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Dutch Red Cross, International Federation of the Red Cross,
Ministry of Foreign Affairs of the Netherlands

International Conference on Climate Change and Disaster Preparedness

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Climate Change, Environmental Stress and Conflict Cases of Bangladesh and Egypt

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1. Focus and Key Questions

➔ **Socio-Econ. & Political Impact of Climate Change**

➔ **Objects of analysis are:**

- **Causes:** Global Environmental Change: *Hexagon*
- **Effects:** environmental *degradation, scarcity, stress*
- **Outcomes:** *disasters, migration, crises, conflicts*

➔ **Research questions:**

- What are the linkages between climate change impacts, environmental stress and conflicts?
- What are the results of social science research on environmental security on these linkages?

➔ **Focus: climate change impacts and interactions with water, soil, population, urbanisation, food.**

Fig. 1: Causes, Effects and Outcomes of Environmental Stress

Causes (Hexagon)	Effect (Interaction)	Environmental Stress	Probable Outcomes
<p>Climate change</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>environmental ➔ degradation (soil, water) ↓ ↑ → ➔ scarcity (water, food, housing)</p>	<p>global cond. ↓ Environ-mental stress ↑ nation. cond.</p>	<p>disaster conflict avoidance ↗ ↖ ➔ Crisis ↘ ↙ migration conflict</p>

- **Case for the interaction of Hexagon: Mediterranean**
- **Disaster and distress migration: Bangladesh**
- **Long-term impact of climate change and population growth: human catastrophe ➔ conflict potential: Egypt**

2. Traditions, Standpoints, a Wide Security Concept: Human, Environmental and Food Security

- Our perceptions depend on our conceptual lenses, that are influenced by our world views (traditions) and our standpoints on environmental problems
- On international (security) policy three traditions may be distinguished in the English school:
 - **Hobbesian** pessimist: *power* is the key category
 - **Kantian** optimist: *international law* is crucial
 - **Grotian** pragmatist: *Cooperation* is vital
- On international environment policy three standpoints may be distinguished:
 - **Neo-Malthusian** pessimist: resource scarcity rises
 - **Cornucopian** optimist: plenty, technology will solve
 - **Distributionist** pragmatist: cooperation will solve

Table 1: Worldviews & Environmental Standpoints

Worldviews/Traditions on security (→)	Machiavelli, Hobbes, pessimist <i>Power matters</i>	Grotius pragmatist <i>Cooperation is needed & matters</i>	Kant (optimist) <i>International law matters and prevails</i>
Standpoints on environmental issues (↓)			
Neomalthusian pessimist <i>Resource scarcity</i>	I dual pessimism	II	III
Reformer, distributionist <i>Multilat. cooperation</i>	IV	V: UN EU states?	VI
Cornucopian (plenty) (neo-liberal optimist)	VII	VIII	IX dual optimist Wilsonian?

In the 1990s the security concept was widened.

From a reformist Grotian perspective (V) I distinguish:

Table 2: Horizontal & Vertical Security Dimensions

Security dimension ⇒ Level of interaction ↓	Mili- tary	Politi- cal	Eco- nomic	Environ- mental ↓	Socie- tal
Human →			FAO: Food security		
Societal/Community	OECD: Livelihood security				
National	US focus		Northern focus		
International/Regional	(NATO, EU countries)				
Global/Planetary					

Focus of this talk:

- **Security dimension:** *environmental security* (UNEP)
- **Level or perspective:** *human security* (UNDP)
- **Sector:** *food security* (FAO)
- **Problem** (coastal zone): *livelihood security* (OECD)

Definitions

Environmental Security: focuses on impacts of wars on environment and on consequences of environmental degradation, scarcity, stress on security & conflicts

Food Security: **FAO (1996) defined:** “as access for all people at all times to enough food for an active, healthy life”.

- adequacy of **food availability** (**effective supply**);
- adequacy of **food access**, ability of the indiv. to acquire sufficient food (**effective demand**) & **reliability** of both

Livelihood Security: **OECD (2002)** at local level refers to ‘**archetypal livelihoods**’, typical for particul. country, achieve: **poverty eradication**, **envir. conservation**:

Human security concept used by UNDP HDR (1994):

- **focus: security of peoples lives, or: human well-being & survival of people, regardless of affiliations;**
- **Kofi Annan (2001) defined ‘human security’ as a people-centred concept based on three pillars: freedom from starvation, poverty & injustice.**
- **Thomas/Tow (02): HS victims of war, poverty, nat. disaster**
- **Global Environm. Change & Human Security (GECHS):**
Def.: HS is achieved when & where indiv. & communities
 - Have the **options** necessary to end, mitigate or adapt to threats to their **human, environmental & social rights**;
 - Actively **participate** in attaining these options; and
 - Have the **capacity & freedom** to exercise these options.
 - **GECHS Science Plan:** no reference to disaster reduction

Rajendra Pachauri, chairman of the IPCC defined environmental security in Washington (2000) as:

- the *minimization of environmental damage* and the *promotion of sustainable development*, with a focus on transboundary dimensions. ‘Environmental stress’ is caused both by environmental resource scarcity (deforestation) and also by environmental resource degradation (polluted water).
- *Economic vulnerability* and *resource dependency* play key roles in the link between environmental change and the potential for violence and insecurity in the developing world.
- Developing countries also *usually lack the infrastructure and institutions to respond to crises*, thereby increasing the chance of violence.
- The majority of such disputes thus far have been solved amicably, but this might not be the case in the future.

Pachauri: 4 linkages: poverty & nat. resource stress:

- *First*, the continuing struggle to **provide food** and basic needs is increasing **land degradation** in the developing world. ...
- *Second*, worsening pollution increasingly impacts air quality, with vehicular traffic & industrial expansion the key contributors.
- *Third*, **world climate change** that has led to a rise in both temperature and sea level holds dire consequences for South Asia coastal regions. In **Bangladesh**, hundreds of people are killed every year by a monsoon and flood cycle, which has become more severe due to changes in sea-level and climate changes.
- *Fourth*, both **water quality and quantity** are at risk due to land-use changes, deforestation, and polluted waters both locally and across national borders.

Rajendra Pachauri identified six concrete actions:

- *First*, **access to resources** must be addressed through ensuring entitlements for the poor, building & sustaining ability, ensuring the property rights of the community over commons, creating market access, and creating rural enterprises and jobs.
- *Second*, **governance** must focus on **participation**, the **capacity and ability to address crises**, and the building of political, economic, and social **infrastructure**.
- *Third*, property rights must be redefined with regard to common resources.
- *Fourth*, the world must reorient the development and use of science and technology.
- *Fifth*, nat. economic policies in their current status are insufficient because they do not ensure equitable growth or internalise environmental costs In addition, regulatory bodies are weak or non-existent, and centralized policies benefit only a small proportion of population.

3. Model: Causes, Effects and Outcome: Disaster

Fig. 2: Causes, Effects & Outcomes of Environmental Stress

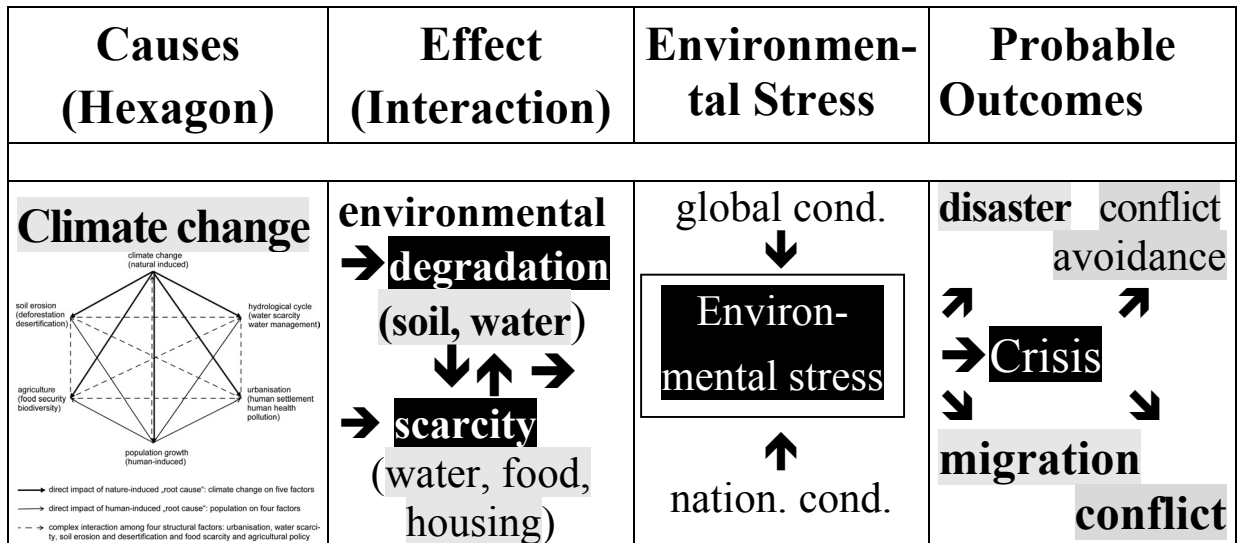
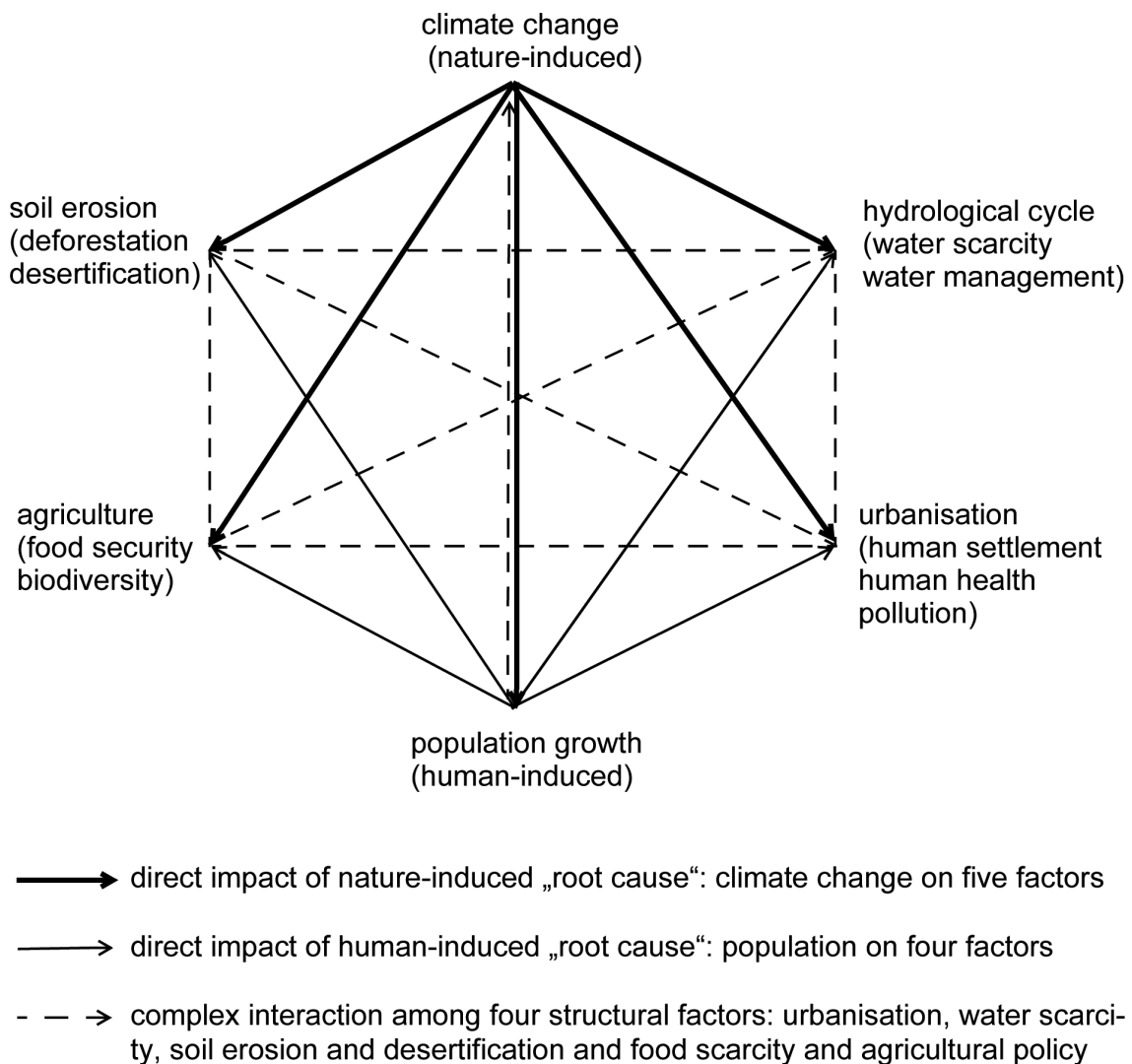


Fig. 3: Interactions of Six Factors of “Survival Hexagon”



Six factors of *Global Environmental Change*:

- **Nature-induced** (Earth system, physical, chemical dimensions of GEC, or **supply-side**): climate change, water, soil → *environmental degradation* (natural sciences: IGBP, WCRP, DIVERSITAS);
- **Human-induced** (biological, ecological dimensions of GEC or **demand-side**): population growth, urbanisation, food contribute to *environmental scarcity* (object: social sciences, IHDP - GECHS).

- *Environmental degradation & scarcity* interact, reinforce each other & produce: *environmental stress* that may result in **disasters, migration, crises**.
- The **impact** of extreme weather events due to *Environmental degradation* (partly due to climate change) depends on the specific vulnerabilities of societies

Fig. 4: Climate change impacts & vulnerability to disasters

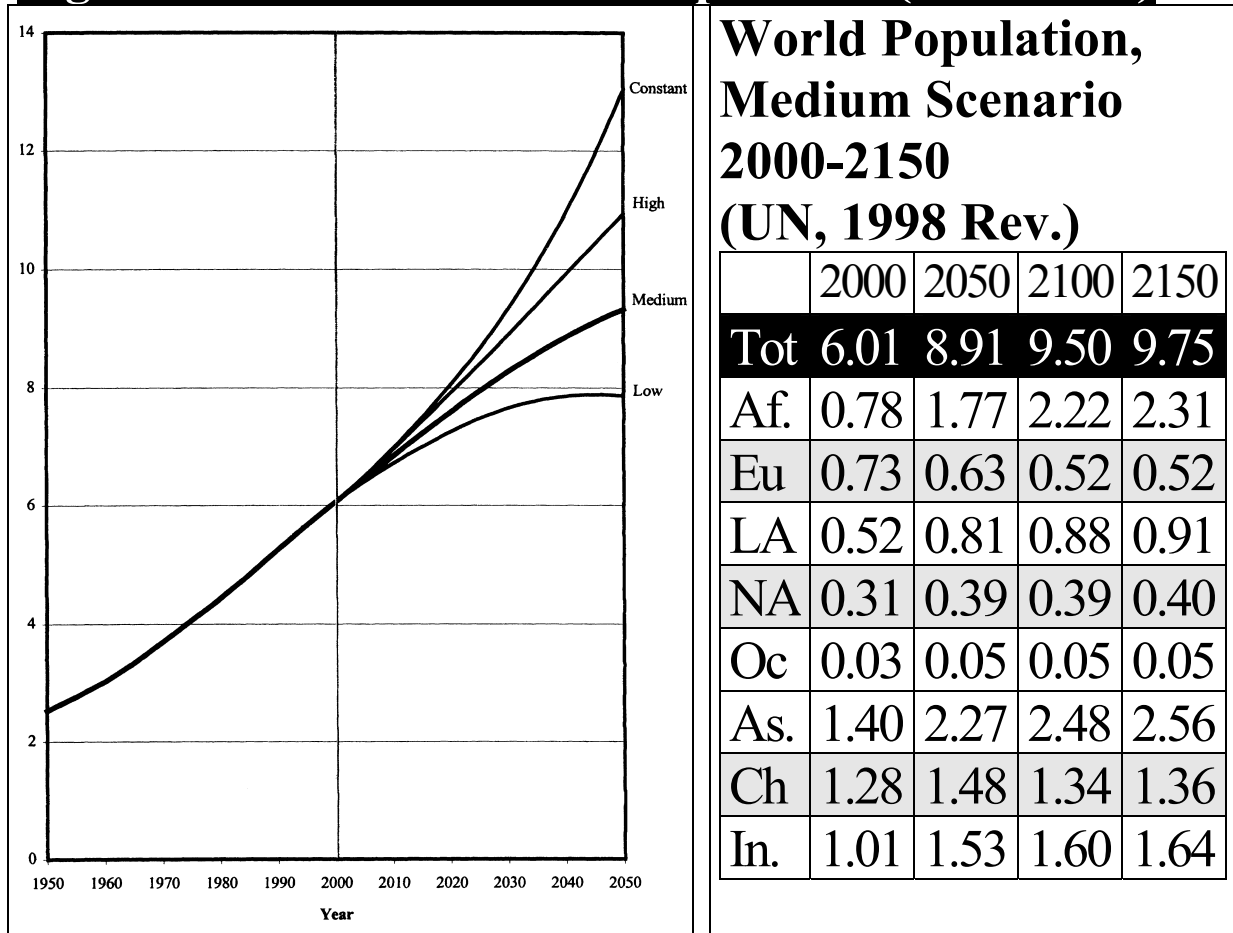
Causes	Effect	Impacts & vulnerabilities	Outcome: hazard, disaster
Climate change <ul style="list-style-type: none"> ▪ temperature 2100: 1.4-5.8°C ▪ sea level rise: 2100: 9-88 cm 	environmental → degradation (desertification, precipitation) ↓ ↑ → → scarcity	extreme weather events ↓ ↑ vulnerabilities of affected regions, countr.	Natural disasters <ul style="list-style-type: none"> ▪ storms ▪ floods ▪ drought ▪ forest fire

- **Disaster reduction: *reduce damage*** by reducing vulnerability: short- and medium-term;
- **Disaster preparedness: *contain causes*** (climate ch.) & *reduce impacts* (extreme weather events: long-term)

3.1 Population Growth (UN Pop. Div. 1950- 2050)

- **Population Assumptions:** 1900: 1.6 mio; 1990: 5.3 mio.;
- **2000: 6.1; 2050: 8.4-11.3 mio.; 2100: 7.0-15.1 mio.**

Figure 5: Growth of World Population (1950-2050)



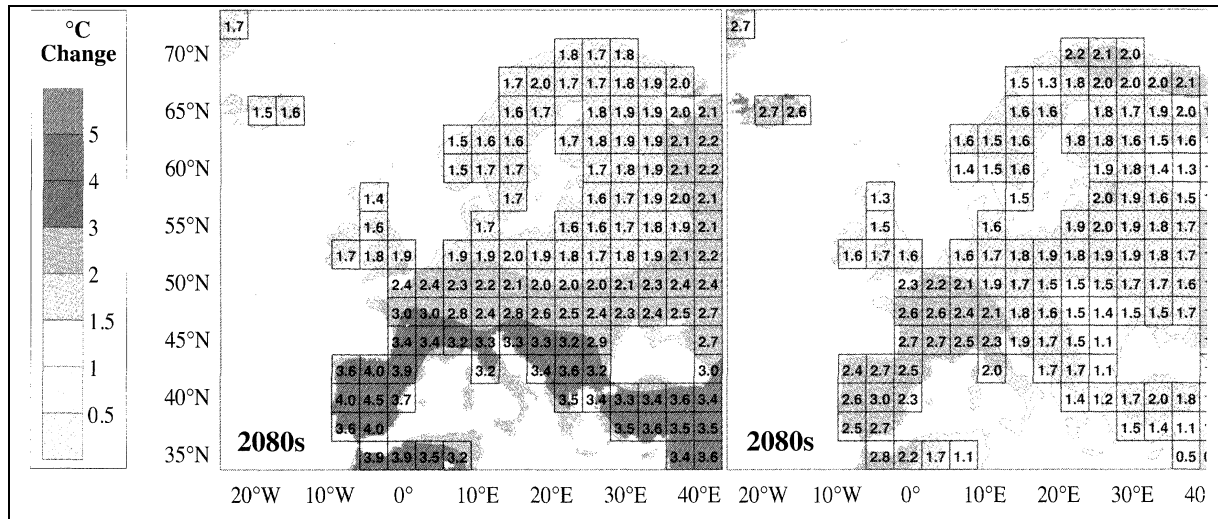
Regional perspective is needed for climate change (supply) and population growth demand factors)

3.2. Linkages Among Supply-Side Factors of the Survival Hexagon: Climate, Water, Soil

- **Climate Change temperature increase (summer) is higher:** North America, Mediterranean, Central Asia
- **Precipitation decline is larger:** Cent. Amer., Mediter.
- **Soil:** deserts more extreme, desertification irreversible
- **Environmental degradation:** from the changes & interact. of 3 factors is likely to increase in 21st century

3.3 Example: Impact for the Mediterranean Region

Fig. 6: Summer Scenario Maps for Mean Temp. Inc.



Conclusions:

- Temperature will rise more in the Mediterranean;
- Precipitation will decline more in Mediterranean.

Population growth will differ on both sides:

- North: *decline*: 2000-2050: - 23 mio. (Italy, Spain)
- South: *increase*: 2000-2050: + 181 mio. (NA + 96 m.)

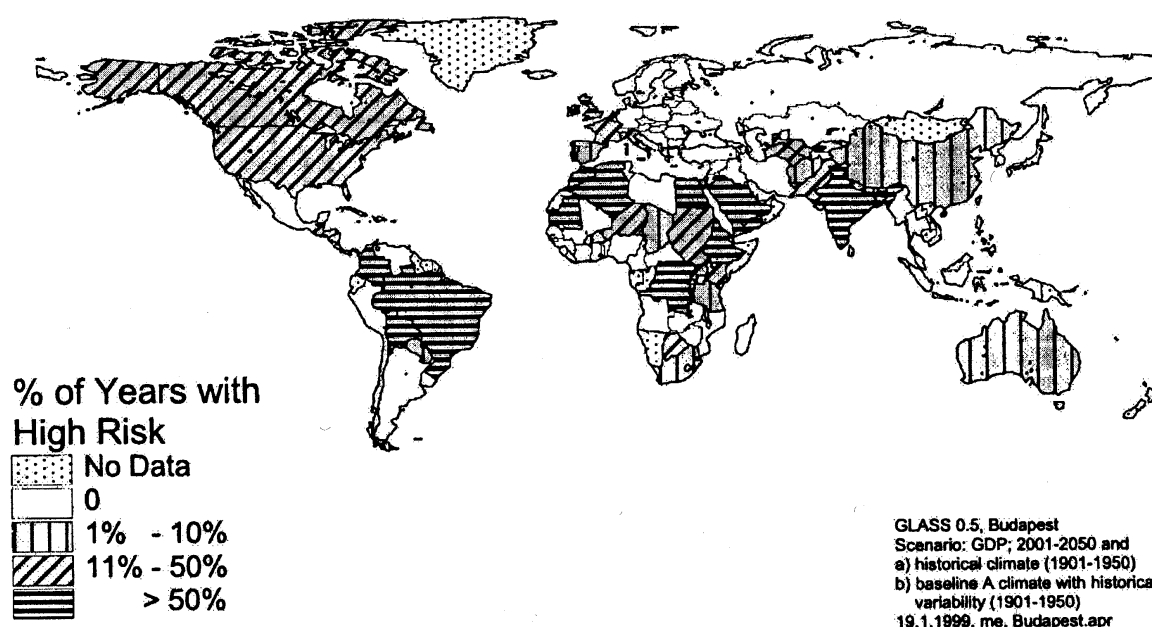
MENA: will be affected both by *climate change* (supply decline) and *population growth* (demand rise).

3.4 Demand-Side: Population, Urbanisation, Agriculture

- In some regions *environm. degradation* will increase & affect supply-factors for food production: **soil & water**
- Environmental *degradation* will contribute to scarcity: demand for **food** and for **food imports** will rise.
- **FAO: Assessment of World Food Situation (6/2002):**
Countries facing Food Emergencies in 2001/2002:
Africa: 16; Asia: 9; Latin America: 2; Russia, FR Yug.

- **Floods:** Malawi; **Earth Quake:** El Salvador; **Drought:** Eritrea, Ethiopia, Kenya, Somalia, Sudan, Uganda, Zimbabwe, Afghanistan, Armenia, Georgia, Iraq, Jordan, Tajikistan, Uzbekistan, Alsavador; **Cold Winter:** Mongolia,
- **Food Deficits:** Tanzania, Zambia, Zimbabwe, DPR Korea
- **(Civil) Strife/War:** Angola, Burundi, DR Congo, Liberia, Sierra Leone, Somalia, Afghanistan, Chechnya
- **Displaced Persons, Refugees:** Eritrea, Ethiopia, Guinea, Liberia, Sierra Leone, Tanzania, Uganda, FR Yug.

Fig. 7: High Potential for Food Crisis 2001-2050



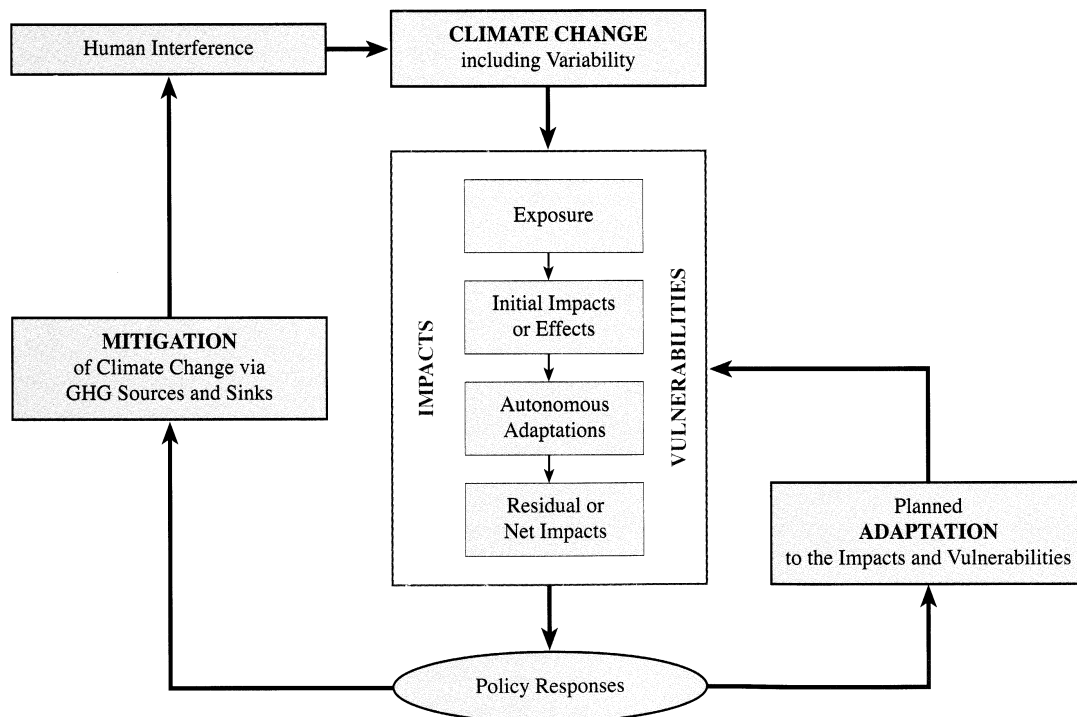
Source: Joseph Alcamo: GLASS Security Diagram

Table 3: Cereal balance by devel. regions, cereals (FAO)

	Self-suffic. rate (%)			Net trade (mio. tons)		
	1964/66	1995/97	2030	1964/66	1995/97	2030
SS-Africa	95	86	84	-2	-10	-32
South Asia	86	97	94	-10	-1	-26
East Asia	98	94	90	-5	-37	-79
L.America	109	90	87	5	-16	-32
→MENA	86	65	56	-5	-43	-102

4. Impact and Vulnerability due to Climate Change

Fig. 8: IPCC's assessment of climate change impacts



IPCC WG II: impacts, adaptation & vulnerability:

- assess **vulnerability** of ecological systems, socio-economic sectors, human health to climate change,
- and examine **feasibility to adaptation** (& mitigation)

Figure 9: Extreme weather events in the 21st century

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 index¹² 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

IPCC WG II (2001): assessment of vulnerability of sectors, systems and regions to climate change:

- **extent** to which a natural or soc. system is susceptible to sustaining **damage from climate change**;
- vulnerability is a **function of the sensitivity** of a **system to changes in climate** (degree of response);
- **adaptive capacity**: adjustments in practices, processes, structures, offset potential of damage;
- degree of **exposure** of a system to climatic hazards;
- **Resilience**: insensitive to CC & high adaptive capacity.

Table 4: Vulnerability of key sectors to CC in Asia

Regions	Food & fiber	Biodiversity	Water resources	Coastal ecosystems	Human health	Settlements
Boreal	+ ***	***	+ ***	+ **	**	***
Central	****	**	***	**	***	***
Tibet	**	***	**	not applic.	no inf.	no inf.
Temperate	****	***	****	****	***	****
South A.	****	***	****	****	***	***
South East	****	***	****	****	***	***

**** highly, *** and ** moderately vulnerable, + slightly resilient

Table 5: Potential land loss & population exposed in Asia

Country	SLR (cm)	Potential land loss		Population exposed	
		km ²	%	million	%
Bangladesh		15,668	10.9	5.5	5.0
	100	29,846	20.7	14.8	13.5
India	100	5,763	0.4	7.1	0.8
Indonesia	60	34,000	1.9	2.0	1.1
Japan	50	1,412	0.4	2.9	2.3
Malaysia	100	7,000	2.1	>0.05	>0.3
Pakistan	20	1,700	0.2	n.a.	n.a.
Vietnam	100	40,000	12.1	17.1	23.1

5. Vulnerabilities & Risk due to Environm. Degradation

Literature: threat, challenge, *vulnerability* and *risk*.

⇒ In GEC research *vulnerability assessment* refers to the evaluation of the *sensitivity of a particular ecosystem, resource or activity* to a broad range of environmental & socio-economic *stresses*. **Kasperson**: Assessment could be conducted through critical thresholds of different stresses & risks.

- **Hewitt**: vulnerability perspective considers how communities are exposed to dangers, the ways in which they are readily harmed, and the protection that they lack.

→ **Vulnerability to a hazard** is created by **social order** on division of labour, **cultural values** & on **legal rights**. **Relative condition**, defined & assessed with safety of others.

- **Ulrich Beck** distinguished: predictable *risks* & unpredictable *threats*, → **3 global threats**: 1) *wealth-driven* ecological destruction & technological-industrial dangers (global warming); 2) risks related to *poverty* (envir. destruction); 3) *weapons of mass destruction*.
- **Kasperson/Kasperson** distinguish *systemic* risks (global warming) & *cumulative environmental change* that may cause short- and long-term consequences.
- **Global environmental risks** “threaten internat. security & peaceful relations among states” contribute to differentiation of wealth, competition, tensions, conflict”.
- **Criticality** from lesser environmental threats: environmental *endangerment, impoverishment, sustainability*.
- **Such regions**: *environmental degradation* (water, air, soil), *wealth* (GNP), *well-being* (longevity, mortality rates) *economic and technological substitutability*.

- Before environmental criticality: **warning signals** alert experts & society to impending/**recurring damage**.
- **Response** depends on political & societal **sensitivity**, on available **resources** to cope with challenges.
- **Key driving forces**: a) population growth, b) technological capacity, c) affluence/poverty, d) political-economic forces e) beliefs and attitudes.
- **Societal responses** due to specificity, context, relationship between environmental degradation, improved reg. well-being, symptoms of emerging criticality, spatial and temporal categories a) *peripheral or marginal situations*, b) *agglomerated environm. stressors*.
- On **causality** they noted a variety of human causation, **no single dominant human driving force** can explain environm degradation or complexity of change.

IDNDR Coping Study on Risk & Society (1999): Africa:

- Disasters increase due to increasing vulnerability to hazards
- **Vulnerability** to disasters due to impoverishment of rural poor:
 - **Circle of survival**: *growing population*;
 - increasing *utilisation of natural resources*;
 - land clearing, firewood, overgrazing, soil erosion, desertification; collapse of ecosystems, hunger, malnutrition & partial recovery from drought (**cycle repeats**);
 - **migration** to cities by rural poor and refugees,
 - unplanned occupation of **high risk peri-urban** areas
 - few jobs, rising crime rate, breakdown of civil administration, **political instability**, civil war, cross-border conflict, **anarchy** (state failure).

- **Impacts of environmental degradation/stress:**
 - **Water:** ocean circulation; sea level; water cycle;
 - **Food:** carbon & nutrient cycles; air quality; product.;
 - **Soil:** product. of agricultural, grazing, timber lands;
 - **Geographic** distribution, survival of plant & animals,
 - **Health:** including vectors, human disease.

UNDP: Linking Poverty Reduction Environm. Managem.

- **Poor people** are highly **vulnerable to environmental disasters** & to environment-related **conflict**. Drought, floods & other disasters can wipe out any development gains that poor people make. **Frequency & severity is expected to increase with climate change.**
- **Competition for scarce natural resources** contributes to **conflict** and **complex humanitarian crises**.
- ***Ecological fragility & likelihood of natural disasters*** contribute to ***vulnerability*** (to natural disasters).
- Expanded social protection, better access to climate information & related measures to protect infrastructure and **improved disaster preparedness** can help to **reduce and mitigate the poor's exposure to risk** and **vulnerability to environmental shocks**.

6. Hazards & Disasters due to Environmental Degradation

Hazard: result of a natural event or of a human induced process that can be increased/reduced by human actions.

- **Hazards impact on:** *people* (death, injury, diseases); *goods* (property damage, economic loss); c) *environment* (loss of flora, fauna, pollution, loss of amenity).
- **Environmental hazards** may be both **natural** or **man-made** with *intensive* or *defuse* effects.

- **Human sensitivity** to hazards: combination of *physical exposure & human vulnerability* (due to poverty).
- **K. Smith:** working definition of **environm. hazards:** Extreme geophysical events, biological processes, major technolog. accidents: concentrated releases of energy or materials, pose an unexpected **threat to human life &** can cause **significant damage** to goods & environment.
- **Five types** of environmental hazards: a) *atmospheric* (rain, hail, storm); b) *hydrologic* (floods, drought); c) *geologic* (landslides, earthquake, volcanic eruption); d) *biologic* (epidemic, forest fires); e) *technological*.
- Source: **hydro-meteorological**, geophysical, manmade
- Time: *short-term (local)*; *medium-term: LUC, deforestation*; *long-term (global):* climate change: temperature rise, SLR
- **Environmental disasters:** result of **human factors & physical triggers** (environmental events),
- Natural disasters result of “**ecologically destructive practices & from putting ourselves in harm’s way**”

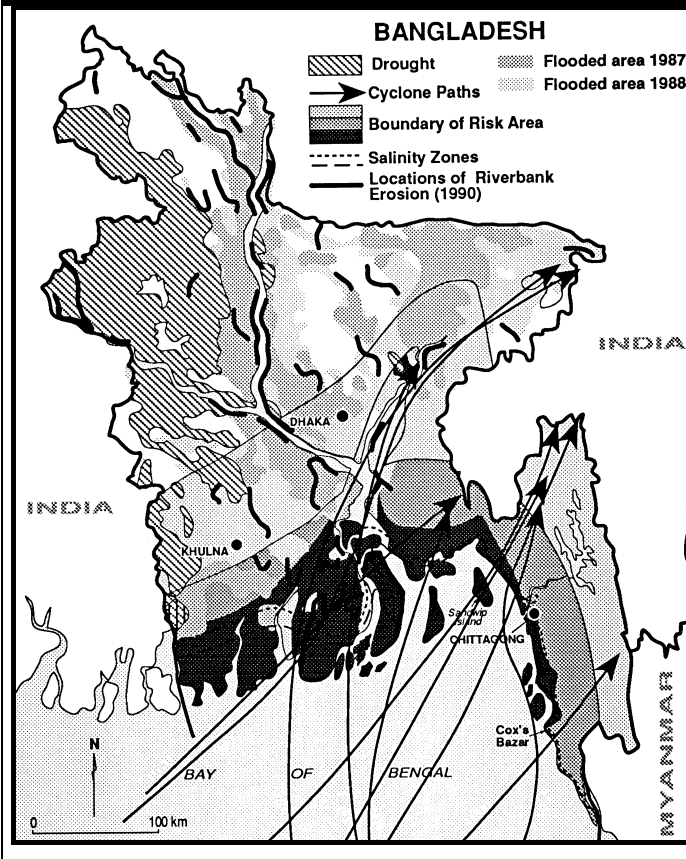
Climate, extreme weather rel. hydrometeorological events

- **Cyclones** (with storm surges): most destructive storm, affect coast communities in (sub)tropical countries with high population; **progress** in forecasting & early warning to **reduce their impact** (WWRP)
- **Storms** (large-scale extra tropical, local st., tornados):
- **Floods:** in river floodplains & coastal regions; **progress** in forecasting, early warning, preparedness
- **Extreme temp.** (cold, hot): deaths, drought, forest fire
- **Drought:** natural & human causes (population growth, agricultural, forestry practices, poor planning, war)
 - ⇒ **famine, migration, environmental degradation**

7. Worst Case: Bangladesh – Human Survival at Risk?

- Short-term hazards: cyclones, floods, drought
- Long-term challenges: SLR and population growth

9: Climate-related Natural Events



10: SLR Scenarios for Bangladesh

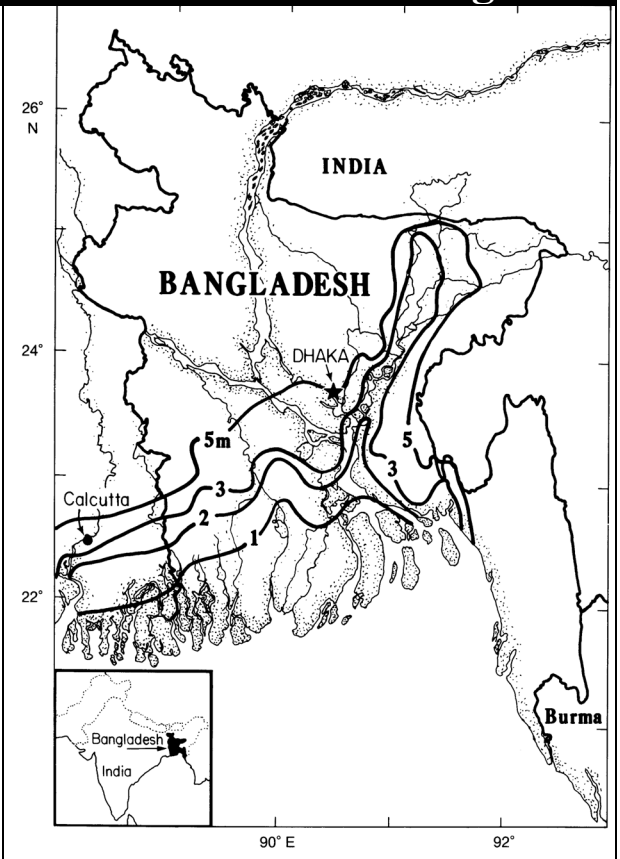


Table 6: Impacts of Climate Change on Security & Survival

	II: Bangladesh	III: Egypt
Climate zone	tropical zone	semi-arid, arid
Impacts	water scarcity	SLR, temper. rise, drought
Impacts on soil, water, agriculture, settlements, health	loss by SLR cyclones, water diseases	loss of best land, yield decline, heat waves, diseases
Security perspective	human security	nat./reg. security

Bangladesh: critical vulnerability to SLR due to low elevation, **high population density** (1950: 290; 2000: 891; 2050: 1,515 pers./km²), critical impacts on wetlands, crops.
HDI: 132 (UNDP 2001); **GDP:** 336 \$ ('95); 1.570 \$ (ppp.)

Bangladesh: severe natural hazards & 4 natural events:

- **Cyclones, floods, riverbank erosion**, salinity problems
- **Droughts, floods, riverbank erosion** in MW to NW;
- **Flooding & riverbank erosion** in *river-margins zone*.
- **Major cities & life-line systems:** several nat. events.

Table 7: People Killed and Affected by Disasters

	1981-1990		1991-2000		2000
	people	average	people	average	people
killed	27,903	2,790	147,753	14,775	681
affected	228,794,460	22,879,446	90,473,239	9,047,324	2,826,122

Since 1960: 600,000 died from cyclones & storm urges.

Bangladesh is a *primary victim of extreme weather events* that forced people to leave homes, rural areas & country.

Future vulnerability to CC without effective counter-measures over the next 40-60 years:

- **Multi-hazard areas** would continue as such.
- **Cyclone, flooding, riverbank erosion**, salinity in *coastal zone* may intensify, more frequent & spatially extended.
- **SLR would exacerbate effects on coastal margin** by alerting erosion rates; saline intrusion further inland; ‘shrinking’ protective barriers; increasing flooding by cyclone storm surges.
- **Flooding, riverbank erosion** in *river-margins zone* may intensify, become more frequent. Design levels of existing protective barriers would ‘shrink’.
- **Drought** in *mid-western zone* may reduce in frequency & intensity, although severe flooding & riverbank erosion would be maintained and may even increase.
- Outside ***multi-hazard core zones***, severe events may become more frequent & intense, except for drought.

Table 8: Popul. Growth in Million, 1950-2050 (Med. V.)

Countries↓	1900	1950	2000	2015	2050
Bangladesh	29.0	41.783	137.439	183.159	265.432

Urb.: Bangladesh, 1950: 4,2%, 2000: 21,2% , 2030: 40.6%

City	1950	1975	2000	2005	2010	2015	'75-'00	'00-'15
Dhaka	0.42	2.17	12.3	15.4	18.4	21.1	6.9%	3.6%

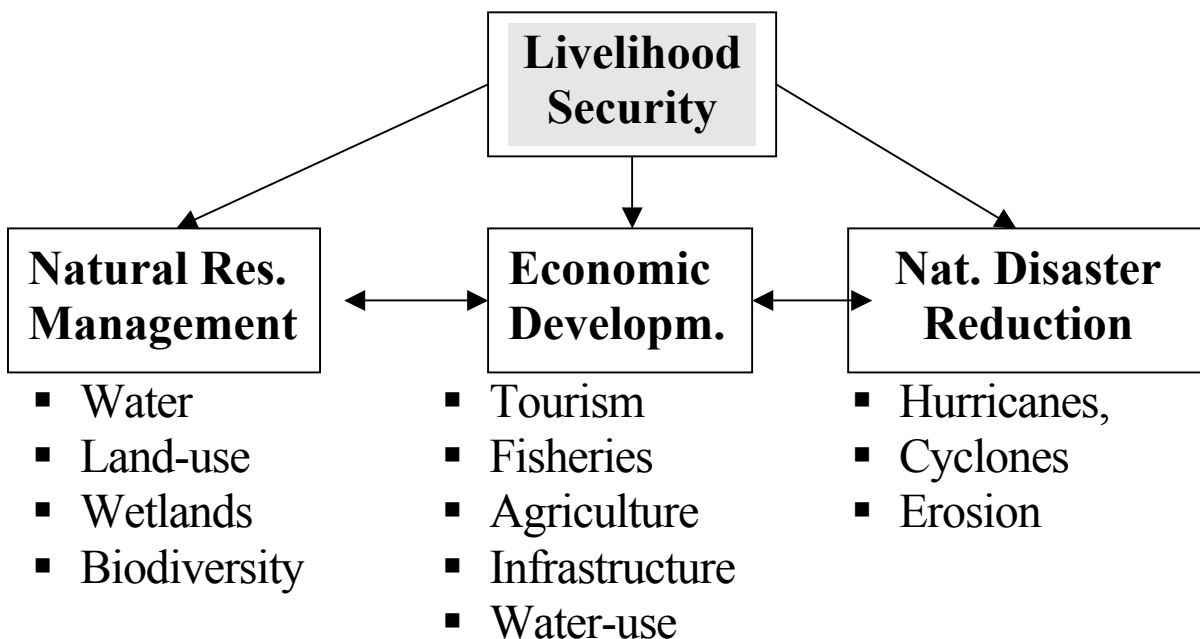
On Coastal Zone Management OECD EnPoC (2002)

suggested to link poverty reduction & environment protection: synergies in investment on adaptation measures.

Livelihood security: through 3 types of activities:

- Natural resource management (water, land-use, biod.)
- Economic development (tourism, fisheries, agriculture, infrastructure/settlements, land-use.
- Nat. disaster management: reduce vulnerability to hurricanes/cyclones, storms/floods, coastal erosions.

Figure 11: Climate & development connections in coastl.



OECD: adaptation to current climate variability: assess vulnerability to CC, linkage between adaptation options & sustainable development in coastal zones.

- Nat. catastrophes from **1947-2001 killed ca. 1 mill.**
- **Several million Bangladeshi** migrated since 1947 to India, West Pakistan, Persian Gulf, to OECD countr.
- B. had severe **social challenges & nat. catastrophes.**
- **Social tension** repeatedly led to coups, murder of key politicians, violent clashes between internal refugees with tribal people & between B. immigrants in India.

Saleemul Huq, Chairman, Bangladesh Center for Advanced Studies in Dhaka, on climate change **impacts for Bangladesh:**

- **Sea Level Rise:** 1 m SLR rise will inundate 17 % of Bangl. 20 million people live there. Impact of rising salinity in coastal lands & waters will affect agriculture & fresh water.
- **Increased temperatures:** rise in global temperat. of 2 - 5°C until 2100. ⇨ Increase in extreme temperatures will lead to more **frequent and more severe droughts**. Bangladesh may be hit **more severely by droughts than by floods**. ...
- **More intense cyclones:** Models differ on frequency of tropical cyclones. **Intensity & destructive power of cyclones** are likely to be **greater** as sea surface temperature rises.
- **Greater flood intensity:** Exact impact of **global temp.** on S. **Asian monsoon** rains are difficult to predict, monsoon is likely to become **more erratic with climate change**. Possibility of more frequent & more intense floods are likely in Bangladesh, through combination of **monsoon rainfall** with increased **snow melt** from Himalayan mountains. Global CC will cause more flooding & more droughts in Bangladesh.
- **Health impacts:** CC impact on health remains **uncertain**. IPCC report states that **increased incidence of vector borne** as well as **water borne pathogens** are likely with CC. ... The recent outbreak of **Dengue fever** in Bangladesh may be a harbinger of things to come.

8. Egypt: Climate Change Impacts on Security

„Given Egypt’s growing **population**, its limited **fertile land**, & its large area of **desert**, and the concentration of its econ. activities in the coastal zones, the potential social and econ, **impact of climate change could be devastating** for the country’s future.“

Egypt, Initial National Comm. on CC, June 1999, p. j

8.1. Impact of Sea Level Rise for the Nile Delta



El-Raey concluded: “a **0.5 m sea level rise** would cause migration of more than **2.0 million people**, loss of more than **214,000 jobs** and a value loss of more than **\$40.0 billion**, mainly in Alexandria Governorate”.



8.2 Temperature Increase: Impact on Agriculture

- **Initial Nat. Communication, Egypt: yield changes** by 2050 due to climate ch.: wheat -18%, maize: -19%, sorghum: -19%, barley: -18%, rice: -11%, soybean: -28%.
- **Egypt's water supply: 95% from Nile** (10 countries)
- **climate change impact** on Nile Basin cannot be predicted
- **SLR in Nile delta:** 2 million people need resettlement
- **Health impacts:** skin cancer, eye cataracts, heat strokes,
- **Indirect impacts:** demographic dislocations, socio-econ. disruptions, ecological system, air pollution impacts.

8.3 Integrated Climate Model: Egypt until 2060

Strzepek/Onyeji/Saleh/Yates, 1995: „An Assessment of Integrated Climate Change Impacts on Egypt“ (1995).

- Temp. increase: +4°C for Cairo, + 3.1°-4.7°C for rest
- Water/cap.: 1990: 1005 m³, 2060: 452 m³ (World Bank)
- **Agriculture:** decline of self-sufficiency: 60% to 10%.

8.4 Impact of Climate Change & Water Scarcity on Conflicts

- **2001:** FAO: 8 of 10 riparians of 29 countries with famine;
- **In Egypt:** distress migration from Sahel has increased;
- **Water supply:** precipitation, water flow of Nile *may decline* due to climate change (evapotranspiration);
- **Water demand:** *will rise* due to population growth;
- **Water sharing and management:** among riparians, crucial for security & survival and for conflict avoidance;
- **Nile Basin Initiative:** riparians adopted: *Nile River Basin Action Plan* (1996) with World Bank support
- **Future security challenges:**
 - demand increase for food due to **population growth**
 - supply decline of food due to **climate change**
 - **distress migration** to and from Egypt will grow!!

Figure 12: Nile Basin (at: <[http:// www.nilebasin.org/](http://www.nilebasin.org/)>



Wolfensohn (WB Pres.): population of ten Nile countries will grow from 300 mio. within 20 years to about 500 million.

Until 2050, population projected to increase from 280.8 million (2000) by 575 mio. to 855.6 mio. by 2050 (UN 2001, table 7).

Key instrument of conflict avoidance: **water sharing** but also: “**virtual water**”: increasing food imports to the whole region.

Table 9: Pop. Growth of 10 Nile Basin Countries, 1950-2050

Nile Count.	1950	2000	2050 MV	Population Growth	
				1950-2050	2000-2050
Egypt		67.884	113.840	92.006	45.956
Sudan	9.190	31.095	63.530	54.340	32.435
Ethiopia	18.434	62.908	186.452	168.018	123.544
Uganda	5.210	23.300	101.524	96.314	78.224
Eritrea	1.140	3.659	10.028	8.888	6.369
Kenya	6.265	30.669	55.368	49.103	24.699
Tanzania	7.886	35.119	82.740	74.854	47.621
Rwanda	2.120	7.609	18.523	16.403	10.914
Burundi	2.456	6.356	20.218	17.762	13.862
Congo	12.184	50.948	203.527	191.343	152.579
Total	86.719	280.783	855.750	769.031	574.967

9. Results of Research Review on Linkages of Climate Change Impacts, Environmental Stress and Conflict

1. **No mono-causal linkage** between climate change & conflicts.
2. **Climate change impacts do not pose a military threat** nor can they be solved with means of military services.
3. **Climate change impacts will contribute to environmental stress** and become a potential cause of conflict constellations.
4. Climate change impacts may **challenge the survival of human beings** and are a challenge to **human security**.
5. Climate change impacts **force human beings to leave** their rural home for the next major city (**urbanisation**) or to take refuge in a neighbouring country or overseas (**migration**).
6. Climate change impacts pose **severe challenges** for countries with most severe effects of **sea level rise** in **delta areas** but also by complex interactions of **increasing temperature** and declining precipitation in **arid- and semi-arid regions**.
7. Climate change impacts **may contribute to escalation of social, ethnic or religious tension** that may erupt in violent riots or result in domestic civil strife or civil war.
8. Climate change impacts and disputes on **scarce resources – access to water** or country-crossing **aquifers** – may contribute to bilateral or regional non-violent or violent conflicts.
9. Climate change impacts and international *environmental refugees* may lead to **international tensions on migration**, on **admission of refugees** in neighbouring or in industrialised countries and on **treatment of immigrant** communities.
10. The **mitigation of challenges** posed by the impact of climate change requires **bilateral or multilateral international cooperation**, support for adaptive capabilities and a massive technology transfer.

9.1 Suggestions for future research on 4th phase of environmental security studies

- **1st phase:** impacts of wars on environment (Westing);
- **2nd phase:** case studies impacts of on environmental scarcity (degradation) on conflicts (prevention): Homer-Dixon (Canada); Bächler/Spillmann (Switzerl.)
- **3rd phase:** case studies, syndromes (mitigation); simulations; water data bases; inclusion in war data bases;
- **4th phase: Environmental security & peace project**
 - *multi- & interdisciplinary:* include natural science expertise on environmental degradation;
 - *focus:* interregional participation: North/South;
 - *broader scope on outcomes:* besides env.-induced migration & conflicts, also: **disasters, crises, prev.**
 - **Mediterranean:** 2 workshops (2 Springer books)
 - **Canterbury:** concepts, Survival Hexagon: 20th C.
 - **Valencia:** env. challenges: Hexagon for 21st Cent.
- **Proposal for GECHS:** add disaster reduction/preparedness
- **Method: Regional and country impact studies:**
 - **CC impact research:** structured, focused comparis.
 - **Vulnerability and risk assessment:** for natural hazards and disasters (development research)
 - **OECD:** Env. Policy Com., WP on global & struct. policies

9.2 Suggestions for future political activities

- **Dual Goal:** mitigate impact & reduce vulnerability
- **Focus: Climate protection:** adaptation & mitigation; **development policy:** disaster reduction, preparedness;
- **New Task:** for policies of crisis & conflict prevention: strategy for **environmental conflict avoidance:** scientific input crucial (*problem recognition, anticipatory learning*)

10. Disaster Reduction and Preparedness

Basic Terminology on Disaster Management

Pre-disaster Phase (Disaster Reduction): Activities

- **Prevention:** for permanent protection from disasters, physical protective measures, legislative measures
- **Mitigation:** advance measures to decrease or eliminate impact on society and environment
- **Preparedness:** minimize loss of life & damage, temporary removal of people & property from threatened location & facilitate effective rescue, relief, rehabilitation
- ☞ **Avoidance:** avoid the impact and reduce the vulnerability to extreme weather events due to climate change

Post-disaster Phase (Disaster Response)

- **Relief:** assistance during, after disaster to meet life preservation and subsistence needs (emergency)
- **Rehabilitation:** restore a stricken community to former living conditions, encourage adjustments
- **Reconstruction (recovery):** re-establish a community after a period or rehabilitation after a disaster: perman. housing, full restoration of services, pre-disaster state

Rio + 10: Reasons for increasing disasters:

- **Population growth** and increasing poverty in DCs;
- **Migration** due to destruction of basis for livelihood;
- Increase of **vulnerability of infrastructure**;
- **Resource depletion & environmental pollution**

Disaster Prevention in support of Sustainable Dev.:

- **Biodiversity loss:** balance resource protection & use
- Lack of integrated approach to **flood management**;
- Increased vulnerability of **urban settlements**.

11. A Comprehensive Strategy for Disaster Reduction and Preparedness by Issue and Community Linkages

Policy contexts:

- **Disaster Reduction Strategy:**
 - **IGOs:** UN: ISDR, UNDP, UNEP, DHA, OCHA, IASC;
 - **EU:** EC Humanitarian Office (ECHO);
 - **EU statements:** Council to EP;
 - **EU interreg. summits:** ASEM, EU-LA, EU-Africa;
 - **Instruments:**
 - **Science & technology;**
 - **Development cooperation:** effectiveness and impacts of disasters on investments
 - **NGOs:** hum. organisations: Red Cross & Red Cresc.
- **Climate Policy context:** UNFCCC, KP, IPCC;
- **Development context:** OECD, Env. Directorate, EPC, WP on Global and structural Policies (2002): connect development and climate policy: to limit vulnerability, increase adaptive capacity, implement adaptation
- **IFIs:** World Bank, EIB, GEF (UNEP/UNDP)

Elements of a disaster avoidance strategy

- **Short-term measures:** early warning, shelter etc.
- **Medium-term measures:** adaptation & mitigation
- **Long-term measures:** climate change policy (KP)

Many Strategies but insufficient implementation

- **UNEP Strategic Framework on Emergency Prevention**
- **UNFCCC:** adaptation & mitigation of CC impacts
- **ISDR:** International Strategy on Disaster Reduction
- **Development:** OECD: development and CC impacts

UNEP Strategic Framework on Emergency Prevention, Preparedness, Assessment, Mitigation and Response

- **UNEP Mandate:** Feb. 1997
- **1998:** env. emerg. response capacity, early warning assessm.
- **2000:** to develop strategy on environmental emergencies
 - early warning for prevention;
 - post-incident refining of policies and practices;
 - globally reinforce broad prevention agenda.
 - Integrate short, medium & long-term activities.
 - Intensify cooperation and coordination: OCHA, ISDR, UNHCR, UNDP, WMO, WHO, IMO, UNICEF, OECD, UNCHS, UN-ECE et al., World Bank et al.
 - Agenda for Action: APELL, GRID, Balkans TF:
 - Future actions:
 - Prevention and Preparedness
 - Environmental Law
 - APELL Programme
 - Cleaner Production Programme
 - Assessment and Early Warning
 - Mitigation and Response
 - Communication and Publicity
 - Resource Mobilization

Climate Change: UNFCCC, Kyoto Protocol, IPCC

Marrakesh Accords (2001): climate impact *reduction*,

- UNCCC, Art.3.3: States should take precautionary meas.
- UNFCC, Art.4.8; KP Art. 3.14: „insurance“
- UNFCC: medium & long-term measures

Bonn Agreement (2001): COP-8: insurance related action

- B.Müller (OIES): Need for climate disaster relief: for a FCCC Disaster Relief Fund (adm. by OCHA), IASC

ISDR Background Document for WSSD (2002): Disaster Risk and Development

- **Reverse Trends of vulnerability to natural hazards**
 - human vulnerability, env. degradation, impoverishment;
 - trends related to climate and disasters
 - migration and unplanned urbanisation
 - increasing infrastructure vulnerability
- **Strategies for developm. policies reduce vuln. to disasters**
- **Specific Action:** capacity building, advocacy of integration, risk assessment, public awareness programmes, comprehensive urban development strategy, early warning systems

International Strategy for Disaster Reduction (ISDR)

Draft for WSSD (Johannesburg), 9.5.2002

32. Develop and implement ISDR: internat, reg. nat. action
- Provide necessary financial means to ISDR trust fund;
 - Address vulnerabilities to nat. disasters, multi-hazard approach, strengthen inst. Capabilities of countries, internat. joint observation, research, knowledge transfer;
 - Implement wetland restoration, better land-use planning, techniques for assessing effects of CC, assistance to vulnerable countries to mitigate this impact;
 - Dissemination of traditional, indigen. knowledge;
 - Establish a global early warning system in framework of ISDR (WMO, UNEP, FAO): nucleus of network;
 - Establish global, regional, nat. strategies & institutions on medium & long-term action to prevent, mitigate & repair damage: technical, scientific, financial assistance;
 - Promote cooperation in prevention, reduction, relief & post-disaster rehabilitation of disasters for environment

12. Conclusions: A Human Security Perspective on Disaster Reduction, Preparedness and Avoidance

IPCC, Int. Fed. of Red Cross, Insurance industry agree:

- **Natural hazards and disasters have increased;**
- **Damages & human fatalities & affected** have risen;
- Most severe impact & **highest fatalities** where **vulnerability is highest**: in least developed countries;
- **Bangladesh**: 1 million fatalities (1950-2000) worst case;
- **Disasters** are partly the result of natural climatic variation & anthropogenic environmental stress caused by environmental degradation and scarcity.
- **Natural hazards and disasters have enhanced human insecurity**: forcing people to leave their home, village, town or country due to severe distress and in search for human survival and livelihood.
- From a **social science** perspective: **human security** focusing at **basic human needs for food, housing, well-being & survival** may be best level of analysis.
- **Food security** may be best sector approach for analysing the impacts & vulnerabilities towards disasters
- **Disaster reduction** should be added to **GECHS agenda**

12.1 Conclusions on Linkages with Disaster Reduction

- Disaster reduction must be linked to poverty eradication;
- Disaster reduction, human vulnerability, env. degradation;
- Disaster reduction, urban settlements and globalisation

12.2 Major political deficits

- Many strategies, strategic frameworks but this is lacking:
- Efficient & result oriented implementation of conceptual & scientific knowledge within & outside of UN
- Needed: Interdisciplinary and intersectoral cooperation.

12.3 Policy Conclusions for NGOs and IGOs

- Security **worldviews** and ecological **standpoints** matter:
- **Grotian** pragmatist and equity oriented distributionist may be best suited for whom **multilateral cooperation** matters
- **Human security** perspective: best suited for humanitarian organisations: focus: **victims** of war, poverty and disaster;
- **Food security**: precondition for **peace, security, survival**

Proposal 1: We need a **wide understanding** & an **integrated assessment** of **causes (CC), impacts & outcomes** (disasters).

Proposal 2: We need an early recognition of the complex interaction among the *causes* (e.g. of the **survival hexagon**), *effects*: **environmental degradation, scarcity and stress** & of *outcomes*: **disasters, distress migration, crises & conflicts**.

Proposal 3: We need an **anticipatory learning** based on interdisciplinary cooperation to prevent violence, to reduce the impact of catastrophic events by reducing the vulnerability.

Proposal 4: We need a **broad policy coalition** of humanitarian, environmental and development **NGOs, governments** and **multilateral international organisations!**

Proposal 5: We need an **equity oriented pragmatic Grotian vision** respecting different cultures & religions

Proposal 6: We must aim at both to **reduce the impacts** of climate change by an *active climate protection policy* and the **vulnerabilities** by a *development policy* that stresses and includes *disaster preparedness*.

Proposal 7: We have common but differentiated responsibilities to **achieve the goals of Kyoto & WSSD**.