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מכון הערבה ללימודי הסביבה
معهد وادي عربة للدراسات البيئية

Security and Environment in the Mediterranean and Middle East

Part III: Environmental Challenges to Security & Survival in the Mediterranean and Middle East

Questions of the day for small group discussion:

1. How do environmental threats create national (military, political, economic) security risks?
2. How do environmental threats create domestic (societal and human) security risks?
3. Are there special environmental security risks to the poor, young, women, and minorities?
4. What are the threats, challenges, vulnerabilities and risks to environmental security in the Middle East?

Contents of Part 3

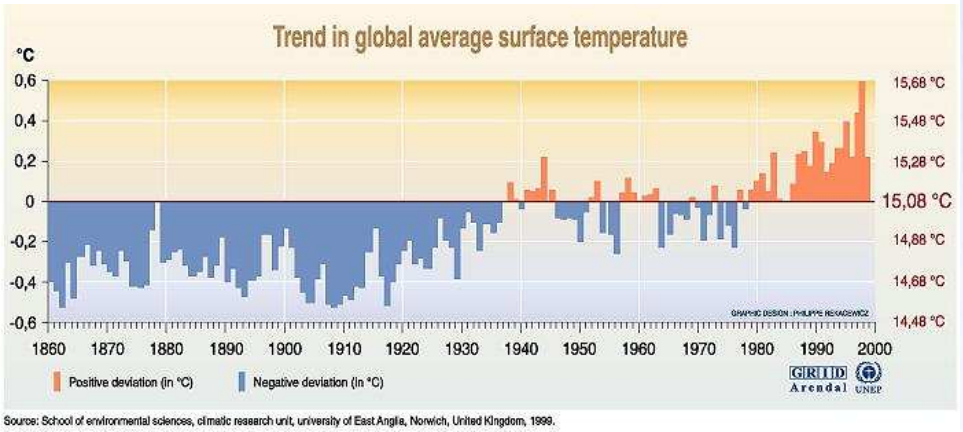
11. Supply Side: Nature-induced and Anthropogenic Factors

- Resulting from natural variability & use of hydrocarbons (coal, oil, gas) Global climate change affects:
  - precipitation & contributes to soil erosion (by increase of extreme weather events: e.g. flash floods)
  - North and South but especially the poor due to higher environmental and social vulnerability
  - yield of agricultural products
- Soil degradation: e.g. deforestation, desertification, salinization, especially in the arid & semiarid Middle East region
- Water: hydrological cycle, pollution, scarcity
  - Hydrological cycle is affected by climate change & human action
  - Water scarcity: result of demand; quality: overuse, pollution

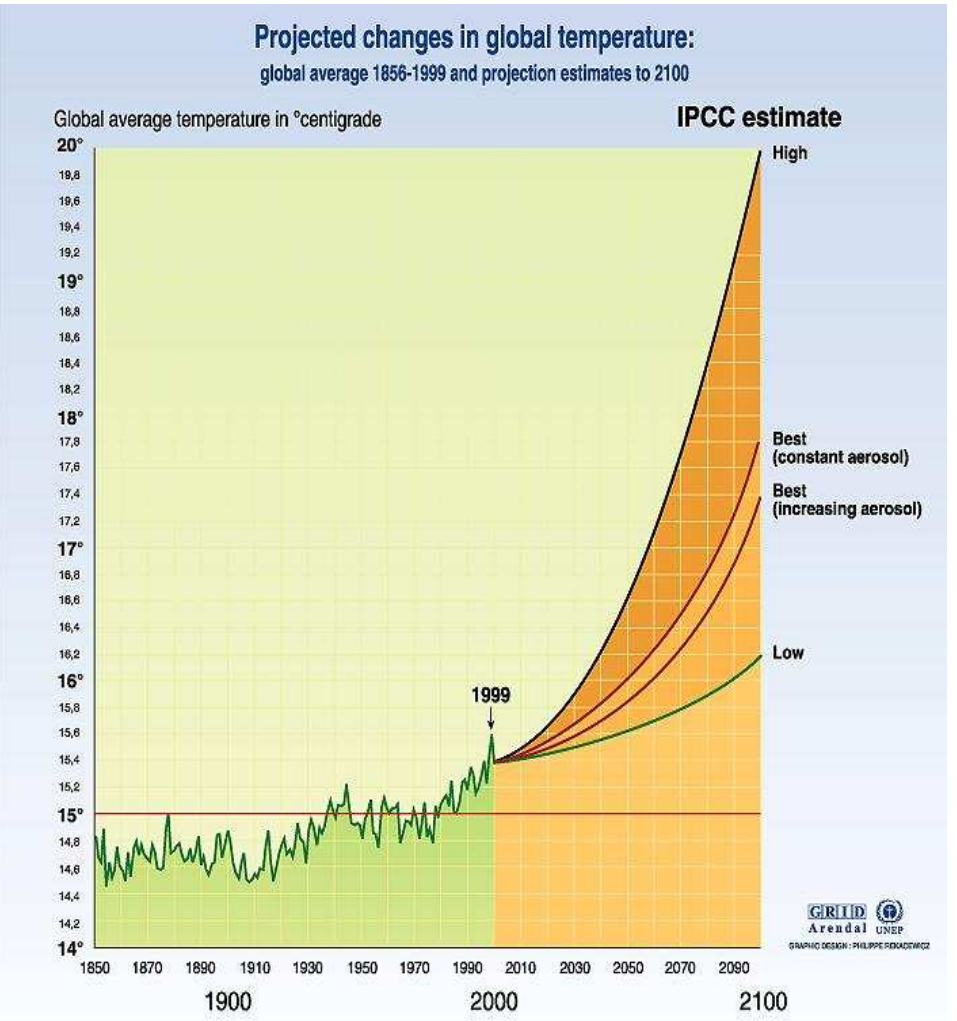
12. Global Climate Change Impacts: Temperature Increases & Sea Level Rise

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

Sources: IPCC 1990, 1995, 2001

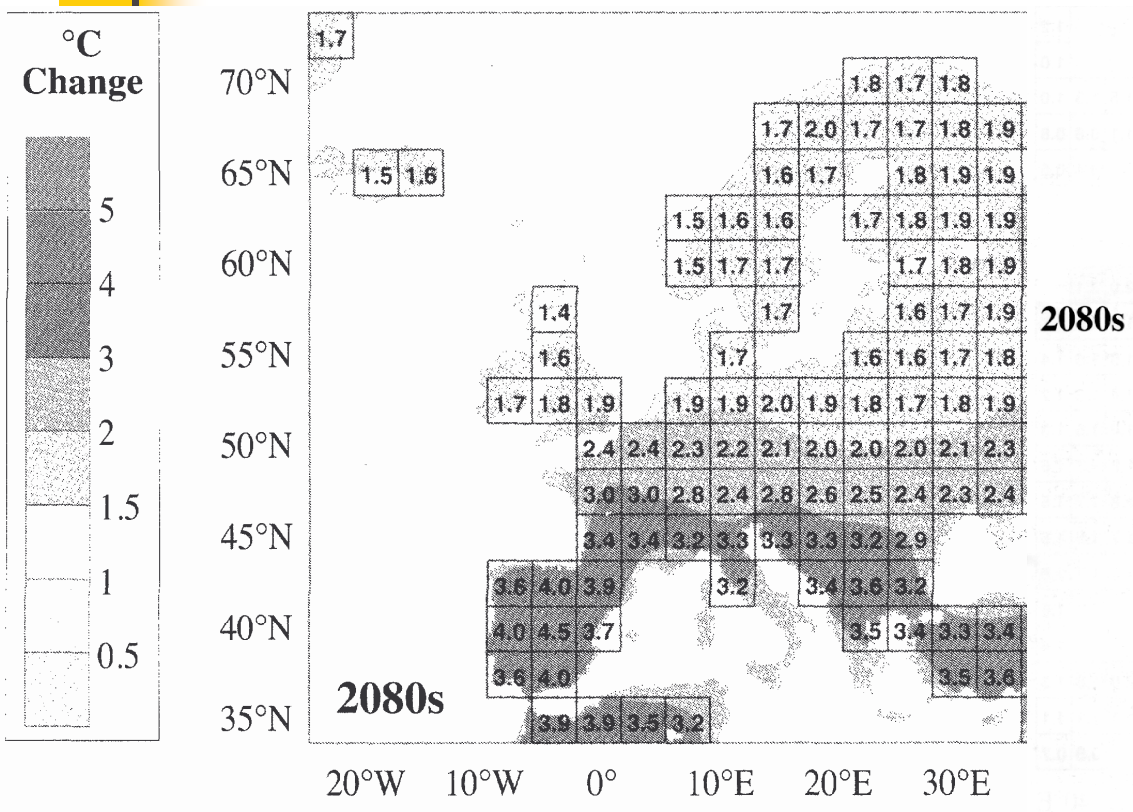


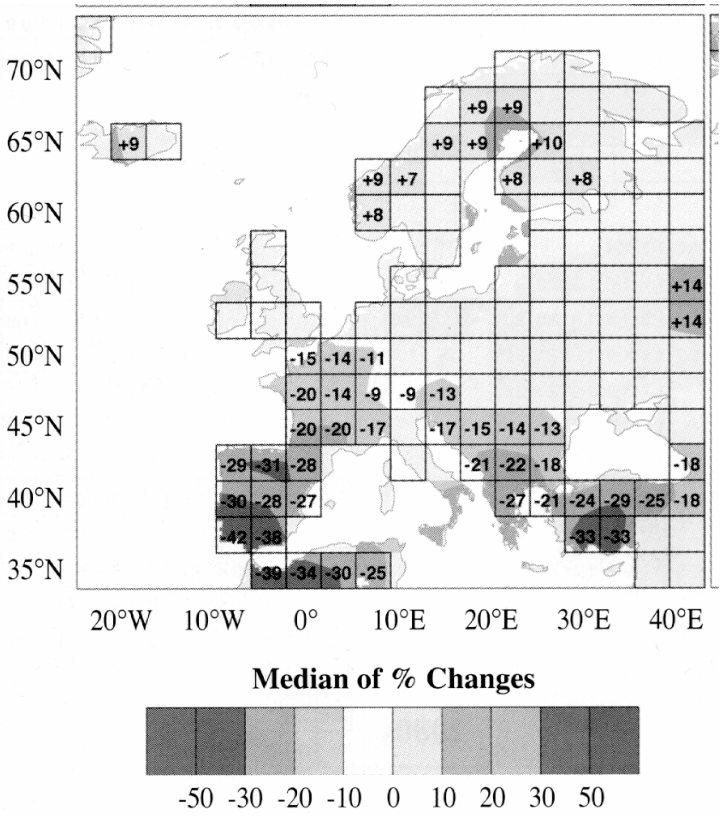
Source: School of environmental sciences, climatic research unit, university of East Anglia, Norwich, United Kingdom, 1999.



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

12.1. Climate Change Impacts in Mediterranean





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

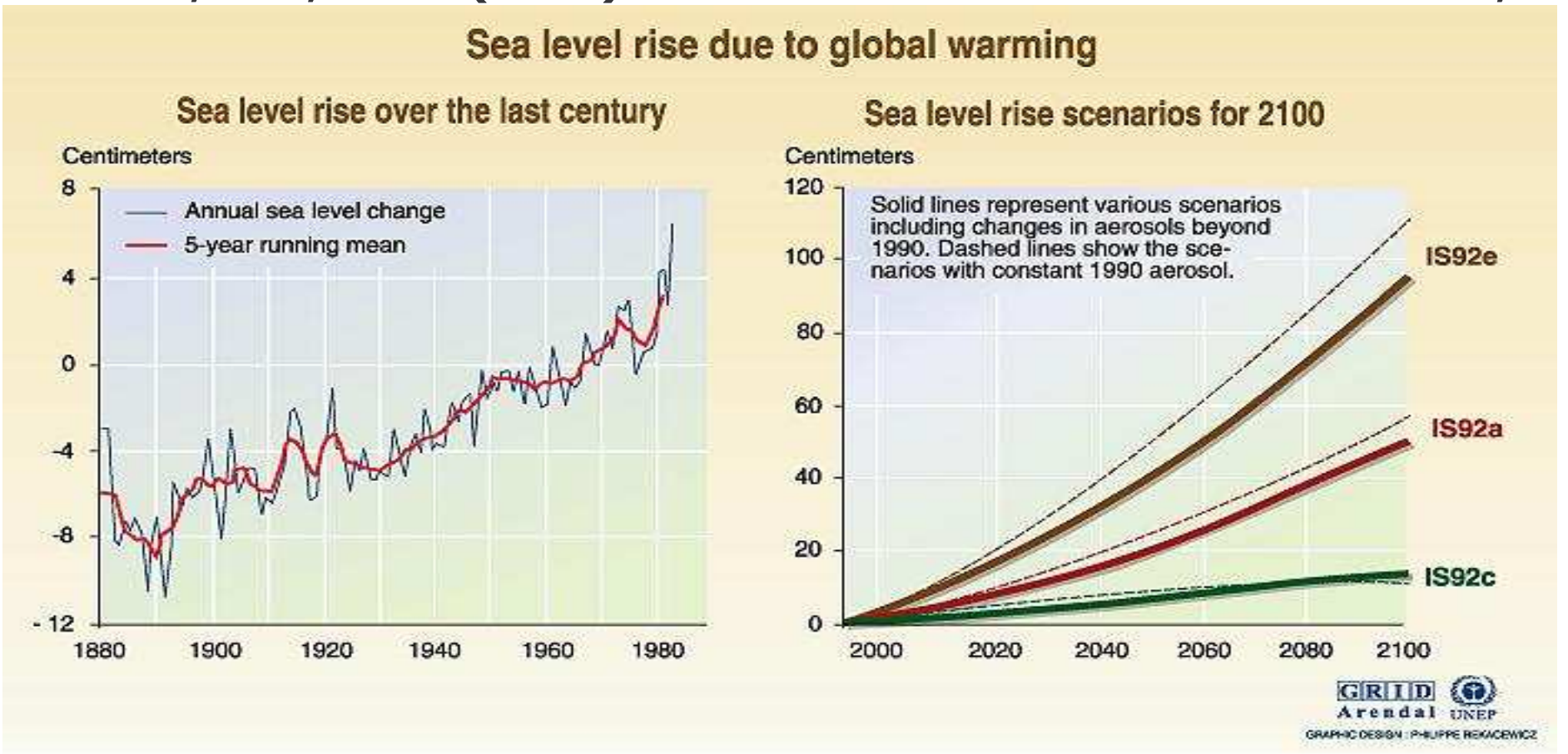
Mean Precipitation Change for Summer in 2080s (WG II, p. 652)

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

No specific climate change models for Eastern Mediterranean.

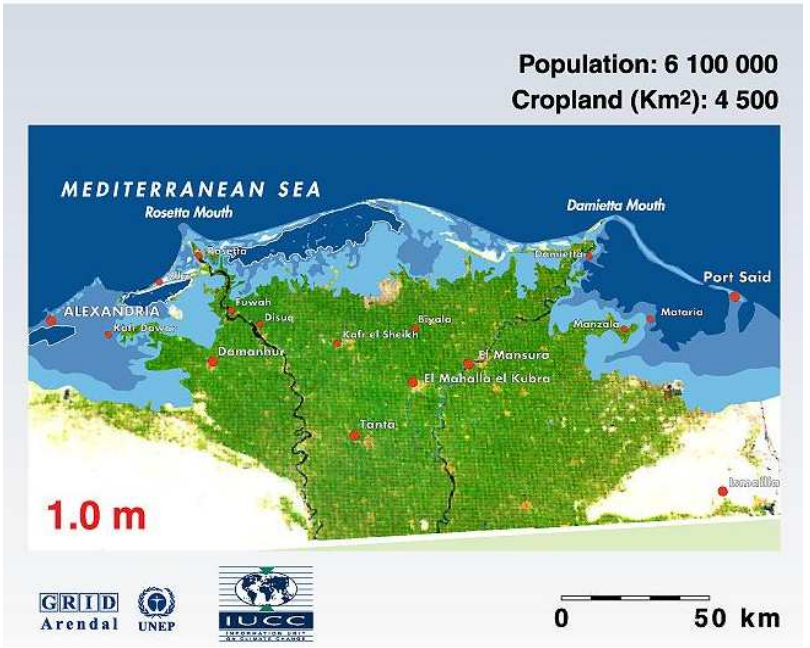
12.2.Global Climate Change:Sea level rise:1860-2100

IPCC, TAR, WG 2 (2001): Sea level rise 1860-2000: 0.1 – 0.2 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.

12.3. Effects of Climate Change: 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 Mediterran. by 2080

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

Population Growth in Med. (2000-2050):

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

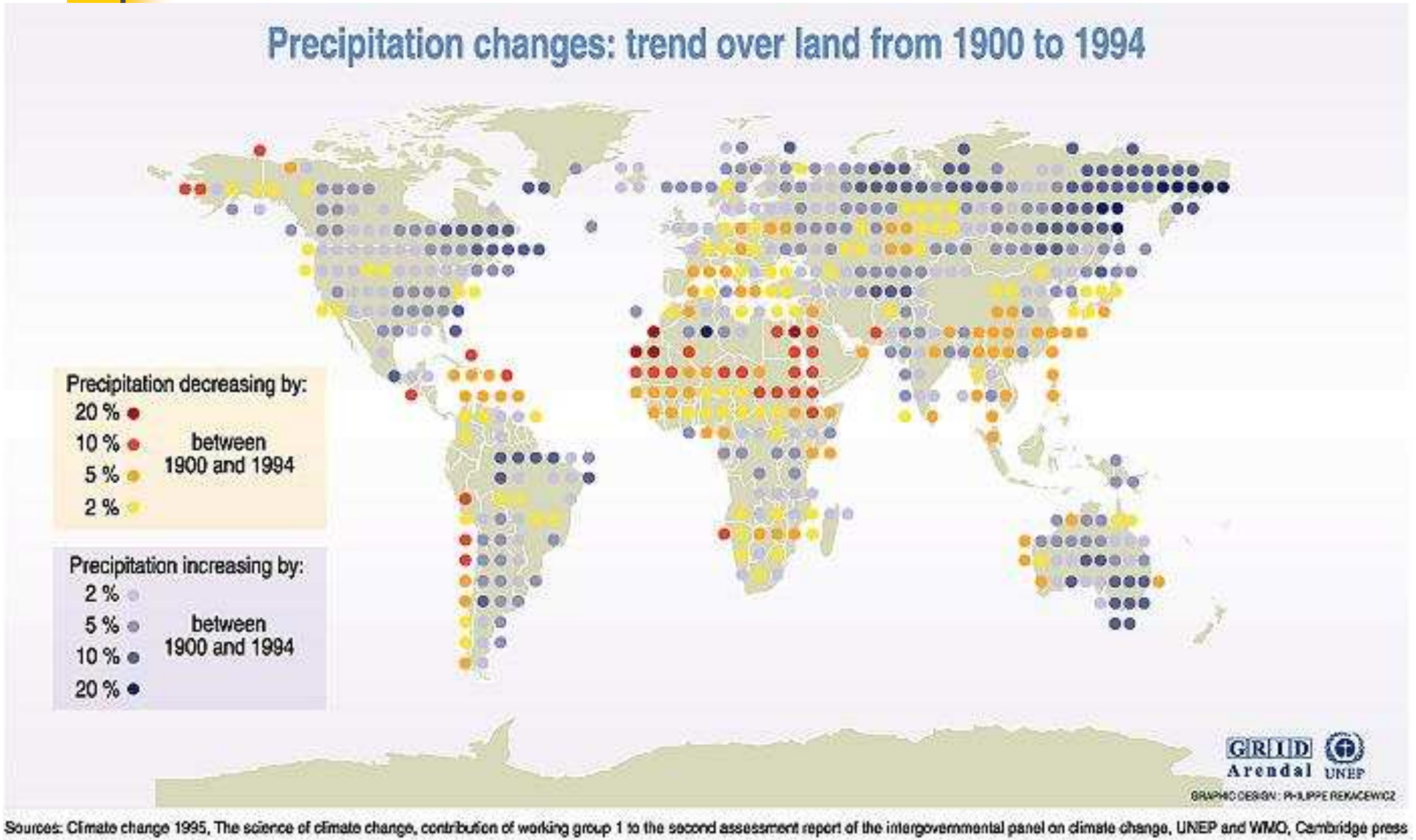
MENA: Increase in Food Insecurity

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

Dramatic Increase in Cereal Imports

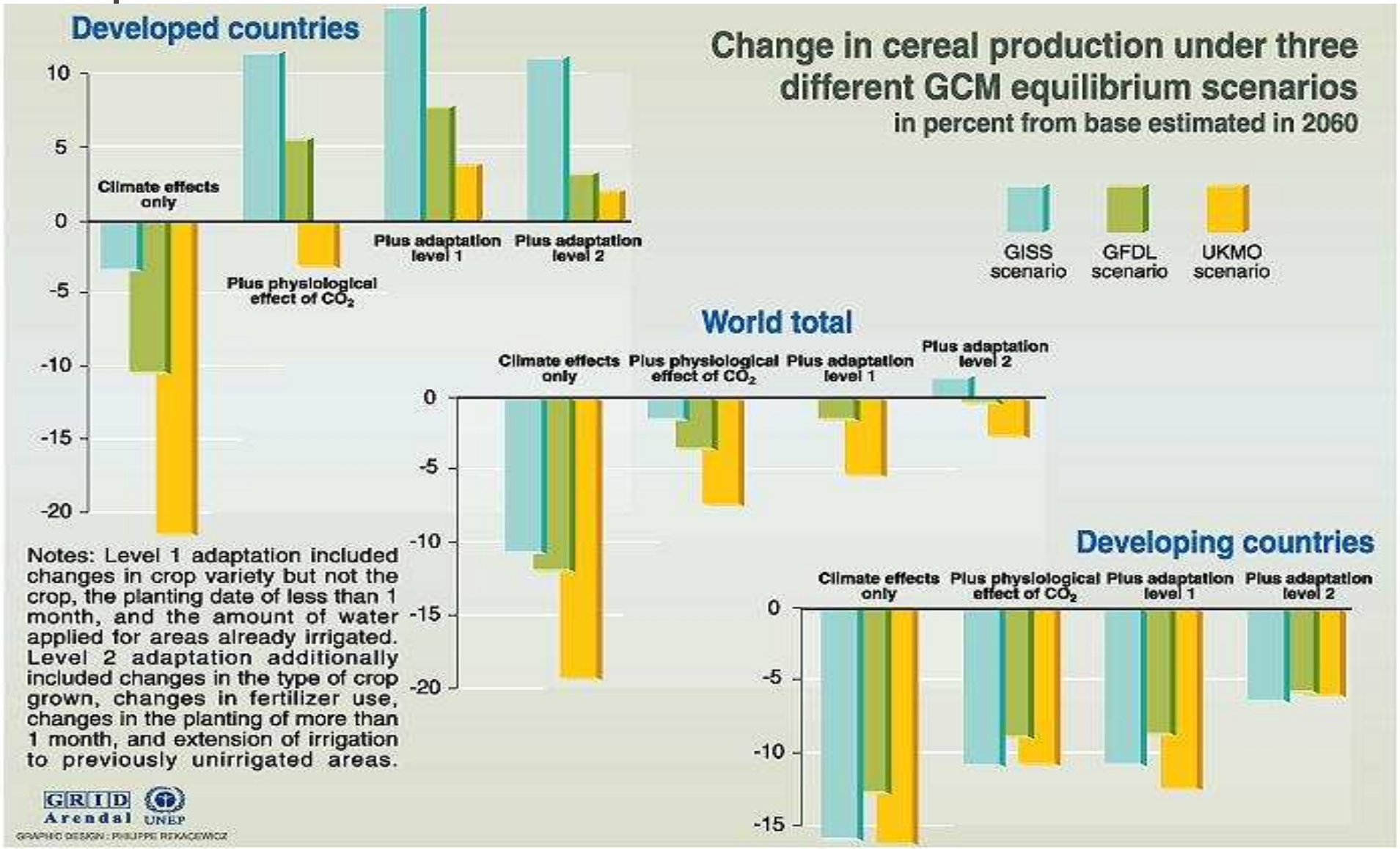
- Due to population growth & climate change

12.4. Climate Change Impacts on Precipitation



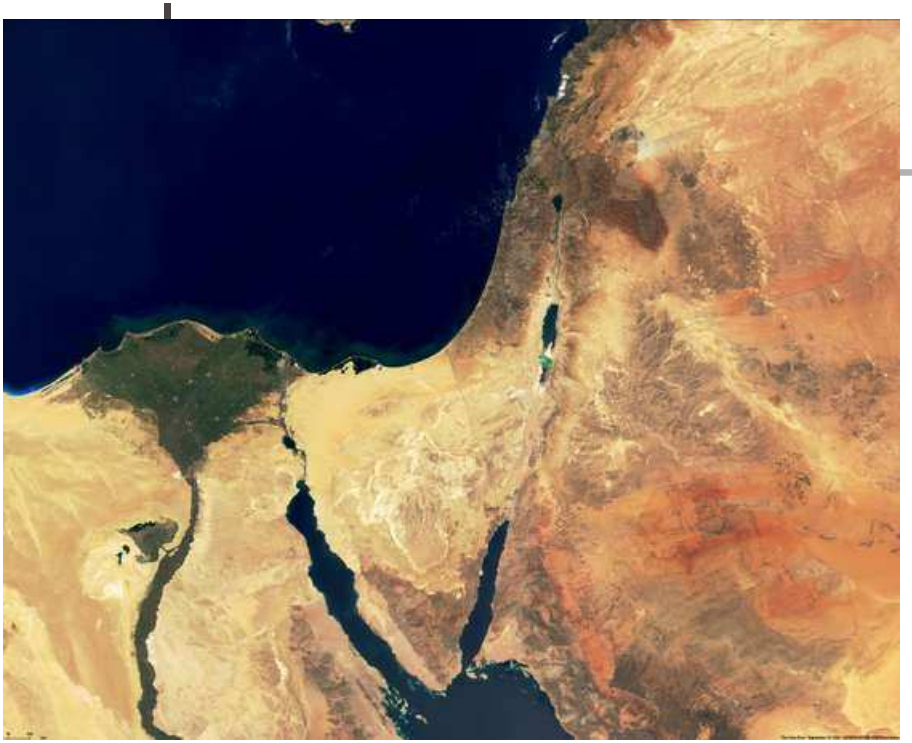
Sources: Climate change 1995, The science of climate change, contribution of working group 1 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge press university, 1996; Hulme et al., 1991 and 1994; Global Historical Climate Network (GHCN), Vose et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

12.5. 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.

13. Soil Erosion and Desertification



Climate change impacts (2100)

- temperature increases (2.5-4.5°C)
- Sea-level rises (SLR)
- uncertainty on precipitation
- heat waves & droughts increase
  - urbanisation increase temp.&SLR
- Desertification increase in max. temperature & reduce precipitation
- climate change impacts may intensify desertification
- decline in agricultural yields **(cereals)**

High sensitivity of ecological & social systems to climate change:

„There is clear evidence of potentially serious impacts throughout the Mediterranean region, with the most acute impacts being felt south of the socio-economic divide in Africa and the Near East."

- **High environmental and societal vulnerability of Eastern Med. region**
- **Low adaptive capacity and limited mitigation efforts (due to ME conflict)**

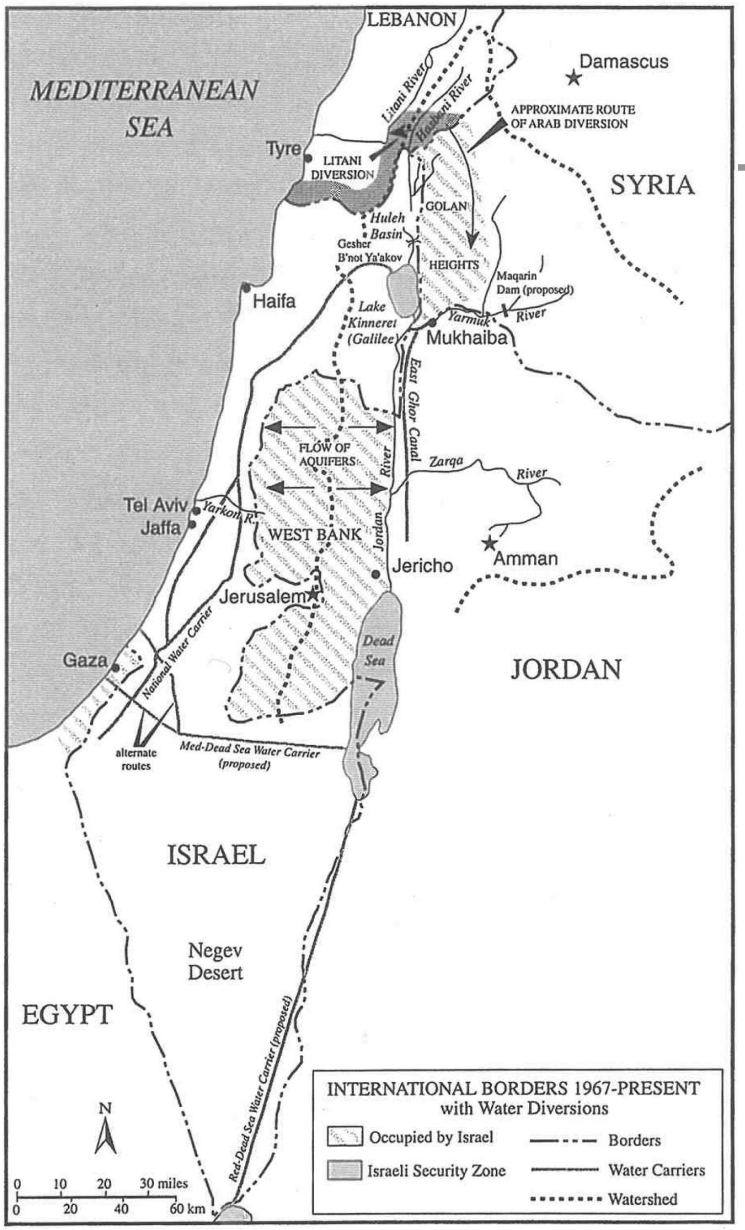
UNEP warned in 1990: "[it] is likely that the impact of climate change will first be felt in the Mediterranean water resource system."

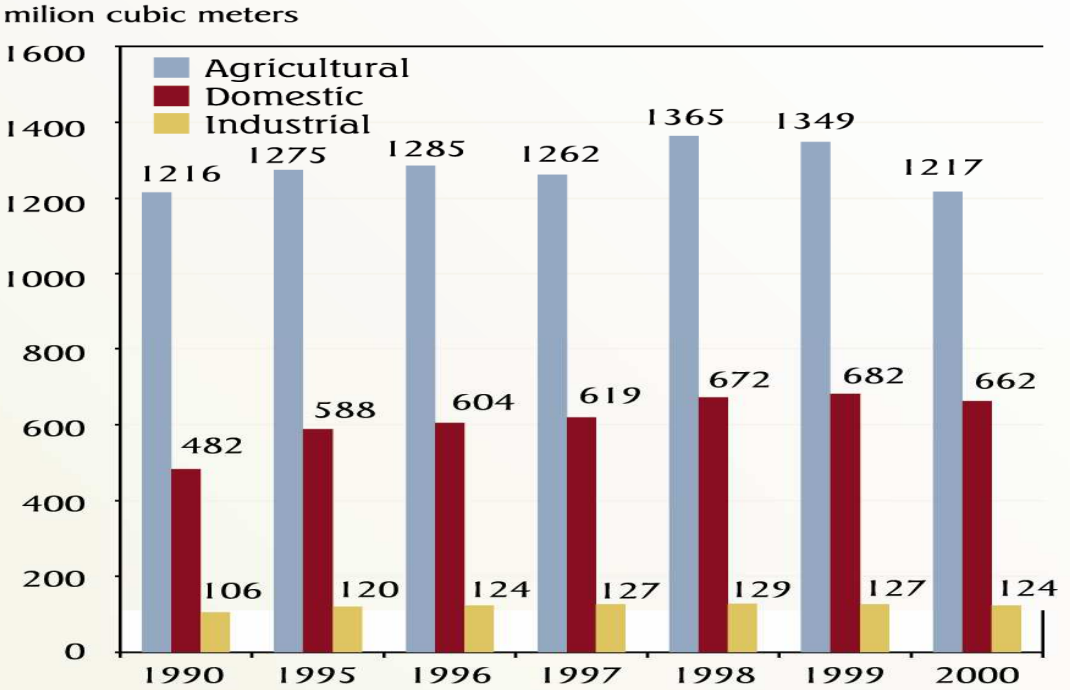
14. Water Scarcity in the Near or Middle East

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

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

14.1. Water Resources in Israel and in OPT





Source: Water Commission

Source: Environment in Israel 2002: 75

- **By 2004: desalination plants should produce at least 250 MCM/yr, Necessary to desalinate at least 375 MCM in 2004,+20 MCM each yr**

14.2. Environment of Israel 2002: Water

PUMPING, YIELD AND REPLENISHMENT OF ISRAEL'S WATER RESOURCES (MCM) (1999/2000)

BASIN	PUMPING TOTAL	SALINE*	INFILTRATION	SPRINGS FLOW TOTAL	SALINE	YIELD	REPLENISHMENT	AVERAGE REPLENISHMENT
Coastal	542	20	128			542	278 **	304
Mountain	399	8	0	28	25	427	301	350
W. Galilee	91	10		24	6	115	173	205
Carmel	37	8		3	3	40	39	41
Kinneret		59		321	18	380	430	580
E. Mountain	149	14		187	125	336	314	367
Negev & Arava	88	59				88	55 ***	55***
TOTAL	1365	119	128	563	177	1928	1590	1902

Source: Hydrological Service, Water Commission

** Water with chloride concentrations exceeding 400 mg/l is defined as saline.*

*** Replenishment in the Coastal Aquifer includes irrigation return flows, leaks, etc. estimated at 59 MCM.*

**** Mostly a one-time reserve.*

Pumping, Yield & Replenishment of Israel's Water Re-Sources (1999/2000)

Fresh & Marginal Water Consump-tion in 2000 (mcm)

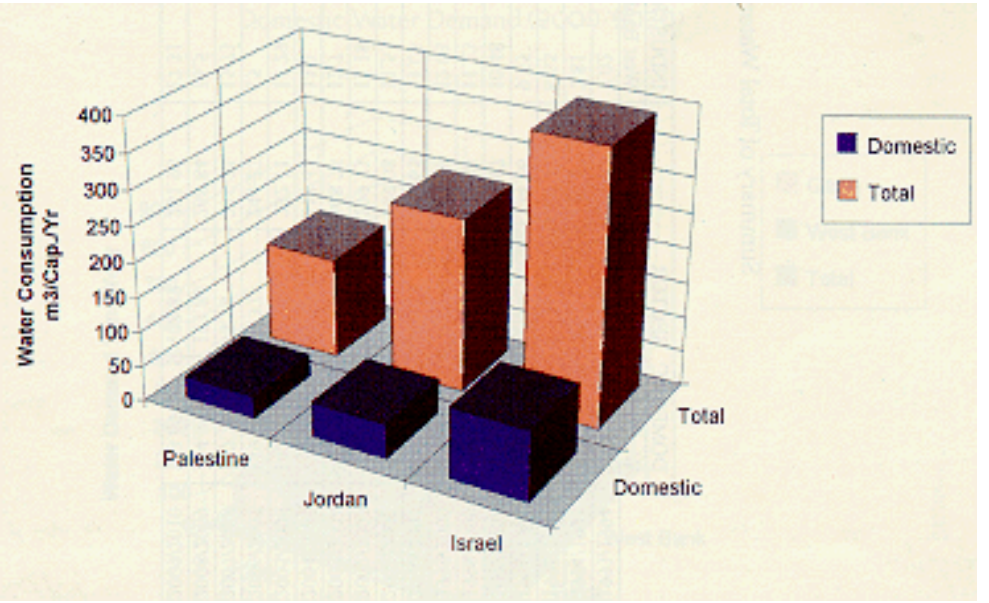
FRESH AND MARGINAL WATER CONSUMPTION IN 2000 (MCM)

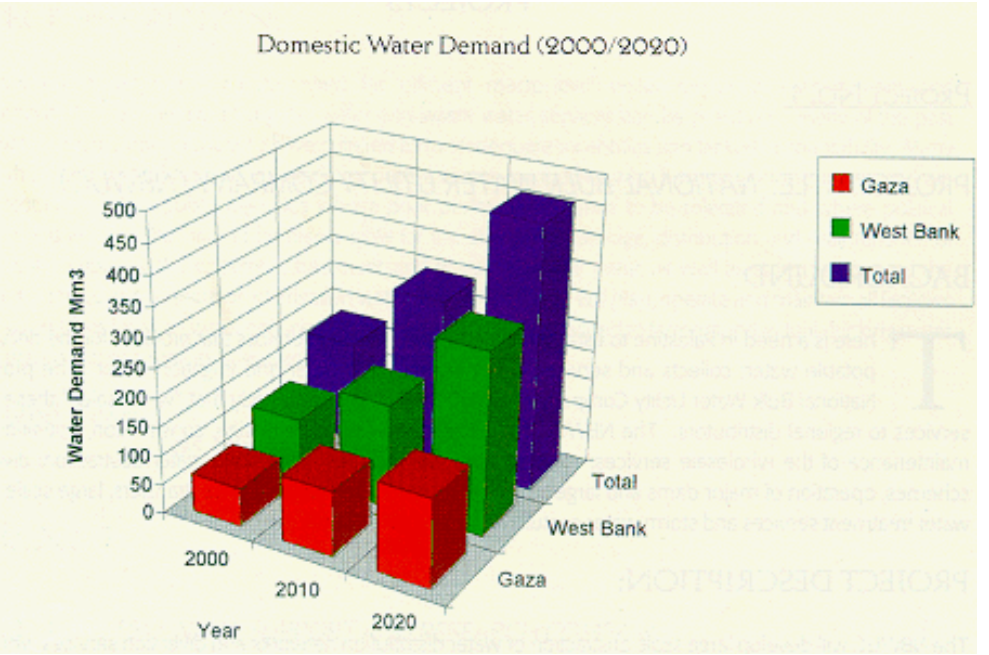
YEAR	FRESH WATER	MARGINAL WATER*	TOTAL
Agricultural	823	393	1216
Domestic	659	3	662
Industrial	90	34	124
Total Consumption	1573	430	2003

* Marginal water includes saline wells, floodwaters and effluents

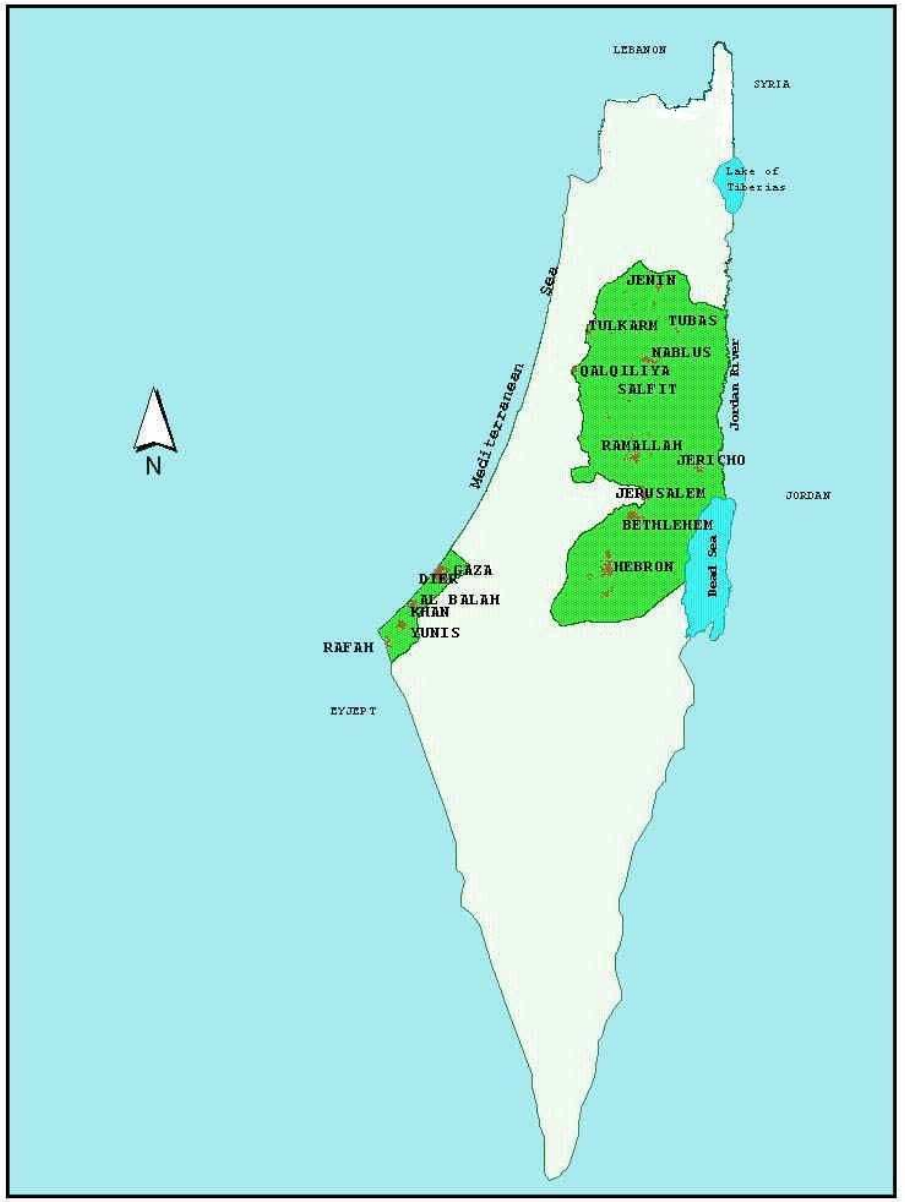
Source: Water Commission

14.3. Water situation in Gaza





14.4. Water Scarcity in Palestine



- Major demand increase due to population growth

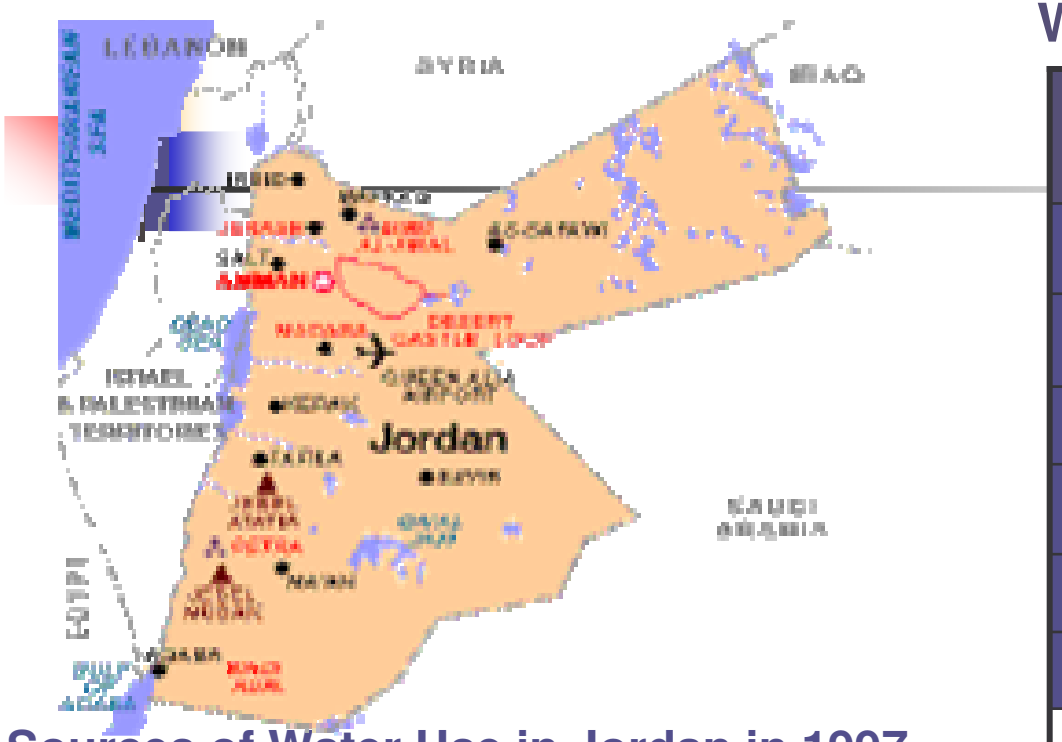
2000: 3.19; 2025: 7.15; 2050: 11.82

- Decline in precipitation due to climate change?

Water Dev./mio. m3/year Source: UNEP Desk Study

	2000	2010	2020
Gaza Strip	114	228	285
Westbank	155	394	584
Desalination (Gaza only)	0	47	57

14.5. Water Demand Forecast: Jordan 1990-2025



Water situation in Jordan

Year	Supply	Demand	Deficit (Mcm/y)
1995	882	1,104	222
2000	960	1,257	297
2005	1,169	1,407	238
2010	1,206	1,457	251
2015	1,225	1,550	325
2020	1,250	1,658	408

Source: Semide: Water in Jordan

Water resources: surface w. (Jordan), Groundwater, waste water (irrigation),

Future solutions:

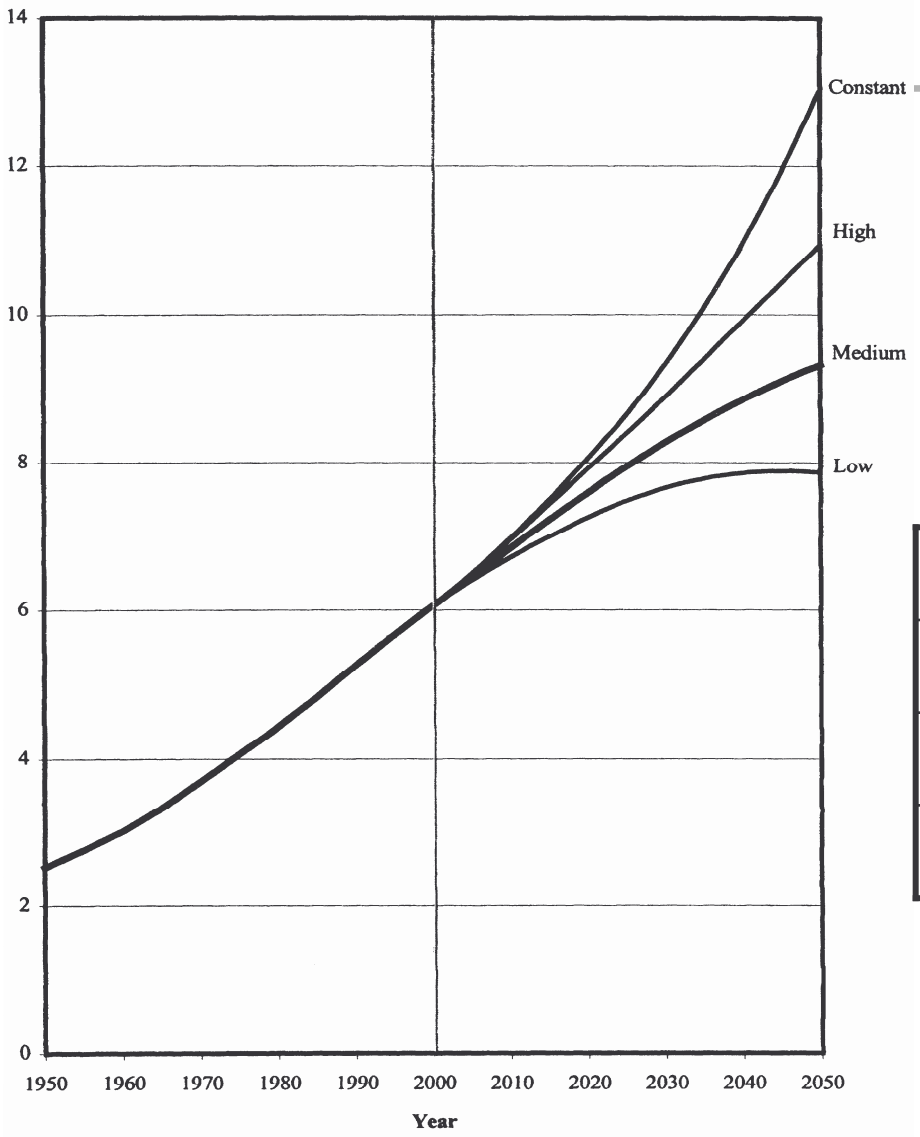
-demand side management, crop changes & water culture

-supply side management: water harvesting, recycling, & desalination

Sources of Water Use in Jordan in 1997

Source	Munic	Ind.	Irrig	Live	Total
Surface	58.071	1.893	264.486	4.00	328.450
Ground	177.557	35.343	266.189	7.12	486.207
Waste	0.000	0.000	61.000	0.00	61.000
Total	**235.628**	**37.236**	**591.675**	11.12	**875.657**

15. Demand Side: Anthropogenic Factors for Eastern Mediterranean: Population Growth



- **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

15.1. Population Growth: Eastern Mediterranean

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

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

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

15.2. Population Growth: East Mediterranean

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

Source: UN Populations Division: Draft World Population in 2030. Highlights According to Medium Scenario, 2000 to 2300, maximum population & year [http://www.un.org/esa/population/publications/longrange2/AnnexTablesB.pdf]

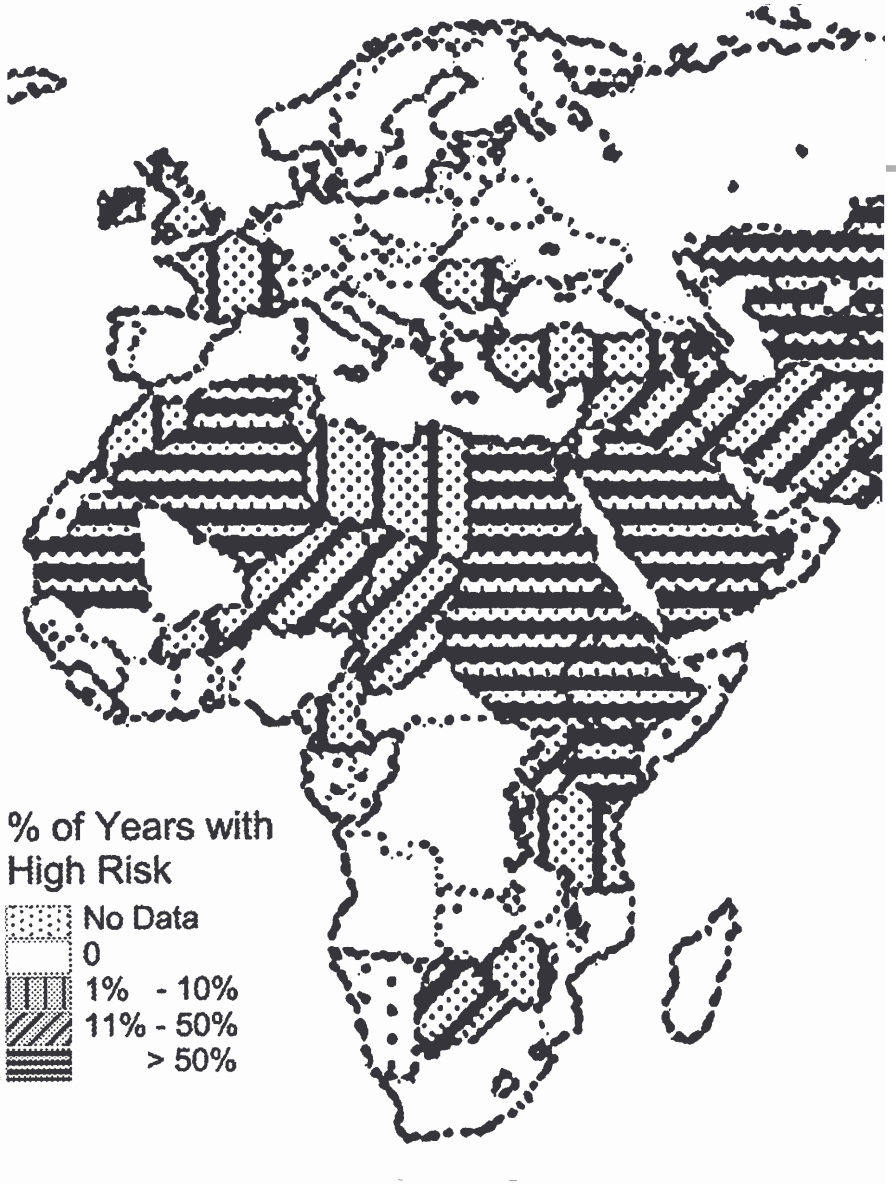
	2000	2050	2100	2200	2300	Year of max. pop.	Max. pop.
Jordan	5.035	10.154	10.664	9.659	10.077	2080	10.902
Israel	6.042	9.989	9.833	8.817	9.370	2070	10.290
OPT	3.191	11.114	14.932	12.856	13.484	2105	14.933
Lebanon	3.478	4.946	4.506	4.420	4.694	2055	4.951
Syria	16.560	34.174	35.012	31.530	33.413	2075	36.316
Turkey	68.281	97.759	90.323	87.452	91.593	2055	98.064
Egypt	67.784	127.407	131.819	117.851	124.715	2075	136.279

16. Urbanisation in Eastern Mediterranean

Table: World Urbanization Prospects (Rev. 2001),% Source: UN Populations Division: World Population Prospects (2002)

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

17. Food Scarcity: High Potential for Food Crisis 1990-2050



← **Food Crisis: 1900-1995**

Source:Alcamo/Endejan (2002)

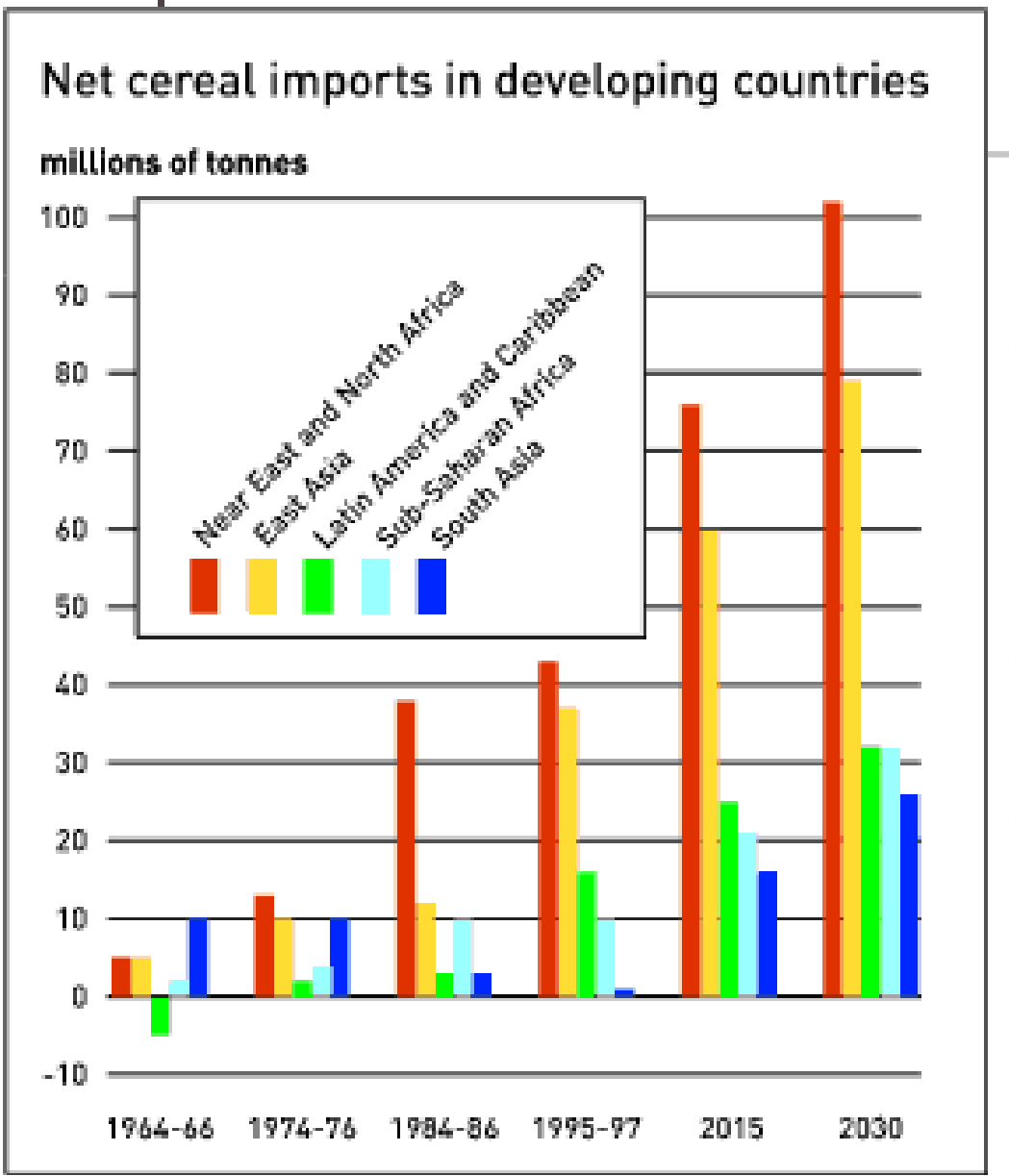
High Potential for Food Crisis 2001-2050 with GDP In-crease & Climate Change ↓

17.1. Food Security in the MENA Region

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

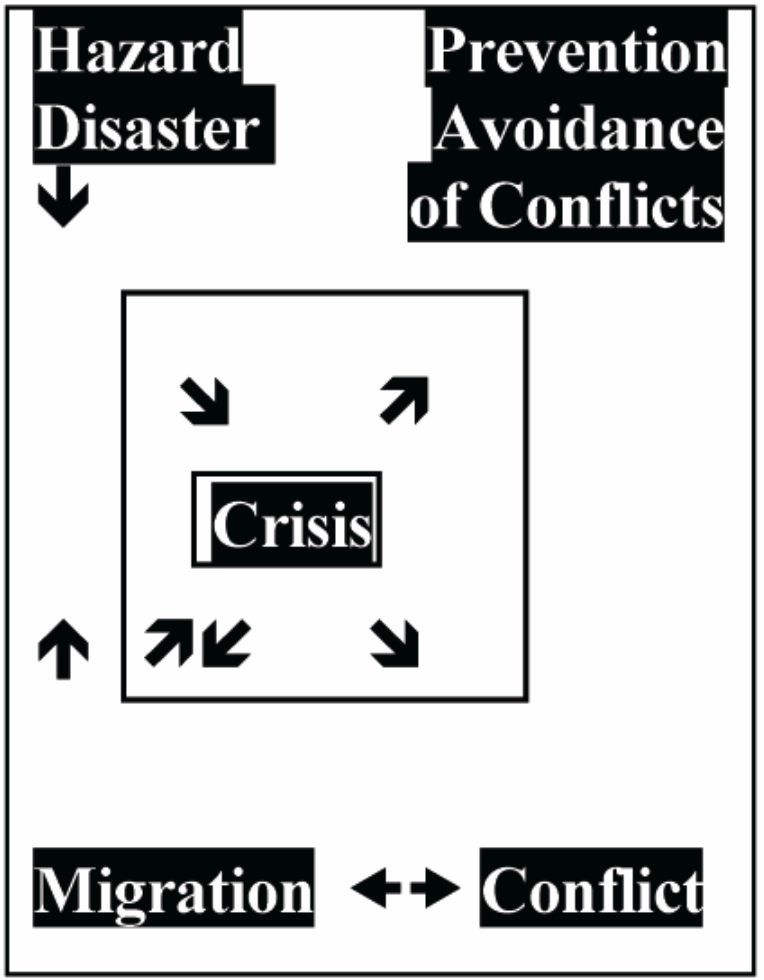
19	Demand				Pro-duc-tion	Net tra-de	Selfs uf-fic. rate %	Growth rates, % p.a			
	Per caput (kg)		Total (mio.tons)					Time 19.../20..	Dem and	Pro-duc-tion	Po-pula tion
	food	All uses	food	All uses							
64/66	174	292	28	47	40	- 5	86	67-97	3.6	2.4	2.7
74/76	190	307	40	64	55	- 13	85	77-97	3.1	2.7	2.7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

17.2. FAO (2000) Increase in Cereal Imports



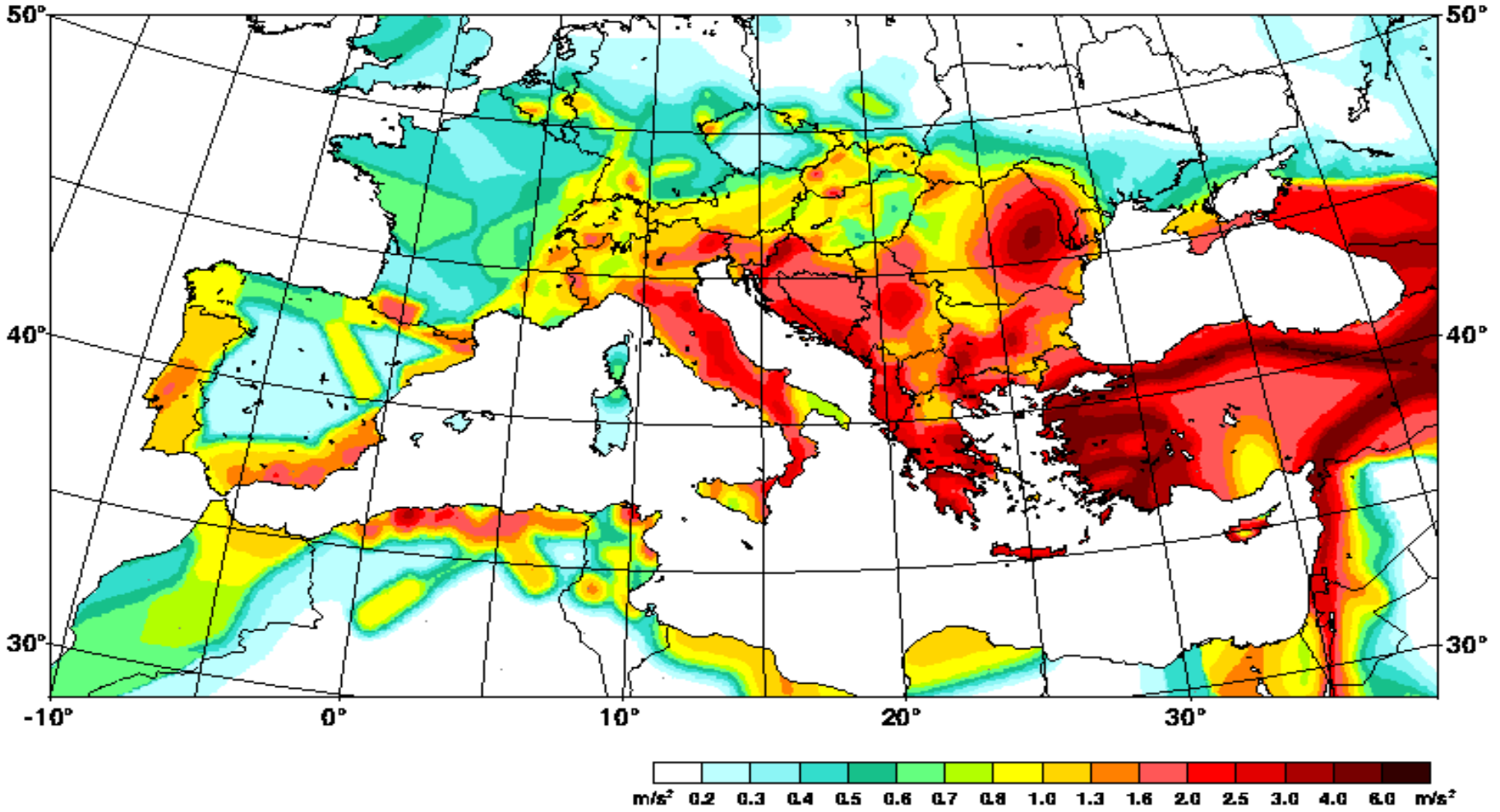
- **FAO: 4 March 2003, Rome**
  World's population will be better fed by 2030, **but hundreds of millions of people in develo-ping countries will remain chronically hungry**.
- Parts of South Asia may be in a difficult position and **much of sub-Saharan Africa** will not be significantly better off than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

18. Interactions among Fatal Outcome: Linking Drought & Famine with Societal Consequences



- Much knowledge on these factors:
  - ✓ Drought, migration, crises, conflicts
- Lack of knowledge on linkages among fatal outcomes
  - ➢ Drought & drought-ind. migration
  - ➢ Famine & environm.-ind. migration
  - ➢ Conflicts & conflict-induced migration
- Lack of knowledge on societal consequences: crises/conflicts
  - ➢ Domestic/international crises/conflicts
  - ➢ Environmentally or war-induced migration as a cause or consequence of crises and conflicts

18.1. Fatal Outcomes: Earthquakes in the Med.



18.2. Fatalities of Disasters in the Eastern Med.

Table: Fatalities of Natural Disasters (1975-2001)

	Total			Drought		Earthquakes		Floods		Storms	
	Ev	Killed	Affect (000)	Kill.	Aff. 000	Killed	Affect (000)	Kill.	Aff. 000	Kil	Aff.
Israel	11	31	2,029	-	-	-	-	11	1	3	410
Jordan	11	47	349,0	-	330	-	-	17	18,0	11	200
Leban.	4	45	105,6	-	-	-	-	-	1,5	25	104,
OPT	1	-	943	-	-	-	-	-	-	-	-
Syria	5	115	662,2	-	658	-	-	27	172	-	-
Turkey	63	27,375	2,580	-	-	26,087	2,377	450	92,2	31	3
East M.	95	27,613	3,700	0	988	26,087	2,377	505	112,9	70	104,
Total M.	485	43,728	22,145	0	10 m	35,735	35,735	4374	2,153,	608	3,697

18.3. Vulnerability of Cities to Earthquakes

City	1950	1960	1975	1990	2000	2010	2015
Athens	1.8	2.2	2.7	3.0	3.1	3.1	3.1
Istanbul	1.08	1.74	3.60	6.54	9.45	11.84	12.49
Ankara	0.54	0.87	1.71	2.54	3.20	3.85	4.08
Izmir	0.48	0.66	1.05	1.74	2.41	3.01	3.20
Cairo	2.41	3.71	6.08	8.57	10.55	12.66	13.75
Alexandria	1.04	1.50	2.24	3.21	4.11	5.05	5.53
Tel-Aviv	0.42	0.74	1.21	1.80	2.18	2.52	2.63
Gaza	1945: 0.072	??	0.414	??	? 0.800	??	??
Amman	0.09	0.22	0.50	0.96	1.43	1.97	2.21
Beirut	0.34	0.56	1.06	1.58	2.06	2.37	2.47
Damascus	0.37	0.58	1.12	1.80	2.34	3.07	3.50
Aleppo	0.32	0.48	0.88	1.54	2.17	2.92	3.31

19. Migration Trends in the Mediterranean

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

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

20. Environmental Challenges & Security

- Report: Global Trends 2015 (Dec. 2000) pointed for ME to 2 of these trends: population growth & water scarcity as U.S. national and international security threats, but not climate, desertification.
- Policy relevance depends on worldview & security concept: perceptions in North and South differ
- Hobbessian pessimists and narrow security concept often ignore or downplay these environmental challenges.
- Kantians: point to democratic, human rights deficits.
- Grotian pragmatist: agenda-setting & cooperative strategy.
- Narrow national security perspective: State, power and territorial integrity and ethnic & religious identity matter.
- It makes a difference how one views the threat or challenge to security: as a military threat or as a challenge to survival of humans
- Conclusion: Worldviews & mindsets of elites are a major impediment to perceive these non-military security challenges that can-not be solved by military means, only by cooperation of parties!

20.1 Environmental Security Dangers: Cause and Victim of Securitisation

- Security is achieved if there is an absence of objective threats and subjective fears to basic values.
- Ecosystem was introduced as reference object of '*environmental security*'. Its values at risk are sustainability & the sources of dangers are humankind & global environmental change .
- Environment is considered as cause & object of threats, challenges, vulnerabilities and risks posed by GEC, environmental pollution & natural hazards.
- While most securitisation efforts have focused on the 'state' or on the 'society' as major referent objects, Westing (1989) introduced the environment into a 'comprehensive human security' concept that requires both *protection* (quality of environment) and *utilisation* requirement (human welfare).
- Renewable natural resources must be used in sustainable way.

20.2. Conclusions

- **The problems of Global Environmental Change that will affect the whole region very severely can neither be solved by violence nor with power as „hard“ security threats with military means. They require cooperation among parties!**
- ✓ **From a *Human Security perspective* the basic human need for security and survival of the individual and of his family matter!**
- ✓ **From an *Environmental Security perspective* the challenges of GEC must be perceived & cooperative counterstrategies must be developed to avoid that these future challenges become new Food, Health & Livelihood Security issues.**
- ✓ **But this requires a fundamental shift in the perception of security. If only one side can win both sides will loose in environmental terms paying a high price.**

Thank you

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

Thank you

for your attention and patience.

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