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**IMPACT OF GLOBAL WARMING AND NON-CONVENTIONAL WATER
RESOURCES: POTENTIAL OF SOLAR THERMAL DESALINISATION TO
DEFUSE WATER AS A CONFLICT ISSUE -- A CONCEPTUAL CONTRIBUTION
TO CONFLICT RESOLUTION AND LONG-TERM CONFLICT AVOIDANCE**

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Abstract²

The article argues that the conceptual ideas of David Mitrany, George Marshall, Jean Monnet, as well as the new thinking of Mikhail Gorbachev were instrumental for 60 years of peace in Europe, for European integration, overcoming the Cold War and contributing to the reunification of Europe. The article contrasts different security perceptions of narrow *national security threats* with a widened security concept that includes economic, societal and environmental dimensions and other levels of analysis and referents, with a special focus on *human security*.

Thereafter, the regional impact of global environmental change and potential fatal outcomes are discussed for the Middle East until 2050 and 2100. These environmental challenges are not yet perceived as common threats. A special focus is on the water demand due to population growth, urbanisation and food needs, as well as the changing supply due to the impact of climate change on both precipitation, soil erosion, drought and desertification in the region.

Then, these common environmental challenges are discussed that will affect Israelis and Palestinians during the 21st century and that may influence the dominant security discourse focusing on military threats. The author suggests a strategy for problem recognition and agenda setting of common long-term environmental challenges in the region. In responding to water degradation and scarcity he proposes a functional cooperation and developing of a joint infrastructure on water, soil and food between Egypt, Israel, Jordan and Palestine in the Gulf of Aqaba, in the Jordan valley and in the Sinai and Negev. He suggests first to jointly analyse these environmental challenges and second to develop common technical solutions and a trans-border infrastructure with support of international donors in two or more countries.

The case of solar thermal desalination is used to develop the idea of a gradual functional cooperation that may lead to common institutions to address common challenges and potential causes of conflict. The cooperation among water authorities and communities during periods of crises could become a nucleus for testing conceptual ideas by focusing on indispensable commodities for survival (water, soil, food, energy). These considerations may conceptually contribute to conflict resolution and long-term environmental conflict avoidance, tasks the international donor community should address to deal pro-actively with common challenges.

Keywords: climate change, conflict resolution and avoidance, functional cooperation, security concepts, solar thermal desalination, non-conventional water resources

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INTRODUCTION: RESEARCH QUESTIONS AND HYPOTHESES

After centuries of conflicts in Europe, two world wars and the holocaust, since 1945 Europe has experienced a period of nearly 60 years of peace among EU members. The article addresses the following questions.

1. Which role did the common military threat, functional cooperation, conditionalised aid, the community process and the “new thinking” play? What have been major conceptual ideas, and 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?

The article is based on the following 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, world-views, 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 and 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.

FOUR CONCEPTUAL PILLARS OF SIXTY YEARS OF PEACE IN EUROPE

After centuries of permanent and repeated conflicts and wars in Europe four conceptual thinkers and key operational ideas have contributed to a basic change that have resulted in nearly 60 years of peace in Europe and to a reunification of the continent after the cold war.

Pillar 1: David Mitrany’s functionalist concept of a working peace system

In the words of David Mitrany (1943), functionalism is concerned “with the ways of creating ... a working peace system. It involves a diagnosis of the problems of disorder in international society and a prescription for ways of shaping a better world” (Taylor/Groom 1975: 1). Functionalism as a theory of cooperation reflects the developments in the structure of the political, social and economic life and it adapts these to a theory of international integration. Groom (1975: 93ff.) analysed functionalism both “as a description of world society and as a prescription for a ‘working peace system’”. This functionally oriented transboundary cooperation in international organisations (ILO, FAO, IFRCRCS) and the technical and non-political problem solution by experts has survived crises and wars and has often contributed to confidence and partnership building processes. In Groom’s (1975: 94) analysis: “Functionalists argue that there is no need for a fixed constitution written in advance because the framework is developed and (ideally) modified as the function being fulfilled changes.” The primacy is given to transaction (functional cooperation) and not to constitutions (form). Functionalists in the tradition of Mitrany argue “that a ‘working peace system’ will evolve that will tend to diminish conflict by allowing cross-cutting loyalties, by developing superordinate goals, by removing barriers to intercourse and by creating a sense of security through fulfilling a necessary function rather than through a threat system” (Groom 1975: 94-95). Groom continues that “functionalist organisation should start from those spheres in which welfare is maximised through transnational cooperation so that the domain of legitimised politics gradually expands while that of power politics gradually contracts”. For Groom functionalism, as a prescription remains a promise or a hypothesis.

Pillar 2: Paul Hoffman and George Marshall's concept of conditionalised aid

The idea of the Marshall Plan was developed by Richard Bissell in 1944 in a report of the Committee of Economic Development, headed by Paul G. Hoffman. In 1948 Hoffman became the administrator of the Marshall Plan and Bissell his closest adviser. The idea was not to punish the aggressor but to use conditionalised economic aid as a tool to open markets, to foster cooperation between those who won and lost World War II, and to build a common institution (OEEC, 16.4.1948) that later became OECD (1960/1961). While the idea of the Marshall Plan was launched by the US business community in 1944, the emerging Cold War offered the legitimacy for approval by the US Congress. The Soviet threat and US terms for cooperation resulted in an integration of Germany into the West and created favourable pre-conditions for European cooperation and integration (Gimbel 1976; Mee 1984; Pisani 1991).

Pillar 3: Jean Monnet's³ concept of functional institution-building

Jean Monnet was the most successful political visionary whose ideas and skills to persuade policy makers fundamentally changed Franco-German relations after World War II. Monnet became the intellectual founding father of the European Community for Coal and Steel in 1950, of the European Economic Community in 1955 and of the European Union with its 25 member countries. Prior to the Korean war Monnet developed the Schuman Plan for a European Coal and Steel Community and immediately afterwards the Plevin Plan. Monnet was no dreamer and he had no illusions on changing human nature, but he was convinced "that by altering the conditions under which people lived they would necessarily adapt to the new reality". He believed that new ideas "should be advanced at moments when the contradictions of the *status quo* forced political leaders to question their own assumptions" (Ball 1994: 13). Monnet wrote: "I've always believed that Europe will be established through crises and not the sum of the outcome of those crises". He had the political instinct to use the Soviet threat to fundamentally transform the thinking of the political leadership in France and Germany. His ideas became instrumental for the building of new and lasting structures of supranational and intergovernmental cooperation (Bromberger 1969; Duchêne 1994; Lipgens 1977).

Pillar 4: Mikhail Gorbachev's new thinking to break out of the deterrence syndrome

The perception of the end of the Cold War differ according to the worldview, mindset and theories of the analyst. For the realists it was US military superiority that provoked the implosion of the USSR, for the liberal institutionalists decades of detente, arms control and confidence building measures contributed to accommodation, and for cognitive psychologists cooperation "created favourable conditions for ideas to emerge which offered a way out of this predicament by fundamentally influencing the values, goals, and perceptions of a new class of Soviet leaders" and "values, norms, and ideas matter in international relations, that they have tremendous potential for bringing about fundamental change in world politics." (Grunberg/Risse-Kappen 1992: 144-45) Research on the end of the East-West conflict concluded that a set of old mind-sets prevented many decision makers in the West to recognise the fundamental changes initiated by Gorbachev's "new thinking" (Checkel 1997). For Garthoff (1994: 756, 773) "the decisive factor in the end of the Cold War was a change in beliefs", where "Soviet leaders could discard a long-encrusted and familiar ideology only because of a powerful transformation in the way Gorbachev and some colleagues perceived reality, and because they

³ Jean Monnet was the deputy secretary general of the League of Nations (1919-23), in 1940 he headed the French-British coordination committee, from 1940-1943 he was in the US contributing to the US post-war conversion plan (Victory Programme), from 1943-44 he was a member of the French Resistance and from 1946-50 head of the Planning Office in Paris, from 1952-1955 he was president of the Coal and Steel Union and in 1955 he founded the Action Committee for the United States of Europe.

were ready to adapt domestic and foreign policies to the new perception. ... The ‘new thinking’ under Gorbachev ... combined idealist assumptions about the international order with pragmatic approaches to resolving concrete problems. . It also reflected and facilitated a learning process, as past failures prompted rethinking and new approaches.”

These four key conceptual and operational ideas of Mitrany (UK), Marshall (USA), Monnet (France) developed during severe crises of World War II, in the early Cold War, and during the Korean War, as well as of Gorbachev (Soviet Union) that emerged during a period of stagnation in the Soviet Union, changed the perception of reality and thus enabled fundamental changes of the political context.

For the Middle East, during the present crisis, new conceptual ideas are needed on both sides to break out of the perennial cycle of action, punishment and revenge. Reviewing the impact context changing ideas had in Europe may contribute to a critical reassessment of the mindsets, political strategies and tactics that have led to the deadlock that postpones taking joint decisions 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.

SECURITY PERCEPTIONS MATTER

According to a classical definition by Arnold Wolfers (1962): „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.“ The (subjective) perception of security threats, challenges, vulnerabilities and risks depends on the worldviews or traditions of the analyst and on the mindset of policy-makers and their advisers. As Weberian ideal types and in the context of the English school three basic traditions or worldviews may be distinguished that of a
 ?? Hobbesian pessimist (realism) where *power* is the key category (narrow concept);
 ?? Kantian optimist (idealism) where *international law* and *human rights* are crucial; and
 ?? Grotian pragmatist where *cooperation* is vital (wide security concept).

With the end of the Cold War, many authors (Buzan/Waever/de Wilde, 1998) have observed a widening and a deepening of the security concept in postmodern OECD countries, while since 30 January 2001 and especially after 11 September 2001 a return (shrinking) to a more narrow security concept has occurred, at least in the US. Across the Mediterranean, post-modern, modern and pre-modern security concepts co-existed that undermined any effort for a common security concept in the framework of the planned Euro-Mediterranean Charter (Brauch, 2001).

Selim (2003) and Kam (2003) have argued that the security discourse in the Arab Masreq countries and in Israel has focused on the narrow security concept and Newman (2004) pointed to an “environmental schizophrenia” in his own country where due to the omnipresence of the military threat, longer-term environmental concerns have a low priority in the public perception. The “Hobbesian fear” (Butterfield 1951), or Herz’ (1950) “security dilemma” have dominated the perceptions in both communities that is rekindled by a cycle of violence.

Table 1: Vertical Levels and Horizontal Dimensions of Security

<u>Security dimension ?</u>	Military	Political	Economic	Social	Environmental ↻ (longer-term env. challenges)
Level of interaction (reference point) ?					
Human ↻					Cause and victim
Societal/Community					↻ ↻
National (short-term threats)	Middle East discourses on security dilemma				↻ ↻ „survival dilemma“
International/Regional					↻ ↻
Global/Planetary ↻					GEC

In European security discourses a widened or expanded security concept has been used in official governmental security white papers and in scientific debates (Buzan et al.1998; table 1). Møller (2003) distinguished a traditional national and three expanded security concepts of societal, human and environmental security that differ with regard to the reference object, the value at risk and the sources of threat. Oswald (2004) added gender security and proposed a combined human and gender security concept (HUGE; table 2). Brauch (2003, 2004) suggested to focus the human security discourse on the environmental security dimension especially on present and future interactions between the individual or humankind as the cause and victim of factors of global environmental change both of an anthropogenic nature and due to natural variability. The economic behaviour of humankind and the six key factors of global environmental change (GEC) may pose for people with a high degree of societal and environmental vulnerability (Bohle 2002) a “survival dilemma” (Brauch 2004; table 3).

Table 2: Expanded Concepts of Security (Møller 2003; Oswald 2004)

	Reference object	Value at risk	Source(s) of threat
National Security	The State	Sovereignty Territorial integrity	Other states (Sub state actors)
Societal security	Nations, Societal groups	National unity Identity	(States) Nations, Mi- grants, Alien culture
Human security	Individuals Humankind	Survival Quality of life	State, Globalisation, Nature
Environmental security	Ecosystem	Sustainability	Humankind
Gender security	Gender relations, Indigenous peo- ple, Minorities	Equality, Identity	Patriarchy, totalitarian institutions (govern- ments, churches, elites)

Table 3: Environmental Security Dimension: Threats, Challenges, Vulnerabilities, Risks

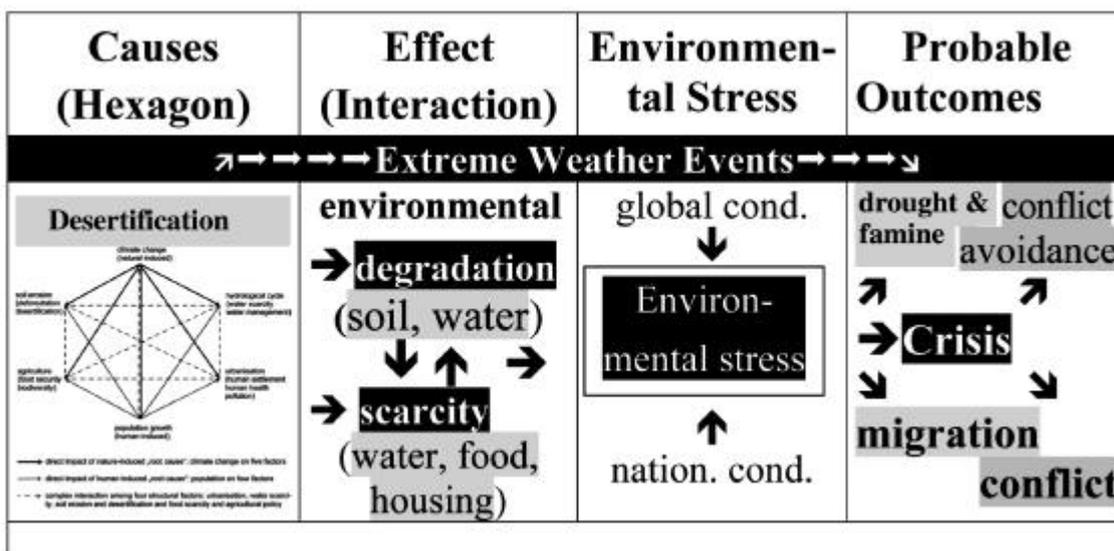
Security dimension ? Level of interaction (reference point) ?	Per- spec tive	Environ- mental ☞	Military Threats	Environ- mental Chal- lenges	Vulnera- bilities	Risks
Human ☞	H	Cause/victim			Internal ☞	high
Societal/Community	U	☞☞		hazard	Societal	medium
National	M A N	☞☞ survival di- lemma	rarely	☞ disasters	(poverty) ☞☞ external	depends on region, in- come/cap.
International/Regional	Secu	☞☞			(environ- mental)	medium
Global/Planetary ☞	arity	GEC				low

From a narrow realist or Hobbesian worldview environmental and human security challenges are not perceived as threats, and thus hardly exist. From a pragmatic Grotian perspective environmental security challenges enhance the societal vulnerability what may lead to a “survival dilemma” (Brauch 1996, 2000, 2003, 2004a) for those with a high degree of societal vulnerability that may be the most seriously affected during hydro-meteorological and geophysical hazards. From a Kantian perspective international environmental treaties and regimes pose obligations both for governments and through national implementation also for individuals.

In his model (figure 1) Brauch (2002, 2003) distinguishes between six factors contributing to global environmental change (GEC), three demand side factors: population change, urbanisation and food, and three supply side factors of soil (erosion, deforestation, desertification etc.),

water (degradation and scarcity) and air (climate change, ozone layer depletion) that interact in linear, exponential or chaotic ways and may contribute to environmental scarcity of soil, water and food that in turn intensify environmental degradation and my result, taking the specific national and international context into account, in environmental stress. Depending on the system of rule and on the level of economic development, the interaction between state, the economy and society differs, as will the role of knowledge due to scientific innovation to enhance the national coping capacities for adaptation and mitigation. Climate change may increase the probability and intensity of extreme weather events (drought, storms, floods, landslides) and thus – as environmental stress – increase internal displacements, transboundary or intercontinental migration. Again both factors (hazards, migration) interact and may contribute, trigger or cause domestic crises that may escalate to different forms of low-level violence.

Figure 1: Model combining GEC, Environmental Stress and Fatal Outcomes



We can project with some degree of uncertainty the six factor of the survival hexagon globally, regionally and for the countries of direct concern for the Middle East Conflict: Israel and Palestine, as well as Egypt, Jordan, Lebanon and Syria. Less is known on the possible linear or chaotic interactions among these factors that may result in unforeseen surprises. These separate trend projections of the demand side, as well as of climate change and soil erosion directly interact with hydrological processes that result in likely declines of precipitation, groundwater resources, intrusion of saline water, increase in evapotranspiration that both impact on the probable future yield of agricultural products. To move from trends to predictions and foresight requires integrated region-specific modelling. Thus, as a political scientist I must limit myself to the main trends for the region. My argument is that these trends may and probably will pose major environmental and human security challenges that will seriously worsen the quality of life in the region, posing for those with a high societal vulnerability a threat to their livelihood and even for some a “survival dilemma”.

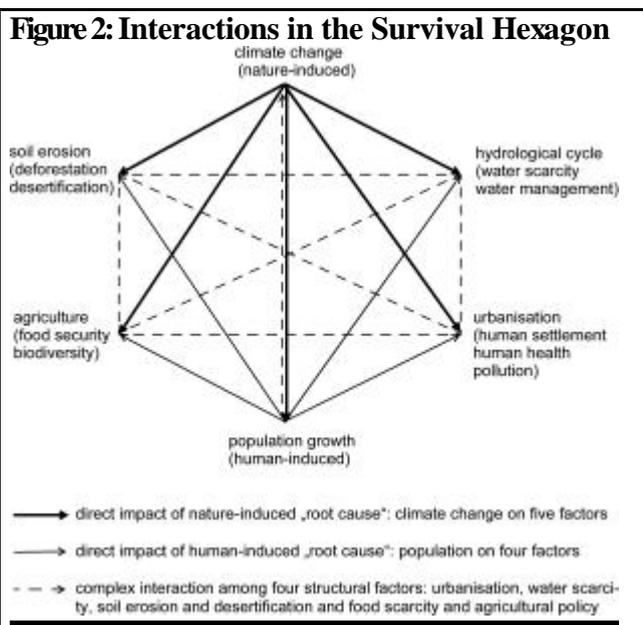
IMPACTS OF GLOBAL ENVIRONMENTAL CHANGE IN THE MIDDLE EAST

What general impacts of global environmental change can be foreseen for Israel and Palestine, as well as for the neighbouring countries: Egypt, Jordan, Lebanon and Syria based on available single trend projections? To which extent have they been perceived as common environmental challenges in Israel and Palestine? Are the people in Israel and Palestine ready to support functional cooperation in coping with these challenges? Newman (2004) has made a convincing argument why these challenges have not yet become part of the traditional security discourse in both Israel and Palestine.

Issar and Zohar (2004) analysed the impact of natural variability of climate change, of warming and cooling and precipitation on the environment and civilisation in the Middle East for the past 10.000 years by integrating the knowledge of archaeology with that of climate change on the background of opposing paradigms: from a) climate determinism (Huntington 1911, 1972) to b) anthropogenic disposition (Woolley/Lawrence 1936, Albright 1949, Glueck 1968) and c) to a neo-determinist trend (Durham 1992). Issar and Zohar (2004:10) tried to overcome the two cultures of the physical-natural vs. the humanistic sciences by moving to an interdisciplinary perspective that combines hydro-geology and archaeology. In their conclusion, Issar and Zohar (2004: 232) argue that the debate on the unresolved conflict excludes global change. They stress that anthropogenic climate change may have severe consequences for the region: “That it may endanger the economy of many countries in the region is a foregone conclusion ..., namely that a warm period is equated with a reduction of precipitation. Taking into account that, with the exception of Israel, agriculture still plays a significant role in the economy of the Near East, a severe reduction in precipitation will most likely damage the economy of most countries in this region.”

In the past, and especially in modern times, crises resulting from water shortages have “been averted or mitigated” by human innovation based on “scientific research, engineering and agronomic innovations, together with the education of farmers to adopt new technologies”. These advances, “together with education, are interdependent processes that can succeed only when the vicious cycle of poverty and ignorance, religious fanaticism and aversion to innovation, is broken.” (Issar and Zohar (2004: 232-233)

In figure 2 six factors contributing to Global Environmental Change (GEC) are combined in a “survival hexagon” (Brauch 2000, 2002, 2003): a) three *demand-side factors*: 1) population growth, 2) urbanisation trends, 3) agriculture and food supply and demand (food security issues); and b) three *supply-side factors*: 4) climate change, 5) water scarcity and degradation and 6) soil degradation and erosion (due to deforestation, desertification). While the demand side factors can to some extent be projected, the interaction among the supply side factors of the earth system is more complex, especially the potential interaction and impacts of climate change on the hydrological process and on precipitation as well as on desertification. Steffen et al. (2004 : 71) noted that “the behaviour of the Earth System is typified not by stable equilibria but by strong non-linearities, whereby relatively small changes in a forcing function can push the System across a threshold and lead to abrupt changes in key functions”.



They argue that “the potential for abrupt change is a characteristic that is extremely important for understanding the nature of the Earth System”(71) and that “the understanding of the natural rhythms and patterns of Earth System functioning is essential to understanding the impacts and consequences of global change” (72). Since the Industrial Revolution, and especially since 1945 the interactions among “population, technology and socio-political organisation has changed dramatically” as have “the scope and degree of human alteration of the Earth System” (Steffen et al. 2004: 83). The syndromes approach may be a promising approach to assess critical developments in the Earth System. They con-

cluded that “the last 50 years have without doubt seen the most rapid transformation of the human relationship with the natural world in the history of humankind” (Steffen et al. 2004: 131). The authors admit that at present it is not possible “to make any projection on how global change will progress over the next few centuries” (134).

Human action has specifically affected a) the carbon cycle, b) the nitrogen, phosphorous and sulphur cycles, c) the hydrological cycle and d) the climate system. Steffens et al. (2004: 196) concluded that “the human-environment relationship has changed fundamentally in the last few centuries, and particularly in the last 50 years. On the effects of climate change on the hydrological cycle and on water resources for humans, Steffens et al. (2004: 222) claimed that such an effect “may already be discernible above natural variability” and they stressed that “rainfall has likely decreased by about 3% over much of the sub-tropical land areas”, and in agreement with the IPCC they noted an “increase in extreme precipitation events over the past century in the Northern hemisphere”. But they caution that “the effect of climate change on water resources in the future is difficult to estimate” (222). As the IPCC, they point out that the scenarios suggest a decrease in runoff in the Mediterranean and that the reduced stream-flow and groundwater recharge may lead to a reduction of water supply by 10% or greater by 2050. “Water supplies will decrease in many countries that are already water stressed and increase in others. ... Second, extreme events – floods and droughts – will increase. Thirdly, currently deleterious impacts on water quality will be amplified rather than damped by climate change”. The latter can be traced in the Middle East for the past 6.000 years.

The changing demand side: population growth, urbanisation, agriculture and food

The Mediterranean region and especially the Middle East have experienced major demographic changes since 1850. While in the five South European EU countries (France, Greece, Italy, Portugal, Spain) the total population has increased from 83 million (1850), to 103.5 million (1900), to 133 million (1950) up to 177 million in 2000, the population may decline due to ageing to 154 million by 2050 according to the medium projection of the UN Population Division’s 2000 assessment. In the 10 non-EU dialogue partner countries plus Libya the population has grown from 25,6 million in 1850, to 38,35 million in 1900, to 73,3 million in 1950, to 232,3 million in 2000 and the population has been projected to grow to 343 million by 2025 and further to 413,2 million in 2050 (Brauch/Selim/Liotta 2003: 972; UN 2001).

Table 4: Population Growth in the Near East Countries, 1850-2050 (UN 2001, Brauch 2002)

	Real population development						Projection	Changes	
	1850	1900	1950	1980	2000 (2000 Rev.)	2025	2050 (2000 Rev.)	1950- 2050	2000- 2050 (2000 Rev.)
Egypt	55	10.0	21.834	43.749	67.884	94.777	113.840	92.006	45.956
Jordan	025	0.3	1.237	2.923	4.913	8.666	11.709	10.472	6.796
Israel			1.258	3.879	6.040	8.486	10.065	8.807	4.025
Palestine Authority	035	0.5	1.005	?	3.191	7.145	11.821	10.816	8.630
Lebanon	035	0.5	1.443	2.669	3.496	4.581	5.018	3.575	1.522
Syria	15	1.75	3.495	8.704	16.189	27.410	36.345	32.850	20.156
Eastern Med.	12.45	16.05	29.247	62.613	89.497	142.899	173.776	144.529	84.279
Only North Africa	13.1	22.3	44.099	91.362	142.802	199.832	239.426	195.327	96.624
South Europe	83.0	103.5	132.913	167.265	177.304	172.492	154.065	21.152	-23.239
Total (12+1)	25.83	38.77	74.152	154.910	233.473	344.048	414.512	340.360	181.039

Sources: McEvedy/Jones 1978 for 1850, 1900; for projections to 2050: UN 2001. The data for 1960, 1980 and for the 1998 UN revisions are from Heilig 1998, 1998a.

In its 2004 World Population Data Sheet, for mid-2004 the U.S. Population Reference Bureau (PRB 2004) estimated the population of Israel at 6.8 million (annual increase 1.6%), of the Palestinian Territory at 3.8 million (3.5%), of Jordan at 5.6 million (2.4%), of Lebanon at 4.5 million (1.7%), of Syria at 18 million (2.4%) and of Egypt at 73.4 million (2.0%). Based on figures by the UN Population Division (2000 Rev., table 4) the population in Israel has increased from 1.26 million in 1950 to 6.04 million in 2000 and is projected to grow by 4 million until 2050 to 10.8 million (PRB: 10.6 m.). The UN population study for the Occupied Palestinian Territories stated an increase from 1.01 million in 1950 to 3.19 million in 2000 and it projected a further increase to 11.82 million (PRB: 11.9 m.) until 2050. The longer-term UN population projection until 2300 projects for Israel a population decline to 9.37 million and for the OPT a further increase to 13.5 million. From 2000 to 2050, the medium 2000 rev. projects for Jordan an increase from 4.9 to 10.47 (PRB: 10.2 m.) million, for Lebanon from 3.5 to 5 million (PRB: 6.9 m.), for Syria from 16.2 to 36.35 million (PRB: 35 m.) and for Egypt from 67.9 to 113.84 (PRB: 127.4 m.) million people. All countries have already experienced severe water scarcity, and due to the demand increase the water stress (scarcity, degradation) will further increase as will the competition between blue and green water.

Table 5: Changes in Urbanisation Rates in the Near East, 1950-2030 (UN 2002)

Ten Non EU-Mediterranean Dialogue Partners (plus Libya) in %									
	1950	1960	1970	1980	1990	2000	2010	2020	2030
Egypt	31.9	37.9	42.2	43.8	43.6	42.7	44.0	48.2	54.4
Jordan	35.9	50.9	56.0	60.2	72.2	78.7	80.1	82.2	84.4
Israel	64.6	77.0	84.2	88.6	90.3	91.6	93.0	93.9	94.6
Palestine (OPT)	37.3	44.0	54.3	61.1	64.0	66.8	70.0	73.5	76.9
Lebanon	22.7	39.6	59.4	73.7	84.2	89.7	92.1	93.1	93.9
Syria	30.6	36.8	43.3	46.7	48.9	51.4	55.4	60.6	65.6
Western Asia	26.7	35.0	44.4	51.7	62.0	64.7	67.2	69.8	72.4

The urbanisation rate (table 5) in all six countries in the Near East and especially in Israel, Lebanon and Jordan has been significantly above the averages for Africa, Asia and West Asia. The growth of megacities has also been significant from 1950 to 2000 and they have been projected to grow further to 2015 (UN 2000, 2002) what has also increased their vulnerability to earthquakes and hydro-meteorological hazards (drought, flash floods) significantly.

Table 6: Growth of Urban Centres in the Mediterranean, 1950-2015 (UN 2000)

City	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015
Istanbul	1.08	1.37	1.74	2.20	2.79	3.60	4.40	5.41	6.54	7.91	9.45	10.81	11.84	12.49
Cairo	2.41	3.00	3.71	4.61	5.33	6.08	6.86	7.69	8.57	9.53	10.55	11.61	12.66	13.75
Alexandria	1.04	1.25	1.50	1.75	1.99	2.24	2.52	2.84	3.21	3.65	4.11	4.59	5.05	5.53
Tel-Aviv	0.42	0.56	0.74	0.88	1.03	1.21	1.42	1.62	1.80	1.98	2.18	2.37	2.52	2.63
Amman	0.09	0.14	0.22	0.30	0.39	0.50	0.64	0.78	0.96	1.18	1.43	1.70	1.97	2.21
Beirut	0.34	0.43	0.56	0.72	0.92	1.06	1.21	1.39	1.58	1.82	2.06	2.24	2.37	2.47
Damascus	0.37	0.46	0.58	0.73	0.91	1.12	1.38	1.59	1.80	2.04	2.34	2.69	3.07	3.50
Aleppo	0.32	0.39	0.48	0.59	0.72	0.88	1.07	1.29	1.54	1.84	2.17	2.54	2.92	3.31

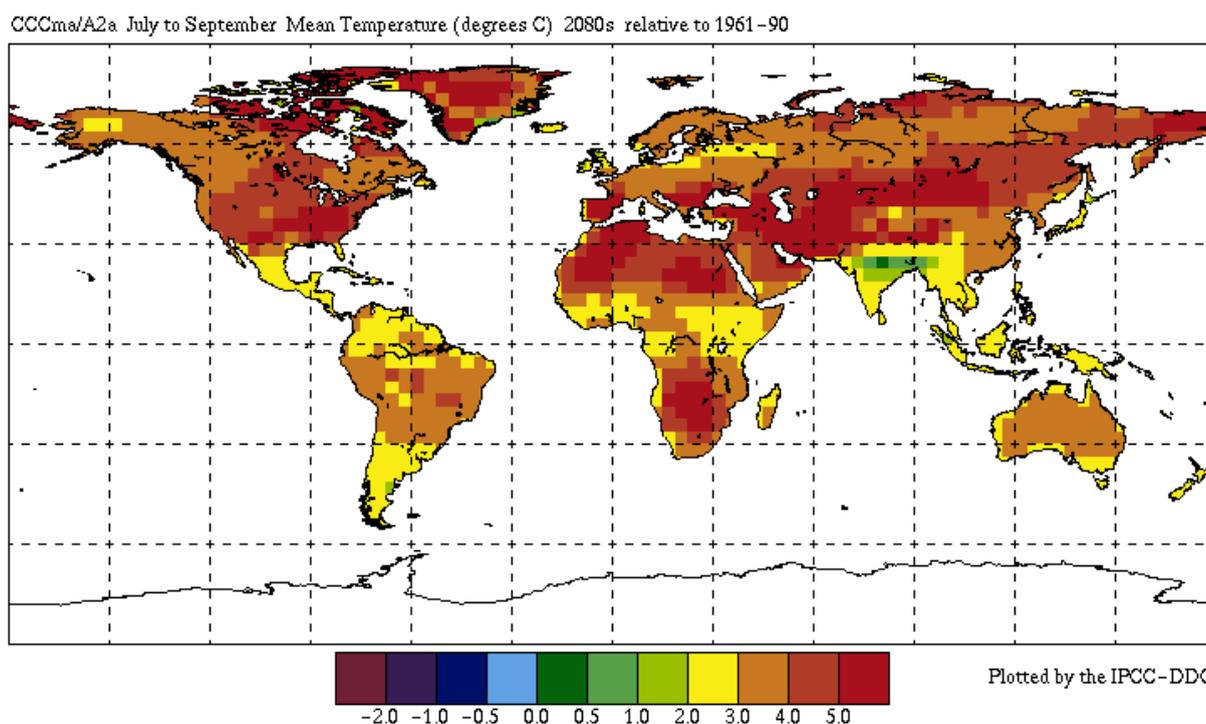
According to FAO (2000) and Bruinsma (2003) the self-sufficiency rates for cereals for the MENA region has gradually declined from 86% (1964-1966), to 65% (1995-1997), and it has been projected to drop further to 56% by 2030. Simultaneously, the net cereal imports have risen within 30 years from 5 million tons in 1964-1966, to 43 million tons in 1995 to 1997 and they have been projected to rise to about 102 million tons by 2030.

According to FAO by 2030 the cereal import needs of the MENA region will be larger than those of Latin America and the Caribbean, Sub-Saharan Africa and South Asia combined. Increase in food demand, decline in crop yield due to climate change (temperature increase, evapotranspiration), the likely decline in precipitation and increasing demand for drinking water will be a key driver for growing food imports.

The changing supply side: climate change, hydrological changes and soil erosion

For the 21st century, the climate models, assessed by the IPCC (2001) in its Third Assessment Report suggest for the Mediterranean Basin “warming greater than the global mean warming” and for the summer season, “this warming is in excess of 40% above the global average warming”. With regard to precipitation, the model consensus is “that there will be little change in winter and drying for the summer” and for some models a large decrease (less than – 20%) is predicted (Palutikov/Holt 2004: 65). Based on GCM models the projected mean temperature for the Eastern Mediterranean for the 2080s between July and September may increase between 3.0 and 5.0°C <IPCC: <http://ipcc-ddc.cru.uea.ac.uk/cgi-bin/ddcvis/gcmcf>>.

Figure 3: IPCC GCM of the CCCma/A2 for mean temperature increases for the 2080s



Two high resolution scenarios of possible climate futures for Guadalentin (Spain) and Agri (Italy) indicate “the potential for a damaging increase in the occurrence of extremes in response to global warming”, especially for the 2090s “the number of very hot days [above 35°C] is equivalent to two months with maximum daytime temperatures continually at or above 35°C” (Palutikov/Holt 2004: 71; Palutikof 2003). The IPCC, in its Third Assessment Report (2001) based on the assessment of several GCM offered these projections of mean temperature change for summer in the 2080s (figure 4), as well as mean precipitation changes for summer in 2080s (figure 5).

Complex interactions between climate change and hydrological cycle (water scarcity)

The Near and Middle East has been water stressed for millennia, but with progressing population increase since 1850 to 2050 the available water per person has steadily declined. Water degradation due the salination has also increased (especially in Gaza) due to overpumping and

intrusion of seawater. The water projections until 2020, 2030 or 2050 due to population (demand) growth and precipitation decline due to regional warming (climate change) for Israel, Palestine and Jordan are very severe (figure 6).

Figure 4: Summer Scenario Maps for Temperature Changes in 2080s (IPCC 2001a: 651)

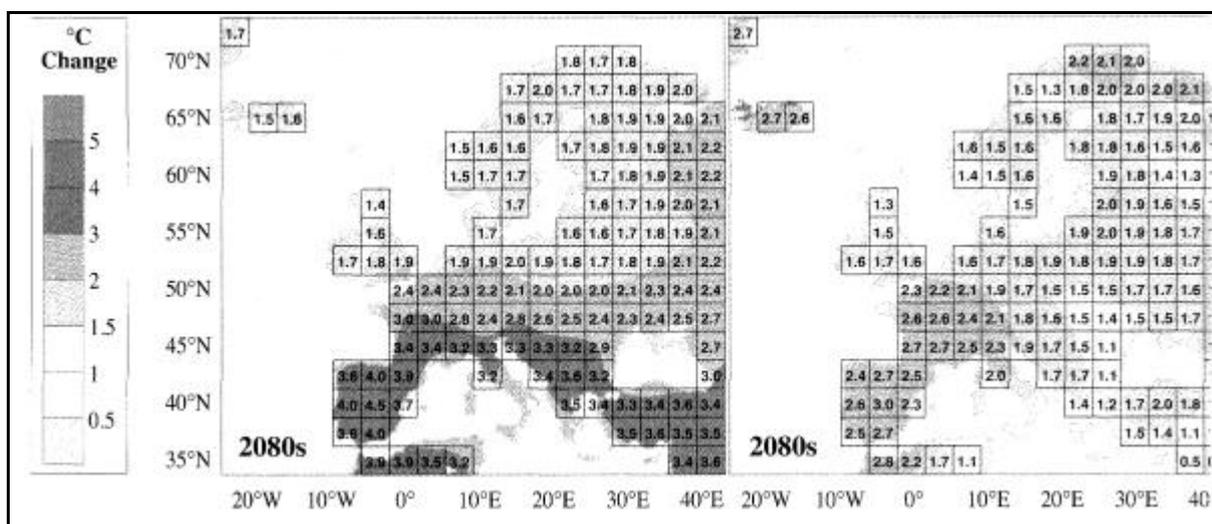


Figure 5: Summer Scenario Maps for Precipitation Changes (IPCC 2001a: 652)

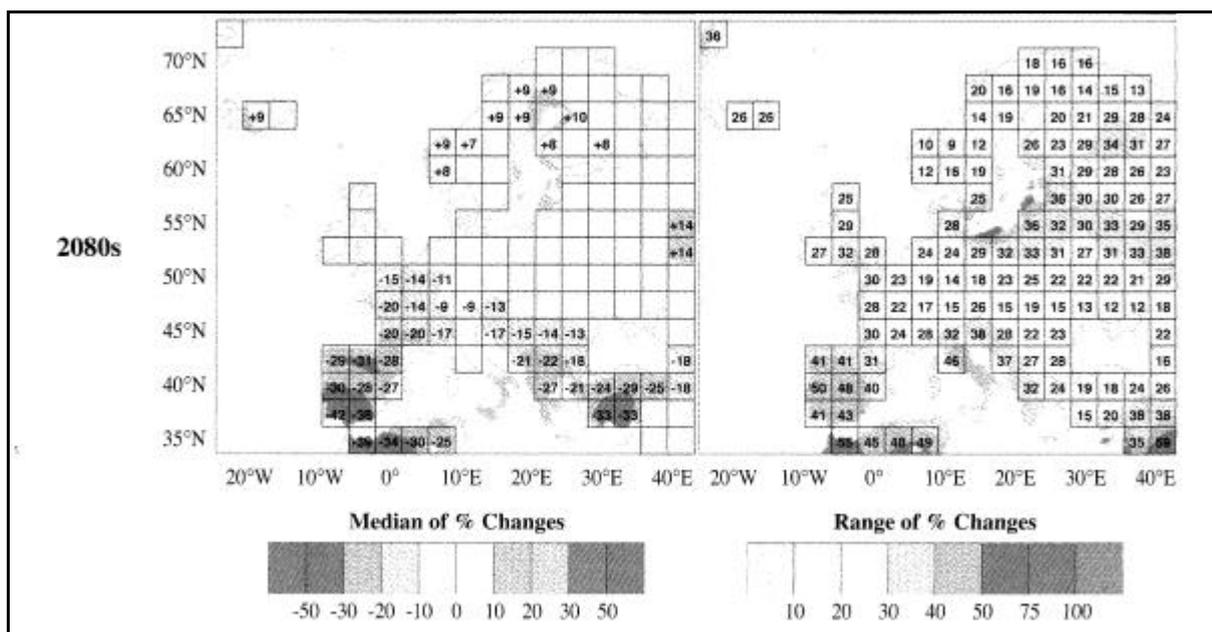
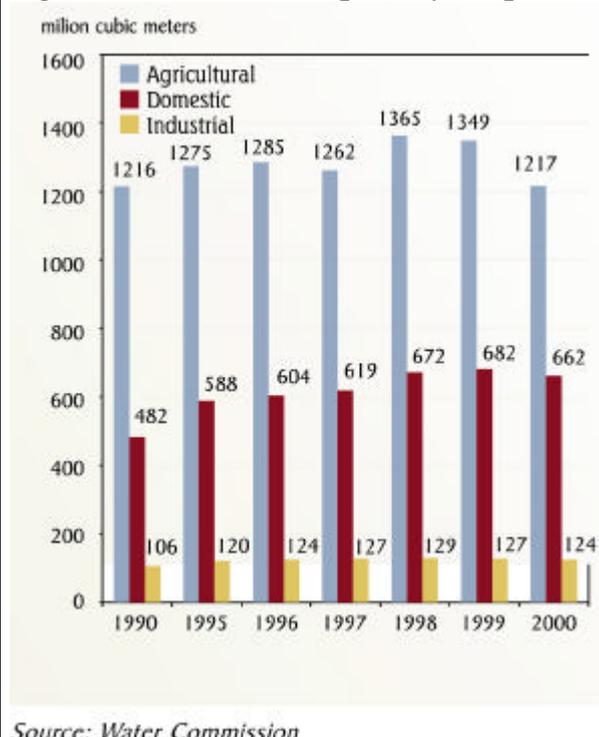


Figure 6 shows the impact of population growth on water usage by 2025 based on the current rate of water use per person. UNEP-GRID states: “The regions most vulnerable to domestic water shortages include those where access to water is already limited, the population is growing rapidly, urban centers are spreading, and the economy is burdened by financial problems and a lack of skilled workers. ... The impacts of climate change ... are expected to have varying consequences for the availability of freshwater around the world. ... An increase in the rate of evaporation will also affect water supplies and contribute to the salinisation of irrigated agricultural lands. ... Current indications are that if climate change occurs gradually, the impacts by 2025 may be minor. ... Climate change impacts are projected to become increasingly strong during the decades following 2025” (<http://www.grida.no/climate/vital/37.htm>). However, for most highly water-stressed countries in the Near East the impact will already be significant by 2025 with major impacts “green water” availability on food production.

ently available water supply of 780 mcm/y, i.e. the demand may be twice the present supply. Hayek projected until 2020 a water deficit of 400 mcm/y or a decline to 140 m³/y per person.

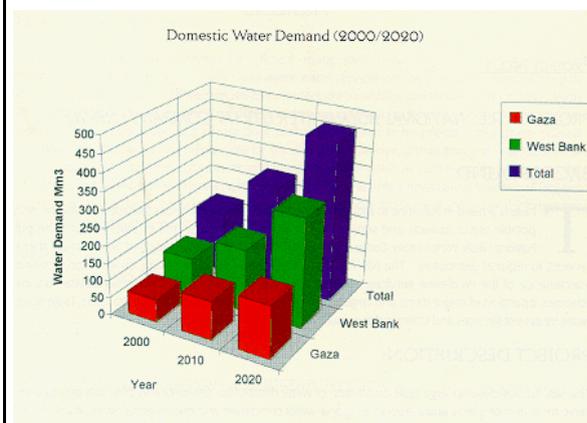
According to the Water Commission of Israel (figure 8) the agricultural water use has declined since 1998 while the domestic water use has increased due to the immigration of about 1 million persons since 1990 (Environment in Israel 2002: 75).

Figure 8: Water Consumption by Purpose



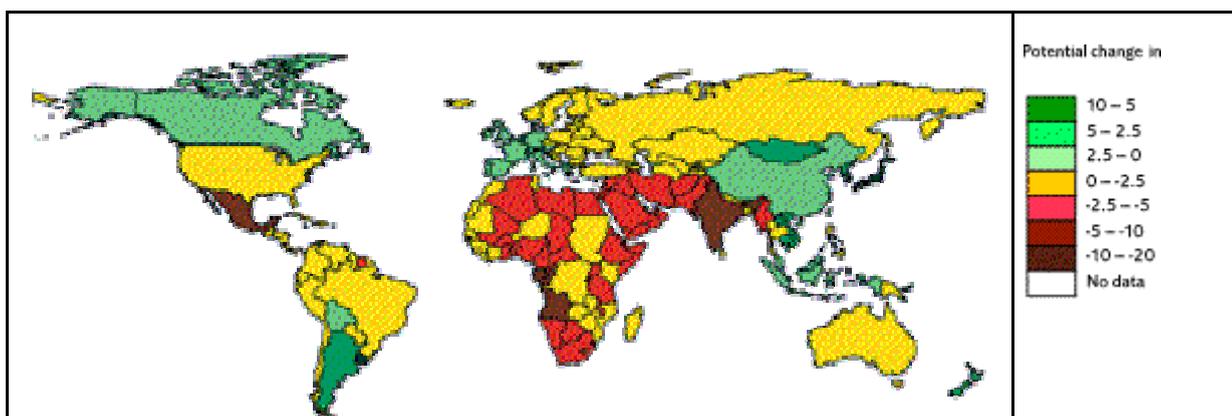
According to the UNEP Desk Study on the Environment in the Occupied Palestinian Territories (2002) the water demand in Gaza may increase from 114 mcm (2000) to 228 mcm (2010) to 285 mcm (2020) and in the Westbank from 155 mcm (2000) to 394 mcm (2010) to 584 mcm (2020) (figure 9).

Figure 9: Water Demand in OPT to 2020



Martin Parry and Matthew Livermore (1999) have indicated major yield declines for an unmitigated emissions scenario of -2.5 to -5% for the Middle East while the European Union, Japan, China and Canada may experience yield gains. With a 750 ppm stabilisation scenario there may be less reduction in yield in semi-arid subtropical regions. Under the 550 ppm stabilisation scenario the pattern is less obvious: lower CO₂ levels and their associated climate changes suggest less reduction in yields than in the 750 ppm scenario in southern Africa, eastern Europe, the northern Middle East and Australia (figure 10).

Figure 10: Impact of Climate Change on Food Supply with an Unmitigated Emissions Scenario. Source: < http://www.met-office.gov.uk/research/hadleycentre/pubs/brochures/B1999/imp_food_supply.html >.



The soil in many parts in the Eastern Mediterranean is already highly eroded. Portnov and Safriel (2004: 123-138) analysed the prospective desertification trends in the Negev and their implications for urban and regional development. They concluded the pace of the desertification process in the Negev largely depends on development processes in the central, non-desert regions of Israel. Instead of expanding agricultural activities into the desert they suggested an urban development strategy with a lower impact on dryland ecosystems' land resources and with less severe desertification consequences.

Complex interactions between climate change, hydrological cycle and soil erosion

What will be the interaction among the factors of the survival hexagon by 2010, 2020, 2030, 2050 or 2100? If one assumes linear interactions the impact for the human and environmental but also economic security (of Arab countries with a high degree of the population living from agriculture) will be very severe. Have these trends and their potential non-linear chaotic interactions been modelled by the natural scientists in the region? Obviously these serious trends have not been conceptualised as issues of national and regional security and survival.

David Newman (2004) has recently argued that "environmental issues have not occupied a prominent place in the Israeli public agenda". He noted that "the redefinition of notions of security which have taken place throughout the world, to include energy, food, health, livelihood, rights or global environmental change, are not considered part of the 'security' discourse as such inside Israel, where the term 'security' retains a narrow and highly focused interpretation. ... This is due to the political, rather than the environmental, significance of land within collective thinking. In the words of Parag (2002) Israel remains an environmental laggard in comparison to most western countries." This self-critical assessment applies also to neighbouring Arab Masreq countries where security has been conceptualised primarily as narrow national and military security (Selim 2003).

To put the regional implications of global environmental change on the agenda of the security discourse, a widening of the prevailing concepts of military and demographic security is needed. However, such a political agenda-setting would require an improved area specific knowledge of climate change impacts, i.e. both higher resolution regional circulation models, local and subregional climate case studies, as well as integrated climate models (Strzepek/Onyeji/Chibo/Saleh/Yates 1995) that take the other factors of the "survival hexagon" into account based on different assumptions with regard to economic growth rates and performance. Water supply and demand will be severely influenced by the impacts of these factors until 2050.

STRATEGY FOR RECOGNISING LONG-TERM ENVIRONMENTAL CHALLENGES

According to a poll of Israelis and Palestinians taken in June 2003 at the request of the World Economic Forum by Gallup International, a majority of ordinary Israelis and Palestinians were supportive of joint economic cooperation.⁴ Among the key findings were: "66% of Israelis and 57% of Palestinians agree that mutual cooperation and joint projects between all nations of the region, including Israelis and Palestinians, in areas such as water, health, environment, tourism, etc., should start as soon as possible, even now before final peace agreements are reached. Both sides agree that it is important to move forward on other areas of possible cooperation, such as water desalination and restoration, environmental issues, regional health projects and agriculture issues."

⁴ See at: World Economic Forum: "New Survey Shows that Ordinary Israelis and Palestinians Are Keen to Move Forward with the Roadmap and Are in Favour of Starting Economic Cooperation", at: <<http://www.weforum.org/site/homepublic.nsf/Content/New+Survey+Shows+that+Ordinary+Israelis+and+Palestinians+Are+Keen+to+Move+Forward+with+the+Roadmap+and+Are+in+Favour+of+Startin+g+Economic+Cooperation>>.

Q: The following are possible areas of cooperation between Israel and the Palestinian Authority. Thinking about each one, please tell us whether you are in favour or against cooperation between the two entities in each area:

	% in Favour	
	Israelis	Palestinians
Water desalination and restoration	78	77
Regional health projects	79	73
Environmental issues	82	68
Regional tourism	76	55
Agricultural issues	79	72
Regional trade relations	76	64
Communication, technology and hi-tech	67	68
Cultural and sports relations	72	51
Free movement of workers between the two sides	56	77

If these figures should be representative for the public opinion for both communities, indicating a willingness for functional cooperation among both people, what have been the obstacles that – with the exception of cooperation on water issues – little functional cooperation has survived the resumption of the conflict since September 2000. Has the narrow conceptualisation of security in both Israel and Palestine prevented the perception of the common environmental challenges that will affect the young generation on either side during their lifetime?

RELEVANCE OF THE EUROPEAN EXPERIENCE FOR THE NEAR EAST?

My thesis is that only the breaking out of the logic of aggression, punishment and revenge (security dilemma) after 1945 made a fundamental change possible in Europe, a logic that was applied towards the Soviet Union in the Cold War. The conceptual ideas of Mitrany, Marshall and Monnet and a powerful US elite with a clear policy perspective using its conditionalised aid to overcome the harsh opposition, e.g. among its closest friends in the UK, to break up the global preference system, and of others, to accept Germany as a partner. Certainly the Soviet threat helped and required a cooperation among former enemies.

Certainly the relevance of direct analogies between Europe and the Near or Middle East is limited. After World War II, Germany was defeated and its Nazi leadership was rightly put on trial at the Nuremberg Trials, and the removal of most former Nazi officials made it possible that new generations in the democratic tradition with totally different worldviews and mindsets could emerge. While these specific conditions are completely irrelevant for the Near East region, my argument is that the four intellectual pillars, created by conceptual thinkers, political visionaries and pragmatists from the four former allied power in dealing with Germany and the “German problem” made a fundamental difference that overcame the cycle of aggression, defeat, humiliation, action, reaction, punishment and revenge in Central Europe.

The environmental challenges that confront the new generation of Arabs and Israelis during their lifetime may become severe because they may fundamentally undermine the welfare, health and possibly even the survival of the poor? The big dreams of both sides will never be realised with a continuation of the cycle of violence and counter-violence. The cycle of violence postpones a recognition of common challenges for young Israelis and Palestinians. Monnet and Marshall were political realists with clear political visions and conceptual ideas and the political skill to realise their “small hope” (Dajani 2004) that fundamentally changed Europe and the perspectives of most Europeans from confrontation to cooperation. Developing the “small hope” in the region may gradually change the context towards cooperation.

If the environmental challenges confronting the livelihood and survival of many human beings in the Near East during the 21st century are real for those who are now attending school, why are they not being taught on these challenges at school? Why are these challenges not being discussed in the respective civil societies, in the press and in parliaments? Why have they remained a concern only for a few specialists in the respective sciences?

I will try below to translate the functional concepts of Mitrany and Monnet with the conditionalised aid of the Marshall Plan and the institutional building of Marshall and Monnet to the Near East. The proposal is based on a reconceptualising of security in relation to the three other concepts of the quartet of peace, environment and developments (Brauch 2004b). The first proposal is probably the most difficult: to gradually shift from a narrow national military security to a human, societal and environmental security concept. It would require a basic shift from the state or the respective political group to the individual as a victim of violence (both of punishment or revenge).

Without a fundamental change in the basic political mindset of policymakers, elites, communicators but also of the people in the streets as well as of the perception of security threats a gradual shift from the exclusive focus on the ongoing conflict to the longer-term mutual environmental challenges that may threaten the livelihoods will not be feasible. At present in both communities environmental concerns have a low political priority. But according to the polls of June 2003, the functional cooperation on issues of water, health and the environment seems to have a potential higher priority for Israeli and Palestinian citizens. Why is this proclaimed readiness for functional cooperation not translated in cooperative frameworks where these longer-term challenges can be addressed jointly.

A basic shift in the perception of security threats, challenges, vulnerabilities and risks necessarily implies a shift away from the Hobbesian fear, the action-reaction patterns of zero-sum games, of thinking in terms of a security dilemma to a pragmatic thinking that focuses on functional cooperative potentials, on non-zero-sum games to enhance the coping capacities in dealing with the emerging survival dilemmas of individuals and their families. This may lead to two conceptual strategic policy goals: a) *sustainable development*: optimising resource efficiency and b) *sustainable peace*: human, societal security and political peace with prosperity based on respect and equity. The latter is utopian for the present and may remain for the future.

However, “our” reality depends on “our” worldview and mindset. What can we learn from the end of World War I and II in Europe? The Versailles Peace Treaty of 1919 may be interpreted as a combination of Hobbesian punishment, of Wilson’s vision and rhetoric of a better world based on democracy and the League of Nations and of L. George’s balance of power considerations. While after World War II a more realistic attempt was made for a UN with teeth, the world was divided into two camps where the perceptions of the “Soviet threat” helped to overcome the fear of “German resurgence”. G. Marshall and J. Monnet succeeded during the postwar crises and the Korean War with their visions for cooperation among former enemies. American policymakers skillfully used the Marshall Plan to overcome objections. They succeeded to change perceptions in Germany towards the allied powers but also of the elites of their allies towards Germany to avoid a perception and an instrumentalisation of humiliation for political ends. This context permitted a new generation to grow up where common European concerns gradually become more important than purely national ones.

May there any lessons be drawn from the end of the Cold War (1989-1990) for the Near or Middle East? Again the lessons depend on the worldviews, the mindsets, the images and the

theories of the observer. For the political realists or Hobbesian pessimists, the global turn was the result of US military superiority, it was a US victory over the Soviet Union that provoked its implosion. However, only in the military sector the USSR could compete and if Gorbachev would have ordered to suppress the societal moves for change in East Central Europe the USSR would hardly have been stopped by NATO or US forces. In my view, it was the breaking out of the arms race by conceptual innovation and learning that made the first global peaceful change in modern history possible. A major lesson from the end of World War II was the successful change of the political thinking in Germany after 12 years of Nazi rule and the successful integration of Germany into European and transatlantic political, economic and security institutions into a security community that has overcome the security dilemma among its members. In 1989 Gorbachev's new thinking fostered a readiness for change from the top that overcame the fear of the people to peacefully protest and to change their system of rule.

As long as both the political leadership and the people in the Near East seem to adhere to a narrow hard security concept and perceive the basically asymmetric conflict as a zero sum game the spiral of violence, the cycle of human misery producing permanent wounds and hatred on both sides may never end and the opportunity to address common challenges for the young generation may be lost. At present, neither "objective security" as the absence of threats to acquired values nor "subjective security", i.e. the perception that these values are not threatened, exists in the region. This remains a task of a regional peace settlement. But such a settlement may never be possible as long as the "big dreams" prevail on either side for a total realisation of ones own policy goals. International and national crises have often produced new ideas and policies, as after 1949 and in 1989. Thus, there may be a need for a fundamental shift in the thinking on security in the region away from national military security concepts with the nation state as the referent to a human-centred environmental security concept that permits a focus on joint challenges of regional, national and individual survival.

One major task is a gradual overcoming the Hobbesian zero-sum games. None of the new environmental challenges can be solved with this perspective. It may even prevent to perceive them as threats to security and survival. The daily experience of violence makes confidence and partnership building measures for cooperation during conflict more difficult but at the same time more timely. During the Cold War, independent thinkers in East and West who analysed the consequences of a failure of deterrence and the reality of a nuclear war in Central Europe started to work jointly on the 'small hope', on small and modest steps of military confidence and political partnership building measures, on non-offensive defence and less threatening military doctrines. In the 1980s, these concepts were analysed by Gorbachev's policy advisers. What lessons can I draw from this personal experience that ideas mattered?

Contributing to the Small Hope: Towards Functional Cooperation in Addressing Jointly the Regional Impacts of Global Environmental Change in the Near and Middle East

The joint recognition of new environmental challenges that affect both communities and cannot be solved with military means or with violence is a major step. This is a task of educators, motivated by an ethics of responsibility (*Verantwortungsethik*) for the next generations. This *joint recognition* requires common frameworks and institutions for research. The next step is *agenda-setting* for this long-term educational agenda, for the public and policy makers on both sides.⁵

⁵ To contribute to problem recognition and agenda-setting, was the aim of a major North-South collaborative scientific effort on *Security and Environment in the Mediterranean*. This project continues with a global focus on reconceptualising security since 1990.

Small Steps towards Environmental Partnership Building Measures

In the Near East there may be a need for cross-border environmental partnership building measures by addressing both the urgent and longer-term joint environmental challenges by cooperation on freshwater, wastewater, solid and hazardous waste, conservation and biodiversity. A second step may be to gradually build mutual trust by functional cooperation addressing the challenges to survival by water, soil and food specialists from Israel, Palestine, Egypt and Jordan. A third step may be to contribute to an *anticipatory learning* to adjust and to mitigate against the six projections and their possible linear, non-linear or chaotic interactions.

The classic functionalists in the tradition of David Mitrany have argued that a network of functional cooperation may gradually spill-over to the political realm. Although many political scientists have challenged this hypothesis, nevertheless functional cooperation may contribute to subjective security, to a gradual decline of the fear that basic values will be attacked by the other. However, subjective security also requires satisfying basic human needs and overcoming the perception of humiliation and creating respect for the dignity of the other.

Towards Functional Cooperation in Addressing Environmental Security Challenges

From my vantage point only from a wider „human security“ perspective environmental security challenges and risks to humans matter and may be perceived as threats to human livelihood and survival. This requires a wider security concept that recognises new soft “security” challenges and an understanding that they can be solved only by daily and persistent functional cooperation. Such functional strategies must build on existing forms of cooperation, like those of water specialists. The increasing water scarcity and degradation of joint aquifers have made the continued cooperation during conflict of water managers, specialists on conservation and distribution a matter of mutual survival.

Can this functional cooperation be broadened by addressing: a) cooperation on reuse of wastewater for irrigation and watering of parks, b) cooperation on desalination, c) desertification strategies to combat soil erosion by sharing of the mutual experience, as well as new methods in combating desertification, and d) on agricultural and food issues by an increased exchange of knowledge on farming in arid and semiarid areas, on cooperation in research, training and capacity building.

Six hydro-political geostrategic contexts may be distinguished in the region, two in the periphery: with the Euphrates and Tigris involving Turkey, Syria, Iraq, and Iran and the Nile River Basin involving Egypt and nine African countries; and four that are of direct relevance for the Near East conflict, i.e. for Israel and its neighbours: the Golan Heights with Israel, Lebanon, Syria and the OPT; the Jordan River involving Israel, Jordan, Palestine (OPT), and Syria; the Sinai, Negev and Gaza involving Egypt, Israel, and Palestine; and the Gulf of Aqaba with Egypt, Israel, Jordan and Palestine. The following conceptual considerations will focus primarily on the Gulf of Taba, Eilat or Aqaba where the three countries with peace treaties meet, but also on the Jordan river and on the border between Egypt, Israel and Gaza.

Unconventional solutions to cope with water scarcity

Two unconventional solutions to cope with water scarcity are: a) to reduce the share of green water for irrigation by importing food (virtual water); or b) to desalinate brackish and seawater for agricultural purposes. The first option seems to be economically feasible only for Israel but hardly for its Arab neighbours. The second is still costly and requires much energy, either fossil or renewable. While desalination with oil is widely used in the Arab and Persian

Gulf and in Libya, it is more costly for countries without oil and natural gas, as Israel, Palestine and Jordan.

However, there are huge unused renewable solar energy potentials in the deserts of Sinai, Negev and Jordan for solar thermal electricity generation that could be used for desalination. Thus my idea is to develop existing technologies further, to optimise them, to create an economy of scale and to use the huge regional solar potential for coping with the rising water scarcity. To realise this goal, this technological option is linked below with the political experience of Europe after 1945. Instead of focusing on coal and steel as the old foundations of war industry (Schuman Plan 1950), the regional functional cooperation should focus on four commodities that are indispensable for human survival: *water, soil, food and energy*.

Regional technical and economic potentials for solar thermal and windpower energy

The region has a huge renewable solar (thermal, photovoltaic) energy potential in the Sinai, Negev and the Jordanian desert, of wind power (Red Sea), city and agricultural waste that may be used for electricity generation, desalination and cooling. So far both technologies of solar thermal electricity generation and desalination as well as pilot plants for solar desalination exist (Saudi Arabia). Solar thermal electricity generation has been developed first by Luz Industries (now Solel, Israel) in the Mohave desert in the 1980s. But so far no large installation was built in Israel, Egypt or Jordan.

Figure 11: Jordan River Basin (Wolf 2000)



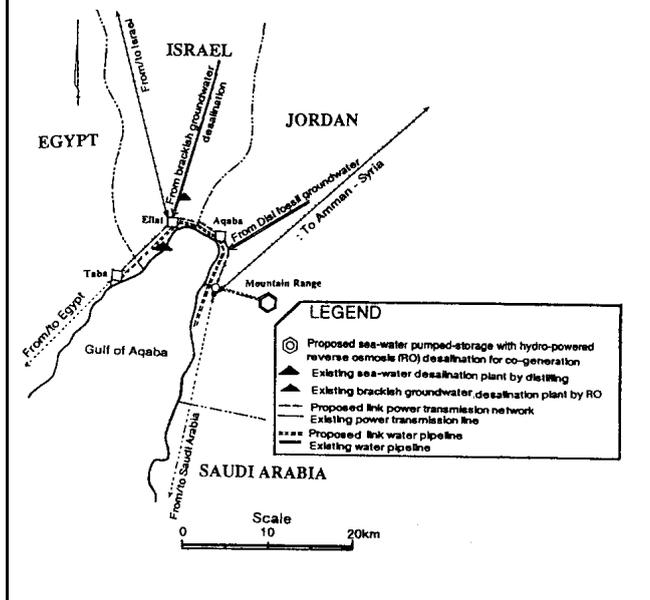
As in the case of the Marshall plan, external donors should conditionalise their financial support for the build-up of a cross border infrastructure with components in different countries that would only function by cooperation where any attack on components in the other country would hurt the attacker. On the Mediterranean coast a solar thermal plant could be built in the Sinai and the desalination plants in Gaza and Askelon. In the Gulf of Aqaba large solar thermal plants could be built both in the Sinai, desalination plants on the Jordanian coast and a major agricultural training centre in Eilat in Israel. Gaza, Israel and the Westbank could be supplied with solar thermal electricity from the Sinai and with desalinated water from the Mediterranean coast in Sinai, Gaza and Israel while Jordan, Israel and the West Bank could also be supplied with desalinated water from the Gulf of Aqaba.

Israel, Palestine and Jordan depend on fossil energy imports for electricity generation, transportation and desalination. Due to the projected global increase in demand for oil and gas, the prices for both will rise during the 21st century. Thus, electricity and in the future hydrogen produced by solar thermal

energy may become economically competitive within ten to twenty years once an economy of scale exists. All components could be developed, and produced locally, creating new indus-

tries and jobs for Israelis, Palestinians, Egyptians and Jordanians. The donors should insist on the build-up of a multinational cross-boundary infrastructure that should be managed jointly involving all parties as was with the Marshall Plan where the US insisted on German participation in the distribution and management of the assistance. Only cross-border multinational infrastructures should be supported by grants and credits.

Figure 12: Gulf of Aqaba <[http:// www.unu.edu/unupress/unupbooks/uu18ce/uu18ce0d.htm](http://www.unu.edu/unupress/unupbooks/uu18ce/uu18ce0d.htm)>



Two geographical pilot projects may be considered in the border between Egypt, Gaza and Israel, and in the Gulf of Aqaba linking Taba, Eilat and Aqaba. Cooperation should start with a joint quadri-national research centre addressing future challenges of climate change, soil erosion, water scarcity and degradation and modern sustainable agriculture for arid and semiarid regions involving Egyptians, Israelis, Palestinians and Jordanians that could form the basis of a Technical University in the Gulf of Aqaba financed by external donors and the four governments with the goal to develop joint concepts, methods and technologies to enhance the coping capacities for adaptation and mitigation to deal with the regional implications of global environmental change.

Solar thermal power technologies

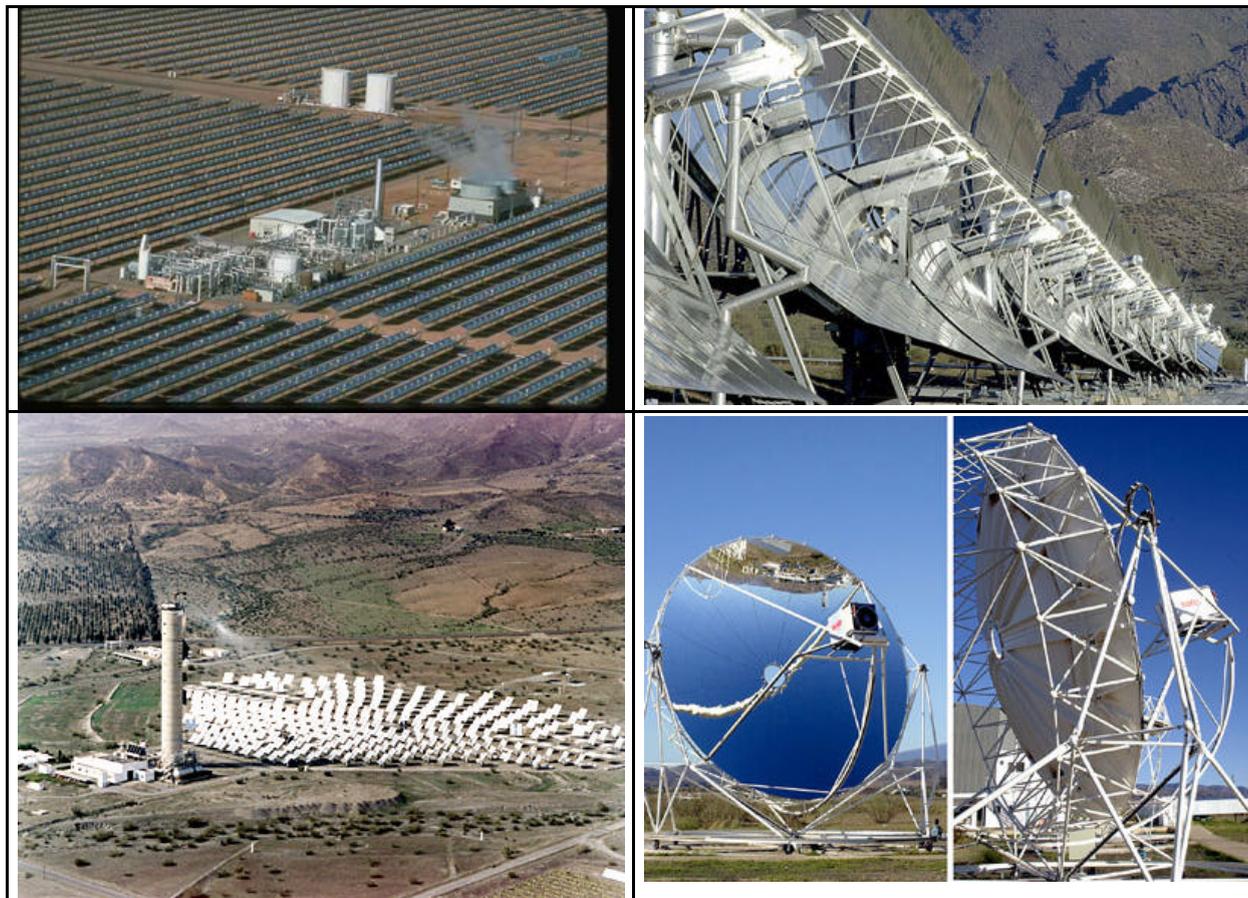
Solar thermal power technologies “use solar radiation to achieve high temperatures and to generate steam or air with high energy density, which can then be used for electricity generation and other purposes“. (Trieb et. al. 2002) Four alternatives exist (figure 13): a) Fresnel concentrators, b) parabolic trough (400-600 °C), c) the solar tower concept with surrounding heliostat field (1200 °C, up to 50 MW), and d) solar dish (for small applications up to 50 kW).

According to some proponents the economic lifetime of such systems is at least 25 years, and the energy payback time of a solar plant ca. 0.5 years (Trieb et. al. 2002). Luz (now Solel) built 9 solar thermal stations in the Mojave desert in 1984 with about 354 MW (30 to 80 MW each), that produced electricity at a price of 12 c/kWh. The new technology may decrease the price to 10-5c/kWh. During the 1990s, Spain (CIEMAT) and Germany (DLR) cooperated in Almería (at the Plataforma Solar Almería PSA) to developed this technology further.

Due to the low performance of Spain in implementing its EU obligations under the Kyoto Protocol, Spain adopted a national energy law that requires a 25% component of renewables in energy generation by the year 2012 (Brauch 2000). The new Spanish electricity law requires utilities to feed-in the electricity of independent producers and to guarantees them higher prices. These Spanish laws have acted as a magnet to attract foreign capital to launch joint ventures with Spanish companies. In the framework of the Kyoto Protocol, in Spain the Joint Implementation mechanism will attract foreign companies with high CO₂ emissions to invest in these technologies. Solel (Israel) was among the first companies to explore the Spanish solar energy market < <http://solel.com/news/pasch/>>. In non-Annex I or II countries under the UNFCCC that have ratified the Kyoto Protocol (both Israel and Jordan) the Clean Development Mechanism offers a similar framework for attracting outside investments or joint ven-

tures both to deduct the saved emissions in their home country while simultaneously contributing to a knowledge and technology transfer.

Figure 13: Technological alternatives for Solar Thermal Electricity Generation



Application of solar thermal power technologies in Israel and in Egypt

Prof. Faiman of the Ben-Gurion National Solar Energy Institute described the status of solar research in Israel: “Solar-thermal power, another candidate technology for future power stations, is under investigation at Ben-Gurion University (parabolic troughs and a parabolic dish) and at the Weizmann Institute (solar furnace and central receiver tower), the latter with the active participation of industry. ... The Weizmann Institute Central Receiver Tower... consists of a field of 64 so-called "heliostat" mirrors, each of approximate area 50 sq.m. that redirect the sun's rays to a boiler, or some other suitable receiver, mounted on a tower some 50 m. in height.”⁶

In November 2001, the Israel Ministry of National Infrastructures decided “to introduce to the Israel electricity market until 2005 the CSP as a strategic ingredient, with a minimal power unit of 100 MWe. There is an option to increase the CSP contribution up to 500 MWe at a later stage, after the successful operation of the first unit.” According to Solarpaces “The investment in the first unit is expected to be 200 million US\$, with an estimated cost of 9 c/kWh for the electricity of the first unit and an expected reduction to 7 c/kWh when the 500 MWe unit is completed. The construction and operation of the first unit will create around 1000 jobs during the construction and 120 permanent jobs for the operation and maintenance of the plant.... In February 2002, the IEC management allowed the construction of a 100

⁶ See: < <http://www.mfa.gov.il/MFA/Facts%20About%20Israel/Science%20-%20Technology/Solar%20Energy%20in%20Israel> >.

MWe solar power plant at a 250 million US\$ investment.” <[http://www.solarpaces.org/ IS-RAEL_SEGS.htm](http://www.solarpaces.org/IS-RAEL_SEGS.htm)>.

In July 2004, after the decision of the Israeli Public Utilities Authority (Electricity) to approve premiums for private electricity producers, “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 Megawatt of power for 50,000 homes. Upon completion, it will produce 500 MW of power for Negev communities. Under the plan, Solel will establish a consortium to finance and build the power station, which it estimates will cost \$1 billion. ... The premium is intended to attract more companies to the market. The cost of the first stage of the project is \$250 million.” Solel’s executive Mandelberg said “that while 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”.⁷ Thus, the technology that has been successfully demonstrated for two decades in the US, will finally be applied in the Near East and thus demonstrate its potential in the region. Egypt has been among the first five countries considered by the GEF for a solar thermal installation.

Combined solar power and desalination plants

Combined solar power and desalination plants with proven technology would combine: a) a steam turbine co-generation system and b) a thermal seawater desalination. Trieb, Nitsch, Kronshage, Schillings et. al. (2002) estimated that “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 electricity for 250.000 people, costs: 800 M€ On 11 December 2003, A. Cohen estimated in Haaretz the costs of electricity generation at 10 cents/kWh, cost of desalination decreased within a decade from 1 \$ to 50 cents. In the Executive Council of the *The Middle East Desalination Research Centre*, Muscat, Oman that has conducted desalination R& D in many crucial technological areas, Omani, Israeli, Palestinian, Jordanian, American, Japanese and other experts closely cooperate on technical solutions for the problems of water scarcity in the region.⁸

Financial Instruments: GEF and Clean Development Mechanism

While both technologies already exist in the region, the realisation of these technologies has so far only been discussed in the framework of national energy and desalination plans and not as an element of an emerging functional peace infrastructure supported by outside donors. This is where the available technologies, the European political experiences and political strategies for building a lasting infrastructure for addressing the long-term environmental challenges for the region should merge. In the framework of the Clean Development Mechanism of the UNFCCC and of the Kyoto Protocol a financial instrument exists. So far only Israel and Jordan have ratified the Kyoto Protocol and would thus qualify for CDM projects. Once Egypt signs the Kyoto Protocol then the Clean Development Mechanism will become a tool for attracting foreign investments in the framework of the UNFCCC.

⁷ See at: Solel’s News Page the press release of 29 July 2004 <<http://solel.com/news/globes/>>.

⁸ See at: <<http://www.medrc.org.om/>>. The Centre has developed a Middle East and North Africa (MENA) University and Research Institution Outreach Program in which leading universities from Egypt (Al-Azhar University, Hydraulic Research Institute) Israel (Ben-Gurion University of the Negev, Technion-Israel Institute of Technology); Jordan (Jordan University of Science and Technology; Hashemite University; Royal Scientific Society; Water and Environment Research and Study Center (WERSC); Saudi Arabia (King Abdulaziz City for Science and Technology; King Fahd University of Petroleum and Minerals); Kuwait (Kuwait University; Kuwait Institute for Scientific Research); Morocco (University IBN Tofail); Oman (Sultan Qaboos University); Qatar (The University of Qatar), Tunisia (University of Sfax).

Feasibility studies on three initial steps towards solar thermal energy and desalination

As part of a functional cooperation to address the environmental challenges of the future, the following initial steps are proposed:

Step 1: With support of international donors, a project may be launched with a study on bilateral cooperation between Egypt and the PNA, as well as between Egypt and Jordan on their water needs, on technological options and on the economic costs of desalination with fossil and renewable energy sources. Such a feasibility study should assess the energy potential and costs of a research and development centre in Sinai for an integrated solar thermal desalination infrastructure for both Sinai and Gaza, as well as for the Gulf of Aqaba. One goal of such a feasibility study could be to assess the costs for a Euro-Mediterranean R & D Facility for hybrid desalination with gas and solar thermal energy. The goal should be to assess the costs for a major desalination plant in Gaza that would use the solar electricity to be produced in Egypt in the Sinai. Thus, as a first step a purely intra-Arab infrastructure could allay Palestinian fears that only Israel would control the tap. Such a first step could significantly improve the water and health security in the Gaza strip.

Step 2: In cooperation with the Middle East Desalination Research Center (MEDRC) where Arab and Israeli Institutes have cooperated on desalination technologies, a second feasibility study may be launched on the development of trilateral hybrid gas and solar thermal electricity generation and desalination plants for the joint water needs of Sinai, Gaza and the Negev. Potential sponsors for such a multinational water and energy infrastructure could be GEF, the EU, USAID, the World Bank, the IMF, EIB, Japan, as well as the Arab Development Fund and Arab Gulf countries. Such a step could reduce the reliance of Israel on water from Lake Tiberias or Kinneret for greening the Negev. The longer-term goal could be the development of a trilateral functional community for developing a joint integrated infrastructure for water and energy, with vital components in Sinai, Gaza and in the Negev (to the extent the IDF permit) to enhance water and food security. This would require a level of trust that presently does not exist. Thus, a strategy should be considered that gradually moves from national self-reliant strategies for water and energy to more integrated or interdependent infrastructures.

Step 3: Later on, the global environmental challenges affecting all countries should be addressed by focusing on the water needs and technological potentials. A third economic feasibility study may focus on the desalination infrastructure in Jordan for the West Bank in the Gulf of Aqaba and for water pipelines on Jordanian territory to supply the West Bank with desalinated water. In the framework of the Euro-Mediterranean Partnership, a small pilot project may be conceived and the potential of the Clean Development Mechanism as an additional funding instrument may be assessed to attract foreign investments in the framework of the Kyoto Protocol. Several project developers have the technical and financial expertise to assess the viability of different options. So far different projects have been suggested for desalination plants in the Aqaba Region, e.g. by G. Fishes (1994, 1994a) among others in the framework of the suggested a) Red Sea-Dead Sea Canal and of b) the Mediterranean-Dead Sea (North Route). Murakami (1995: 167) analysed a hydro-powered reverse-osmosis desalination in water resource planning in Jordan (Aqaba-Disi), as well as a solar-hydro power and pumped-storage co-generation in hydro-powered reverse osmosis desalination as an interstate development project in the Jordan River basin (Murakami 1995: 202). According to the Jordan Times (17.4.2002), the Jordanian Ministry of Water and Irrigation was studying a plan for a first sea-water desalination plant in Aqaba for the Aqaba Special Economic Zone (ASEZ).

Desalination plants in the Gulf of Aqaba

Desalination plants in Aqaba have been discussed since the peace treaty with Israel in 1994. The proposed plant is one of 4 water projects to solve water supply in the Aqaba zone. The Jordanian Ministry and USAID developed Aqaba's wastewater treatment plant (\$30-35 million) to irrigate parks and for industrial purposes. A fourth project to convey water from the Disi aquifer at a 4 million m³/y will provide Aqaba with drinking water, and meet the water demand of the industrial and tourism sectors in ASEZ for the next five years. The total investment cost of proposed hydro-powered seawater reverse osmosis desalination plant in Aqaba was estimated at US\$ 389.4 million. In addition to the three countries who signed peace treaties: Egypt, Israel and Jordan; Palestine should also be involved from the outset and possibly also Saudi Arabia who has technical expertise with a pilot plant on solar desalination (figure 14).

Figure 14: Pilot Solar Thermal Desalination Plant in Saudi Arabia



A Perspective for functional cooperation of water, food and desalination experts

This cooperation could start building on existing foundations of cooperation among water, food and desalination specialists within the region with the goal to create regional interdependence that requires daily cooperation. This cooperation may focus at six components:

- 1. Research on common environmental challenges on regional implications of global environmental change.** This could become a major task for a quadri-national **Research Institute on Global Change in Taba, Elat and Aqaba** (funded international donors).

Around such a high-level regional research centre, several technical institutions of higher learning with scholars from all four countries including outside scholars should be considered. At a later stage even a **joint technical university of the Gulf of Aqaba** with graduate schools in Egypt, Israel and Jordan may be reviewed addressing those technologies most in need to enhance the coping capacities of all four countries to adapt to and to mitigate against the projected regional impacts of global environmental change. Such integrated advanced research centres could address the following areas for functional scientific cooperation:

- 2. Developing most advanced renewable energy technologies relevant for the region;**
- 3. Schemes for desalination;**
- 4. Sustainable food production;**
- 5. Sustainable tourism;**
- 6. New urban environments for jobs and living.**

Ten steps for functional cooperation in addressing common environmental challenges

The sponsors of such a joint research infrastructure for recognising the common environmental challenges and for developing the adaptive and mitigation technologies could be the EU countries, the USA and Japan, with support of major international financial institutions (World Bank, IMF, EIB). To realise this small hope for functional scientific cooperation the following ten steps could be considered:

- 1st Step: **Problem Recognition and Creation of Awareness:** Establishment of an international Research Centre on Regional Impact of Global Environmental Change to Mitigate Environmental and Human Security Risks;
- 2nd Step: **Creating the Knowledge Basis for Mitigation:** Establishment of an 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**, e.g. in **Taba**: a Centre and Laboratory on Renewable Energy: solar and wind funded by the EU; in **Elat**: a Centre on Agriculture in Arid Regions in close cooperation with the Desert Research Center in Egypt and the Blaustein Institute on Desert Research (Israel) with US financial support, and in **Aqaba** a Centre for Hydrology and Desalination to be supported by Japan.
- 4th Step: **Supplying Fossil and Renewable Energy.** Initially such a pilot desalination plant could be operated with natural gas from Egypt and oil from Saudi Arabia, that could increasingly be replaced with energy from solar thermal with major plants in the desert and wind power installations along the Red Sea with excellent technical potential.
- 5th Step: **A longer-term goal could be the creation of a joint infrastructure for a local hydrogen economy across the Gulf of Aqaba** as is presently being planned by Daimler Chrysler, Norskhydro and the Icelandic Electricity Company for Iceland.
- 6th Step: **Cooperative Mitigation of Water Scarcity** by a joint training institution for water experts on water efficiency, and building joint water desalination plants to serve all three countries; and finally
- 7th Step: **Creating new jobs and supplying food** by joint research and training institutions for agriculture, irrigation, and desertification specialists for arid regions (ICARDA), and Centres for IT, computer, software industry.
- 8th Step: **Develop Joint Advanced Medical Research Centres** where integrated teams of specialists and nurses would serve patients from all four countries. Besides desalination, the realisation of regional health projects had the highest support among Israelis and Palestinians.
- 9th Step: **Build New Sustainable Cities and Tourist Centres** by developing sustainable tourist centres based on renewable desalination, and developing sustainable cities with a low emission transport system, solar cooling and energy generation, as well as waste based electricity generation.
- 10th Step: **Gradually create a pride in joint achievements and create a culture of cooperation and tolerance.**

These ten small steps of functional cooperation among scientists and experts should avoid any national political preconditions. As in the case of the Marshall Plan, the donors should develop a united strategy and avoid to become a victim of national politics in the region. These scientific institutions should be international institutions, and they could be under the management of UN agencies (e.g. UNEP, UNDP, UNU) or of high-level professional organisations, or even of new international private institutions that would guarantee with the support of the major donors both political independence and high academic standards.

RECOGNISING COMMON CHALLENGES AND POTENTIAL FOR FUNCTIONAL COOPERATION IN RESPONDING TO NEW COMMON THREATS

This functional strategy of creating awareness and joint regional coping capacities will not realise the big dreams of either side that cannot be mutually realised. These steps rather rely on the small hope on what is scientifically possible, politically acceptable and economically feasibility with outside assistance. Multilateral frameworks may also assist in the post-conflict environmental reconstruction, especially of the OPT. Based on the functionalist credo that *form follows function*: the process should start with modest functional cooperation in areas both population already support in the areas of: water, environment, health, and food.

This requires also a gradual shift in the mindset of policymakers on either side to gradually shift from narrow military to wider human security concepts. A precondition is a recognition of the mutual challenges to survival (*Awareness creation*). Thus, collaborative research should address these joint challenges, establish joint scientific and technological capacities in the region, use the energy potential of deserts for its greening and for the protection of the climate. The development of scientific, environmental and economic partnership building measures may contribute to a potential spill-over from functional cooperation to conflict resolution, and thus create preconditions for the development of confidence-building measures for the political and military realm.

Whether the Middle East conflict is a permanent conflict depends on the worldview and mindset of the observer or policy-maker and his or her preferred means in dealing with this conflict. The continued asymmetric cycle of violence will not produce peace but only continued hatred. It may be worthwhile to study the cases of successful peace-building and of overcoming centuries of conflicts, e.g. between Germany and France. It may be worthwhile to study the relevance of the simple but innovative political concepts of Mitrany, Marshall, Monnet and Gorbachev in shifting European policy after 1945 and especially also after 1990 from conflict towards West European and Pan-European cooperation..

This may require to overcome the traditional Hobbesian worldview and popular mindset by maintaining, creating, building on and developing regional functional networks of water managers in Israel and Palestine on joint groundwater aquifers, of energy and food specialists as well as sustainable urbanisation experts. The building of common institutions requires a certain degree of trust of the partners. The Gulf of Aqaba: could become a laboratory for a joint regional development. Such a process of cooperation could start with the technical education and expand to the economic sector, and finally hopefully contributing to a political spill-over.

The search for common strategies for „human survival“ that create joint coping capacities to adapt to and to jointly mitigate against the regional impact of global environmental change requires to overcome state-centred security concepts based on power (military means). Civilian society may contribute to a gradual awareness for the common environmental security challenges with the goal of a stable human security. However, such a problem solution may

require high political courage, President Sadat showed in 1979 by going to Jerusalem, and entering into a peace treaty with Israel. A „new thinking“ with a new generation of leaders, as with Gorbachev may gradually evolve, destroying some of the big dreams of either side that can never be realised but that will only create more misery and deeper wounds on either side.

Let me return to my basic hypothesis that ideas mattered to overcome centuries of wars and conflicts between France and Germany, and to transform the Cold War peacefully. If “wars start in the minds of men”, then ideas mattered in Europe and they will matter in the Middle East as well, once there is a willingness to break out of the confinements of Machiavellian or Hobbesian strategic thinking. The proponents of the *Geneva Initiative*, of the *Ayalon-Nusseibeh Plan: Vote for Peace* and of the many other peace plans have challenged the mindsets of the past. Many small steps and new conceptual ideas are needed to break the ice.

Unilateral steps may contribute to a gradual reduction in tensions (GRIT) if they are part of a multilateral strategy. In the medium or longer-term there will be no alternative but to return to a multilateral peace process whatever its structure may be. One of the preconditions of success of the Marshall Plan was that the donor, in this case the US government, used its conditionalised aid wisely. A strong and unified strategy of all donors and equal treatment of all recipients may be a necessary prerequisite.

Grants and credits should 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. In the past, conflicts and crises have been the time for learning and conceptual innovation. Thus, the present crisis may produce the conditions for a new “small hope” for a step-by-step implementation. The conceptual ideas for multilateral functional projects should be developed by joint functional teams of scientists from Egypt, Israel, Palestine and Jordan. A multinational NGO consultation and planning process could be supported by the EU in the framework of the Euro-Mediterranean partnership or its new Anna Lindh Foundation. Other functional projects may also be developed with the support of private foundations in Europe, North America (e.g. of the Carnegie, Ford or UN Foundation), and in Japan (by the Sasakawa or Nippon Foundation).

SUMMARY AND CONCLUSIONS

Let me summarise the key arguments and hypotheses of this paper in ten points:

1. The key goal of the paper has been to develop conceptual ideas to gradually overcome the cycle of violence in the Middle East by increasingly recognising the common regional impacts of global environmental change by addressing them jointly through a network of coordinated functional cooperation of water, soil, food, energy and health specialists of Egypt, Israel, Jordan and Palestine.
2. Period of crises and conflicts have often been periods of conceptual innovation. During the World War II, during the early and late Cold War and during the Korean War new conceptual ideas were developed by Mitrany, Marshall, Monnet and Gorbachev that fundamentally changed the political thinking and strategy in Europe.
3. New ideas mattered in Europe and fundamentally changed the political context. Such a “new thinking” and conceptual ideas are needed in the Middle East conflict overcoming the “big dreams” and developing the “small hope” by functional cooperation of experts to visibly improve the quality of life of both Arabs and Israelis in the region.
4. There seems to be a will among Israelis and Palestinians in support of functional cooperation on desalination, health, environmental, agricultural, tourism and on other issues.

5. Future environmental challenges in the region may become as severe for many young Arabs and Israelis during the next few decades that may only be addressed jointly.
6. There is a need for a fundamental shift in perception of subjective and objective security threats, challenges, vulnerabilities and risks in the security discourses within all countries in the region: from a narrow military threat-based national security view to a wider security perspective that includes the economic, societal and environmental security dimensions and the human being as well as humankind as referent objects.
7. The European experience of functional cooperation on coal and steel matters that started in 1951/1952 during the Korean War and gradually expanded to economic and nuclear cooperation in the Rome treaties of 1957 and later to other policy areas. However, cooperation should address not the most sensitive "war industries" but the technological opportunities to cope jointly with the environmental challenges of the future.
8. Such a functional cooperation will not produce miracles and will not immediately break the cycle of violence. It must be robust and guided by conditions that abide to all countries in an equal and equitable manner and must be directed by a consortium of donors of the international financial and political institutions that must be detached from domestic politics both in the donor and recipient countries.
9. If wars and conflicts start in the "mind of men" then these minds of the citizens and policy-makers must be gradually changed to recognise the new common environmental challenges, to initiate a process of anticipatory learning by fostering the gradual emergence of joint coping capacities to address and to avoid those challenges to become threats to the security and survival of all people in the region.
10. While the donors should attach clear conditions on their support of cross-country functional cooperation in the region the recipients should be persuaded to accept the support without political links to the prior realisation of their respective "big dreams" for a prior peace settlements that only serves their own "national" or community interest.

PROPOSAL FOR A NETWORK TO DEVELOP FEASIBLE FUNCTIONAL CONCEPTS

Given the ongoing conflict and the daily mourning over the dead and the wounded this functional perspective may appear unrealistic to many colleagues in the region due to experience and lack of trust. But in 1947, the ideas of Marshall and in 1950 those of Monnet or in 1986 those of Gorbachev were perceived by some - who were victims of their own mindset - as dreams and by others as propaganda. My initial operational proposal is very modest:

1. A group of two functional (water, soil, food, energy) experts each from Egypt, Israel, Jordan and Palestine may be formed and 3 to 7 experts from Europe, Japan and North America should be added. This group should look for funding to make two to four meetings outside the region possible during 2005 and 2006.
2. These experts should be given a clear task: to explore areas where functional cooperation among experts in the region exists, where it appears to be possible and appears to be needed to address the challenges of the future.
3. These experts should be asked to develop a priority list of concrete proposals for functional cooperative projects that appear to be feasible at present.
4. These experts should ask private foundations for seed money to develop concept or pre-feasibility studies most promising proposals for functional cooperative projects.
5. These experts should present these feasibility studies at a conference in the Jerusalem or in the Gulf of Aqaba to representatives of the Middle East Quartet and to international donors and private foundations.
6. IPCRI may offer an appropriate organisational framework to get this process of searching for new cooperative ideas and areas of functional cooperation started.

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