Water for Life in the Middle East

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Impact of Global Warming and Non-Conventional Water Resources:

Potential of solar thermal desalination to defuse water as a conflict issue - A conceptual contribution to conflict resolution and long-term conflict avoidance

Impact of Global Warming and Non-Conventional Water Resources:

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Contents

1. INTRODUCTION: RESEARCH QUESTIONS Learning from 60 years of peace in Europe?

- The talk addresses three questions:

1. Which role did common threat, functional cooperation, conditionalised aid, the community process and the “new thinking” play? What have been **major conceptual ideas**, the political **circumstances** that made a major change in Europe possible?
2. Can we draw **conceptual lessons from this experience** of **fundamental change in state and human behaviour** that may be relevant for the conflict in the Middle East?
3. **Which role can functional water cooperation play** in addressing the **impacts of global environmental change** in the Middle East in the 21st century in **avoiding violent conflicts** over water and **contributing to a spill-over for cooperation among conflict parties**?

1. INTRODUCTION: Basic Assumptions

- **The talk is based on three basic assumptions**:

1. **If reality and our knowledge** of reality are **socially constructed** then our **perceptions and the factors that determine or influence perception matter**: our intellectual traditions, worldviews, mindsets, national and individual traumas and experiences.
2. **Security concepts** and especially **subjective security** threats, challenges, vulnerabilities and risks are influenced by those factors that contribute to the **perceived social reality.**
3. **Philosophical, religious, political, cultural** & **conceptual ideas matter** and they have been instrumental throughout human history to initiate a major change in science, society, politics and in the relations among states.

Ideas often inspired action both to the better or worse.

2. FOUR CONCEPTUAL PILLARS OF SIXTY YEARS OF PEACE IN EUROPE

- Pillar 1: David Mitrany's functionalist concept of a „working peace system“: form follows function
- Pillar 2: George Marshall's concept of conditionali-sed aid (German integration in decision-making)
- Pillar 3: Jean Monnet's concept of functional insti-tution-building (that led to the European Union)
- Pillar 4: Mikhail Gorbachev's „new thinking“ to break out of the deterrence syndrome that was instrumental for ending the Cold war globally and for first peaceful global change in human history.

2.1. Lessons from Europe for the Middle East?

- These four key conceptual ideas of Mitrany (UK), Marshall (USA), Monnet (France) developed during World War II, in the Cold War, and Korean War, and of Gorbachev changed the per-ception of reality and enabled fundamental contextual changes.
- For the Middle East, during the present crisis, new conceptual ideas are needed to break out of the perennial cycle of violence.
- Reviewing the impact context changing ideas had in Europe may contribute to a critical reassessment of the mindsets, poli-tical strategies and tactics that have led to the deadlock.
- The prevailing thinking postpones taking joint decisions in the Middle East now to cope with the projected regional impacts of global environmental change in this century.
- The longer these challenges are being ignored the higher the price for regional adaptation and mitigation strategies will be.

3. SECURITY PERCEPTIONS MATTER

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 depends on worldviews or traditions

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

Security dimension? ? Level of interaction	**Mili- tary**	**Political**	**Economic**	**Environ- mental ?**	**Societal**
Human individual ?				**victim**	
Societal/Community				✍✍	
National	**MENA region: sec. dilemma**			✍✍	
International/Regional				✍✍	
Global/Planetary ?				**GEC**	

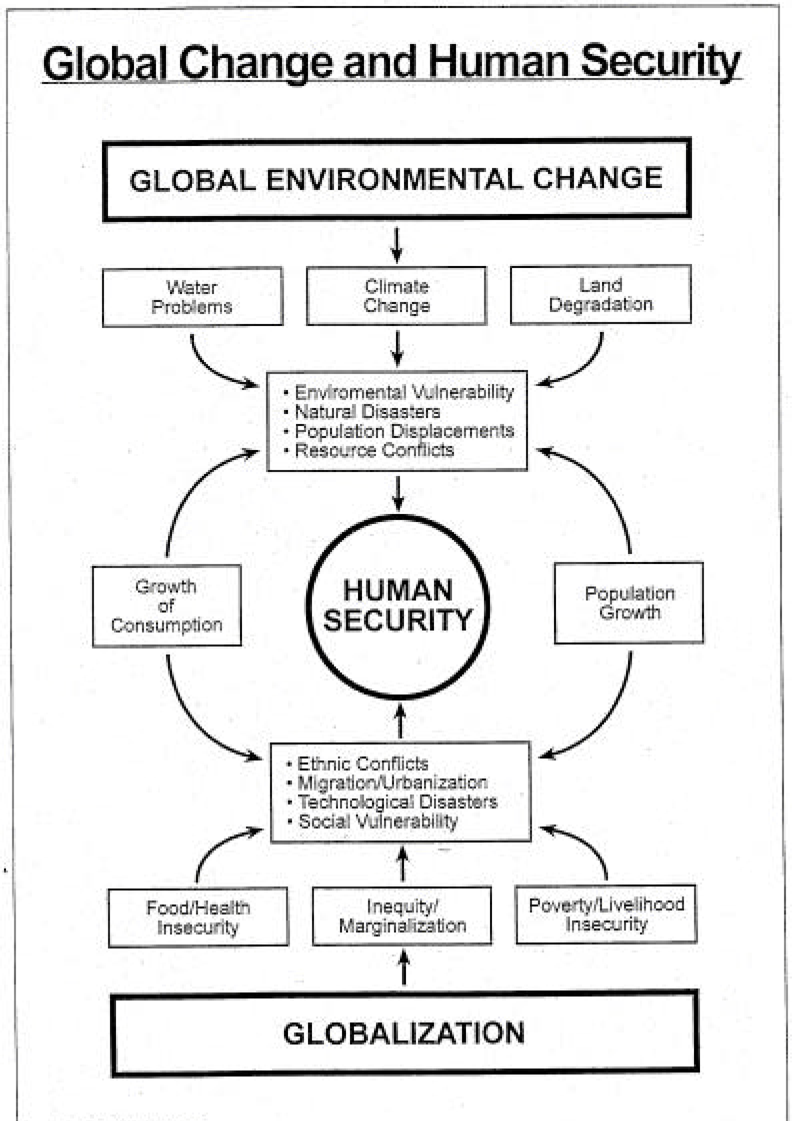
3.1. Expanded Concept of Security

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

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

Security dimension? ? Level of interaction	Environmental ?	Threat	Chal-lenge	Vulne-rability	Risk
Human individual ?	victim			Internal (societal)	hígh
Societal/Community	✍✍		hazards		high
National	✍✍	rarely	disaster	✍✍	medium
International/Regional	✍✍		migration	External (env.)	low
Global/Planetary ?	GEC				low

3.2. Dual Global Challenge: GEC & Globalisation



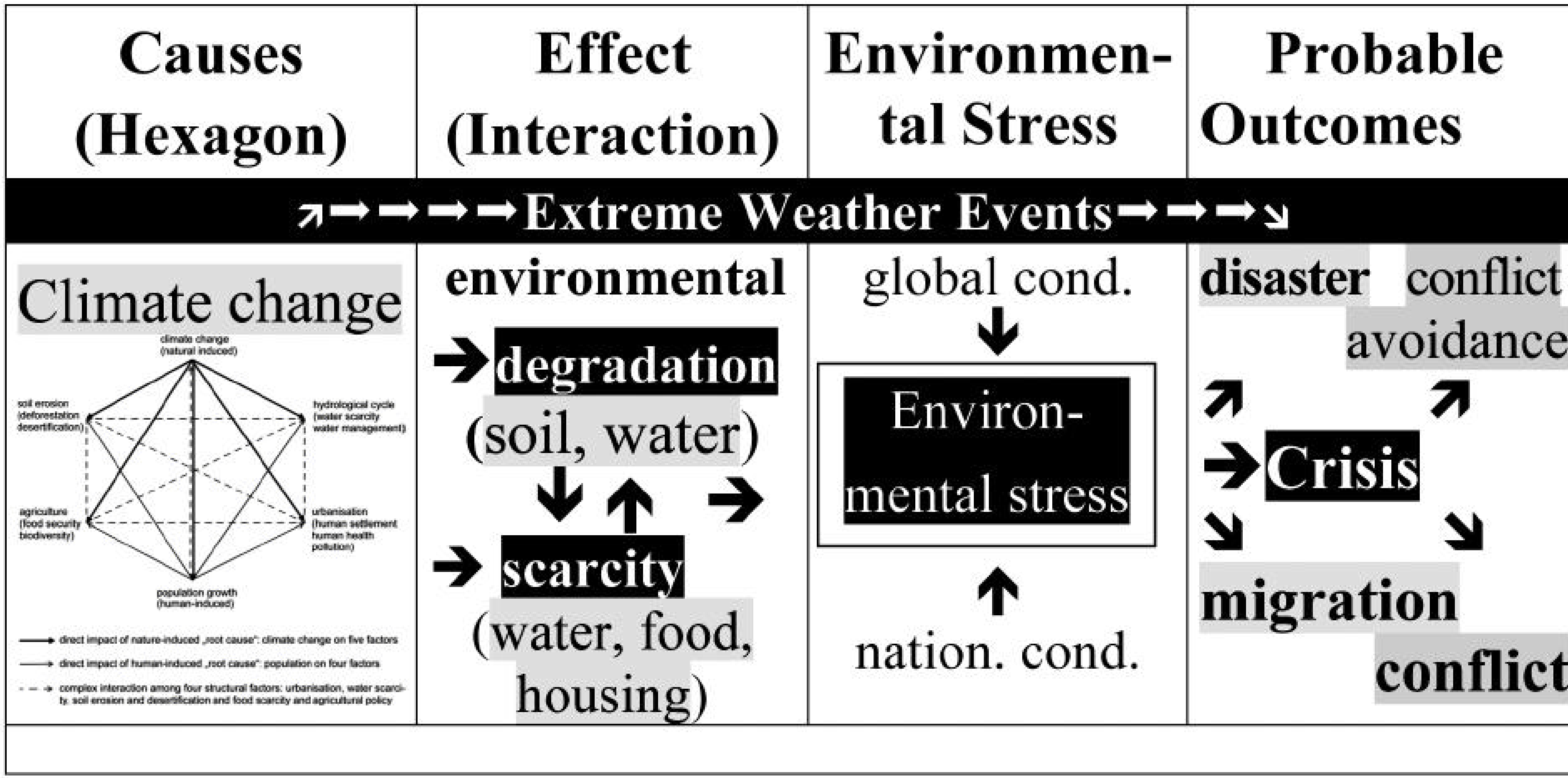
Human Security Perspective

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

- **GEC > env. vulnerability > disaster > migration > scarcity**
- **Globalisation > inequity > social or societal vulnerability**
- **Key questions for Middle East**

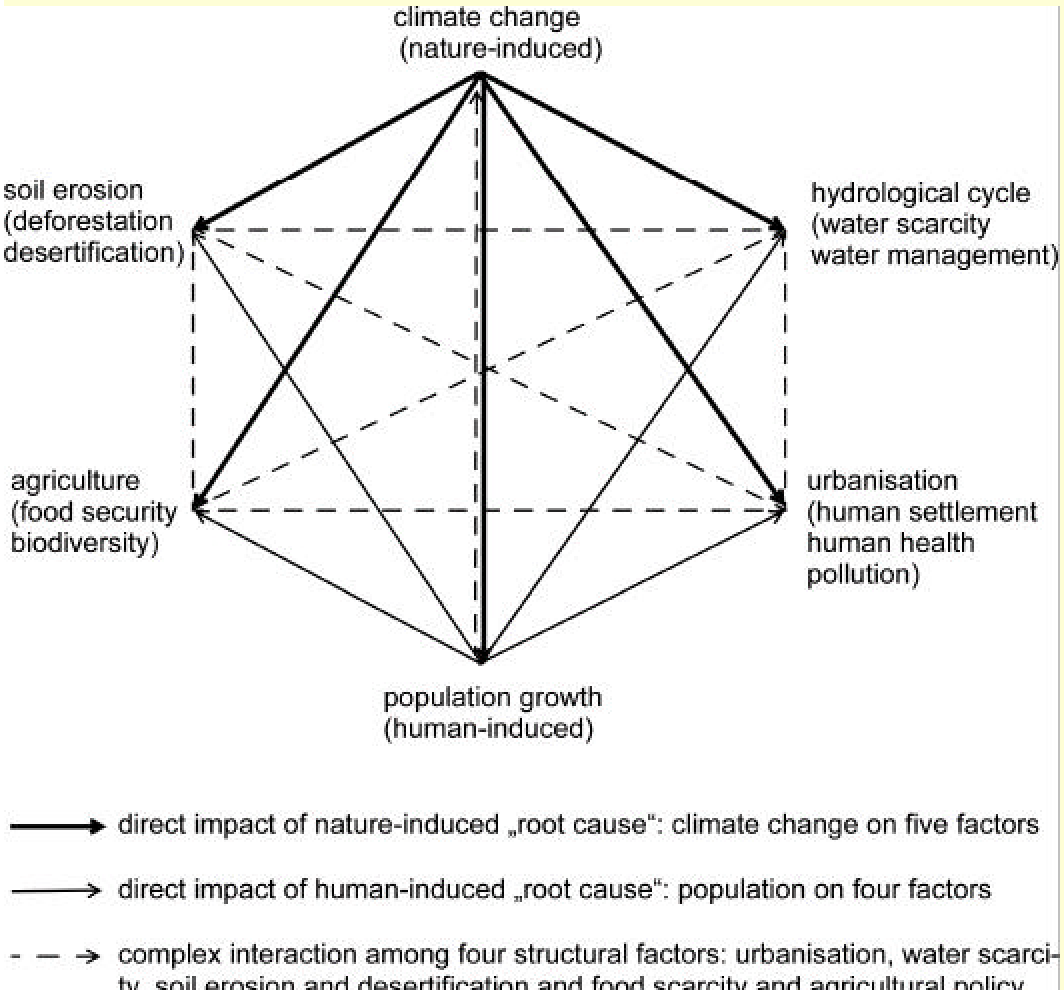
- How will GEC & globalisation affect the individual, society, countries?
- Is human survival at risk, for whom?
- Can the global environmental security challenges (GEC) be solved by hard security concepts and means?

3.3. Model: Global Environmental Change, Environmental Stress & Fatal Outcomes



3.4. Six Factors of GEC: Survival Hexagon

Survival Hexagon: 6 key factors



Environmental security **in the Middle East is affected by both** GEC & by human activities (including economic globalisation)

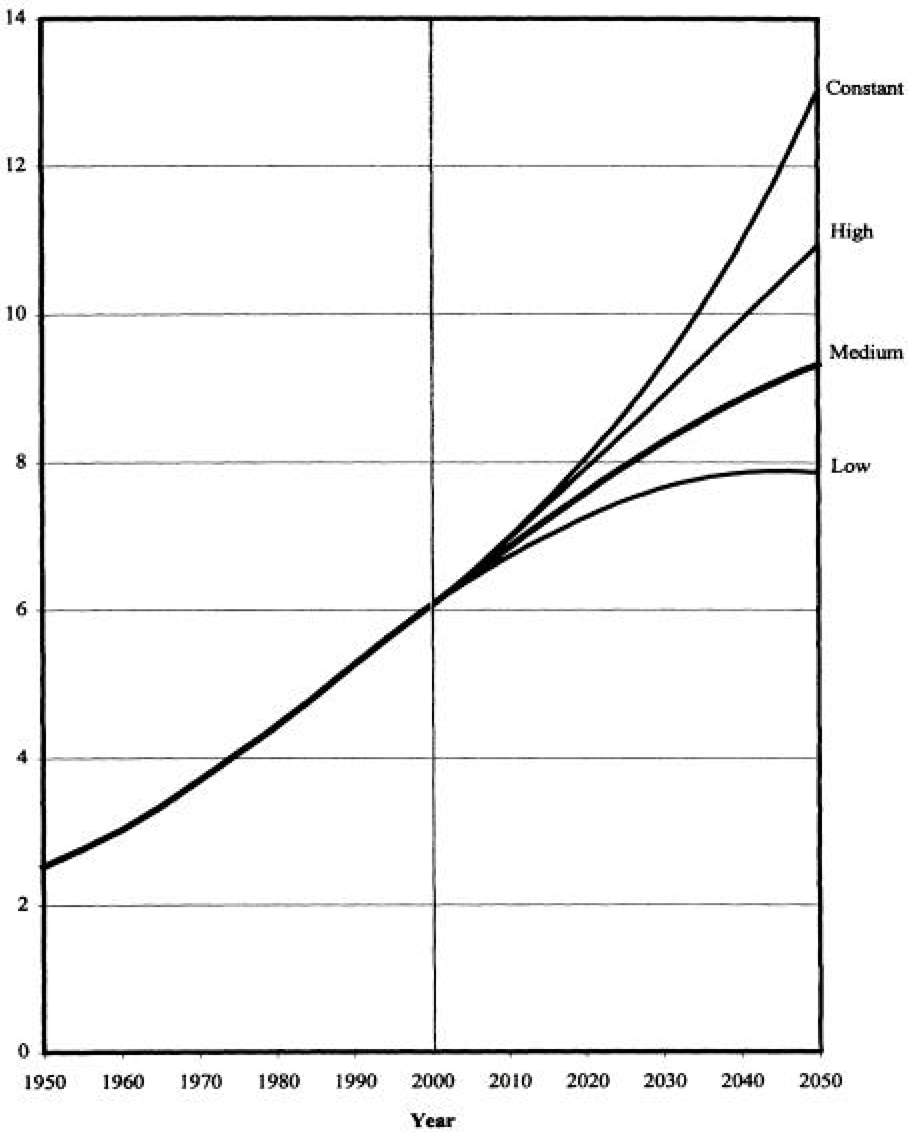
Nature & human-induced

- Air: Global climate change
- Soil degradation, desertification
- Water: hydrological cycle,

Human-induced factors

- Population growth
- Urbanisation
- Food & Agriculture
- **Economic production & consumption patterns (impacts of globalisation) on Global Environm. Change (GEC).**

4. IMPACTS OF GEC IN THE MIDDLE EAST



- **Population growth:**
  - World Population, Medium Scenario 2000-2150 (UN, 1998 Rev.)

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

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

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

- **Urbanisation:** will increase
- **Food & Agriculture:** Demand will grow due to popul. growth

4.1.Population Growth: Eastern Mediterranean

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

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

	1850	1900	1950	2000	2025	2050	1950-2050	2000-2050
Jordan	0.25	0.3	1.24	4.91	7.19	11.71	10.47	6.80
Israel			1.26	6.04	8.49	10.07	8.81	4.03
OPT	0.35	0.5	1.01	3.19	7.15	11.82	10.82	8.63
Egypt	5.5	10.0	21.8	67.9	94.8	113.8	92.01	45.96
Syria	1.5	1.75	3.50	16.19	27.41	36.35	32.85	20.16
Lebanon	0.35	0.5	1.44	3.50	4.58	5.02	3.58	1.52
East. Med.	12.45	16.05	29.25	89.50	141.43	173.88	144.53	84.28
S. Europe	83.0	103.5	132.9	177.3		154.1	+21.2	-23.24

4.2 Population Growth: UN Projection to 2300

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

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

According to the Medium Scenario, 2000 to 2300, maximum population & year

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

	2000	2050	2100	2200	2300	Year of max. pop.	Max. pop.
Jordan	5.035	10.154	10.664	9.659	10.077	2080	10.902
Israel	6.042	9.989	9.833	8.817	9.370	2070	10.290
OPT	3.191	11.114	14.932	12.856	13.484	2105	14.933
Lebanon	3.478	4.946	4.506	4.420	4.694	2055	4.951
Syria	16.56	34.174	35.012	31.530	33.413	2075	36.316
Turkey	68.28 1	97.759	90.323	87.452	91.593	2055	98.064
Egypt	67.	127.41	131.819	117.851	124.715	2075	136.279

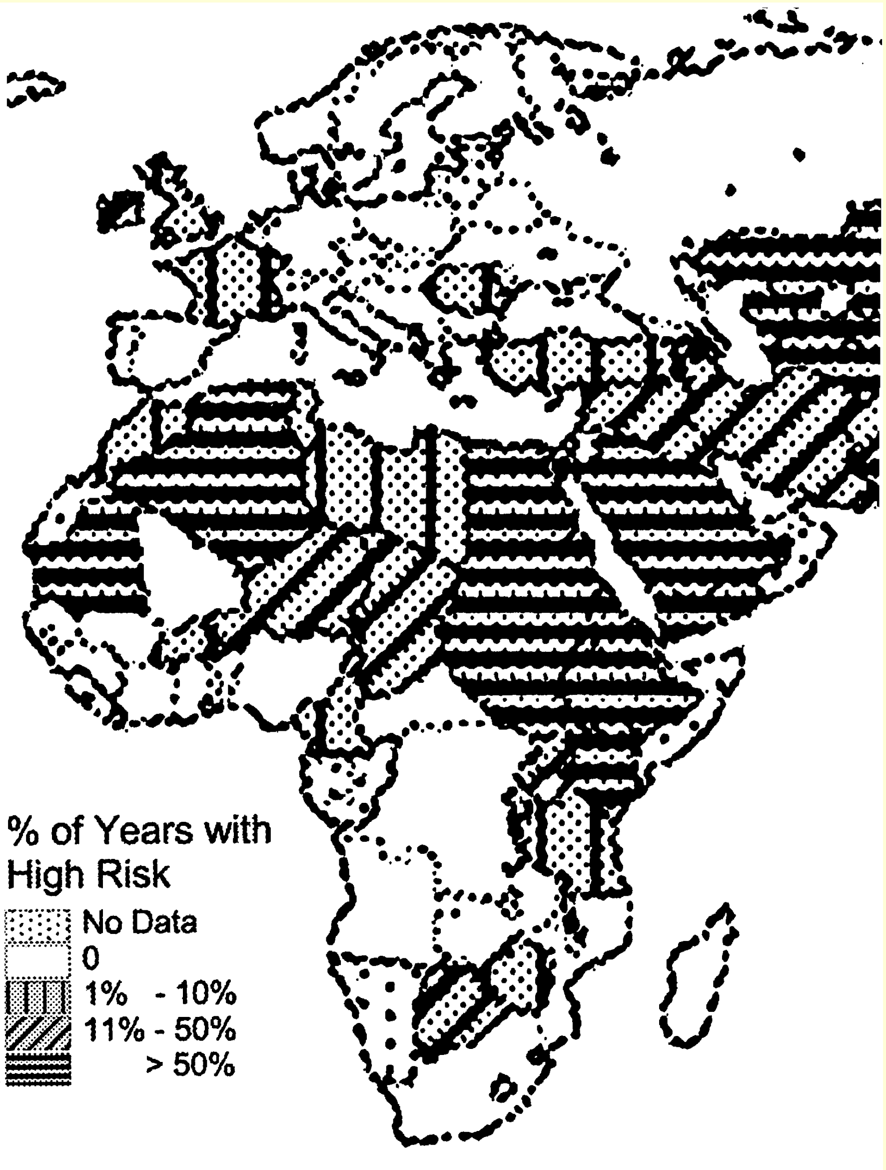
4.3 Urbanisation in the Eastern Mediterranean

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
Egypt	31.9	37.9	43.8	42.7	44.0	48.2	54.4
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

4.4 High Potential for Food Crisis 1990-2050



- **Food Crisis: 1900-1995**

Source:Alcamo/Endejan (2002)

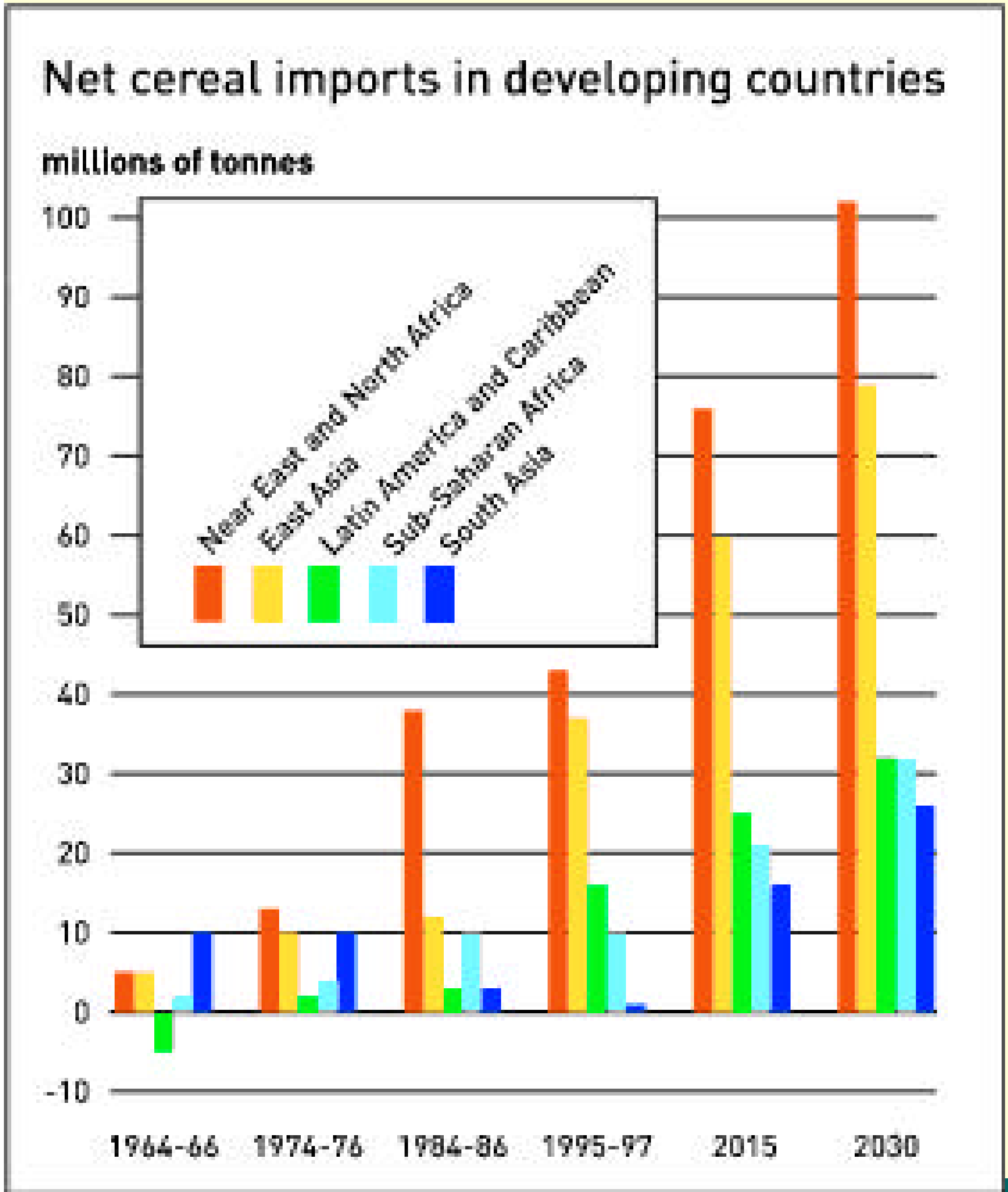
High Potential for Food Crisis 2001-2050 with GDP In-crease & Climate

4.5. Food Security in the MENA Region

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

	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
19	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

4.6. FAO (2003) Increase in Cereal Imports



- **FAO: 4 March 2003, Rome** World's population will be better fed by 2030, **but hundreds of millions of people in developing countries will remain chronically hungry**.
- Parts of South Asia may be in a difficult position and **much of sub-Saharan Africa** will not be significantly better off than at present in the absence of concerted action by all concerned.
- Number of hungry people is expected to decline from 800 mill. 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.**

4.7. Summary of Demand Factors:

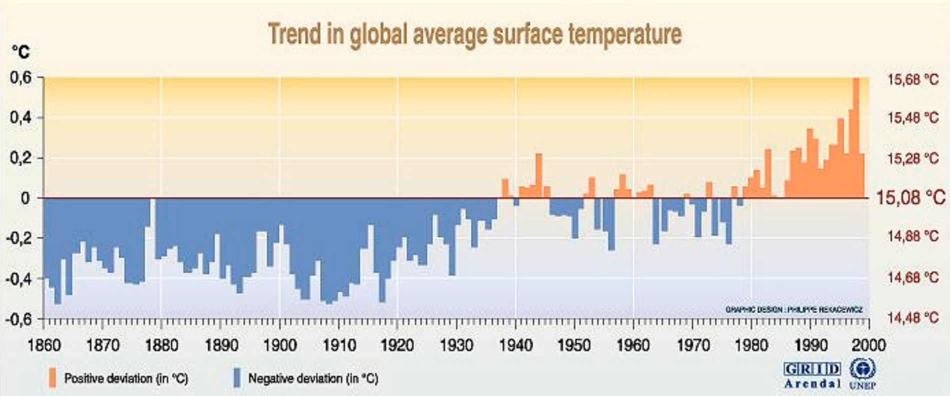
- The population of Israel & Palestine was projec-ted to grow from 2000-2050 by 10.83 million or for Israel, Jordan and Palestine to double from 14.14 mio. to 33.6 mio. by 19.66 million.
- Most of the growth will be in urban centres.
- The demand for water and food will grow signi-ficantly, especially for food imports of cereals.
- How will the supply factors: climate, water and soil in this semi-arid and arid region contribute to satisfying the growing demand?

5. Global Climate Change: Temperature Increases

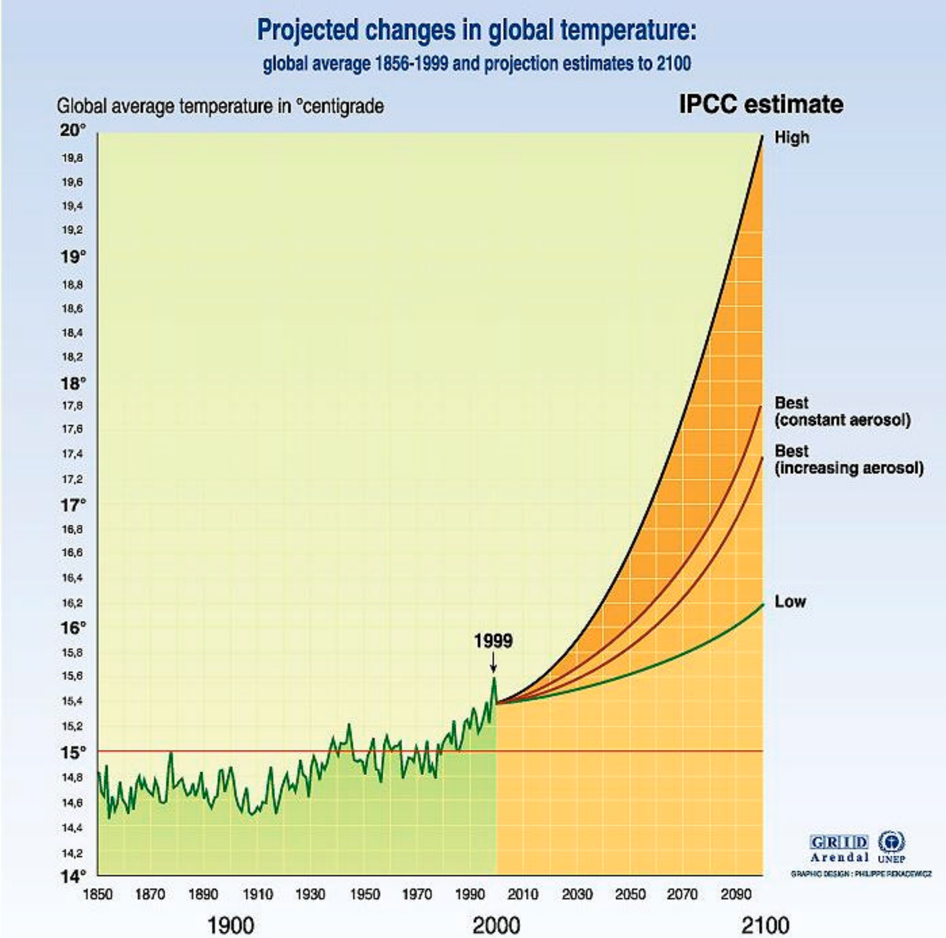
Climate Change Impacts: Temperature & Sea level Rise

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

Sources: IPCC 1990,1995,2001

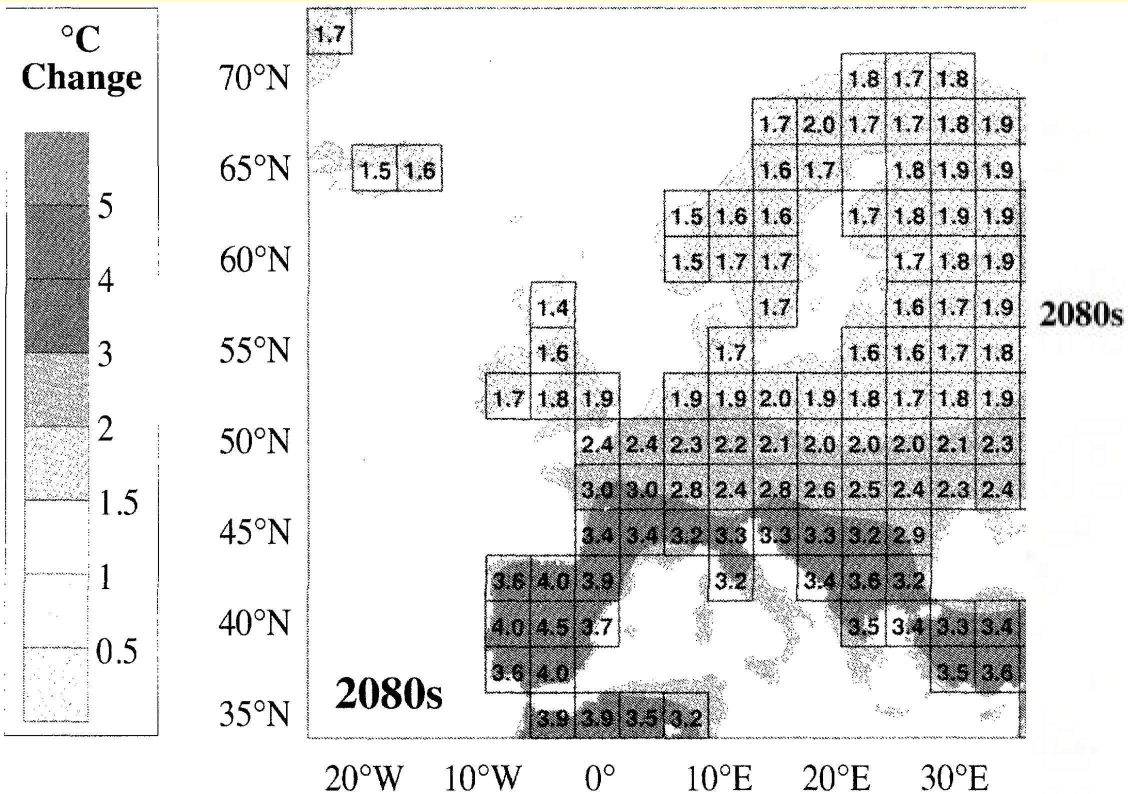


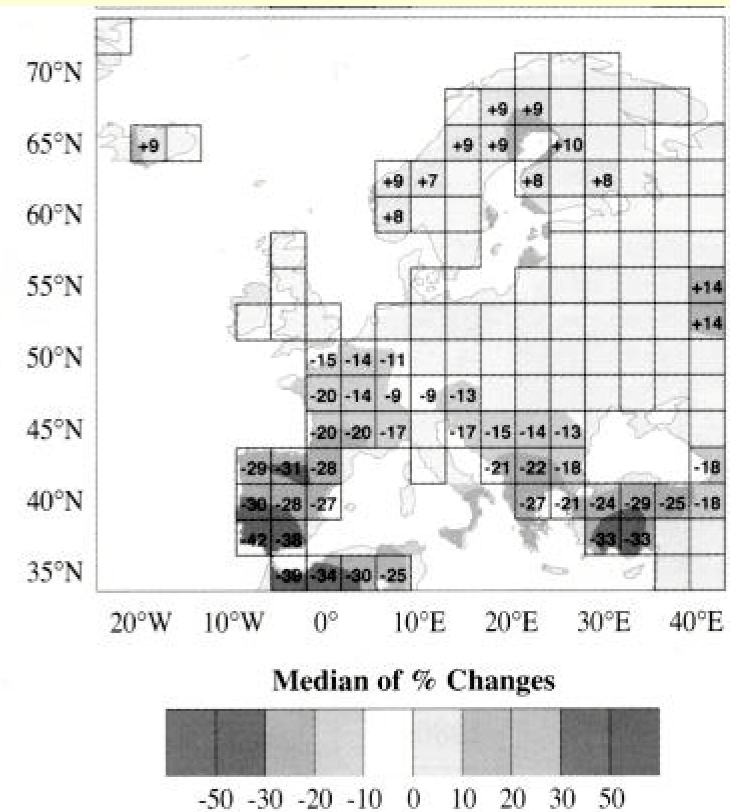
Source: School of environmental sciences, climatic research unit, university of East Anglia, Norwich, United Kingdom, 1999.



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

5.1. Climate Change Impacts in Mediterranean





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

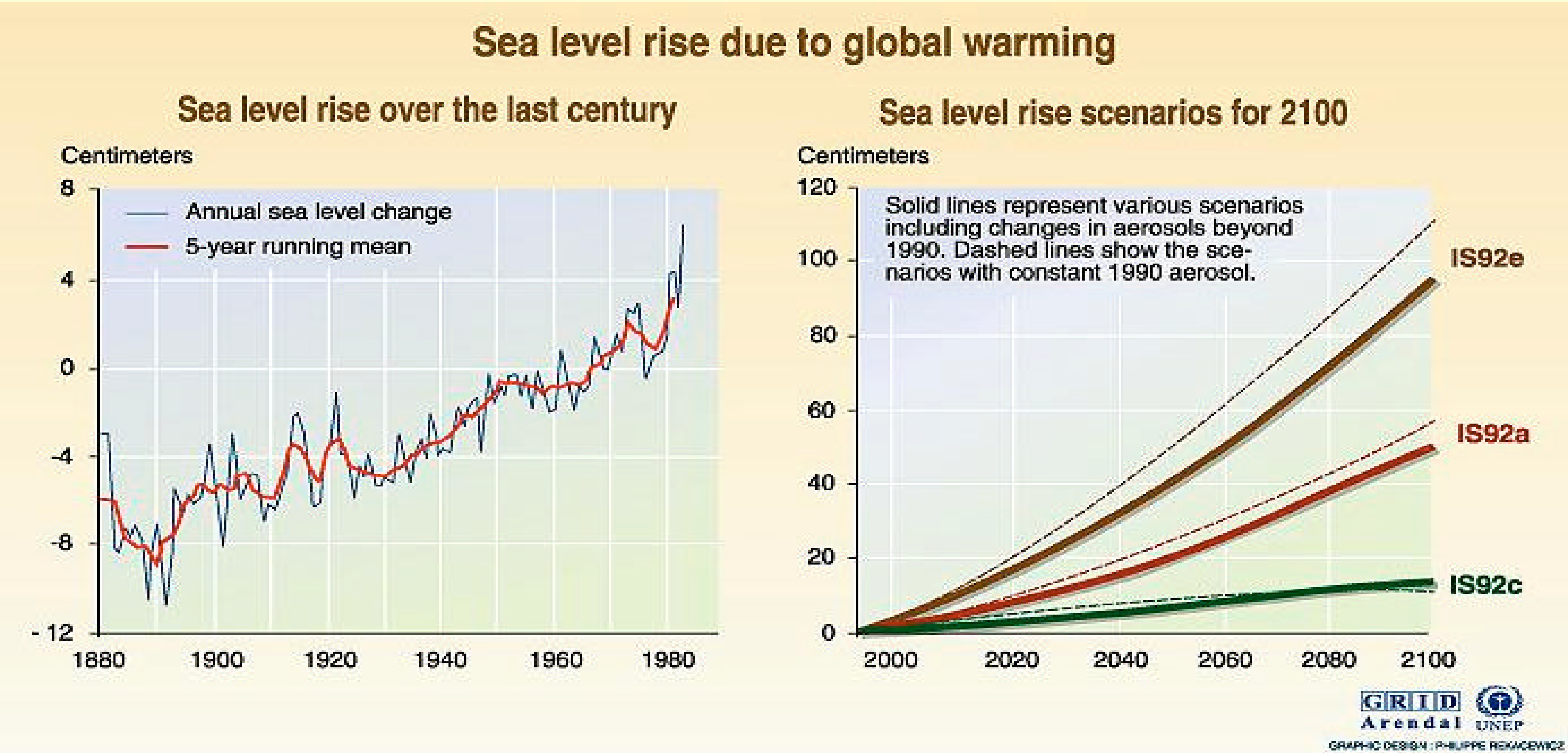
Mean Precipitation Change for Summer in 2080s (WG II, p. 652)

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

No specific climate change models for Eastern Mediterranean.

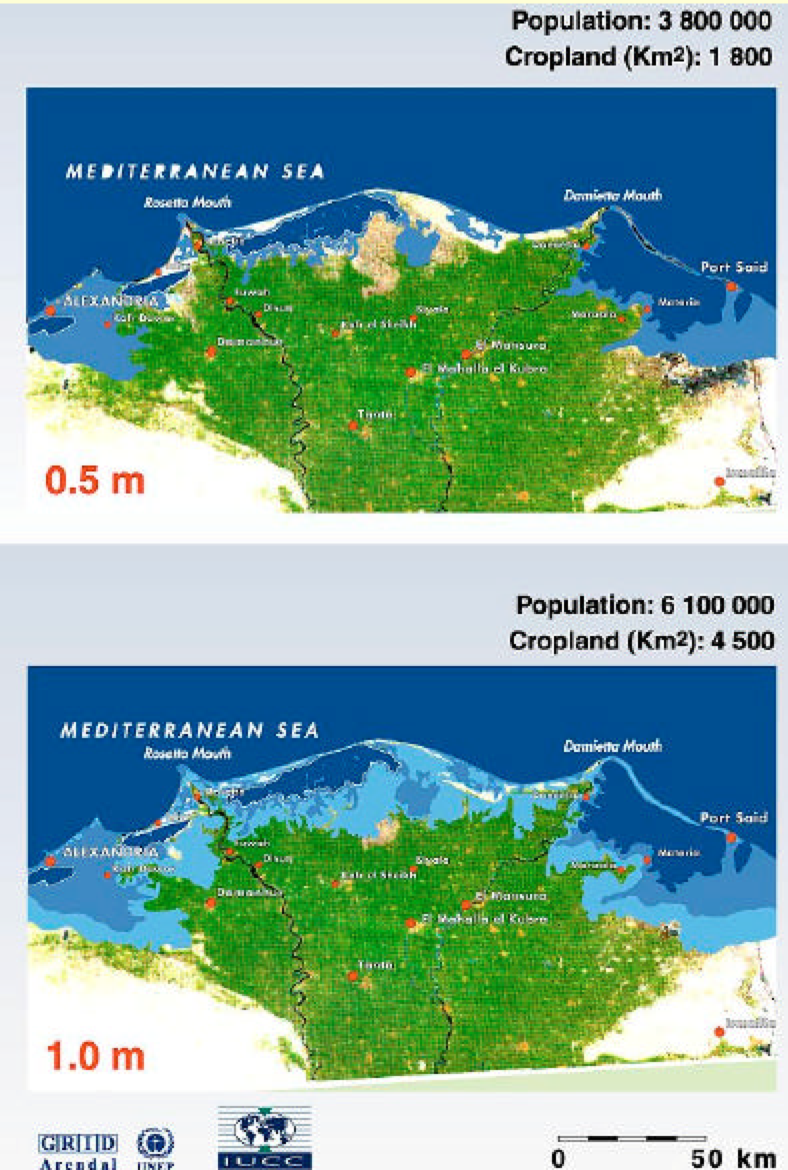
5.2.Global Climate Change: Sea level rise: 1860-2100

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



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

5.3. Effects of Climate Change for Egypt & Nile Delta



Climate Change Impacts for Egypt:

- Nil Delta: 50cm, 2 mio. persons,214.000 jobs
- Temperature for Cairo to 2060: + 4°C
- SSR (cereals): 1990-2060: 60% ✍ 10%
- Decline in yield of wheat (by 2050: -18%)

Climate trends in Medit. 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.

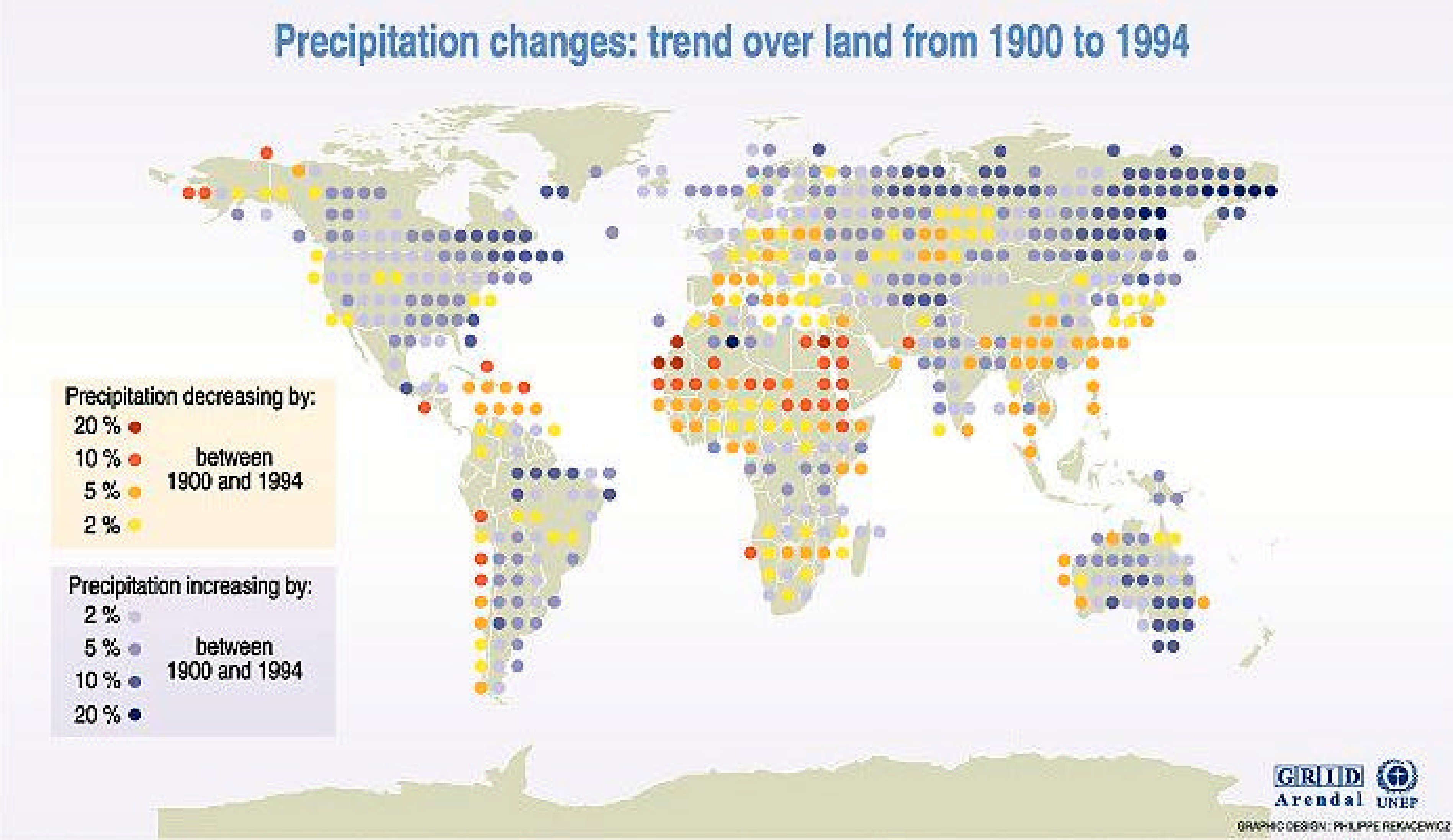
MENA: Increase in Food Insecurity

- FAO 2003: 1995-2030: +150% (42✍116 Mio.t)
- SSR: 1964: 86%, 1995: 65%, 2030: 54%

Dramatic Increase in Cereal Imports

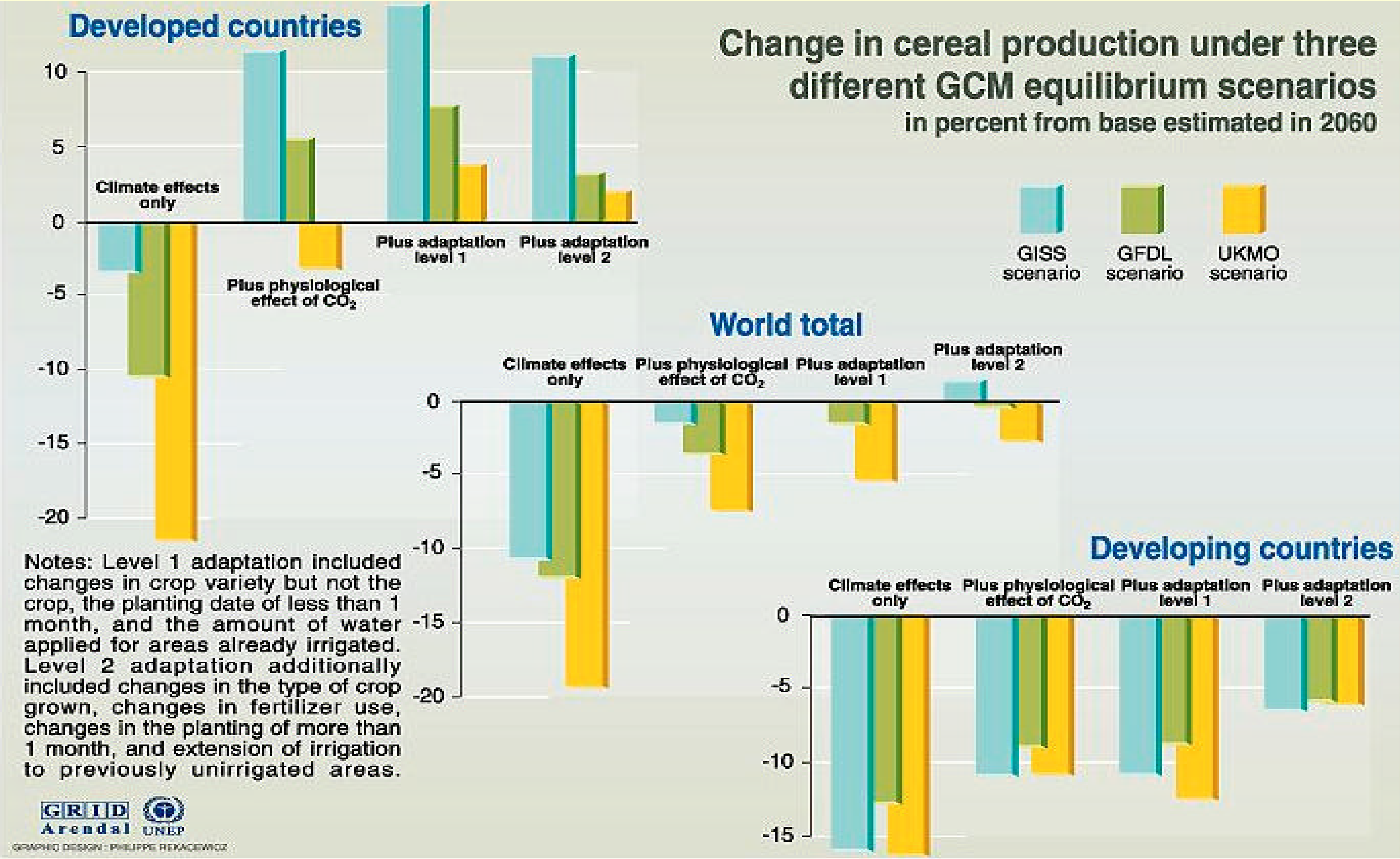
- Due to population growth & climate change

5.4. Climate Change Impacts on Precipitation



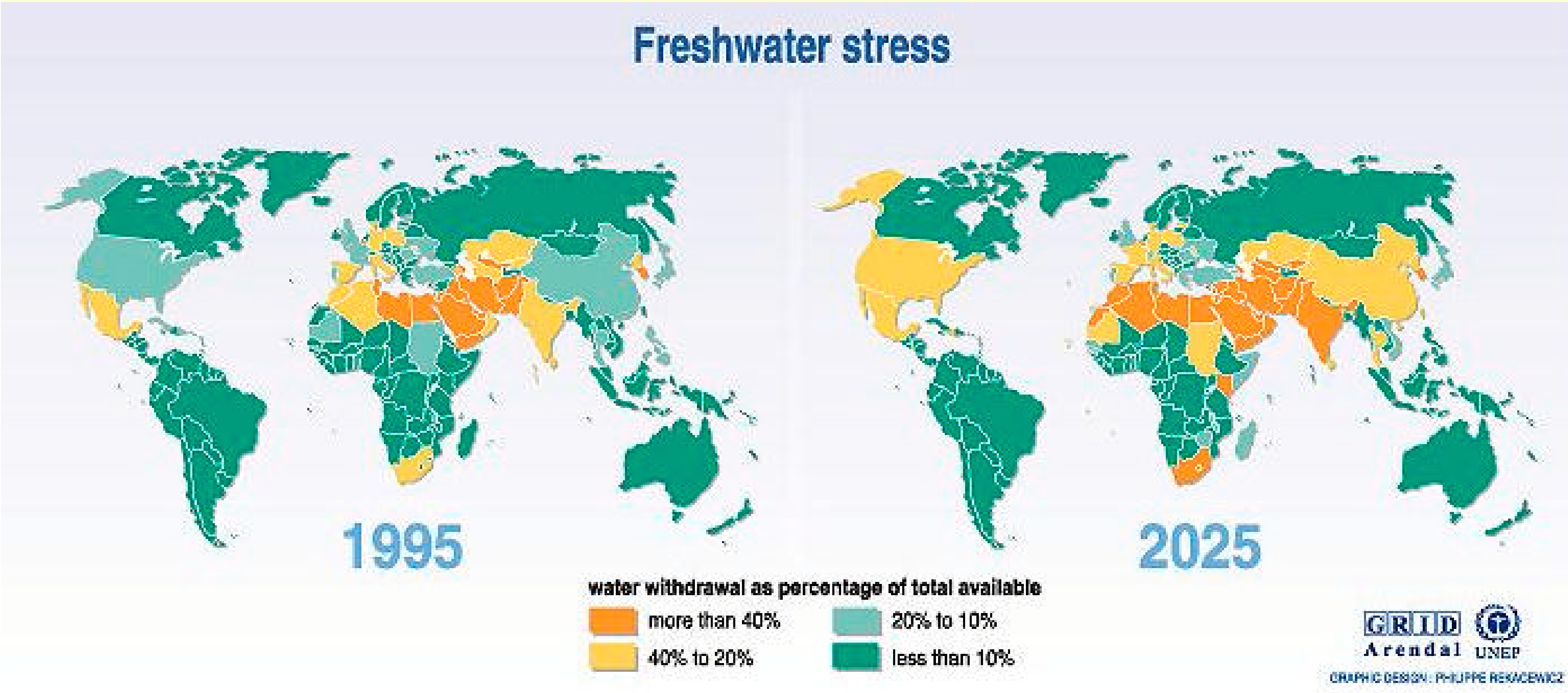
Sources: Climate change 1995, The science of climate change, contribution of working group 1 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge press university, 1996; Hulme et al., 1991 and 1994; Global Historical Climate Network (GHCN), Vose et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

5.5. Climate Change Impacts on Agriculture



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

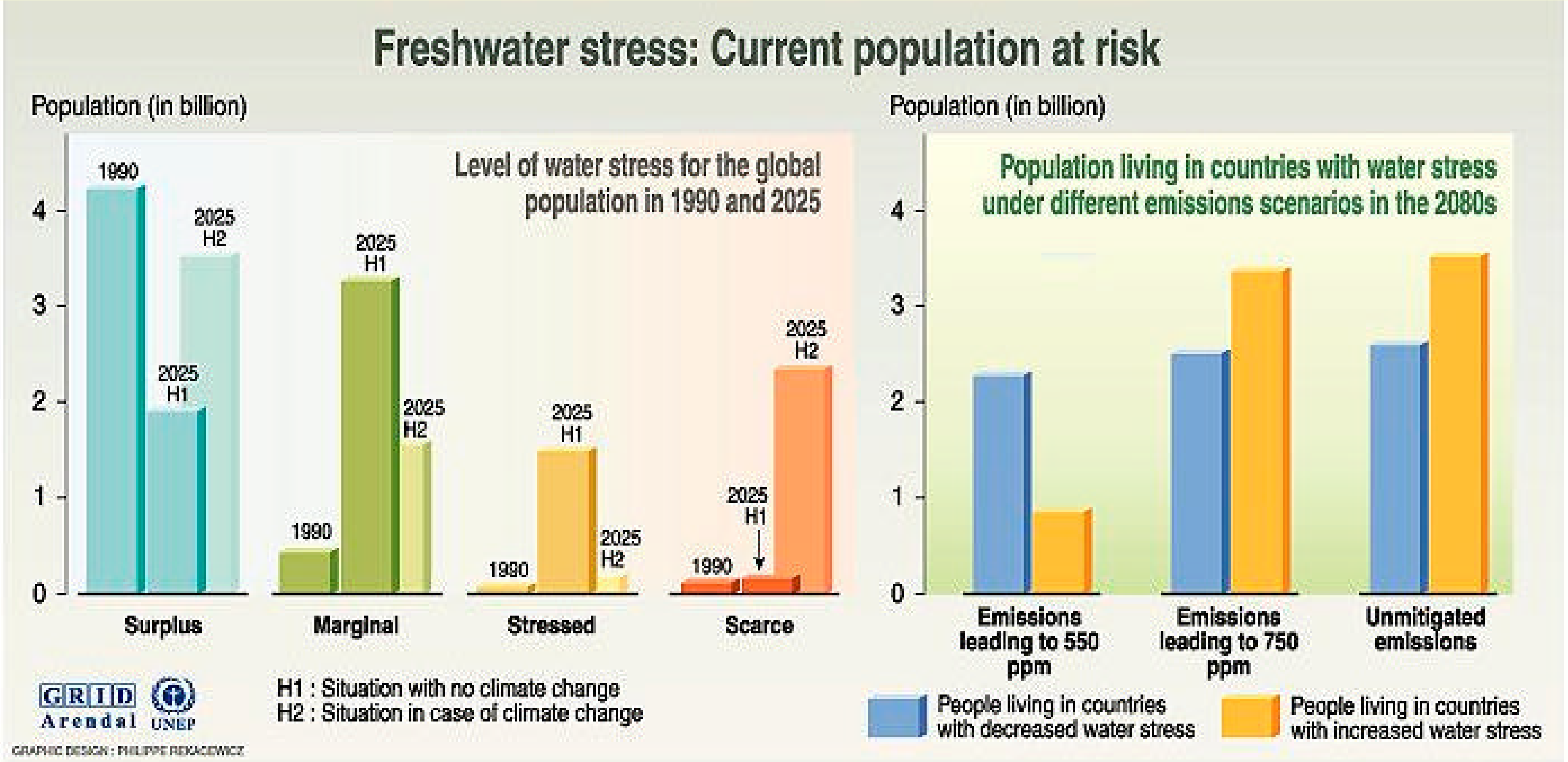
5.6. Global Fresh Water Stress, 1995-2025 (UNEP)



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

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

5.7. Population at Risk due to Freshwater Stress in 1990, 2025 and in 2080s with(out) Climate Change



Source: Climate change 1995, Impacts, adaptations and mitigation of climate change: scientific-technical analyses, contribution of working group 2 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge press university, 1996; Climate change and its impacts, stabilisation of CO2 in the atmosphere, Hadley centre for climate prediction and research,the meteorological office, London, 1999.

6. STRATEGY FOR RECOGNISING LONG-TERM ENVIRONMENTAL CHALLENGES

- **Water demand will significantly increase due to population growth & growth in food.**
- **Water supply in the region will most likely decline due to climate change depending on Climate Model & on Greenhouse Emissions**
- **Knowlede is needed on impacts of interactions among six factors of Global Environm. Change to develop adaptation and mitigation measures.**
- **Is the new generation aware of these challenges and prepared to cope with them?**

6.1. Readiness of Israelis and Palestinians for Functional Cooperation?

Public Poll of World Econ. Forum (21.6.2003): Findings

- About 66% of Israelis & 56% of Palestinians are for renewal of negotiations between Israel & the Palestinians on basis of the roadmap.
- Israelis (75%) & Palestinians (68%) believe: both have a right to live in peace and security.
- 66% of Israelis & 57% of Palestinians agree: mutual cooperation & joint projects between all nations of the region, in areas such as water, health, environ-ment, tourism, etc., should start as soon as possible, even now before final peace agreements are reached.
- Both sides agree to move forward on other areas of possible cooperation, such as water desalination & restoration, environmental issues, regional health projects & agriculture.
- What are the obstacles against this mutual readiness for functional cooperation and how can they be overcome?

6.2. From Readiness to Action

The following are possible areas of co-operation between Israel and the Palestinian Authority. Please tell us whether you are in favour or against cooperation between the two entities in each area:

	% in favour	
	Israelis	Palestinians
Water desalination	**78**	**77**
Regional health	**79**	**73**
Environm. issues	**82**	**68**
Agricultural issues	**79**	**72**
Regional tourism	**76**	**55**
Reg. trade relations	**76**	**64**
IT and hi-tech	**67**	**68**
Culture & sports	**72**	**51**
Free movement of workers in between	**56**	**77**

- **Readiness of both Israelis & Palestinians for functional cooperation.**
- **Implementation of this will of peoples requires a shift in concepts from national to human & environmental security.**
- **The visions of Mitrany & Monnet & policies of G. Marshall & M. Gobachev may contribute to such a mutual learning process.**

7. RELEVANCE OF THE EUROPEAN EXPERIENCE FOR THE NEAR EAST?

What you see depends on your worldview & mindset!

Learning from the End of World War I and II

- **Versailles:** Mixture of **Hobbesian** punishment with **Wilsonian** vision and rhetoric
- **G. Marshall & J. Monnet:** two **pragmatic functionalist visions for cooperation** among former enemies: **conditionalised support for countries and people**
- **Shift for Germany: objective security**: joint enemy and integration in NATO/EU; **subjective security:** Avoidance of perception of humiliation

Learning from the End of the Cold War (1989-1990):

- **Hobbesian: Anderson: Victory: US Military and economic superiority (power)**
- **Grotian: Gorbachev: Breaking out of arms race by conceptual learning**

In ME: exclusive focus on hard security as a zero sum game & power

- **Asymmetric conflict:** between a powerful **state** vs. powerless **non-state** actors
- **Spiral of violence:** cycle of human misery producing hatred on both sides

Need fundamental shift in thinking on security in and on ME region:

- **From national military and political security: referent: nation state to**
- **Human-centred environmental security: focus on joint challenges of survival**

7.1. Perception Requires a Shift in Security Concept and of Perceptions in the Near East

- **Lessons learned from end of WW II: In Germany: from a perception of humiliation to an experience of integration in an emerging postnational constellation (J. Habermas).**
- **Lessons learned from 1989: Peaceful change is possible. Combination: loss of fear of people, readiness for change**
- **Major Obstacle: Adherence to a narrow hard national military security concept in Israel and in most Arab countries including Palestine**
- **Objective security: Absence of threats to acquired values: This does presently not exist in the Middle East. Remains task of a peace agreement.**
- **Subjective Security: Absence of fear that such values will be attacked: This does not exist in the Middle East. Requires satisfying basic human needs & overcoming the perception of humiliation & repect for the dignity of the other.**

- **Only from a wider „human security“ perspective environmental security challenges and risks to humans matter. This requires a wider security concept that recognises new soft “security” challenges & an understanding that they can be solved by functional cooperation.**
- **Thus, strategies must build on existing forms of cooperation.**

7.2. Functionalist Perspective towards a Mutual Sustainable Development

- **Major task of overcoming the Hobbesian thinking in zero-sum games.**
- **No environmental challenge can be solved with Hobbesian logic.**
- **Major obstacle: lack of trust due to daily experience of violence.**
- **East-West Conflict: Lack of trust: resulted in search for confidence & partnership building measures to prepare cooperation during conflict.**
- **First step: problem recognition: our book on *Security and Environment in Mediterranean*) and agenda setting**
- **Near & Middle East: Need for environmental partnership building measures to build mutual trust** by addressing these urgent **joint environmental challenges** by **functional cooperation** on **freshwater, wastewater, solid & hazardeous waste, conservation and biodiversity**.
- **Second Step: Gradually building mutual trust by functional cooperation addressing the challenges to survival by water, soil and food specialists between Israel & Palestine and with Egypt & Jordan.**
- **Third Step: Anticipatory Learning: Mitigate the horrible projections!**

7.3. Coping with Non-military Challenges

1) Climate Change: Implementing Kyoto and Beyond

- ✍**Kyoto Mechanisms: Clean Development Mechanisms, GEF etc.**
- ✍**Technology transfer & capacity building in P-P partnership**
  ✍ **Special Climate Change Fund & Least Developed Countries Fund,** support technology transfer, adaptation projects & other activities,

2) Population Growth: Reproductive Health

- Support for **UNPF** activities **in cooperation with governments**, due respect to **cultures & religions**. This is a major health security but also education & gender issue (women);
- **Financial cuts due to ideological battle, ignorance, resource scarcity.** This is a major issue to be addressed solely by the future Palestinian state

3) Urbanisation: Livable rural and urban spaces.

- ✍ **for Palestine: agricultural constraints lack of water and soil erosion**
- ✍ **social security challenge: high unemployment rate among the young**
- ✍ **economic security issues: employment: crafts, industry and services.**

7.4. Coping with Water, Soil and Food Challenges

- **Water: Water Harvesting, Management, Desalination**
  - ✍**Near and Middle East high water stress, will rise**
  - ✍**joint aquifers: continued cooperation during conflict of water managers, specialists on conservation & distribution**
  - ✍**Cooperation on re-use of wastewater for irrigation, watering of parks**
  - ✍**Cooperation on desalination: coping common challenges**
- **Desertification: Strategies to Combat Soil Erosion, Degrad.**
  - ✍**Region has traditional knowledge for combating desertification**
  - ✍**Sharing of experience, new technologies in combating desertification**
- **Food Scarcity: Satisfying Food Needs**
  - ✍**Exchange of knowledge on farming in arid/semiarid areas**
  - ✍**Cooperation in research, training and capacity building**
- **Three Pillars for needed regional functional cooperation!**

7.5. Policy Goals for Water, Food, Energy Security

Water Security relying on desalination

- ✍Israel, Jordan & Palestinian Authority need desalination to meet water needs: desalination plants are being planned & built.
  - ✍ Israel: by 2004: 250 MCM, necessary: 375 MCM
  - ✍ OPT & Palestinian state by 2010: 47 MCM, by 2020: 57 MCM
  - ✍ Jordan deficit by 2000: 297 MCM, 2010: 251 MCM; 2020: 408 MCM
- ✍Cooperation in research, development & construction of des. plants?
- ✍Research & development on solar desalinat. in Israel, OPT, Jordan?

Food Security by relying on virtual water

- ✍ With population food demand grows, water supply & crop yield drop due to climate change > Cereal import demand grows (SSR drops)
- ✍Competitiveness of irrigated agriculture with desalinated water?

Energy Security by exploiting the virtual sun

- ✍Research & Development on use of renewable energy sources I,P,J?
- ✍Cooperation among experts on jointly developing new survival industries?

8. UNCONVENTIONAL SOLUTIONS TO COPE WITH WATER SCARCITY: „virtual water“ vs. „virtual sun“

- **Allan‘s concept of „virtual water“ by food imports**
  - **This has been a solution for Israel:** water for agricultural purposes declined, industry & drinking water increased
  - Increase imports of agricultural, food products
  - Solution for Israel, but not for Egypt, Jordan, Palestine?
- **Brauch‘s concept of „virtual sun“ to create water**
  - Use excellent solar potential for desalination of water for drinkin, tourism and competitive agriculture: fruits etc.
  - This requires investments in technology & infrastructure
  - This may be an attractive solution for both Egypt, Jordan and parts of the West Bank

8.1. Focus: Hydropolitical Geostrategic Context

- **Focus 1: Euphrates/Tigris**
  Turkey, Syria, Iraq, Iran
- **Focus 2: Nile River Basin:** Egypt & 9 African countries
- **Focus 3: Golan Heights**

✍ Israel,Lebanon, Syria,OPT

- **Focus 4: Jordan River**
  Israel, Jordan, OPT, Syria

These three will be discussed

✍ **Focus 5: Sinai and Gaza**
Egypt, Israel, Palestine

✍ **Focus 6: Gulf of Aqaba**
Egypt, Israel, Jordan & Saudi Arabia & Palestine

8.2. Solar Desalination with Renewables: Response to Water Scarcity in Middle East?

- Desalination – A costly solution for Palestinians & others?
- Large hydocarbon reserves in Saudi Arabia, Syria; limited reserves in Egypt, imports in Israel, OPT & Jordan
- Energy Needs: From fossil (Arab Gulf, Libya) to renewables
- Renewable potential: solar, wind, city & agricultural waste
- Renewable solar thermal desalination: Sinai, Negev and de-serts in Jordan as a source of energy generation
- Water desalination for Gaza using renewable energy from the Sinai (Egypt): Intra-Arab cooperation
- Water desalination for Israel: Greening the Negev (without water from L. Tiberias/Kinneret)
- Water desalination for the West Bank in the Gulf of Aqaba (Egypt, Israel, Jordan, Palestine: West Bank).

8.3. Energy Potentials of Renewables

- **Israel, Palestine & Jordan depend on fossil energy imports for electricity generation, transportation & desalination**
- **High demand fossil energy prices will increase in 21st cent.**
- **Renewable Energy Sources:**
  - **Hydropower, biomass, geothermal: virtually not existent**
  - **Wind power: Red Sea, Sinai, some potential, offshore and in mountains??**
  - **Solar potential: very high solar potential**

a) **solar thermal** i) **heating/cooling; ii) electricity; iii) desalination, iv) hydrogen**

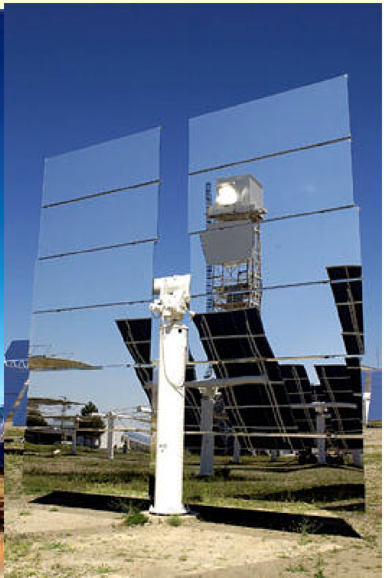
b) **solar photovoltaic: i) electricity (for small-scale solutions: hotels, outposts ets.**

- **Constraint: higher cost (no economy of scale), exc. wind**
- **Mid & longer-term alternative for Middle East countries**
- **Potential area for research & technology co-development**
- **Geo-strategic advantages of solar energy for 3 countries:**
  - **High national technical and economic potential, energy independence**
  - **Renewable source and unlimited supply (Sinai, Jordanian desert, Negev!)**

8.4. Solar Thermal Technologies

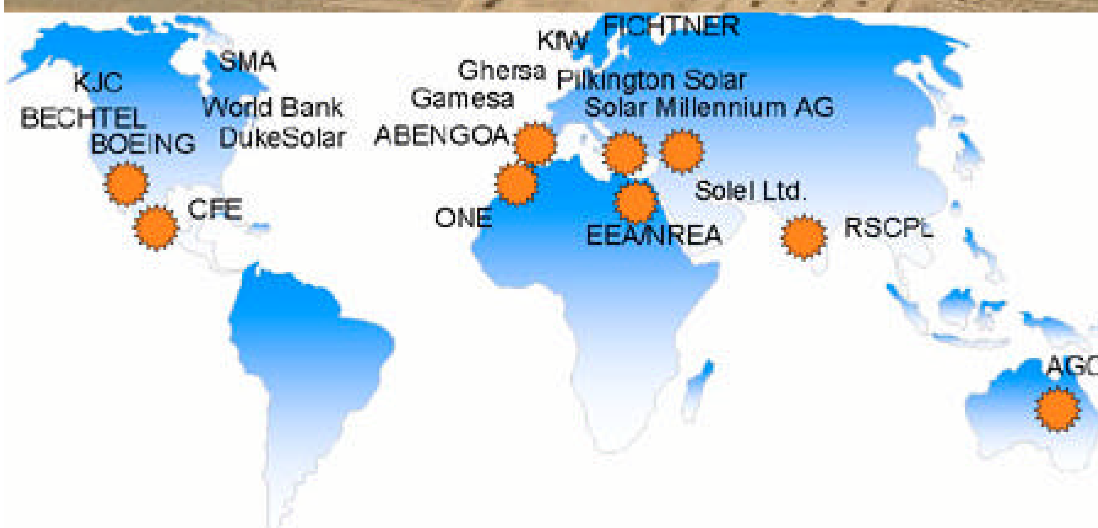
- **Concentrating Solar Power Technologies:**

- „use solar radiation to achieve high temperatures and to generate steam or air with high energy density, which can then be used for electricity generation and other purposes“. (Trieb et. al. 2002)
- alternatives: a) Fresnel concentrators, b) parabolic trough (400-600 °C), c) solar tower concept with surrounding heliostat field (1200 °C, up to 50 MW), d) solar dish (for small applications up to 50 kW).
- Economic lifetime: at least 25 years; energy payback time of a solar plant: ca. 0.5 years (Trieb et. al. 2002)



8.5. Solar Thermal Technologies (2)
Parabolic Trough & Solar Dish (for small applications)

8.6. Solar Thermal Electricity Activities



- Luz (now Solel) built 9 solar stations in Mojave desert in 1984, ca. 354 MW (30 to 80 MW each), price: 12 c/kWh, new: 10-5C/kWh
- Only commerc. installation
- CIEMAT (Spain) & DLR (Germany) at PSA Almeria developed technology
- Israel, Ministry of National Infrastructure approved plan to build a 100 MW station in the Negev to expand to 500 MW
- Spain: in planning stage
- GEF: projects in Mexico, Morocco, Egypt, India

8.7. Solar Thermal Electricity Plans in Israel & Egypt

- **Prof. Faiman**, Ben-Gurion Nat. Solar Energy Inst.: solar research in Israel: **"Solar-thermal power is studied at Ben-Gurion University (parabolic troughs, parabolic dish); at Weizmann Institute (solar furnace, central receiver tower)**
- **Nov. 2001,** Israel Ministry of National Infrastructures decided "until 2005 the CSP with a minimal power unit of **100 Mwe**; option to increase the CSP up to **500 MWe**."
- **In July 2004**, "Solel Solar Systems has decided to build a solar power station in the Ashalim area in the Negev. The power station will initially produce 150 MWe for 50,000 homes, up to 500 MWe for Negev communities.
- **Solel** will establish a consortium to finance and build the power station, which it estimates will cost **$1 billion**. Cost of the first stage of the project is **$250 million**."
- **Solel's excecutive Mandelberg:** "Israel has plenty of sunlight available for exploitation, it has little land, and most of the **Negev** is occupied by the **IDF** and consequently is unavailable for use. This fact hinders the construction of solar power stations".
- **Egypt has been among the first five countries considered by the GEF for a solar thermal installation**.
- **The technology that was successfully existed for two decades in the US, will finally be applied and demonstrate its potential in the region.**

8.8. Desalination: Technologies & Use

- **Combined solar power & desalination plants with proven technolog-:**
  a) steam turbine co-generation system and
  b) thermal seawater desalination.
- **Trieb/Nitsch/Kronshage/Schillings et. al. (2002):**
  “a **200-MW plant** of this type with 7.500 full load operating hours/yr under conditions of Dubai would deliver approximately **1.5 bn. kWh/yr of electricity** and 60 million m3 of freshwater at approximately **4.3 €-cents/kWh and 1.30 €/m3 of water**, **water for 50.000 and electrictiy for 250.000 people, costs: 800 M€.**
- **A. Cohen: Haaretz, 11.12.2003: Giza Financ. Consult.; 10 cents/kWh, cost of desalination decreased within a decade from 1 $ to 50 cents.**
- **Middle East Desalinat. Research Centre, Muscat, Oman:**
  20 experts, budget US$ 1,000,000, desalination R& D in these areas:
  a) thermal processes, b) membrane processes, c) **desalination & renewable energy system integration, d) hybrid desalination processes**, e) non-traditional or alternative desalination processes, f) common technical processes, g) environmental Issues, h) capacity building, i) data banks & ref. material

8.9. Middle East Desalination Research Center (MEDRC) in Muscat, Oman

- **Middle East Desalination Research Cent.(MEDRC), Muscat, Oman developed a MENA Univers. & Research Institution Outreach Program:**

- Al-Azhar University
- Ben-Gurion University of the Negev
- Jordan University of Science and Technology
- Hashemite University
- Hydraulic Research Institute
- King Abdulaziz City for Science and Technology
- King Fahd University of Petroleum and Minerals
- Kuwait University
- Kuwait Institute for Scientific Research
- Royal Scientific Society
- Sultan Qaboos University
- The University of Qatar
- University of Sfax
- Technion-Israel Institute of Technology
- University IBN Tofail
- Water and Environment Research and Study Center (WE

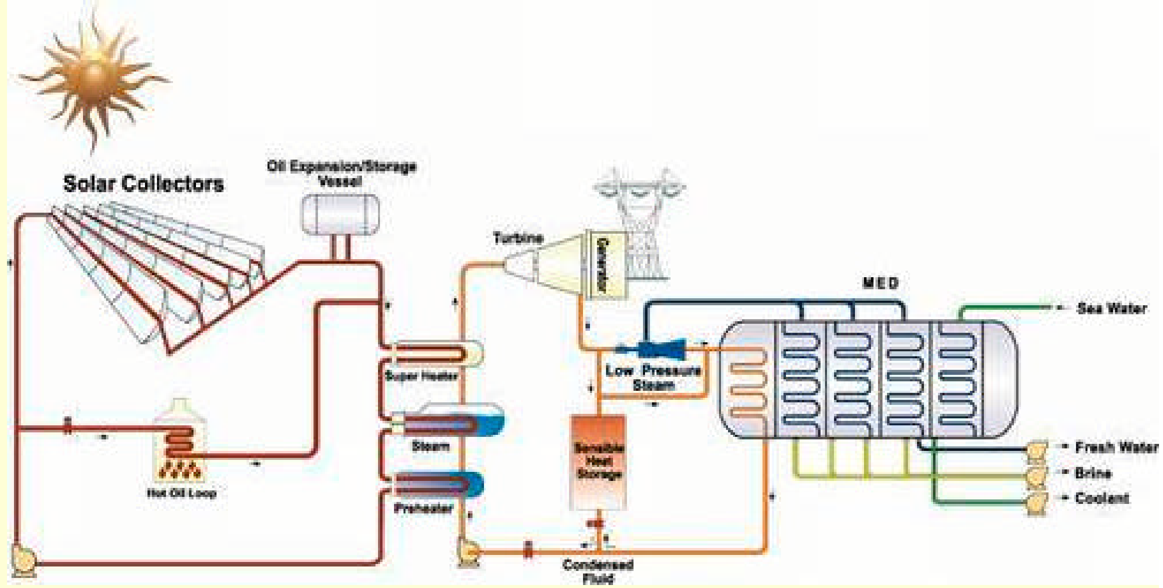
8.10. Solel: Model of a Solar Desalination Process

Most effective with direct radiation & when the cost of electrical power is more than 7 cents kWh, for resort, recreation sites & remote locations requiring auto-nomous power &desalination (Solel).

- **Desalination** separates water from salt by evaporating and re-conden-sing water. Solar thermal desalina-tion is effective: high efficiency of **solar collectors provide energy** (heat) for first evaporation. A de-salination unit evaporates & con-denses water using familiar & well tested **M.E.D. (Multi Effect Distilla-tion)** plant IDE Technologies Ltd. adapted to solar desalination.
- **Solar thermal desalinat. system** operates as a **hybrid plant** 24 hours a day, with sunshine during daylight hours and a backup fuel at night. Optional heat storage system can extend operation beyond sunny hours. The most economically viable system incorporates **solar collectors driving a steam turbine for power generation** & **waste heat is used to drive the MED**.

8.11. Solel: Model of a Solar Desalination Process

- Components of combined Solar Power & desali-nation system include:
  - Solar Field
  - Steam Generator
  - Power Block
  - Backup Storage System
  - Heat Storage Unit (Optional)
  - MED Multi Effect Distill. plant



Performance & cost effective
- Thermal efficiency of collec.
- Size of the field
- Steam pressure & temperat. at steam turbine inlet effects evaporation & condensation
- Time duration of operation
- Level of direct solar radiation at the site: at least 850 W/m2

Source: Solel website

Key Features
•Technology available tested and proven
•Suited to remote locations
•Economic. viable: plants of 5,000-10,000 m3/day
•Produces high quality water for potable & industry
•Cost effective co-generation of power & steam
•Reduces electricity consumption
•Operates 24 hours a day seven days a week.
•Solar energy during day, heat storage at night.

8.12. From Fossil to Renewable Desalination

- **Seawater desalination: 2002: 23 MCM/day most from oil in Arabian Gulf & Libya, 0.02% use renewable energy sources (46.000 CM/day):**

Source: Jenny Lindblom: Solar Thermal Techn., State of the Art, (Sweden, 2003)

- **Solar Thermal Desalination: A Future Solution?**
- **Free energy, insignificant operation costs, low environm. Impact**
- **Energy indepence & water insurance**

Solar thermal energy generation: 3 techn.options: dish, trough, tower

Desalination: a) Multi-Effect, b) Multi-Stage Flash, c) Reverse Osmosis

- **Direct Solar Desalination: Small production: less 200 m3/day**
- **Indirect Solar Desalination:**

a) Multi-Effect (ME), Arabian Gulf: plant: parabolic trough coll.: **6000 M3/day**

b) Multi-Stage Flash (MSF): produces globally **10 mill. ton** of fresh water daily

c) Reverse Osmosis (RO): possible combination with solar energy for cost-effective solutions.

Both technologies need development & economy of scale.

They cannot be produced without support of external donors.

9. RECOGNISING COMMON CHALLENGES & POTENTIAL FOR FUNCTIONAL COOPERATION IN RESPONDING TO NEW COMMON THREATS

- **Recognise challenges of GEC for region**
  - **Experts:** are familiar, **Need:** integrated climate change simula-tions for countries in the region (low res. RCM, case studies)
  - **Need: education:** in schools, universities; **political agenda-setting:** media, societal groups, policy-makers; **overcoming perceptual constraints:** dominance of the conflict, distrust
- **Build on exisiting functional cooperation**
  - **Water Specialists:** What has been achieved together?
  - **Food Specialists:** role of education, exchange of experts etc.
  - **Energy Specialists:**
  - **Desalination Specialists:** Middle East Desalination Research Center

Assessment of functional cooperation since 1991: What have been achievements, and reasons for setbacks?

9.1. Functional Cooperation: Solar Desalination for Egypt & Gaza

- **Step 1: Bilat. cooperation between Egypt & PNA on fossil & renewable desalination**
- **Assessment of water needs & technological and economic feasibility study**
- **Goal: Research & development in Sinai on solar thermal desalination infrastructure for Sinai and Gaza**
- **CDM: as a tool for attracting foreign invest-ments in the framework of the Kyoto mecha-nisms (Egypt to sign the Kyoto Protocol)**
- **Pilot Project: Capacity Building: Euro-Mediterranean R & D Facility for hybrid desalina-tion with gas and solar thermal energy**
- **GEF and international donor community, incl. Arab Development Funds: Pilot projects**
- **Goal: Establishment of a major desalination plant in Sinai at the Egyptian border to Rafah.**
- **Contribute to Water & Health Security in Gaza**

9.2. Functional Arab-Israeli Cooperation: Solar Desalination for Egypt, Gaza & the Negev

- Step 2: Cooperation with Middle East Des. Res.Cent. (MEDRC) of Arab & Israeli Institutes on Desalination Technologies
- Feasibility Studies on the Development of trilateral gas & solar thermal electricity & desalination plants for water needs of Sinai, Gaza & Negev.
- Sponsors: GEF, EU, USAID, WB, IMF, EIB, Japan, Arab Gulf countries etc.
- Reduce reliance on water from Lake Tiberias/Kinneret for greening the Negev.
- Goal: Trilateral functional community for developing a joint integrated infrastruc-ture for peace, with vital components in Sinai, Gaza and in the Negev to enhance water and food security.

9.3. Functional Arab- Israeli Cooperation:

Water for the Jordan Basin: Solar Desalination in the Gulf of Aqaba for Egypt, Jordan, Palestine & Israel

- Step 3: Address the global environmental challenges affecting all countries
- Assessing water needs & technological potentials: Economic feasibility study
- Desalination infrastructure in Jordan for the West Bank in the Gulf of Aqaba and water pipelines on Jordanian territory
- GEF: Pilot projects
- CDM with EU countries: foreign investments in framework of Kyoto Prot.

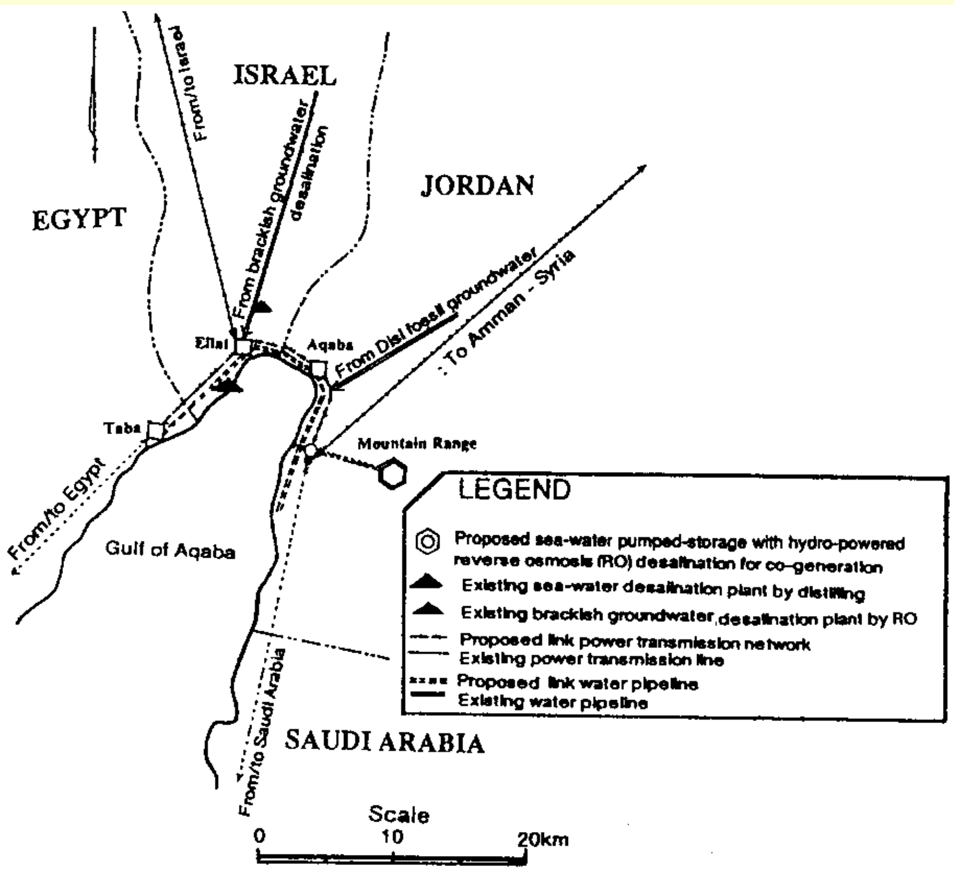
9.4. Functional Cooperation in the Gulf of Aqaba

Existing project proposals for desalination in the Aqaba Region

- G. Fishelson (1995) Water Desalination a) the Red Sea-Dead Sea Canal; b) Mediterranean–Dead Sea (North Route)
- M. Murakami (1995: 167): Hydro-powered re-verse-osmosis desalination in water-resour ces planning in Jordan (Aqaba-Disi)
- M. Murakami (1995: 202): Solar-hydro power & pumped-storage co-generation in hydro-powered reverse osmosis desalination in in-ter-state development of Jordan River basin
- Jordan Times (17.4.2002): Ministry of Water & Irrigation is studying a plan for a first sea-water desalination plant in Aqaba for the Aqaba Special Economic Zone (ASEZ).

9.5. Proposals for Water Desalination in Gulf of Aqaba

Water Ministry studies possibility of desalination plant in Aqaba (17.4.02)



- **Desalination plant in Aqaba** was discussed since peace treaty with Israel in 1994. **The proposed plant is one of 4 water projects to solve water supply in the Aqaba zone.**
- **Ministry & USAID develops Aqaba's wastewater treatment plant ($30-35 million) to irrigate parks & for industrial purposes.**
- **Fourth project to convey water from the Disi aquifer at a 4 million m3/ p.a. will provide Aqaba with drinking water, and meet the water demands of the industrial and tourism sectors in ASEZ for the next five years.**
- **Total investment cost of proposed hydro-powered seawater reverse osmosis desalination plant in Aqa-ba was estimated at US$389.4 m.**

9.6. Plans for Water Desalination in Gulf of Aqaba

Global Water Intelligence - July 2002: Jordan water investment plans

- Proposal to improve **water and wastewater services in Aqaba** in line with the financial and economic requirements of **Aqaba Special Economic Zone (ASEZ).**
- **ASEZ is a multi-sector investment zone** dependent on adequate water services. The **current population of 74,000 is expected to increase to 250,000 by 2025** with an allied increment in water demand from 15 M m3 /year to 50 M m3 /year.
- The **Aqaba region** is likely to need a **desalination plant** with capacity of **10 Mm3/yr**, as water from the nearby **Disi aquifer** will supplement **supply in Amman**.
- A study by the **World Bank's Public-Private Infrastructure Advisory Facility** (PPIAF) to assess options for regulatory reform in Jordan's water and sewage sector. Support from **EU, EIB, German governm**. for similar projects elsewhere is possible.
- **Ministry of Water** is reviewing draft RFP for **Disi-Amman water conveyor**. Five groups have pre-qualified for project to be co-financed by the Jordanian government.
- **28 July 2002**: Agreement on **desalination plant**: **Jordan & USAID (154 Mio.$)** in **Kurba al-Samraa;** costs: **Jordan (6%), USAID (43%), US/French comp. (51%)**
- **Desalination plants in Southern Sinai:** e.g. by Egyptian government (**Sharm El-Sheik & Taba**) & by **hotels along the coast between Sharm El-Sheik to Taba**

9.7. Joint Red Sea-Dead Sea Pipeline/Canal Project

Dead Sea: Jordan & Israel Cooperate to Save Water Basin, ***Water& Sanitation News*****, 13.8.02**

- Jordan is revived a project with Israel to boost the water level of Dead Sea, on the border of two countries and is shared with Palestinians.
- Stalled by Arab-Israeli conflict & lack of finan-ces, EUR 2 billion project to build a canal along the Jordanian-Israeli border from **Red Sea to Dead Sea** was discussed since 1994.
- **The canal would send saltwater from Gulf of Aqaba down a 400-meter incline to Dead Sea in a desalination process that would relieve parched Jordan with fresh water**.
- **Negotiations on the project have focused on technical matters**, with Israel favouring a pipeline to cut costs and Jordan calling for a canal to boost both countries' shore areas.
- **A compromise is still in reach, with a canal at the start of the water tract on the Red Sea connected to a pipeline in the desert**.

9.8. Functional Cooperation in Gulf of Aqaba

- **Three Partners entered into peace treaties: Egypt – Israel – Jordan; plus Saudi Arabia and Palestine.**
- **Building on existing foundations**: cooperation of water & food specialists
- **Model:** Creating **regional interdependence** that requires daily cooperation
- **Comp. 1: Research** on common challenges for the region: Possible tasks for a new **UNU centre** funded by the EU in **Taba, Elat and Aqaba**
- **Comp**. **2:** Creating **renewable energy**
- **Comp**. **3:** Schemes for **desalination**
- **Comp. 4**:**Sustainable food** production
- **Comp. 5: Sustainable tourism**
- **Comp**. **6: New urban environments** for jobs and living.

9.9. Creating a Knowledge Infrastructure for Functional Cooperation in the Gulf of Aqaba

- **Initial Countries**: **Jordan (Aqaba), Egypt (Taba), Israel (Elat)**
- **Partners**: **Saudi Arabia and Palestinian Authority**
- **Sponsors**: **EU, USA & Japan, WB, IMF, EIB**; **Facilitator: UN**
- **1st Step: Problem Recognition & Creation of Awareness**: **UNU Centre on Regional Impact of Global Envíronmental Change to Mitigate Environmental & Human Security Risks**
- **2nd Step: Creating the Knowledge Basis for Mitigation: International Technical University of the Gulf of Aqaba with international departments and faculty in Taba, Elat, Aqaba**
- **3rd Step: Setting up a tri-national integrated infrastructure**

✍ **Taba: Centre and Laboratory on Renewable Energy: solar & wind (EU)**

✍ **Elat: Centre on Agriculture in Arid Regions in cooperation with with DRI (Egypt) & Blaustein Institute on Desert Research (Israel) (US)**

✍ **Aqaba: Centre for Hydrology and Desalination (Japan)**

9.9. Coping with Water & Food Scarcity: Framework Instruments for Long-term Conflict Avoidance

- **4th Step: Supplying Fossil & Renewable Energy**
  - **Fossil Energy: Natural gas from Egypt and oil from Saudi Arabia**
  - **Renewables: Exploit solar thermal and photovoltaic energy, wind power**
  - **Long-term: Create a joint infrastructure for a local hydrogen economy**
- **5th Step: Cooperative Mitigation of Water Scarcity**
  - **Joint training institution for water experts on water efficiency**
  - **Build joint water desalination plants to serve all three countries**
- **6th Step: Creating New Jobs & Supplying Food**
  - **Joint research and training institution for agriculture, irrigation, and desertification specialists for arid regions (e.g. in cooperation ICARDA)**
  - **Centres for IT, computer, software industry**
- **7th Step: Build New Sustainable Cities & Tourist Centres**
  - **Develop sustainable tourist centres based on renewable desalination**
  - **Develop sustainable cities with a low emission transport system. solar cooling and energy generation, waste based electricity generation**
  - **8th Step: Create a Pride in Joint Achievements & a Culture of Tolerance**

10. Peacebuilding by Functional Environmental Cooperation - Addressing Regional Impacts of Global Environmental Change

- Multilateral frameworks for post-conflict environmental reconstruction
- Functionalist credo: form follows function: start with functional coope-ration in areas population supports: water, environment, health, food
- Shift focus from narrow military to a wider human security concept
- Recognise the mutual challenges to survival (Awareness creation)
- Start with collaborative research that address these joint challenges.
- Establish joint scientific and technological capacities in the region
- Use energy potential of deserts for its greening & change of climate
- Develop scientific, environm. & econ. partnership building measures
- Potential spill-over from functional cooperation to conflict resolution.
- Develop confidence-building measures for political and military realm .

10.1. Beyond the Hobbesian Security Dilemma

- **Middle East Conflict: a Permanent Conflict?**
- Answer depends on your worldview and mindset and preferred means
- Continued asymmetric cycle of violence will not produce peace but hatred
- **Learning the Lessons from Successful Peacebuilding**
- Study and learn from Mitrany, Marshall, Monnet and Gorbachev
- Overcome the traditional Hobbession worldview and popular mindset
- **Maintain, create and develop regional functional networks**
- Of water managers in Israel & Palestine on joint groundwater aquifers
- Of energy and food specialists as well as sustainable urbanisation experts
- **Build common institutions**
- Gulf of Aqaba: regional laboratory for a joint regional development
- Start with education and expand to the economic sector, political spill-over.
- **Look for common strategies for „human survival“**
- Overcome state centred security concepts based on power (military means).
- Civilian Society: to contribute to a gradual awareness for the common environmental security challenges with the goal of a stable human security
- **Problem solution requires a „new thinking“ and new security concepts**

10.2. Conclusions: Window of Opportunity

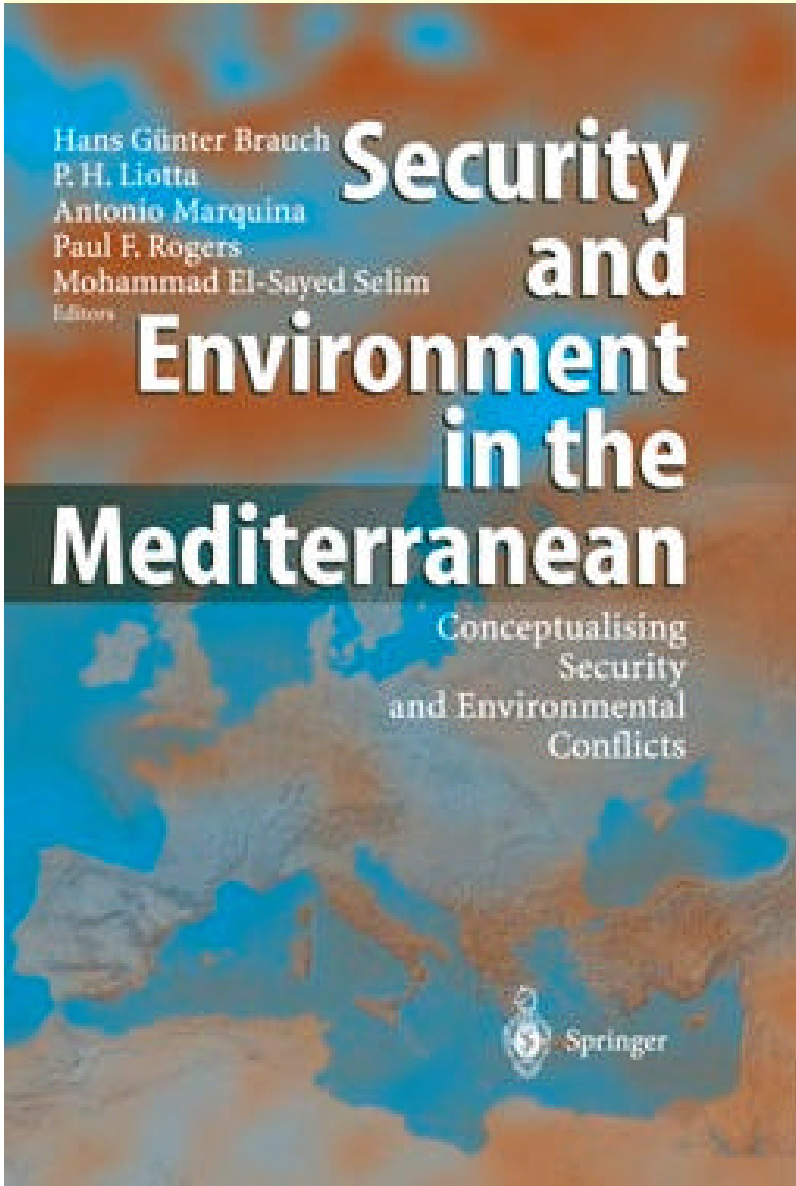
- **Preconditions for Consideration of these Conceptual Ideas**
  - Implementation of the Roadmap for the Middle East of the Quartet
  - Return to the Multilateral Peace Process with the Working Groups: Regional Economic WG: EU; Water WG: USA; Environmental WG: Japan or to a new structure.
  - Plans should be developed within the Quartet with clear division of labour.
- **Conditionalised Support by the Donor Community**
  - The Marshall Plan aid was conditional on the cooperation among recipients!
  - Strong unified strategy of all donors and equal treatment of all recipients.
  - Grant and credits would be conditional on the development of multilateral regional functional infrastructures with a premium for cooperation and sanctions for violation that would hurt the violator with the suspension of assistance.
- **Preparation during Conflict: Step-by-Step Implementation**
  - The conceptual ideas for multilateral functional projects should be developed by joint functional teams of scientists from the three countries & Palestine
  - The multinational NGO planning process should be supported by the EU in the Framework of the Euro-Mediterranean partnership or its new foundation.
  - Other functional projects may be developed with the support of foundations in North America (e.g. Carnegie, Ford), and in Japan (Sasakawa or Nippon Fd.).

10.3. Proposal to contribute to the small hope

NETWORK TO DEVELOP FEASIBLE FUNCTIONAL CONCEPTS

- **Functional perspective** may appear unrealistic due to experience & lack of trust. After WWII, ideas of **Marshall & Monnet** or those of **Gorbachev** were perceived by some as dreams and by others as propaganda.
- **My initial operational proposal is very modest:**
- A group of functional (water, soil, food, energy) experts from Egypt, Israel, Jordan & Palestine may be formed with experts from Europe, Japan and North America. This group should look for funding for meetings outside the region during 2005/ 2006.
- These experts should explore areas where functional cooperation among experts in the region exists, where it is possible and needed to address future challenges.
- **These experts should be asked to develop a priority list of concrete proposals for functional cooperative projects that appear to be feasible at present.**
- These experts should ask private foundations for seed money to develop concept or pre-feasibility studies most promising proposals for **functional** cooperative projects.
- These experts should present the feasibility studies in Jerusalem or the Gulf of Aqaba to the Middle East Quartet & international donors and private foundations.
- **IPCRI offers an appropriate organisational framework to search for new cooperative ideas & areas of functional cooperation.**

Major Sources



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[http://www.nato.int/science/news/2003/docu/031211c-desertification.pdf]

- **Download of previous talks by Brauch: (http://www.afes-press.de/html/download_hgb.html)**