likely to decrease in many regions.**
- Demand for water generally is increasing as a result of population growth and economic development, but it is falling in some countries.
- The impact of climate change on water resources depends not only on changes in the volume, timing, and quality of streamflow and recharge but also on system characteristics.
- Unmanaged systems are likely to be most vulnerable to climate change.
- **Climate change challenges existing water resources management practices by adding additional uncertainty (IPCC 2001a: 193).**



## *9.8. Climate Change and Water Resources*

- **On water availability**, the **IPCC** stated that change “has the potential to induce conflict between different users” within or between different parts of the river basin.
- Where there are disputes, the **threat of climate change** is likely to **exacerbate**, rather than ameliorate, matters because of uncertainty about the amount of future resources that it engenders. One major impact of climate change for agreements between competing users (within a region or upstream versus downstream) is that allocating rights in absolute terms may lead to further disputes in years to come.
- The **impact of climate change for water resources**, requires according to the TAR more research with a focus on: a) creation of credible climate change scenarios; b) characterisation of natural & hydrological variability, c) improved hydrological models, d) characterisation of uncertainty, e) impacts on real world water systems and f) effects of adaptation.
- **Effective adaptation to climate change in the water sector** requires efforts in five main areas: a) data for monitoring; b) understanding patterns of variability; c) analytical tools; d) decision tools and e) management techniques.
- Many studies have addressed the climate-ocean interaction, implications of climate & sea level change & the impact of climate change on coastal areas.
- **More research is needed on the likely impact of climate change on the availability of water resources, on precipitation and evaporation levels.**



## 9.9. Water Scarcity in the Near or Middle East

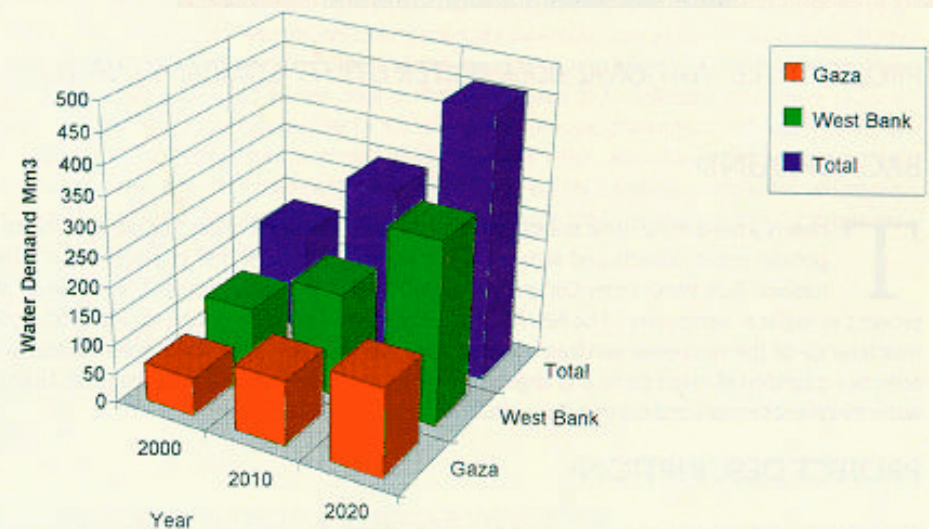
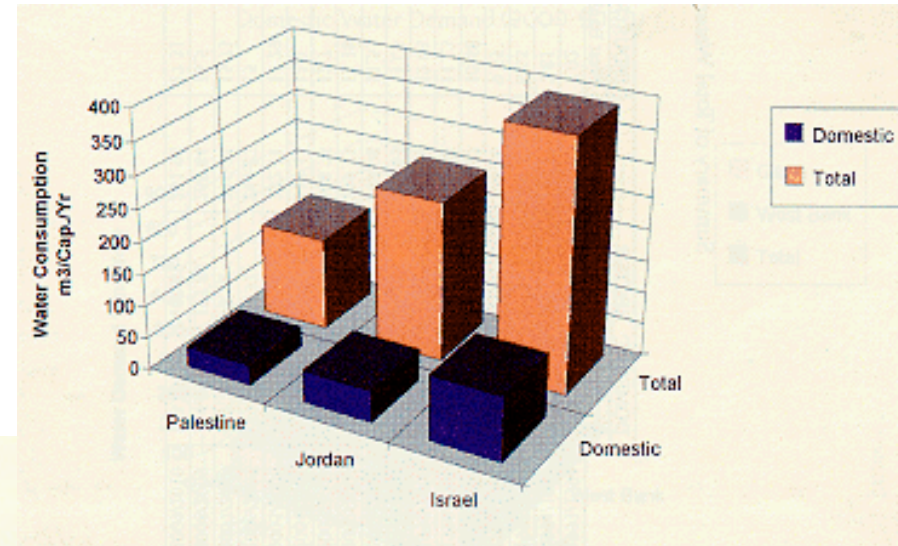


- **FAO:** of 21 c. water-scarcity, 12 are in NE
- 11 MENA c. fresh water: 220 m<sup>3</sup>/cap. Jordan, 330 m<sup>3</sup>/cap. OPT, **2,000 m<sup>3</sup>/cap. Turkey, Syria.**
- **K. Khosh-Chashm:** Most extreme water crisis is in **Gaza (15 gallons, US: 800 gall. or 1: 53).**
- **Estimate:** a drop of 50% in ann. cap. Renew. Water: 1995 and 2025 in MENA countries.

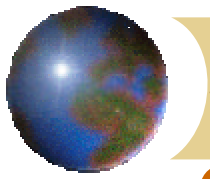
Water	Israel	Jordan	West Bank
Supply	<b>1987-1991 (million c.m)</b>		
Normal	1,950	900	650
drought	1,600	700-750	450-550
Demand	<b>Projected increase</b>		
1987-91	2,100	800	125
2020	2,800	1,800	530

Source: Helena Lindblom 1995; Lowi 1992.

# 9.10. Water Situation in Gaza & in the West Bank 2000-2020







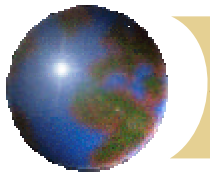
## *9.11. Common Environmental Challenges: Different Impact & Vulnerability until 2100*

### **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**

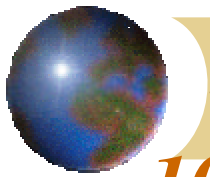
### **Southern & Eastern Shore: Middle East & North Africa**

- ? **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**

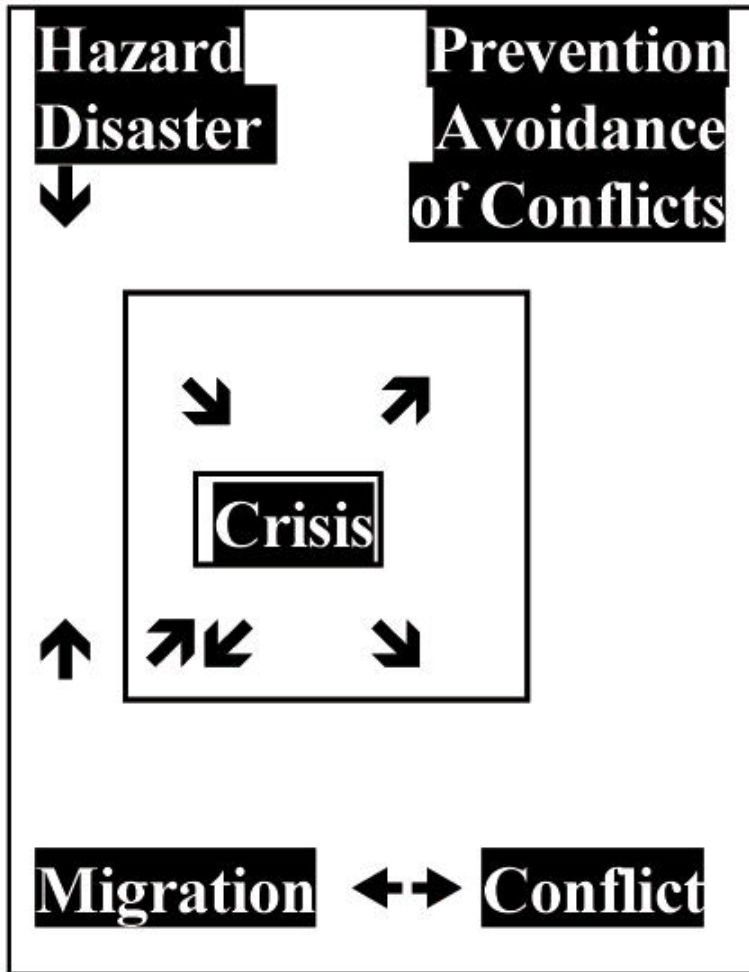


## *10. Climate Change and Security: National vs. Environmental Security*

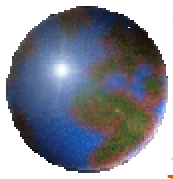
- Has climate change implications for security in the Med. ?
- This depends on the security concept of the analyst.
- Due to population growth or decline the impact of climate change will differ due to the different coping capacity for adaptation & mitigation in North and South.
- Climate Change will have significant implications for the environmental security dimension with the human being both as a cause and a victim of processes of GEC (global environmental change).
- Among and in interaction with other factors, climate change may enhance environmental vulnerability and thus contribute to human & environmental insecurity.



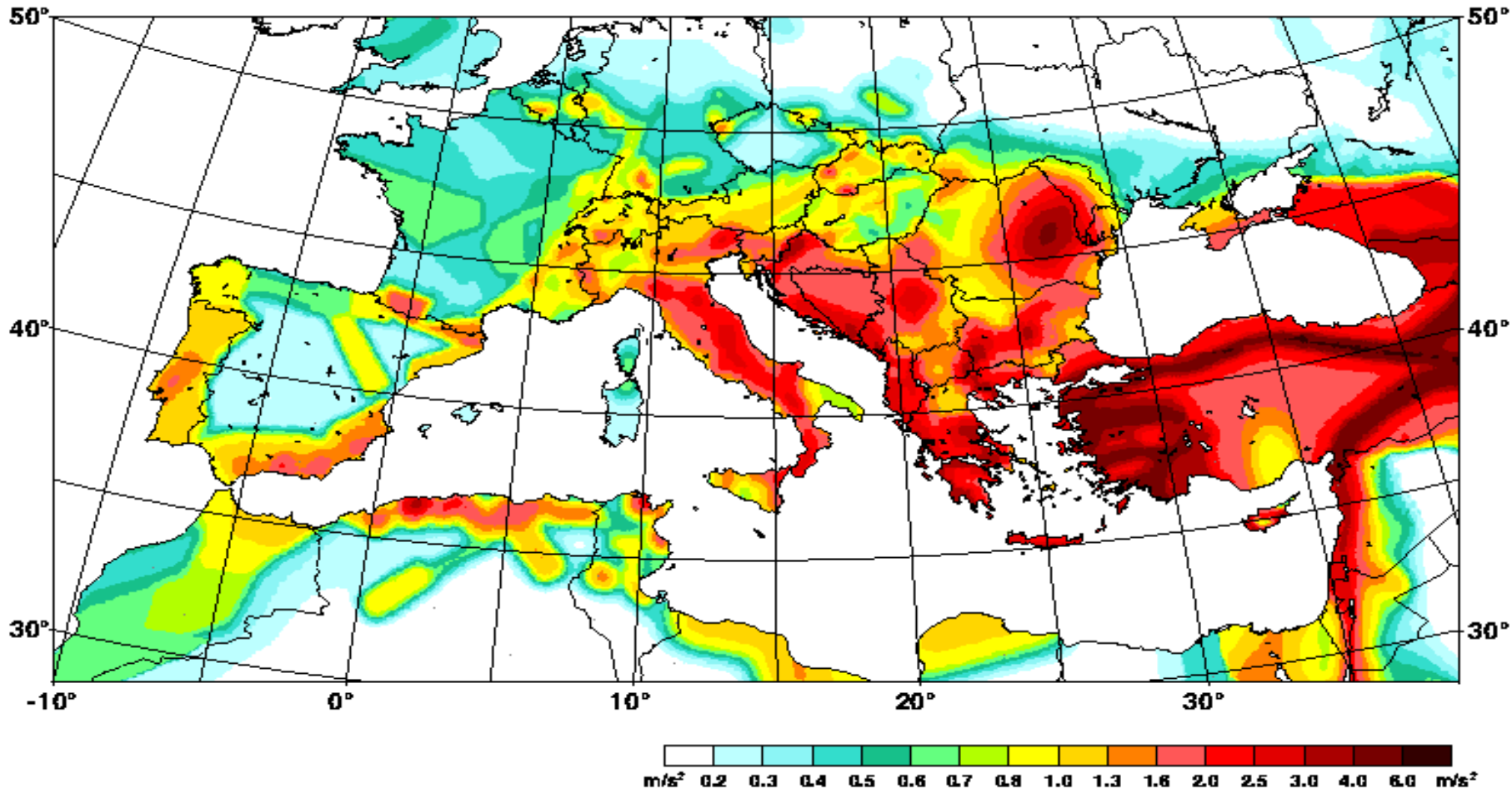
## 10.1. Fatal Outcomes: Hazards, Migration, Crises and Conflicts in the Mediterranean

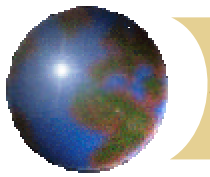


- What are impacts of common & divergent trends on outcomes?
- Mediterranean coastal zone is vulnerable to:
  - ? **Urbanisation & tourism**
  - ? **North: stable size of urban centres**
  - ? **South: rapid growth of megacities**
  - ? **Increasing soil erosion & extreme weather events:**
    - ? **Drought & forest fires**
    - ? **Storms, floods & mudflows**
  - ? **Different fatal outcomes**
    - ? **Rise in environmental vulnerability**
    - ? **Different societal vulnerability.**



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





## 10.2. Trends in Disasters in the Mediterranean

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

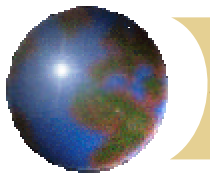
	Total		Earthquake		Flood		Storm	
	E	Killed	E	Killed	E	Killed	E	Killed
S.Europe	249	8,889	33	6,007	71	837	60	469
Balkans	50	562	11	187	12	108	0	0
W. Asia	95	27,613	23	26,087	24	505	8	70
N. Africa	82	6,606	10	3,452	38	2,924	6	69
Total	485	43,729	79	35,735	145	4,374	76	608

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)

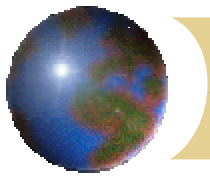
Floods: More events & damages in S.Europe, more fatalities in N.A.



## 10.3. Fatalities of Disasters in the Eastern Mediterranean

**Table: Fatalities of Natural Disasters (1975-2001)**

	Total			Drought		Earthquakes		Floods		Storms	
	Ev	Killed	Affect (000)	Kill .	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	-	-
<b>Turkey</b>	<b>63</b>	<b>27,375</b>	<b>2,580</b>	-	-	<b>26,087</b>	<b>2,377</b>	<b>450</b>	<b>92,2</b>	<b>31</b>	<b>3</b>
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	10m	35,74	35,74	437	2,15	608	3,70



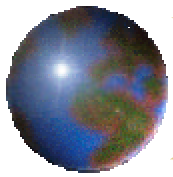
## *10.4. Vulnerabilities of Cities to Disasters*

### **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., ec. Loss (US\$1 2b.)**
- ? **ISDR Report (2000) high vulnerability due to: pop. growth, urbanisation; 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**

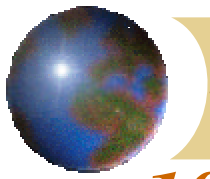
- ! **Algeria: 36 events, 4,124 fatalities, 1,154,355 affect.,  
earthquakes: 2,881; floods: 1,201; affect.: earthquakes: 1,001,212**
- ! **9-13 Nov. 2001: Flash floods in Algiers: 921 deaths (IFRC 2002), and affect. 50,423, UNICEF: 10,000 families; econ. losses: US\$ 300 mill.**
- ! **High vulnerability ? 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.**



## *10.5. Floods in the Mediterranean, 1975-2001*

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





## *10.6. Vulnerability of Cities to Earthquakes*

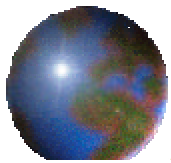
City	1950	1960	1975	1990	2000	2010	2015
Athens	1.8	2.2	2.7	3.0	3.1	3.1	3.1
Istanbul	1.08	1.74	3.60	6.54	9.45	11.84	12.49
Ankara	0.54	0.87	1.71	2.54	3.20	3.85	4.08
Izmir	0.48	0.66	1.05	1.74	2.41	3.01	3.20
Cairo	2.41	3.71	6.08	8.57	10.55	12.66	13.75
Alexandria	1.04	1.50	2.24	3.21	4.11	5.05	5.53
Tel-Aviv	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



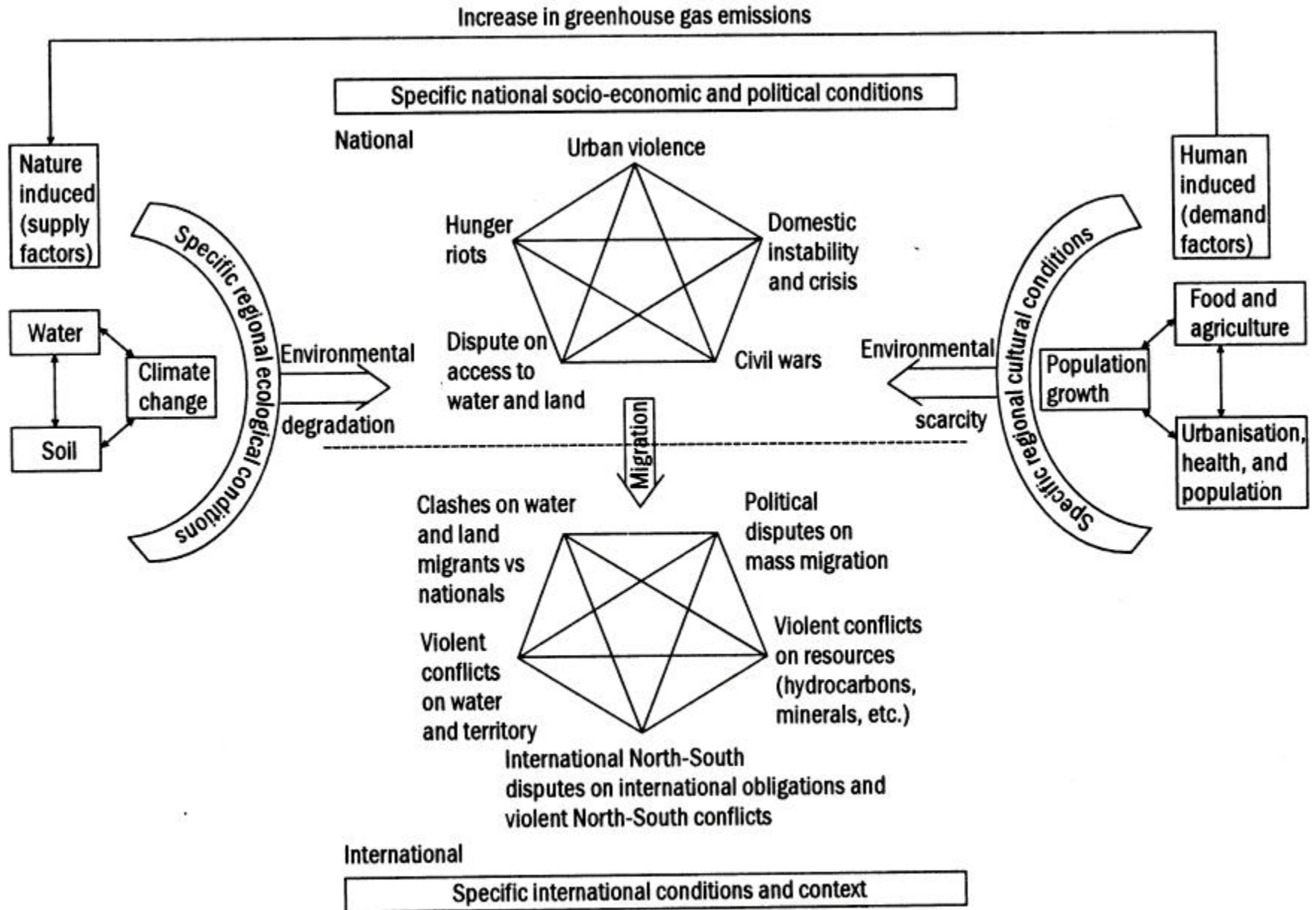
## 10.7. Migration Trends in the Mediterranean

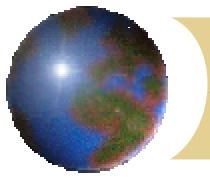
Table: Net migration rates in the Med. (Zlotnik, 2003:599)

Region	1950-60	1960-70	1970-80	1980-90	1990-2000
	<i>Net number of migrants per year (thousands)</i>				
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
	<i>Net migration rate</i>				
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



# 10.8. Types of conflicts

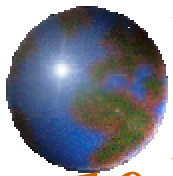




## 10.9. Diagnosis: Interactions among Outcomes

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	Un-der 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



# 10.10. 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.

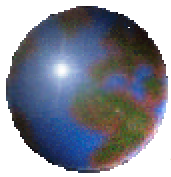
Early warning systems: GIEWS (FAO), FEWS (USAID) HEWS, IRIN. FEWER, FAST

Long-term indicator population growth

BRD 30785



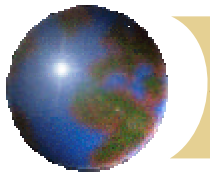
	1950	2000	2050	2000-50
<b>Sudan</b>	9,2	31,1	63,5	32,435
<b>Ethiopia</b>	18,4	62,9	186,5	123,544
<b>Ruanda</b>	2,1	7,6	18,5	10,914
<b>Burundi</b>	2,5	6,4	20,2	13,862
<b>Sum (1-4)</b>	32,2	108,0	288,7	180,755
<b>Sum (1-9)</b>	86,7	280,8	855,8	574,967



## 10.11. Extreme Weather Events in the 21<sup>st</sup> 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 <sup>7</sup>	<b>Higher maximum temperatures and more hot days over nearly all land areas</b>	Very likely <sup>7</sup>
Very likely <sup>7</sup>	<b>Higher minimum temperatures, fewer cold days and frost days over nearly all land areas</b>	Very likely <sup>7</sup>
Very likely <sup>7</sup>	<b>Reduced diurnal temperature range over most land areas</b>	Very likely <sup>7</sup>
Likely <sup>7</sup> , over many areas	<b>Increase of heat index<sup>12</sup> over land areas</b>	Very likely <sup>7</sup> , over most areas
Likely <sup>7</sup> , over many Northern Hemisphere mid- to high latitude land areas	<b>More intense precipitation events<sup>b</sup></b>	Very likely <sup>7</sup> , over many areas
Likely <sup>7</sup> , in a few areas	<b>Increased summer continental drying and associated risk of drought</b>	Likely <sup>7</sup> , over most mid-latitude continental interiors. (Lack of consistent projections in other areas)
Not observed in the few analyses available	<b>Increase in tropical cyclone peak wind intensities<sup>c</sup></b>	Likely <sup>7</sup> , over some areas
Insufficient data for assessment	<b>Increase in tropical cyclone mean and peak precipitation intensities<sup>c</sup></b>	Likely <sup>7</sup> , over some areas

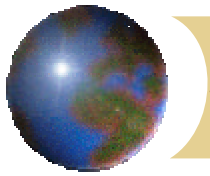


## *10.12. Increase in Human Disasters and Conflicts Impacting on the Mediterranean*

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

### **Hypotheses**

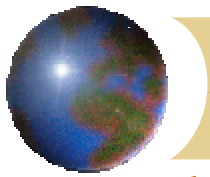
- **Thesis 1:** Population growth, urbanisation & persistent high poverty will increase the **societal vulnerability** to hazards and disasters.
- **Thesis 2:** Extreme weather events will „very likely“ lead to an increase in **environmental vulnerability** through **hydro-meteorological hazards** (droughts,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



## *10.13 Conclusions on Projected Fatal Outcomes in the Mediterranean*

- **IPCC (2001):** Climate change has already contributed to an increase in extreme weather events in the 20<sup>th</sup> century and will increase further in 21<sup>st</sup> century.
- Due to high societal vulnerability in North Africa the number 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!**

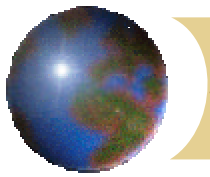




## *11. Climate Change a Source of Conflicts:*

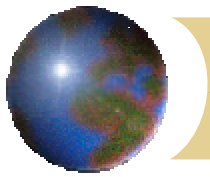
### *Comparison of Two Studies: for US DoD & BMU*

- **H.G. Brauch (AFES-PRESS)**
- **Contract Study for German Environment Ministry, Nov. 2002**
- *The purpose is to provide empirical evidence on climate change and conflicts & to contribute to the national & international debate on climate protection.*
- **Contribute to crisis prevention & crisis management & provide additional arguments for precautionary & ambitious climate protection policy.**
- **Peter Schwartz/Doug Randall**
- **Contract Study for DoD, Net Assessment, Oct. 2003**
- *The purpose of this report is to imagine the unthinkable – to push the boundaries of current research on climate change so we may better understand the potential implications on United States national security.*
- **Vantage point: Hobbesian**
- **Neo-Malthusian pessimist & Cornucopian optimist**
- **Pentagon, US national security**



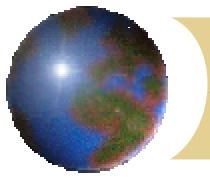
## *11.1. Global Warming vs. Cooling: Slow-Onset vs. Abrupt Climate Change*

- **Science Context: 3 IPCC Assessment Reports (10990, 1995 & 2001) & Reports**
- **Arrhenius hypothesis of 1896: burning of hydrocarbons contributes to global warming**
- **Basis of political agenda setting of Reagan Administ. 1988**
- **Increase in energy consumption contributes to: a) temperature increase. b) sea level rise**
- **Basis: of UNFCCC & IPCC**
- **Science Context: Rahmstorf (PIK) hypothesis: on sudden change in the Gulf stream,**
- **US Nat. Academy of Science: *Abrupt Climate Change: Inevitable Surprises* (2002)**
- **J. Marotzke, Kiel (1990, 2000)**
- **Mike Hume: Tyndall Centre**
- **Robert Gagosian, President of Woods Hole Oceanographic Institute (2004)**
- **Pittinger/Gagosian (10/2003)**



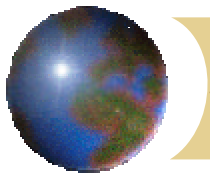
## *11.2. Climate Change and Conflicts? Hobbesian vs. Grotian Perspectives*

- **Hobbesian diagnosis: P.Schwartz, Doug Randall: *An Abrupt Climate Change Scenario and Its Implications for US National Security*, Oct 2003, for DoD, NA (worst case)**
- **Focus: on one specific possible consequence of Global Warming: Regional Chilling (Gulf Stream collapse)**
- **US: European migration to US,**
- **Climate Refugees from Northern and Central Europe to the Mediterranean and to North Africa**
- **Grotian Diagnosis: H.G. Brauch: *Climate Change, Environmental Stress and Conflicts*, Fed. German Min. of Environment (Nov. 2002)**
- **Focus: Interaction between Global Environmental Change and Fatal Outcomes, case studies: Mexico, Bangladesh, Egypt, Mediterranean**
- **Distress migration: from Nile Basin, across the Mediterranean, major human disasters, increase in hydro-meteorological hazards in the Mediterranean: storms, droughts, flash floods.**



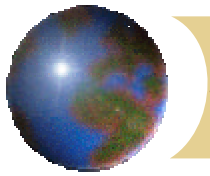
### *11.3. Worst Case Scenario due to Climate Change (2010-20)*

Europe	Asia	United States
<p><b>2012:</b> Severe drought and cold push Scandinavian populations southward, push back from EU</p> <p><b>2015:</b> Conflict within the EU over food and water supply leads to skirmishes and strained diplomatic relations</p> <p><b>2018:</b> Russia joins EU, providing energy resources</p> <p><b>2020:</b> Migration from northern countries such as Holland and Germany toward Spain and Italy.</p>	<p><b>2010:</b> Border skirmishes &amp; conflict in Bangladesh, India, and China, as mass migration occurs toward Burma</p> <p><b>2012:</b> Regional instability leads Japan to develop force projection capability</p> <p><b>2015:</b> Strategic agreement between Japan &amp; Russia for Siberia &amp; Sakhalin energy resources</p> <p><b>2018:</b> China intervenes in Kazakhstan to protect pipelines regularly disrupted by rebels &amp; criminals</p>	<p><b>2010:</b> Disagreements with Canada &amp; Mexico over water increase tension</p> <p><b>2012:</b> Flood of refugees to southeast U.S. &amp; Mexico from Caribbean islands</p> <p><b>2015:</b> European migration to United States (mostly wealthy)</p> <p><b>2016:</b> Conflict with Europeans over fish-ing rights</p> <p><b>2018:</b> Securing North America, U.S. forms integrated security alliance with Canada &amp; Mexico</p> <p><b>2020:</b> DoD manages borders &amp; refugees from Caribbean &amp; Europe.</p>



## *11.13. Worst Case Scenario due to Climate Change (2020-30)*

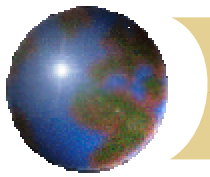
Europe	Asia	United States
<p><b>2020:</b> Increasing: skirmishes over water &amp; immigration</p> <p><b>2022:</b> Skirmish between France&amp;Germany over commerc. access to Rhine</p> <p><b>2025:</b> EU nears collapse</p> <p><b>2027:</b> Increasing migration to Medit. countries such as Algeria, Morocco, Egypt, and Israel</p> <p><b>2030:</b> Nearly 10% of European pop. moves to a different country</p>	<p><b>2020:</b> Persistent conflict in South East Asia; Burma, Laos, Vietnam, India, China</p> <p><b>2025:</b> Internal conditions in China deteriorate dramatically leading to civil war and border wars.</p> <p><b>2030:</b> Tension growing between China and Japan over Russian energy</p>	<p><b>2020:</b> Oil prices increase as security of supply is threatened by conflicts in Persian Gulf and Caspian</p> <p><b>2025:</b> Internal struggle in Saudi Arabia brings Chinese and U.S. naval forces to Gulf in direct confrontation</p>



## *12. Active Climate Policy as a Conflict Avoidance Strategy*

The best proactive strategy is an active climate strategy to contain greenhouse emissions at the source by:

- **Fully implementing** the **UNFCCC** and the **Kyoto Protocol**;
- **All 25 EU members & the European Commission** have signed the Kyoto Protocol and are bound to fully implement it.
- **Enhancing the policies of adaptation and mitigation** against **climate change impacts**, such as **hydro-meteorological hazards and disasters**;
- The **more effective the countermeasures** are the less likely it will become that **climate change** may become a **cause** or **trigger for conflicts** and of their escalation to violent forms.



## *12.1. Dual Goal: Achieving Environmental and Human Security in the Mediterranean Region*

### **Contribute to environmental security by**

#### ? **Reducing internal or societal vulnerability:**

- ? Create housing for poorer people living in vulnerable flood-prone areas and in housing vulnerable to earthquakes
- ? Implementing vulnerability mapping into local city building plans
- ? Enhance local coping capacity by education and preparedness training

#### ? **Reducing external or environmental vulnerability**

- ? Develop specific regional & local vulnerability indicators as a planning tool
- ? Invest in adaptation & mitigation measures for climate change & hazards

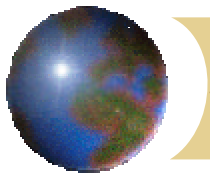
### **Contribute to human security by**

#### ? **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**

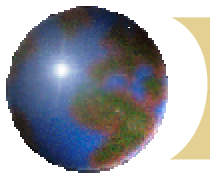
- ? better knowledge on hazards and training
- ? enhanced individual & local coping capacity (investment)



## *12.2. Environmental Conflict Avoidance: Addressing Causes & Fatal Outcomes*

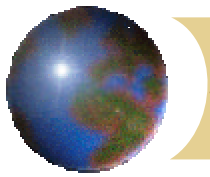
- **Environmental and human security strategies:** address the two values at risk a) **sustainability** (environmental security); and b) **survival** (human security);
- **Deal with different referent objects of security:** a) **eco-system** (environmental security); and b) **individual & mankind** (human security);
- **Address the different causes of threat, challenge, vulnerability and risk:** a) **mankind** (environm. security); and b) **nature, state, globalisation** (human securirty);
- **We need sustainable development strategies** (development, environment policies addressing 6 GEC-factors).
- **We need survival strategies** (protection & empowerment).





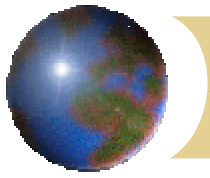
## *12.3. The Human & Environmental Security and Peace Project (HESP)*

- **Synthesis of four approaches:**
  - a) Grotian approach: multilateral, international law based
  - b) environmental security debate (environmental dimension)
  - c) human security (human being: cause & victim of GEC)
  - d) proactive focus: conflict avoidance (structural factors)
- **AFES-PRESS contributions to 4th Research Phase on Environment and Security Linkages:**
  - a) **HEXAGON Series on Human & Environmental Security and Peace Project (HESP) with Springer (Berlin – NY - London - Tokyo)**
    - vol. 1: **Environment & Security in the Mediterranean (2003), 2nd ed.**
    - vol. 2: **Globalisation and Environmental Challenges: Reconceptualising Security in the 21<sup>st</sup> Century (2006)**
    - Vol. 3: **Facing Global Environmental Change: Environmental, Human, Energy, Food, Health and Water Security Concepts (2007).**



## *12.4. From Research to Action: Towards Environmental Conflict Avoidance*

- **Primary Goal:** address fatal outcomes of GEC: hazards and disasters, migration, crises & conflicts that may have been caused, triggered, induced, influenced by: a) environmental stress and b) extreme weather events,
- **Enhance Environmental Security:** Address human behaviour that contributes to GEC via climate change, soil degradation, water pollution & scarcity: sustainable strategies
- **Enhance Human Security:** address factors of GEC that challenge survival of individuals, families, villages, ethnic groups
- **Avoid Environmentally-induced Conflicts:** address structural or causal factors (of Survival Hexagon), e.g. climate policy, combat desertification, cope with water stress.



**Thank you**

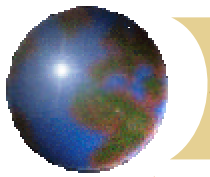
**for inviting me and giving me an opportunity to share with you these very preliminary and emerging conceptual ideas.**

**Thank you**

**for your attention and patience.**

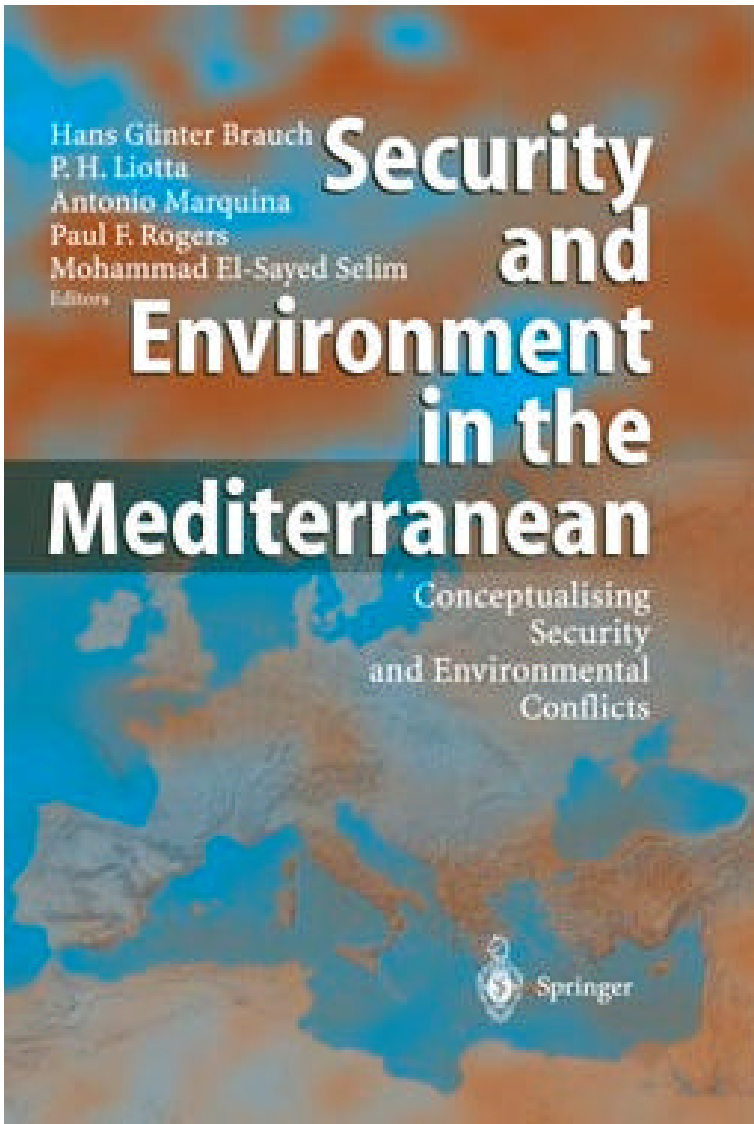
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## Sources

([http://www.afes-press.de/html/download\\_hgb.html](http://www.afes-press.de/html/download_hgb.html))



- **Brauch:** *Climate Change and Conflicts* (Berlin: BMU 2002) ([http://www.bmu.de/en/800/js/download/b\\_climges/](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](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 Paneuro-pean Conference on Int. Relations) ([http://www.afes-press.de/html/the\\_hague.html](http://www.afes-press.de/html/the_hague.html))