

**Dr. Hans Günter Brauch, Chairman,
Peace Research and European Security Studies
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**A Survival Pact for the Mediterranean:
Linking “virtual water” and “virtual sun”**

Outline

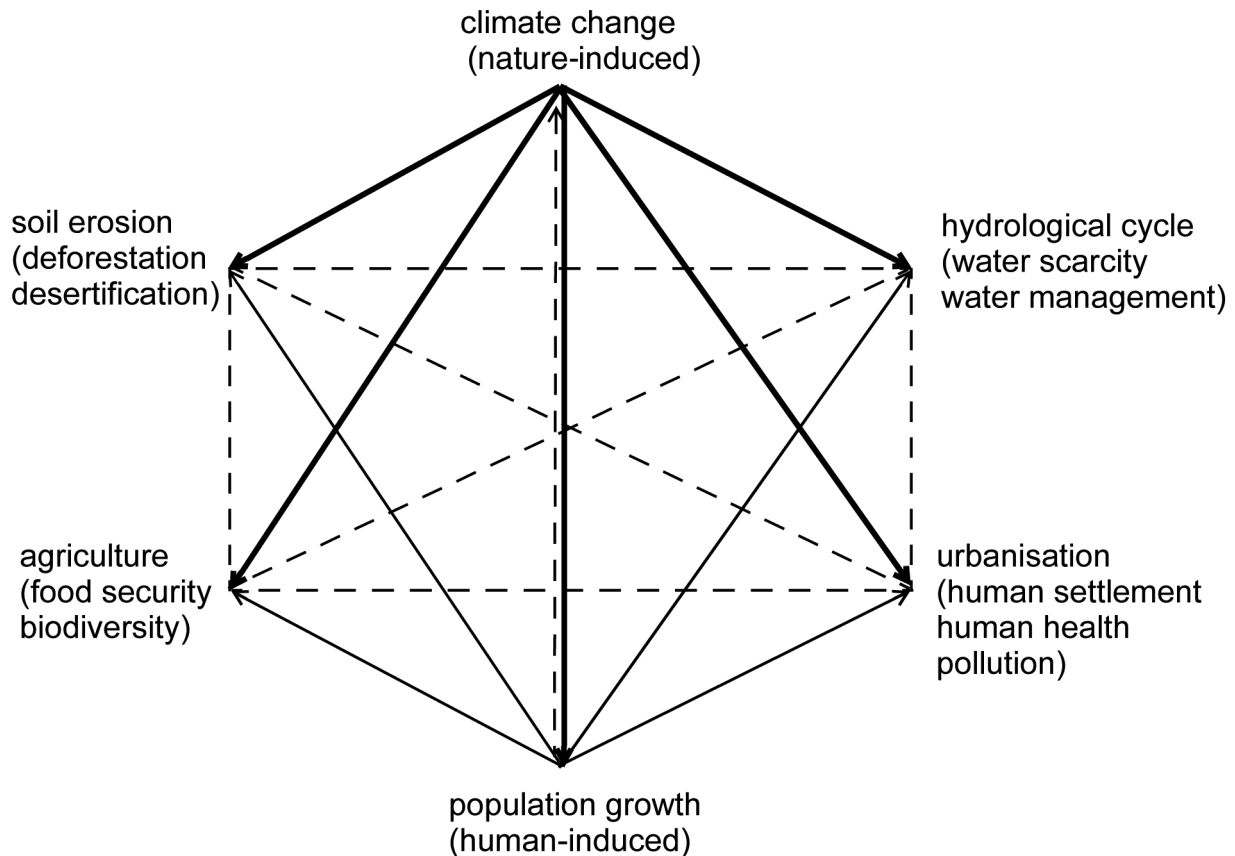
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1. Environmental Changes in the 20th Century in the Mediterranean Space

➤ **Focus: Long-term Structural Factors**

➤ **Thesis: 6 Factors have changed differently in N/S**

Fig. 1: Interactions of Six Factors of a Survival Hexagon



————→ 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

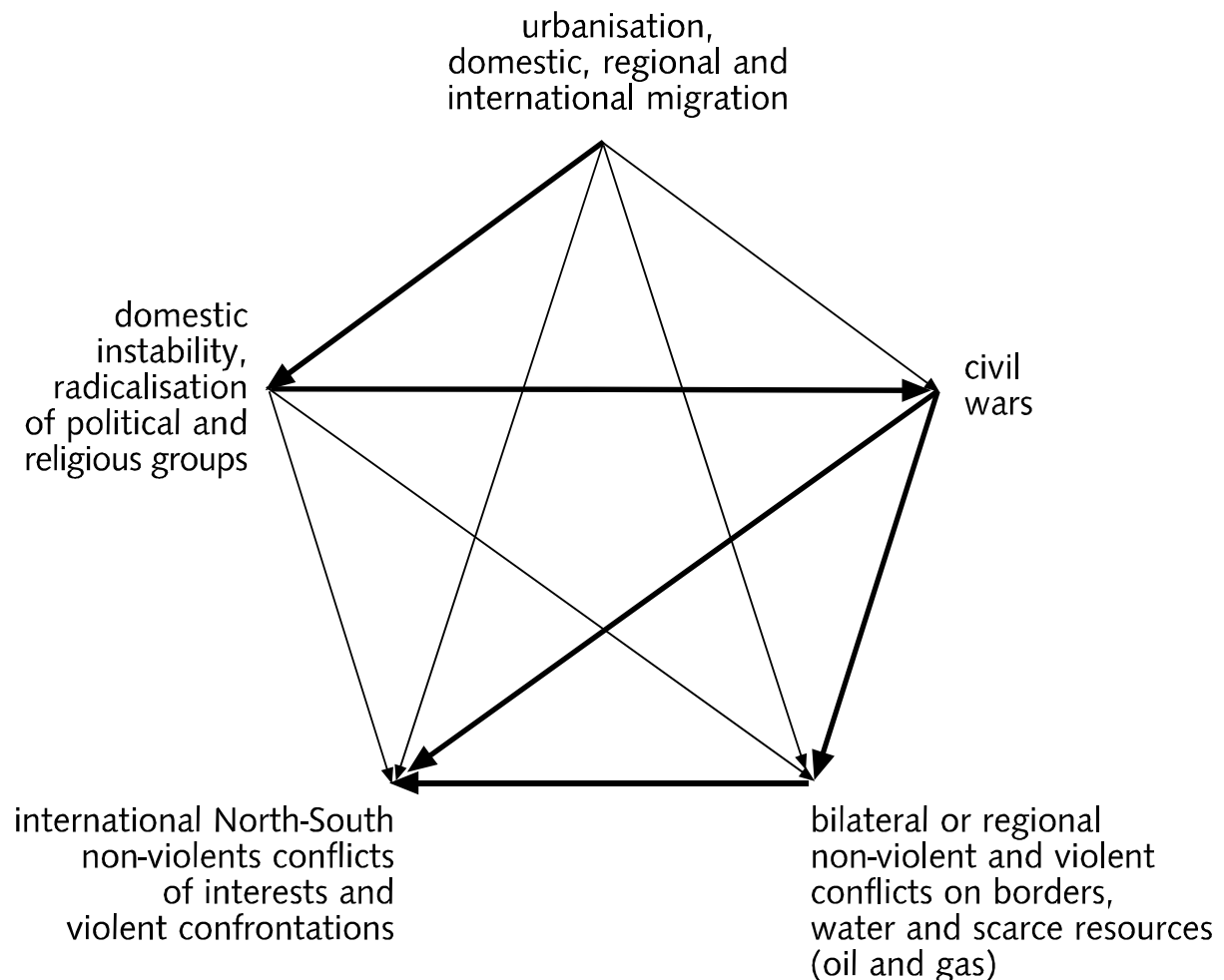
➤ **Common Changes (Supply factor): climate change, desertification intensified, water scarcity increased**

➤ **Different Changes (Demand): population growth, urbanisation, food needs: exports vs. imports**

Figure 2: Causes, Effects, Outcomes of Environm. Stress

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

Figure 3: Five Potential Outcomes (Conflict Pentagon)



- **Political task: inputs (1): mitigation & adaptation**
- **Outcomes (2): Conflict avoidance by a policy of sustainable development dealing with input factors**

2. Environmental Challenges in the 21st Century: The Survival Dilemma of the MENA Region

➤ **Six fundamental long-term challenges that will confront the Mediterranean until 2050-21000:**

1. different levels of *population growth* on **Northern** (low), and **Southern** and **Eastern shores** (high);
2. the regional impact of global *climate change* due to projected increases in temperature, decline in precipitation and rise of the sea level, but **no IPCC regional assessment** by on Mediterranean region;
3. *scarcity of water*: drinking & irrigation: dramatic: **demand** will increase due to *population growth* *precipitation* (supply) will decline: *climate change*
4. **consequence**: the decline in self-sufficiency in *food production* and the increasing need for imports of cereals (Egypt by 2060: self-sufficiency in cereals of 10-20%);
5. **consequence**: progressing *soil erosion* and *desertification*: *poverty driven* in the South (**Maghreb, Mashrik**), *market driven* in the North (**Spain**);
6. **consequence**: progressing *urbanisation, health and pollution* in major MENA cities (governmentability)

➤ **Six Factors will affect North & South differently:**

Population growth, urbanisation and food needs

• **North**: a) decline; b) stable, c) exports

• **South**: b) increase; b) increase; c) imports

➤ **Common challenges: climate change, soil, water**

3. Regional Population Growth Projection (UN 2001)

Table 1: Popul. Growth of Med. Countries, 1850-2050

in millions	1850	1900	1950	2000 (2000 Rev.)	2050 (2000 Rev.)	1950- 2050 (2000 Rev.)	2000- 2050 (2000 Rev.)
Germany	35.0	57.0	68.376	82.017	70.850	2.474	-11.167
France	36.0	41.0	41.829	59.238	61.832	20.003	2.594
Greece	3.5	4.5	7.566	10.610	8.983	1.417	-1.627
Italy	25.0	34.0	47.104	57.530	42.962	-4.142	-14.568
Portugal	3.5	5.5	8.405	10.016	9.006	601	-1.010
Spain	15.0	18.5	28.009	39.910	31.282	3.273	-8.628
S. Europe	83.0	103.5	132.913	177.304	154.065	21.152	-23.239
EU Candidates (Mediterranean Islands)							
Cyprus	0.15	0.23	0.494	0.784	0.910	0.416	0.126
Malta	0.13	0.19	0.312	0.390	0.400	0.088	0.010
Total	0.28	0.42	0.806	1.174	1.310	0.504	0.136
10 MENA countries plus PA (Gaza, West Bank)							
Algeria	3.0	5.0	8.753	30.291	51.180	42.427	20.889
Morocco	3.0	5.0	8.953	29.878	50.361	41.408	20.483
Tunisia	1.0	1.5	3.530	9.459	14.076	10.546	4.617
Libya	0.6	0.8	1.029	5.290	9.969	8.940	4.679
Egypt	5.5	10.0	21.834	67.884	113.840	92.006	45.956
N.Africa	13.1	22.3	44.099	142.802	239.426	195.327	96.624
Jordan	0.25	0.3	1.237	4.913	11.709	10.472	6.796
Israel			1.258	6.040	10.065	8.807	4.025
Gaza, WB	0.35	0.5	1.005	3.191	11.821	10.816	8.630
Lebanon	0.35	0.5	1.443	3.496	5.018	3.575	1.522
Syria	1.5	1.75	3.495	16.189	36.345	32.850	20.156
Turkey	10.0	13.0	20.809	55.668	98,818	78.009	43.150
East.Med.			29.247	89.497	173.876	144.529	84.279
MENA	12.45	16.05	73.346	232.299	413.202	339.856	180.903

Sources: UN, Populations Division, Department for Economic and Social Information and Policy Analysis: *World Population Prospects: The 2000 Revision* (New York: UN, 2001).

4. Regional Climate Change Impacts

- **Foundation: IPCC-Reports: 1:1992, 2: 1995, 3: 2001**
- **Temperature increase: 1990-2100: +1.4 – 5.8°C**
- **Sea Level Rise: 1990-2100: + 0.09 - 0,88 m**

4.1 How will these affect the Mediterranean region?

a) precipitation, b) soil erosion, c) yields of agricult.

Fig. 4: Summer Scenario Maps for Mean Temp. Ch.

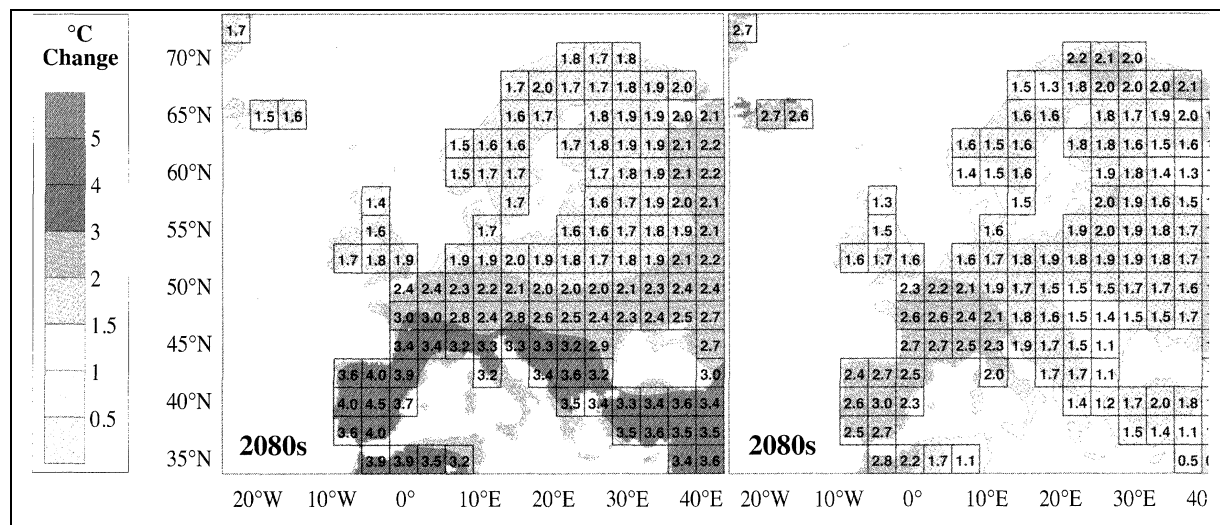
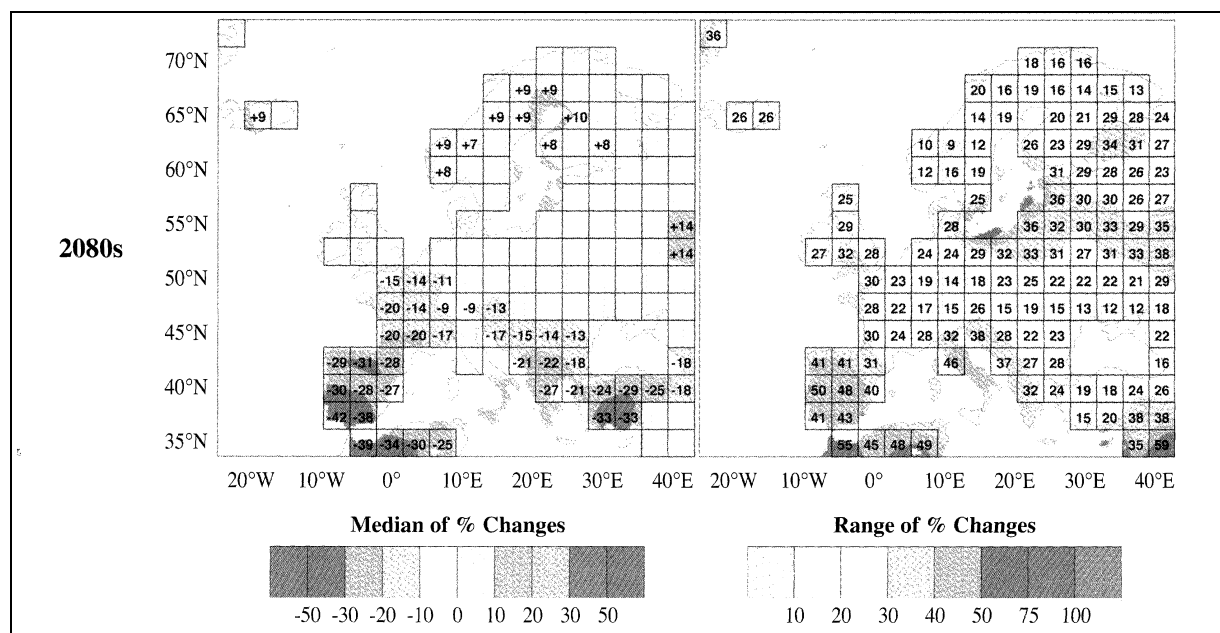


Fig. 5: Summer Scenario Maps for Precip. Changes



- **Temperature will rise more in the Mediterranean**
- **Precipitation will decline more in Mediterranean**

➤ **Fig. 6: Impact of Sea-Level Rise in Nile Delta**



4.3. Regional Impact: Desertification, Precipitation

- **Thesis: European vicinity: CC Impact most severe in the Mediterr., Central Asia, or in Muslim Countries**
- **Mediterranean: MENA-Region: arid, semi-arid zone: lack of water, progressing deserts due to human activity**
- **Africa: drought periods: 1981-84, 86-87, 91-92, 94-95**
- **Europe: dryer, less precipitation in South in summer,**
- **Middle East: temperature stable, increasing water needs**

5. Agricultural Production Trends (1970-1999)

Fig. 6: Cereal Production & Trade (Alexandratos)

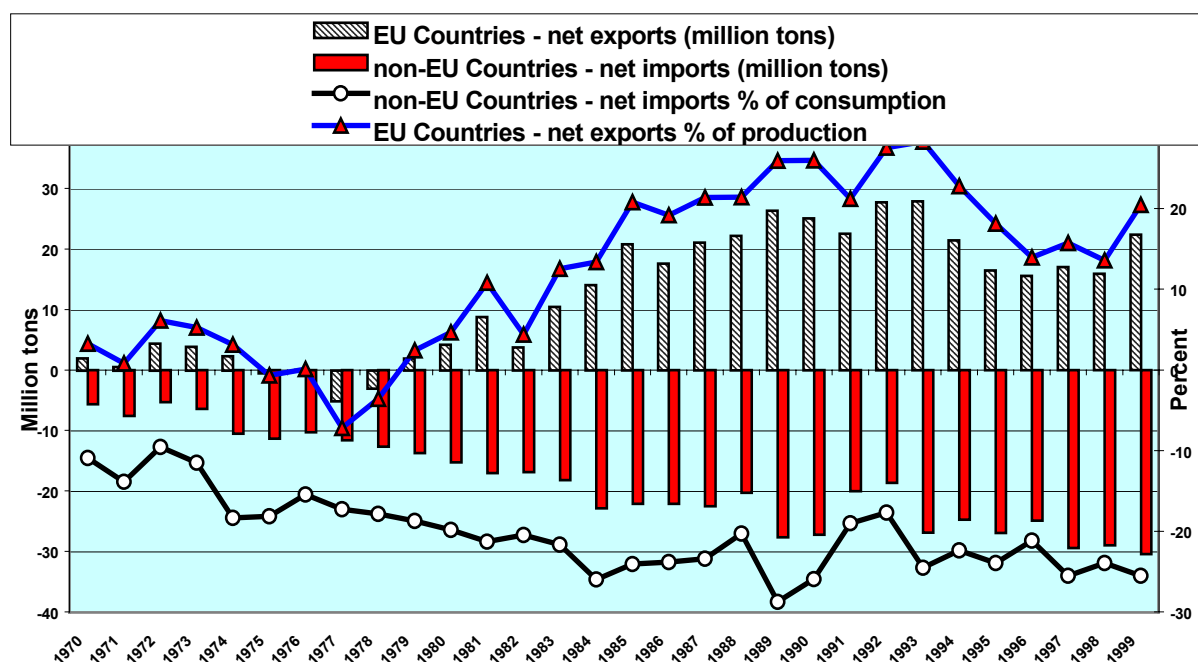


Table 2: World Cereal Balances (million tons)

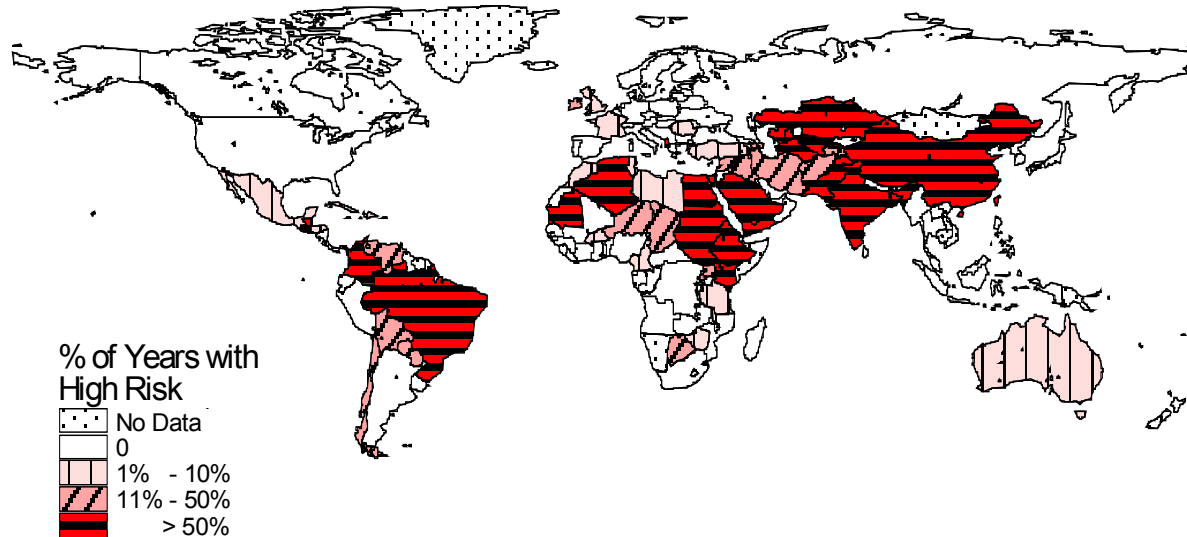
Importers/Exporters	64-66	74-76	84-86	97-99
Non-EU Med. Countries	-4	-11	-22	-30
share of net importers, %	8.1	12.1	14.0	17.8
Other Middle East	-1	-4	-18	-22
Total Importers	-51	-89	-160	-167
Exporters (EU part)	-25	-21	15	24
Total Exporters	55	89	162	176

Table 3: Cereal balance for NearEast/North Africa

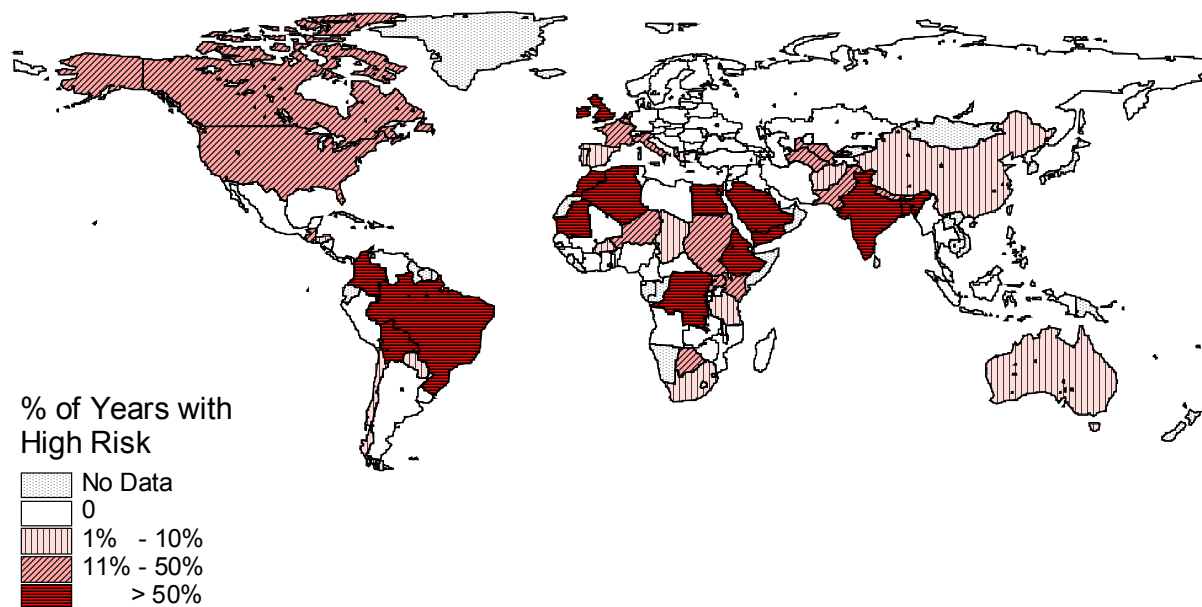
	Demand				Pro- duction	Net trade	Self- suffic. %
	per cap.		Mio. tons				
	food	all	food	all uses			
1964/66	174	292	28	47	40	- 5	86
1995/97	208	357	75	129	84	-43	65
2015	209	359	108	186	110	-76	59
2030	205	367	130	232	131	-102	56

Increasing Water Scarcity and Food Needs

Fig. 7: High Potential for Food Crisis 1901-1995



Source: Joseph Alcamo: GLASS Security Diagram
High Potential for Food Crisis 2001-2050 (Baseline A)
Figure 8: High Potential for Food Crisis 2001-2050



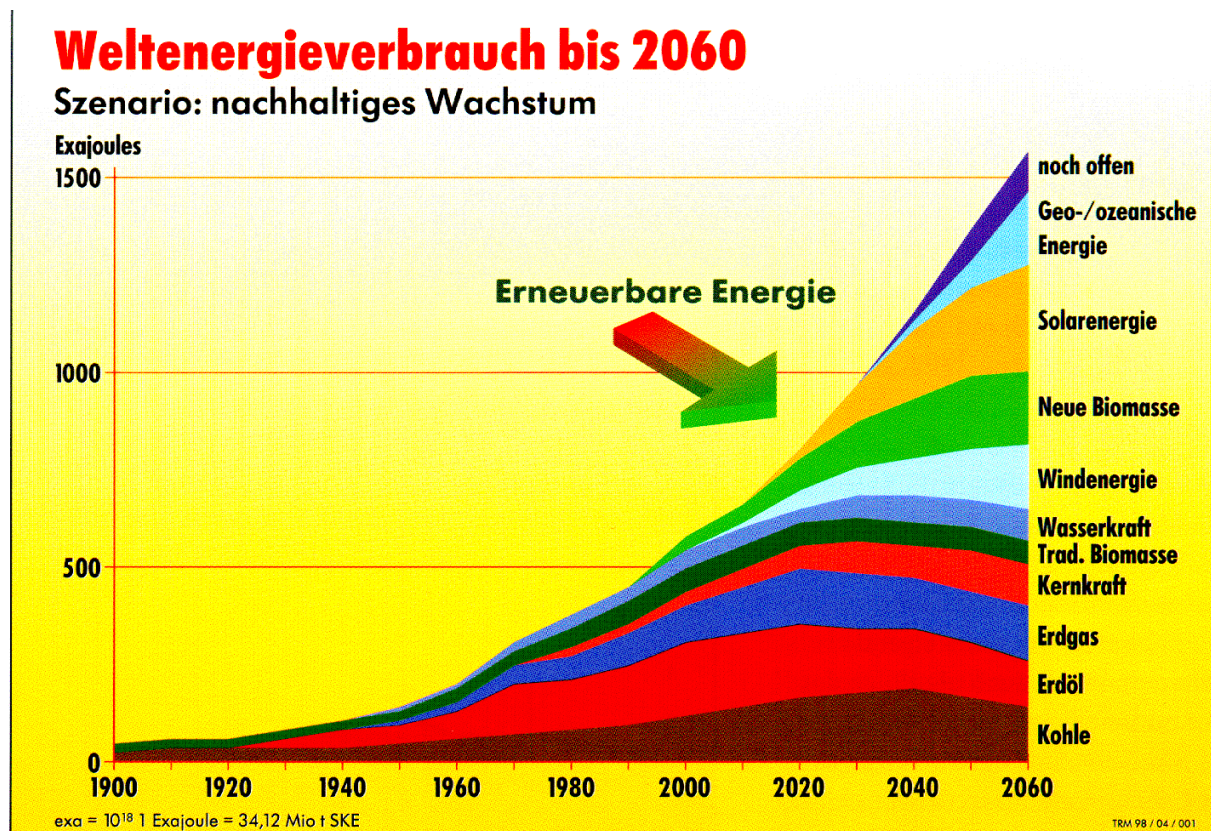
Conclusion: Mediterranean, MENA Region will experience in 21st century high potential for food crises due to opposite trends: *increasing demand* (population) and *declining supply* factors (precipitation, yield)

6. Tony Allan's Concept "Virtual Water"

- **Prof. Tony Allan (SOAS, London):** *Virtual water* is water embedded in water intensive commodities as grain. MENA region imported 20% as virtual water by 2000. Proportion will rise to 50% by 2050.
- **Virtual water via food imports, reduces urgency of local water deficits.** Virtual water creates political space for balancing national water budgets. But the re-allocation of scarce water from economically water inefficient activities to those that would bring a high return to water is delayed to accord with political imperatives constructed by coalitions of water users.
- **Problem can be solved by exporting virtual water (cereals, food from Europe to MENA region)**
- **2 Constraints that produce 2 problems**
 - **resources (*debt problem*):** Can we afford imports?
 - **self-sufficiency (*trust problem*):** Can we trust?
- **Conclusions: Both constraints must be addressed: MENA countries need foreign income and must overcome the fear that *food* is used as a *weapon*.**
- **What is the commodity whose supply will rise in the South and where there is an increasing demand in the North?**
- ***Renewable energy* sources: conditions will improve due to climate change in the MENA, i.e. comparative advantage (solar thermal, PV, wind power)**
- **With the implement. of *Kyoto* and beyond 2012 *demand for renewable energy imports* will grow in the North to comply with climate obligations!**

8. My Concept Renewable Energy as “Virtual Sun”

Figure 9: Shell Sustainable Energy Scenario (2060)



Major Increase of Renewable Sources of Energy

- My definition: “*Virtual sun*” is the sun embedded in forms of renewable energy that can both solve the energy demand (including for desalination of drinking water) and can be exported to the North as electricity via long-distance cables (from Morocco to Spain and Tunisia to Italy) and as hydrogen (as alternative fuels for the road transport system of the 21st century with hardly any CO₂ emission).
- Major constraint: Thinking in terms of energy security (supply security) due to the oil shocks of the 1970s, 1980s that energy can be used as a weapon to “strangulate” the economies of the North.

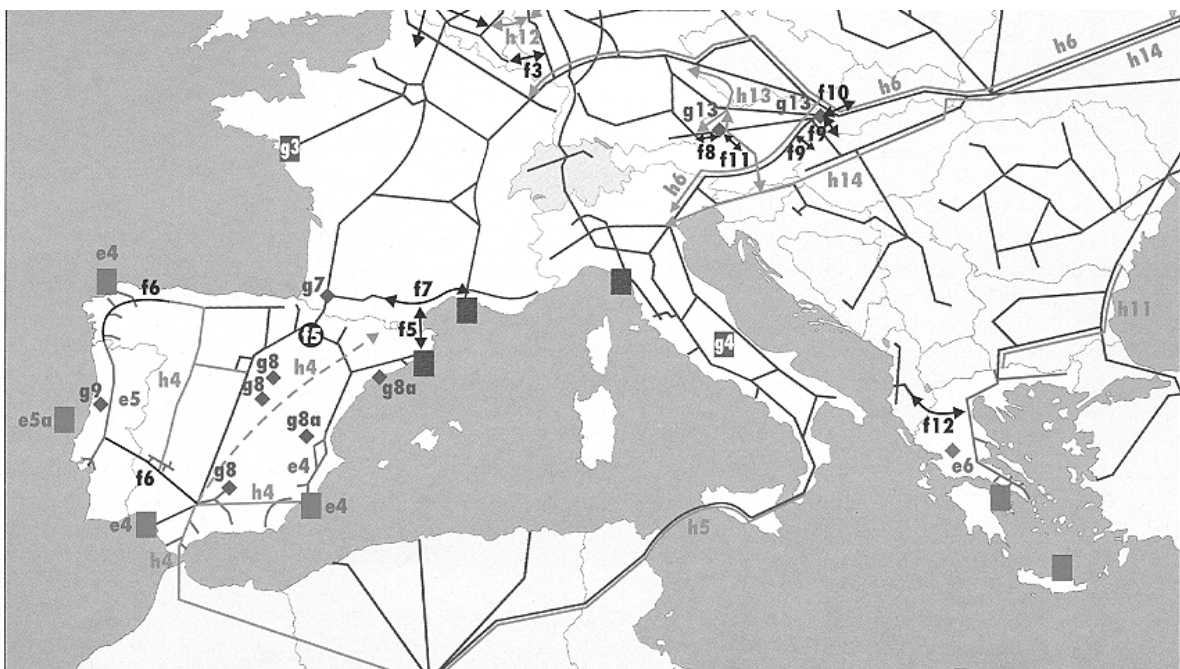
9.Link: “Virtual Water” & “Virtual Sun”

- a) We need a **political structure** that creates both trust and a complex interdependent structure.
- b) We need a **new political thinking** on co-development based on partnership that overcomes both the fear of a “*food*” and “*energy*” *weapon*.
- c) We need **financial incentives** and tools for the market place for linking both: food and energy.

Renewable energies have a threefold potential:

- for a long-term *sustainable energy policy* in line with climate obligations for both South and North;
- for creating *sufficient revenue* for other sustainable development projects & imports of *virtual water*;
- for reducing the competition over scarce oil and gas resources (avoid: *resource control conflicts*).

Fig. 12: Existing Trans-Mediterranean Gas Pipelines



- **Today**: Mediter. Energy Cooperation: *Fossil Fuels*
- **Future**: Euro-Mediter. Partnership: *Renewables*

10. Survival Pact: Regional Component of a Global Partnership for Sustainable Devel.

- Ideal Env. Space: Mediterranean space of the Barcelona Declaration (environm. regime, 1976ff.);
 - Political Region: Framework of the Euro-Mediterranean Partnership (Barcelona II, 1995);
 - Barcelona II,4 (Nov. 2000): *Euro-Mediterranean Charter for Security and Stability* (not signed due to events in the Middle East: 2nd Intifada);
 - Only long-term goal: Euro-Mediterranean free trade zone by 2010 (framework);
 - Needed: A pragmatic longer-term realistic vision in the *Grotian tradition* (cooperation matters) and from a *reformist ecological perspective* that multilateral cooperation can solve global challenges due to environmental change is possible and necessary.
 - A long-term oriented Euro-Mediterranean Survival Pact should jointly address the six long-term challenges of the survival hexagon in order to develop cooperative strategies that combine both:
 - a) the goals for a sustainable development via
 - b) a sustainable energy policy that contributes to *sustainable economic development* in South & North
 - c) a sustainable agricultural policy that counters the *poverty* and *market driven* processes of desertification
 - Such a Euro-Mediterranean Survival Pact requires
 - a. *Science and knowledge transfer* on renewable energy technologies (e.g. technical training in MENA area)
 - b. market incentives (Kyoto mechanisms, CDM)
 - c. a financial framework: e.g. Oil-Pipeline Deal
- Survival Pact: Reg. Partnership for Sustainable Dev.*