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How can the Middle Eastern States Build a Cooperative Freshwater Supply Policy? The Myth and Realities of Freshwater Cooperation

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Abstract

This paper describes an applied research project using a six-criterion policy analysis model that can be used in the preparedness planning efforts for those cooperating Middle Eastern States that are building a cooperative freshwater supply policy. It details what they should consider, exploring the most critical issues to consider prior undertaking any freshwater projects, and specifies those issues Middle Eastern States need consider in order to build a successful cooperative policy. This paper systematically examines the adoption of the use of nuclear energy for the large-scale production of freshwater at a reasonable cost to cooperating States, and proposes that the nuclear-desalination method for the production of fresh water is one such cost-effective cooperative project.

Working together on various water projects, elected political leaders, scientists and local community leaders could bring about an eventual peace among the states in this region of the world. It proposes that an emphasis on the cooperative production of freshwater could be one means of establishing peace in the Middle East. The method used in this paper is a six-point matrix [5] analysis detailing what States should consider before undertaking any cooperative freshwater project, and it also advocates shared strategic planning among states in order to achieve the goal of producing enough freshwater to meet projected regional needs in both the short-and long-term.

In the meantime, the U.S. Government should encourage a broad-based diplomatic approach including using water negotiations as additional tool to have achieve the peace.

We propose an agreement establishing a United Middle Eastern States (UMES) Agency. UMES then can coordinate cooperation in freshwater projects in turns would help to achieve a broad based peace in the Middle East.

It is now possible to use nuclear energy to produce freshwater with almost no environmental impact, whereas the production of water using coal power has many limitations whereas the production of desalinated water production using coal power has many adverse impacts on the environment. Therefore, the use of water nuclear power to fresh-water will prevent catastrophic shortages and aid in the achievement of peace in the Middle East.

We believe that solving the problem of water shortages through cooperative fresh-water production projects is the key to building peace in the Middle East.

Keywords: Freshwater resources in the Middle Eastern States; Large scale desalination; Nuclear desalination; Freshwater production; Freshwater production using Nuclear Energy; Water projects cooperation; Peace building and making.

1. Introduction

As freshwater resources are being depleted globally, water is becoming a valuable commodity, and it may be more valuable than petrol in the near future. Today, freshwater shortages exist in many parts of the world, especially in Africa, Asia, the Middle East, and North and South America. Having petrol in hand and using it as a weapon is no longer a strong economic asset for Arab States, but fresh water will be an invaluable asset in the near future. The Middle Eastern region lacks adequate water resources, and it badly needs water because its population is growing exponentially. This is gradually leading to a water crisis for Middle Eastern States; if not now, then in the near future. From the Middle Eastern States' perspective, we'll focus on how States can build cooperative freshwater supply policy.

In the Middle Eastern region, "30 percent freshwater resources are limited to the Jordan River basin, 70 percent are groundwater resources, and a small portion, only 15 percent, are coastal waters" [13]. Table 1 shows trends in water of the Middle Eastern region from 1970 through 2001, and estimated renewable water by 2025. The situation indeed is very grim for Middle Eastern States.

Table 1. Population Growth and Fresh Water in the Middle East [2] (Table modified by author)

Population Growth and Fresh Water in the Middle East (2002)[a] , [4] p.1 in source [6]							
	Population (millions)			Annual Renewable Fresh-Water (km^3)	Per Capita Annual Renewable Fresh-Water (m^3)	Per Capita Annual Renewable Fresh-Water ($m^{3)\ b}$	Per Capita Annual Renewable Fresh-Water (m^3)
(a) Year	**1970**	**2001**	**2025****		**1970**	**2001**	**2025****
Israel*	3.0	6.4	8.9	2.2	740	342	247
Jordan	1.6	5.2	8.7	0.9	555	174	103
Lebanon	2.5	4.3	5.4	4.8	1944	1120	896
Syria	6.3	17.1	27.1	46.1	7367	2700	1701
Iraq	9.4	23.6	40.3	96.4	10,304	4087	2392
Kuwait	0.7	0.7	1.0	0.1	455	140	97
Bahrain	0.2	2.4	4.9	1.0	1383	416	206

[a]This indicator represents freshwater resources in a country; actual renewable supply varies from year to year.
The data typically include both surface and groundwater supplies, including surface inflows from neighboring countries. The United Food and Agricultural Organization (FAO) refer to this as total natural renewable water resources. Data for Israel are from 1986 and all other data refer to 1997 estimates [14].
*Israel includes Palestinians who live in the West Bank and Gaza.
** Estimates for 2025.

Table 1 shows that, based on the annual rate of population growth and freshwater in the Middle East, for an anticipated estimate of population in 2025, water resources would be scarce and have to be shared by countries in the region. By 2025, for example, the population would be 8.9 million for Israel, 8.7 million for Jordan, 27.1 million in Syria, 40.3 million in Iraq, and about 5 million in Lebanon Kuwait and Oman. Per capita annual renewable fresh-water by 2025 for Israel will be 247 cubic meters; for Jordan 103 cubic meters; for Iraq 2392 cubic meters; for Bahrain 206 cubic meters, and for Kuwait as little as 5 cubic meter. It clear that per capita annual renewable fresh-water for Syria and Iraq would be very high, while for Israel and Bahrain average, and Jordan and Kuwait is low.

Table 2. Water consumption by sector [9]. (Table modified by author)

Middle East Countries	Population (in millions)	Total water Consumption mcm**	*Agriculture in %*	*Industrial in %*	*Domestic in %*
Israel (1993)	5.1	1754	63	6	31
Jordon (1992)	4.3	875	74	5	21
Lebanon(1990)	3.3	1060	74	7	19
Syria(1990)	12.5	9500	79	5	16
Palestine (1992) (West Bank & Gaza)*	1.8	210	62	38*	38*

*In these figures for the West Bank and Gaza Strip, domestic and industrial consumption is counted together.
Sources: Statistical Abstract of Israel 1994 [15]; Salameh, Elias, Helen (1993).Water resources of Jordan, Present Status and Future Potential [12]; Amman, Salameh, Elias (1992): Water Resources of Jordan [1].
**mcm= million cubic meters.

On the other hand, Table 2 shows water consumption by sector. For Israel, with a 5.1 million population, the total consumption is 1754 million cubic meters, of which 63 percent is used in agriculture, 31 percent in households, and as small as 6 percent in industry. In Jordan and Lebanon the total water consumption is 875 and 1060 million cubic meters respectively, of which about 74 percent usage is in agriculture, 21 percent in households, and as small as 5 percent in industry. For Syria, a 12.5 million population uses a total water consumption of 9500 million cubic meter of which about 79 percent is used in agriculture, 16 percent in households, and as small as 5 percent in industry. Palestine's total population of about 1.8 million has a total water consumption of 210 million cubic meters, of which 62 percent is used in agriculture and almost 38 percent usage in industry and domestically, combined. Clearly, Palestine is in short supply of freshwater for its population as compared with other states in the region. This table indicates that most water usage is in the agricultural sector, which can be three to four times the domestic water usage in the Middle Eastern countries. "Salameh and Bannayan estimates for Jordan a freshwater consumption per capita of 115 liters a day; in Lebanon, fresh-water consumption per capita is about 150 liters a day" [12]. For the "Palestinians, domestic fresh-water consumption as estimated by Amman, Elmusa and Sharif is in the range of 63-104 liters per day for the Gaza strip, and 68-96 liters for the West Bank, which includes industrial and commercial fresh water consumption" [1]. Readers should note that this figure does not take into account the quality of the fresh-water consumed, seasonal and annual fluctuations, or regional variations within states.

Table 3. Daily domestic water consumption per capita in the region (in liters a day) [9]. (Table modified by author)

Middle East Countries	
Israel (1993)	275 liters
Jordon (1992)	115 (85*) liters
Lebanon(1990)	150 liters
Syria(1990)	130 liters
Palestine (1992) (West Bank & Gaza)*	63-104 (50*) liters

* The figures in parenthesis refer to the amount of water that really reaches the household, after other municipals uses and losses in the network has been subtracted. **Sources:** Central Bureu of Statistics (1992) [3].; Statistical Abstract of Israel 1993,1994; [16].

On the other hand Table 3 shows that daily domestic water consumption per capita in five countries. On average, an Israeli consumes about 275 liters a day, almost same as a person in the European countries. By way of contrast, domestic water consumption for a Palestinian is about 50 liters on average and doubles that amount for Jordanians and treble for Lebanese and Syrians in the region.

The overall impact demonstrated by Tables 1, 2 and 3 is that, as natural resources deteriorate population continues to grow, as does the demand for water in the region. With an annual population growth rate almost reaching 8% between 2002 and 2004, an alarming demand for water has been made [9]. This data alone should alert Middle Eastern States as to the urgency for their cooperation on the water front, and make it a top priority in their national interests and in their responsibility to their people.

2. Background Information

Globally speaking, the main water shortage issue is that, while population growth is taking place exponentially and outstripping available freshwater resources for human and animal consumption, water needed for industry and agriculture is further depleting available water resources.

An annual dry season is commonplace in the Middle East, Asia, and North and South America. Throughout the year, little rain is common most of the seasons. Especially in Middle Eastern and North Africa regions there is little rainfall, and the dry season lasts for a longer period [8]. In addition, drought makes ordinary peoples' lives unbearable, as critical basic food shortages have lead to famine for almost the entire region in recent years. It looks as though the future is not going to be much different than today.

Middle Eastern regional water resources come primarily from the Euphrates and the Tigris rivers, which originate from Turkey. From a "relatively cool and humid zone with rugged 3,000 meter-high mountainous regions, the two rivers run separately onto a wide, flat, hot and poorly drained plain. In their middle courses, they diverge hundreds of kilometers apart, yet again meet near the end of their journey in the Shatt al-Arab, and discharge together into Persian Gulf. Shatt al-Arab, and the combined area of the lakes and swamps have a length of 180 kilometers and constitute the combined delta of the Euphrates-Tigris rivers basin" [17]. The Euphrates and the Tigris reach the Middle Eastern States with their "characteristic of high temperature resulting in high evaporation. The Euphrates river basin provides 65% of surface water supply in Syria, and contains 27 percent of overall land resources. While, the Euphrates and Tigris rivers constitute the entire freshwater supply in Iraq" [17]. It is obvious that water reaching the Middle Eastern region fails to meet these States' freshwater drinking needs, let alone the need for industry and wide spread agriculture in the region.

Therefore, in Middle Eastern States, there is a need for the large-scale production of water for drinking as well as for industry and agriculture. Large-scale freshwater production, technically derived by using high temperature stream, is possible only with nuclear power; as opposed to coal power, which provides only a lower temperature stream. Therefore, nuclear energy is the ideal energy source to provide high temperature stream for the desalination of seawater in large-scale water production. A Nuclear desalination, combined power plant that produces both electricity and high temperature stream is ideally suited to desalinate seawater and produce fresh water for States at a large scale. Nuclear desalination is the only viable water production alternative, and if chosen, in its best, environmentally safest method, known as reverse osmosis process adaptation [11]. This "environmentally friendly technique, where the brine discharged is quickly dispersed, contains no chemicals and has a minimal temperature variation of approximately one degree" [10].

However, the central question is: how can Middle Eastern States build a cooperative fresh water supply policy? And what systematic policy criteria and issues must be considered and followed to obtain a successful outcome? We believe that Middle Eastern States can establish a cooperative freshwater supply policy in the use of nuclear energy for water production at a large scale. Because it is in their national interests, Middle Eastern State Governments need to adopt a sustainable long-term policy for large-scale water production through the peaceful use of nuclear energy.

To this end, the U.S. Government can take strong leadership role in support of such programs and make the use of nuclear technology available for water production in the region at a large scale for both the long and short term.

In this study, we will be using Greenberg's [6] six-point matrix policy formulation in order to assess Middle Eastern States advantages and vulnerabilities, and which criteria should be considered in order to build a cooperative freshwater policy.

3. Research Methods and Analysis

In this paper we use Greenberg's 2008 [6] six-point policy criteria for analysis, consisting of: reactions of elected officials and staff; reactions of non-government stake-holders; human and ecological health; economic costs and benefits; moral imperatives; and time and flexibility. We begin an overview of the relative importance of the above six criteria are summarized and examined as follows:

3.1 Restatement of Policy Question: How can the Middle Eastern States (herein referred as to "States") Build a Cooperative Freshwater Supply Policy?

We followed Greenberg's [10] six-point matrix policy criteria for freshwater policy formulation: to build a cooperative freshwater supply policy, two decision making paths are indicated: (1) States Governments are led by a body of scientists which Greenberg labels "centralized," [6] , or (2) another, managed by States "supply and demand" or "market" forces [6]. On the issue of how Middle Eastern States can build a cooperative freshwater supply policy, Greenberg outlines that it "first depends on strong science and economic analysis, preferably evaluated by the National Research Council (NCR) of National Academy of Sciences. The second path would have a less comprehensive scientific program, and advocacy science would play a major and continuing role in formulating policy" [6].

This section summarizes the advantages and vulnerabilities of nuclear desalination water production as 120 points to be considered by States' policy makers (see Table 4) [6]. States will need to build a freshwater policy that is flexible enough to accommodate Middle Eastern States national needs for a freshwater supply for the short- and long term. In the table below we note 120 new points that States policy makers should consider, then use these points to identify key States' policy drivers [6].

Table 4. A six-point policy criteria matrix for nuclear desalination water production.

Criteria:	**Advantages (Pros)** [6]	**Vulnerabilities (Cons)** [6]
Reaction of elected officials and staff	•[1]President and Parliaments are supportive in cooperating of States**.** •[2]Local mayors and suburban administrative bodies are supportive (for political reasons, and for jobs) •[3]States Environmental Protection Ministers and related agencies are supportive. •[4]Strong support will come from key members of local Governments (for political reasons) who are strongly supportive. •[5]Local mayors and suburban administrative bodies are supportive (job creation) and local economies. •[6]Governers of local States are likely to be supportive (for political reasons), or are somewhat supportive. However, they ask fo more cleanup funds rather than Additional nuclear related power plants. •[7]Constructors and developers are supporti for cooperative freshwater projects using nuclear power for water production, and win contacts.	• [8]States' Prime ministers' Offices, Governments regulatory Agencies and Parliaments of States are actively questioning undertaking to build nuclear desalination and joint water projects. • [9]Opposition is also likely come from local Governments surrounding cities where nuclear fuels will be used for nuclear desalination plants.

Reaction of non-governmental stakeholders	•[10]The local and national media will cover the issue and press government for cooperative agreement action. •[11]States business interests are supportive of freshwater cooperation as a fix for the confusing current situation in which business must be prepared to take a piece of the a pie from each joint freshwater cooperative project •[12]Strong support from eminent and environmental scientists more likely to continue. •[13]Strong support from environmental advocacy groups and from proponents of environmental justice is likely if they are persuaded that their issues will be part of the analysis. •[14]Some local community and activist groups in States will put great pressure on elected officials and staff to perform analysis. •[15]Labor Unions of States are supportive because building joint water projects in cooperating States will create jobs. •[16]Local Communities can have an economic boom when States' freshwater cooperation projects in the works are supported.	•[17]There would be strong opposition from business interests that feel their control of issues would be lost. •[18]There could be opposition from businesses fearing that centralized government management would stifle innovative technology-based solutions •[19]Some activist and local community groups fear that a centralized analysis and cooperative agreement will favor powerful (and most lobbied) business interests and that abuse is likely. •[20]Opponents of expanding nuclear power to produce fresh water will oppose States' cooperation. •[21]Most most local peoples are likely not to oppose the concepts of State fresh water cooperation, but likely to oppose the use of nuclear energy to produce it. •[22]States National media are unlikely to care, unless Governments make mistakes or environmental problems, such as a combined use nuclear plant problem occurs, arguing a coal desalination plant can be managed more easily. •[23]States Public Health efforts will be hurt in the long run if no freshwater projects are developed among States. The States' people believe that Government cannot be trusted.
Human and ecological health	•[24]Health threats can be reduced and minimized by removing and containing contaminants during the process of seawater desalination. •[25]More fresh water used in agriculture soils of cooperating States for ecologically and environmentally safe and improved health. •[26]More fresh water for industry use among cooperating States will improve industrial ecology. •[27] With cooperation between States, more people will travel, visit sites, and use mass transit. •[28]More cooperation between States' in development reduces energy consumption and auto travel time •[29]Fresh water cooperation reduces the	•[36]Groups to protect human and ecological health oppose nuclear desalination plants as harmful to environment and ecology •[37] In the case of accidents, local health risks may be increased in States where combined-use plants are located •[38]In addition, if the clean up required is too aggressive, the ecology could be disrupted. •[39]States' current, older and urban freshwater resources, such as rivers, ground aquifers, mountain aquifers and limited-location desalination plants are inadequate: the water transportation pipeline system would need to be upgraded if and when plants are operational. •[40]Nuclear reactors create toxic materials

	distance required for emergency care among member States. • [30]Freshwater cooperation among States will result in fewer water and septic problems, and less contamination of the potable water supply. •[31]From freshwater cooperation, States' residents will have a broader base of support for city water and sewage infrastructures. •[32]Cooperation among States for freshwater production will improve air quality and reduce health threats •[33]Water quality problems will be reduced among cooperating States. • [34]Freshwater cooperation among States provides an opportunity to unite and integrate energy resources to balance ecology and health issues in a comprehensive way. • [35]States' schools, colleges, universities and scientists will collaborate on the projects.	that could contaminate desalinated waters and damage human and ecological health •[41]Nuclear desalination could pollute water, affect local agricultural output, and harm human and ecological health.
Economic costs and benefits	•[42]There will be lower costs and greater benefits to States' populations if new nuclear desalination plants provide a stable source of fresh water and are made available and applied as quickly as possible. •[43]Using nuclear energy will reduce the balance of debt payment problems among States, as large-scale water production would reduce deficits •[44]Economic benefits will accrue to local areas where States make large investments for fresh water production and use. •[45]Using nuclear energy will reduce the balance of payment problems for States, as large-scale water production will increase revenues. •[46]Dependence on unpredictable or depleting fresh water resources from rivers, lakes or groundwater sources will be reduced. •[47]Growth of populations within cooperating States increase the need for fresh water, which justifies the building	•[58]There will be a long wait for the national benefits from an operational nuclear desalination plant at some sites compared to others. •[59]The economic dependency on State governments will increase at locations hosting nuclear desalination plants •[60]States investments are needed to prepare nuclear desalination plant sites. •[61]More economic uncertainty among States, regions and the country as a whole potentially results from putting too many eggs in the new water production technology basket, and in ignoring other natural desalination methods. •[62]There is more economic uncertainty for nuclear desalination water production compared with natural water resource sites in cooperating States. •[63]At many sites, the low benefit to developers will mean no redevelopment without large subsidies from States •[64]Local neighborhoods will be hurt by the stigma that nuclear desalination plants

	of combined-use nuclear desalination plants. •[48]The daily operating cost of combined-use nuclear desalination plants compares favorably to the cost of the daily production of fresh water from other sources. •[49]The use of nuclear energy for water production will create more jobs and regional economic activity where nuclear desalination facilities are built •[50]What interest rate, amortization, insurance and taxes will be paid? •[51]What is the cost of freshwater going to be if produced on a large scale as opposed to a small scale? •[52]What materials should the combined-use nuclear desalination plant be made of, and what is the plant's lifetime economic analysis? •[53]How can the present day processes of existing small-scale nuclear desalination plants be scaled upward to a larger size? •[54]Freshwater cooperation between States reduces water quality problems in joint plant operation. •[55]How much cheaper will freshwater from big nuclear desalination plants are? How will costs decrease based on the size of the plant? •[56]States will need to analyze the different impact on States' economic and technological budgets created by nuclear desalination plants versus coal-powered plants. • [57]In the short run, what is the cost of reducing people's fear of nuclear freshwater production, even by a little bit?	are dangerous to humans. •[65]Construction companies disengage from building near nuclear desalination plant areas. •[66]Initial capital investments can be costly for nuclear desalination plants •[67]Limited monitoring and surveillance resources will be used at plants, with little chance of finding anything. • [68]Economic dependency on State Governments in areas used for nuclear desalination will increase. •[69]Construction businesses that are falsely accused of graft at nuclear desalination locations could leave or refuse to make new investments in construction in nearby areas. •[70]States' limited monitoring and surveillance resources may be used with little chance of discovering hazards or expensive inefficiencies. •[71]The stigma of a long term wait for benefits could be exacerbated by a concentration of nuclear energy water activities at State sites exclusively •[72]Large amounts of capital will be required from State governments for the support of all water projects. •[73]Substantial legal and administrative support from State governments will be required for all water projects.
Moral imperatives	•[74]States Governments have the responsibility to provide a better, cheaper and more reliable freshwater supply source than that offered by rivers, ground aquifers and mountain aquifers within the States' own boundaries. •[75]States' Governments have the moral imperative to protect lands from the	•[81]State Governments should not consider clustering nuclear desalination plants with technological development and similar facilities because this will create a regional sacrifice zone within the State. •[82]Oppoenents of nuclear power expansion will label combined-use freshwater plant investments as a moral

	effects of mining, groundwater contamination and air pollution. •[76]Aggressive State implementation is needed to meet States' agreements. •[77]States must set aside large areas for ecological parks that preserve unique local ecosystems for future generations. •[78]The economics of redevelopment must be certain for water sharing projects or jointly administered plants •[79]States' Governments have the responsibility to investigate if freshwater production plants are suspected of failing to protect local communities. •[80]States must communicate the results of all investigations truthfully to reassure the public that precautions have been taken and that further concerns will be addressed in town hall-style meetings.	mistake. •[83]State governments have the moral obligation not to invest in a nuclear desalination technology that could leave a massive public health and economic legacy those future generations will have to deal with. •[84]Investments by States increase dependencies on State governments, and this is morally wrong among capitalist States. •[85]Building large, indiscriminate nuclear desalination plants, causing rapid expansion at sites, could destroy valuable natural and cultural ecosystems. •[86]Should States decide to build clusters of nuclear desalination plants, it will create opportunities for unjustified lawsuits •[87]Cooperating State governments should not make agreements if they believe that the marketplace and/or local governments cannot resolve the issue to build or not. •[88]State governments have the responsibility not to investigate circumstances that will not lead to any resolution saving State and taxpayer money. •[89]In the event of plant accidents, will injured parties be able to use investigative findings in court proceedings? •[90]States' failure to adequately study or truthfully communicate results to local populations could lead to a loss of confidence in States' governments, a loss in the economic value of land areas and serious psychological ramifications among people who are frightened .
Time and flexibility	•[91]Investment in nuclear desalination technology may provide enough time for the next generation to learn better ways to desalinate seawater on a large scale rather than using nuclear energy, by evaporating seawater by a series of processes to obtain fresh water. •[92]Investments in new nuclear-related technologies are essential to bring States to the next generation of technologies that produce fresh water.	•[97]Serious concerns about desalination waste management needs to be addressed either jointly, by cooperating States, or by individual States prior to any large investments, binding agreements or political commitments. •[98]States that are uncertain about freshwater projects' outcomes suggest that care must be taken before major resources are committed to production. •[99]States that are uncertain about urban

	•[93]Improved freshwater production for States will help them keep pace with their growing populations and increasing demands for fresh water. •[94]Cooperating States' investment in new freshwater production is essential for getting States to the next generation of all technologies. •[95]States that establish a centralized, science-based solution for water scarcity have a better chance of survival and accommodating technological innovations. •[96]A delayed response to crises by States puts human safety and investments at risk.	freshwater resources such as rivers and ground aquifers may not cooperate •[100]States' reliance on new technologies to produce fresh water has proven to be a mistake in the nuclear field. •[101]Cooperating States' science-driven efforts often take a long time to implement, leaving investments at risk.
Regional Security and Creation of an Independent UMES Agency	•[102]Security of having Middle Eastern States (UMES) Agency with real legal power independent of any states government across national boundaries •[103]Prospects of sufficient water for each and every Middle Eastern State for short-and-long term needs of fresh-water for all purposes: home use, agriculture and industry. •[104]States' cooperation would provide deeper understanding among Middle Eastern States. •[105]Emigration from Middle Eastern Countries will cease. •[106]Water related projects will provide increased job availability in the region. •[107]Israel's fresh-water security will be preserve indefinitely, as well as Israel's rights affirmed by other Middle Eastern States' Parliaments. •[108]Easing of water related confrontations among Middle Eastern States leads to more durable and stable peace in the Middle East zone, which would transform the international system, having a stabilizing effect on global geopolitics and any cross border future confrontations will cease for the short-and long term. •[109]Political and cultural exchanges between Middle Eastern States will be	•[110]Prospects of sufficient water needed for each and every Middle Eastern State for short-and long term will diminish, eventually, and States will be without a fresh water supply for the basic needs of their citizens. •[111]If States do not cooperate this would lead to distrust and misunderstanding among Middle Eastern States' leaders, intellectuals, and citizens. •[112]Emigration from Middle Eastern States will continue to increase at alarming rates, much worse than citizen migration across international borders, as did poor Europeans to seek a better life in the North America a century ago. If the living conditions would improve in the Middle Eastern countries and freshwater needs were provided, they would not have leaved their county. •[113]Basic work opportunities will become inadequate in both urban and rural areas of the region and will continue to decrease, worsening by day and year by year toward an impossible situation without water cooperation among States. •[114]Israel's fresh-water security will not be preserved indefinitely, and her right to exist in the region is continually the subject of arguments, conflict and question. •[115]Escalation of water-related confrontations among Middle Eastern

smoothened, enhanced, and strengthened by developing better relations via water related projects.	States leads to unstable region, as future prospects are worse than today. Comprehensive peace in the Middle East region will become impossible to achieve in the near and distant future, transforming the region to a chaos within the international system, additional destabilizing effects on world politics and could lead to future cross border confrontation and aggression. Innocent citizens would face daily cross fire and many innocent lives would be lost for the short- and long term in the region. •[116]The current emigration from the Middle East will continue, draining citizens who emigrate for a better life and fresh-water needs, especially to Europe, North America, reaching an epidemic scale they are not able to accommodate. •[117]Political instability resulting from conflicts among Middle Eastern States will continue, and may intensify, compounded with high emigration from the region. •[118]Due to declining demographic momentum and an unstable political landscape, escalating ethnic conflicts may arise, culminating in persistent economic decline, severe droughts eventually leading to extreme poverty in each Middle Eastern State. •[119]Declining conditions may also have a negative impact on ecology and environments for each and every State in the region. •[120]Finally, Israel's current water security will become more tenuous, perhaps bleak for the short and long term while Middle Eastern populations grow. Explosive revolutions would make Israel less secure in the future.

We begin with a framework of policy analyses and practical management criteria using a six-point matrix analysis outlining how Middle Eastern States can build a cooperative freshwater policy. This analysis is essential for States and technical specialists confronted with the practical, social and political problems in the planning and management of not only the national society, but the environment as well. Therefore, we provide an overview of six-point matrix analysis as follows:

3.2 Overview of the Importance of the Reaction of Elected Officials and Staff to how States Build a Cooperative Freshwater Supply Policy

(1) Political objectives to protect freshwater for the States for short-and long term need.
(2) Protecting States' human health and welfare in case of immediate threat to the public requires openness and honesty in public forums when questioned on the issue.
(3) Create an Office to oversee local and regional cooperative projects with other States.

(4) Protecting States' environments with as low risk as possible locally and statewide.
(5) To get a piece of cooperative fresh-water projects is an economic value for the State, as it will: generate jobs and better income for middle class families, lift living standards, provide better housing, generate more income for companies in regions with freshwater projects, increase tax revenues for the State, and build more local community facilities for the poor.
(6) May go along with cooperation with almost no opposition, at the same time may be cautious and rush to say "no" for the benefit of the State.
(7) Establish a State President or Prime Minister's Council made up of intellectuals, local leaders, clergy, etc., representing all sectors for consultation with States on all cooperated freshwater projects and issues including health care, welfare, housing, environment, short and long term quality of life, and economic impact.

3.3 Overview of the Reaction of Non-governmental Stakeholders on the Importance of how States Build a Cooperative Freshwater Supply Policy

(1) Stay ahead of elected officials and continually find their weak points in freshwater agreements, or undertake joint projects.
(2) Show a deep concern for short-and long-term health and welfare of people.
(3) Keep all issues alive and keep Elected Officials on their toes and awake.
(4) Protect the States' human health and welfare.
(5) Protect the environment to insure as low risk as possible, both locally and statewide.

3.4 Overview of Human and Ecological Health Importance in Regard to Middle Eastern States Building a Cooperative Freshwater Supply Policy

(1) States have a great responsibility to protect their people from potential health risks from joint freshwater projects; for example, in the use of nuclear energy processes for the large scale desalination of seawater to produce freshwater.
(2) Cooperating States have a great responsibility for the local and regional protection of the environment, where freshwater nuclear desalination projects might affect the local ecology for fish, birds, rare species, plants and soil, and might alter the environmental setting and damage the ecology. This includes: hazardous waste; a high concentration of salinity leaks, or, during plant maintenance, an accident or other plant mechanical components failure that can result in undesired effects on the environment; in addition to partially or even completely cutting off freshwater sites from wildlife, or to provide only saltwater might affect the ecology and wildlife significantly by the alteration of such events.

3.5 Overview of Economic Costs and Benefits to States Building a Cooperative Fresh-water Supply Policy

(1) States are dependent on unpredictable and often hostile freshwater supply sources and will be reduced to building nuclear desalination plants which will create jobs regionally and statewide at locations where plants are built, and lift regional and State economies.
(2) States, long before agreeing, should do an economic-feasibility analysis of nuclear desalination plants by carefully determining the required size of plants for regional need and the cost of the freshwater produced.
(3) States should also conduct a cost-benefit analysis of a nuclear desalination plant before they build any nuclear-related plant. States should consider in their supply versus demand analysis whether the purchase of fresh water from the nearby water market is cheaper than the initial costs of building; plus additional economic costs might include the disposal of nuclear fuel waste generated by the operation of nuclear power plants.
(4) Additionally, the waste disposal of spent fuel from nuclear plants is also is an economic cost. An excellent step by step six-point matrix policy analysis provided by Greenberg shows how costly it is to clean up waste burial in brownfield sites during urban redevelopment. As he puts it, a "natural damage resource analyses" (Ibid., 2008:126) are among many of the issues States should consider. In addition, toxic material clean up from nearby soil or, for example, waste cleanup by "the removal of all waste materials, can be extraordinarily expensive, essentially making the site unattractive to private developers" [6].
Cooperating States should also consider some aspects of the economic cost, or a standards and norms agreement for desalination, showing how much it would cost for each 1000-gallons of freshwater produced by desalination. Is it cost-effective to produce freshwater from desalination processes on a large scale for the short- and long term?
(5) The cost of producing large scale of freshwater from nuclear desalination is a necessary factor for water planning. For such processes high temperature stream is essential for desalination. This information is needed for local, city, and State leaders who are making political decisions based on need, or for the State's national capital investment in the long-and short-term. This should also include whether a desalination project can save itself or be amortized long before payments are completed by States. This should include contingencies of technology or the more efficient use of equipment, the manufacture of a less costly desalination unit or improved desalination processes, or improved and new engineering designs units would make water production less costly, and at a how much reduced cost?
(6) Cooperating States should also consider in their decision making the direct economic impacts, indirect economic impacts, and induced economic impacts.
(7) Finally, for comparative analysis, States should calculate the cost of operating such combined plants with nuclear energy as opposed to coal based fossil-fuel plants, and the energy required to increase the temperature of salt water: is it more costly to produce 1000-gallons fresh water from coal or nuclear desalination? This detail should be carried out by State related Agencies as well.

3.6 Moral Imperatives of States Building a Cooperative Freshwater Supply Policy

(1) Because States have the responsibility to supply better and cheaper fresh water for their people, a supply policy is an imperative for the short and long-term.

(2) Cooperating States have a responsibility for the local and regional protection of the environment where freshwater nuclear desalination projects might affect the local ecology for fish, birds, and rare species, plants, and soil. Might this alter the environmental setting and damage ecology?

This includes hazardous waste, high concentration salinity leaks during plant maintenance.

An accident or other plant mechanical component failure can result in such undesired effects on the environment, but these can be managed. Also, to partially or even completely cut off fresh water from wildlife sites, or to provide only salty water, might affect the ecology and wildlife significantly by the alteration of such events.

3.7 Overview of Time and Flexibility Issues for States Building a Cooperative Freshwater Supply Policy

(1) States cooperatively building a freshwater supply policy need to invest time to better develop nuclear desalination technologies and other freshwater projects for water production in the short-and long term, and with flexibility.

(2) Investment in nuclear-desalination projects "may provide sufficient time for succeeding generations to have enough time and flexibility" to learn more about nuclear desalination for freshwater production, and learn how to "conserve water" [5] and know when water should not be used sparingly.

(3) The populace' "concerns about the use of nuclear energy and spent nuclear fuel management need to be addressed before large investments and political commitments are made" [5].

(4) While improved understanding of other water technologies may provide freshwater from other types of combined power plants, so far, nuclear energy provides the high-power, high-temperature stream needed for the desalination of water, while coal-powered desalination is not technically effective, because of it provides only a low steam temperature. Using nuclear energy buys enough time for the next generation to find other technologies to produce freshwater, and "help to supply the growing demand" [5] for freshwater by States' populations.

(5) By not using today's best and most efficient technology for nuclear desalination, and since "a delayed response puts people and investments at risk" [5] a State would soon not be able to provide for its growing populations' demand for freshwater.

4. The Two most Important Criteria for Assessments, in the Opinion of the Authors

4.1 Detailed Analysis of Human and Ecological Health, and why it is Extremely Important?

(1) States should maintain and preserve their environment in harmony with human and ecological health. This would benefit not only wildlife and different animals, but also attract new species and birds, plants, fresh water agriculture and water for healthy crops and food. A continual monitoring should maintain after the nuclear desalination plant is operational, thereby ensuring accountability to nearby communities and stakeholders. In addition this plant must be build with latest technologies and techniques to protect nearby habitat, while ensuring brine is safely secured in a landfill instead of discharged to back into sea again, hence prioritizing the environment's health. Therefore, the public health would increase in longevity, and in harmony with its ecology. Any hazardous waste, including a toxic cocktail of concentrated brine and chemicals must be placed into secure landfills rather than dumped back to into sea. Dump sites near the combined plant should not be allowed. This is because the maintenance of a healthy ecology is essential during nuclear-desalinated freshwater production, as is the reduction of carbon dioxide emissions into the atmosphere. However, we are always aware of the risk that the nuclear desalination plant could break down, may require maintenance, experience a power failure, that some parts might not be working, and that leaks of highly concentrated brine and dissolving chemicals into the environment could affect human and ecological health. McAvoy et al. [10] and Popkin [11] explained large scale desalination and desalination processes.

This risk is always there, even though a plant may have a backup unit. It is obvious that this is an advantage over coal-burning desalination plants, which add more carbon dioxide to the atmosphere, and with less efficiency.

(2) It is known that coal-burning plants add more carbon dioxide to the atmosphere, causing global warming. Therefore, the nuclear desalination process better preserves the environment, reduces environmental pollution, and avoids ecological dangers caused by climate changes.

A deep concern for short- and long term effects on human and ecological health is necessary. The functioning of a healthy self-regulating feedback system for the ecosystem is vital for a State to maintain itself.

4.2 Detailed Analysis of Economic Costs and Benefits and why it is Important?

Recently, Greenberg, Lahl, Mantell has provided systematical analysis of "manmade disasters, i.e., terrorist attacks or other human-caused disasters, such as hazardous waste sites and spills…" [6]. They outlined, by a table, the attributes required for economic preparedness [6]. Included under the 'ability to measure costs and benefits' are direct impacts, indirect impacts, and induced impacts. We can apply these concepts to how States can build a cooperative freshwater supply policy by examining and understanding economic and cost benefits in the aftermath of nuclear desalination freshwater plant construction, and the economic costs and benefits brought to States by its direct impact, indirect impact, and induced impacts.

(1) Economic impacts for building nuclear-desalination plants:

(i) Jobs and employment would be created from the construction phase to its operational stages.

(ii) This means the creation of industrial jobs, probably with higher wages at locations where plants are built than for other industries regionally and State wide, and the lifting up regional and State economies.

(iii) Direct impacts are associated with the building and production of freshwater from nuclear desalination plants: The total economic impact is the combined direct and indirect impact from a combined plant. Greenberg provides an analogous example: "If a bridge collapses, it affects the railroad. If the rail company uses buses, that will impact revenue for railway operations in additional costs "[7].

(iv) Direct impacts on people and business are both positive and negative" [7]. After States agree to cooperate on a building freshwater facility, it will have effect - and have impact on both people and businesses.

(v) Jobs will be created locally and regionally by fresh water production activities. Local indirect impacts would be important as well. Local governments will get additional tax revenue, which is a direct economic impact.

(vi) Indirect economic impacts are the result of direct effects. A newly built freshwater facility in a region increases the economic activity generated by local stores, which will benefit the local economy. There also might be a need for additional mass transportation to get the workers to work, as well as more transport workers to operate the mass transit system. More hotel workers will be needed to accommodate the executives and workers who might stay in the hotel.

(vii) The effects can be the result of positive impacts or negative impacts, or vice versa.

(viii) Rent or leases of property operated by the local Government is an indirect economic impact for States to consider.

(ix) Induced economic impacts are the result of employment generated by the freshwater production facility, and will include all workers, whether employed directly or indirectly. For example, with higher wages, workers or employees might begin enjoying more social, cultural, and recreational activities which they could experience as a family. With higher income, they could enjoy activities they did not in the past because of low employment in the region, or there being no jobs at all. These people would enjoy the benefits of doing what they like to do. The revival of local traditions and cultural activities might begin in the region. Tourist income in the region might increase as a result of increased civic pride, and as people travel to visit the new freshwater facility.

In sum, we can say that the induced economic impacts are those increases in economic activities associated with increased spending, created by an increase in freshwater production or water-related cooperative projects. On the other hand, negative induced effects can occur when an increase in population leads to the increased cost of housing, food, and services, including land.

(x) Other negative induced effects are increases in pollution and crime, as well as heavy traffic and congestion in the local region.

(2) States should conduct a detailed risk analysis and Environmental Impact Statement (EIS) must be prepared for each and every proposed sites using nuclear for desalination. It is obvious that detailed risk assessments and EIS work would take very long time because of given these State's propensity for secrecy, not mutual trusts, and Middle East politics.

These are enormous tasks and great challenges lies ahead for the States to overcome.

(3) Long before and after agreeing, States should conduct an economic-feasibility analysis of nuclear desalination plant construction by carefully determining the required size of plants, based on regional need and the cost of the freshwater produced.

(4) States should also conduct a cost-benefit analysis for a nuclear desalination plant before they build. In their supply-versus-demand analysis, States should determine whether the purchase of fresh water in the nearby water market is cheaper than initial cost to build; plus any additional economic costs that might include the disposal of nuclear fuel waste generated by the operation of a nuclear powered plant.

(5) Additionally, the waste disposal costs of spent fuel from a nuclear plant are an additional economic cost to consider. The step-by-step, six-point matrix policy analysis is provided by Greenberg [5], showing how costly it is to clean up buried waste in brownfield sites for urban redevelopment. He calls this is a "natural damage resource analyses" [5], and it is one among many issues States should consider. Also, States should consider these two aspects of economics costs for their standards-and-norms for nuclear desalination: how much it would cost per 1000 gallons of desalinated freshwater? Is it cost effective to produce freshwater from large-scale desalination processes in both the short-term and long-term, or should States purchase fresh water from water-rich States nearby?

(6) The cost of freshwater produced by nuclear desalination is a necessary factor for a water planner. This information is needed by residents, the local city, and the State's leaders all who make political decisions, whether for their own need, or for the States' national capital investments in the short-and long term. This should also include whether the desalination project can save itself or be amortized long before States completes payments. Cost should also include: technology, the more efficient use of equipments, the manufacturing of desalination units, less costly or improved desalination processes, new and improved engineering design units that would make water production less costly, and how much reduction in cost this will provide.

(7) In their freshwater cooperation projects policy decision-making, cooperating States should also consider direct economic impacts, indirect economic impacts, and induced economic impacts.

(8) Finally, for comparative analysis, the cost of operating a nuclear desalination plant as opposed to a coal based, fossil-fuel-desalination plant should be studied by States as well.

5. Benefits of Water Cooperation among Middle Eastern States for the Security and Peace of the Entire Region

This research paper describes how a six-criterion policy analysis model can be used in planning efforts among those cooperating Middle Eastern states that want to establish a cooperative freshwater supply policy. In supplementing the earlier parts of this paper, this section argues that freshwater cooperation among Middle Eastern States will provide a political benefit for the entire region. Our proposal addresses an urgent need, given the current state of awakening in many Middle Eastern States, where citizens are reshaping political institutions after a period of 30 to 43 years, during which time the dictatorial heads of states ruled without regard for the needs and aspirations of their people. These countries have witnessed a rapid growth in population, poor economic conditions, a pervasive lack of work, and a growing dearth of fresh water. This has created widespread pressure on many individuals and families to seek out ways of emigrating from the Middle East. We believe that if these trends continue, conflicts in the region will intensify as long as a lack of freshwater cooperation among Middle Eastern States serves as a common denominator for all parties. Because their autocratic regimes remained unchanged for 30-43 years, many of these countries' leaders failed to do anything to improve the fundamental needs of their citizens, including provision for the basic need of daily freshwater use. As a result of these failures, the citizens of Middle Eastern countries are still among the poorest in the world. The daily life of an ordinary citizen has become extremely difficult, living as he or she does with only a fraction of the amount of water needed for daily use. When water is not available or in short supply, life is made quite unlivable. What can they possibly do if they cannot meet their basic need for the daily use of fresh-water?

The direct causes for emigration are many. Middle Eastern citizens face numerous hardships because of their rapidly deteriorating socio-political and economic conditions. They have a dismal outlook on the future, both for themselves and for their families. They believe that the only choice for them is to migrate to another region; otherwise they and their families face extinction. It is a matter of survival. Some citizens are seeking a better life for their families outside the Middle East: in Europe or North America. One important factor in this decision to migrate is a lack of freshwater. The same forces that brought many thousands of poor Europeans to America one century ago are pressuring Middle Eastern peoples to emigrate. The large influx of immigrants who came to New York Harbor's Ellis Island sought a better life, and today's Middle Eastern citizens are crossing international borders for the same reasons.

In order to prevent even more Middle Eastern citizens from leaving their countries, their living conditions must be improved by providing for their freshwater needs. Western governments bear full responsibility for letting Middle Eastern tyrants remain in power for years, for supporting them financially and using them for intelligence-gathering purposes by the CIA. Because of this, citizens' basic needs could not be provided for, and their living conditions did not improve for 30 to 43 years. Unfortunately, the U.S. government has failed the citizens of most of Middle Eastern States by letting rulers wield power undemocratically for 30 years or more, while U.S. taxpayers allowed the U.S. Government to use its taxes to support tyrants unwilling and unable to improve job opportunities, living conditions, or the supply of basic needs, including water. Therefore, the U.S. Government is historically responsible for this situation in Middle Eastern states, and ordinary citizens in these countries are awakening to this. Once a freshwater agreement has been reached, developments will begin to correct for these faults by initially providing jobs for everyone. This will greatly ease up the pressure on citizens to emigrate to a better life. Cross border confrontations will then stop, and as conditions improve, further developments can provide a host of other benefits for the region.

Water insecurity has caused several armed conflicts in the region in the past, and will do so in the future unless dialogue and agreements concerning freshwater are undertaken among Middle Eastern States. For the government of Israel to sufficiently protect its borders, it will need to establish water security for itself and its neighbors. Water cooperation agreements would result in the security of Israel's water, and might help in providing broader security along several fronts for the short-and long term. Therefore, water cooperation projects are multi-front windows of opportunity for states in the region. They will encourage them to get to know each other, build trust and understanding, and achieve a much wider peace in this troubled region via the many dialogues necessary to complete large-scale water projects.

First and foremost, Israel must secure its borders, meet its water needs and protect its water security for the short-and long term. How should Israel do this? Israel can remain a protectionist state by holding on to her current water resources and refusing to share them with other states. After fully securing its water resources, Israel should enter into agreements to work with its neighbors on collaborative water projects, including the development of advanced desalination technologies and experience. The goal is to make similar desalination technologies available and ready for purchase by any Middle Eastern state. To this end, Israel should show a willingness to share its technologies with its neighbors as long as they accept Israel's right to exist in the region. This can be done through a public announcement and legally enforceable declaration that has been approved and endorsed by all Middle Eastern governments in the region. After doing so, Israel and the Middle Eastern States will have a deeper and more durable peace. They will be able to

understand each neighbor's real intentions, and form a level of inter-state cooperation that effectively eliminates the Israel wants to live in peace with other Middle Eastern nations. Israel would better understand their intentions, get to know them, and at the same time to secure its needs—including much needed fresh water—by working with its neighbors. Israel can share its water desalination technologies with other states while securing its own freshwater technologies, know-how that took years to develop. While securing its water resources, in exchange it will build better relations through dialogue about water project cooperation. Given the difficult nature of the issues at the present time, Israel's ordinary citizens deserve this from their government. It is long overdue. Table 5 outlines 120 points of concern for Israel and other Middle Eastern States' water cooperation and policy analysis by using a six-point matrix. This table is a road map for Middle Eastern States, showing them what they can do to cooperate on water projects. Complete security is a dilemma for all states, and is always accompanied with uncertainties. This is a commonplace in global politics, as any state cannot know with absolute certainty or confidence what another state's intentions are. Therefore, in global politics, we can safely treat these uncertainties as a changing variable, instead taking it as a constant political problem in relations among states. Each state's understanding of its security needs is different, because of cultural, educational, and economic differences. One state may be an aggressor, causing security dilemmas for another, and the other state's insecurity might be seen as threatening to the first, and so on.

In sum, when states cooperate on water projects that affect one state's willingness to lead in that cooperation, they are moving to resolve differences. If the U.S. Government could get Middle Eastern States to sit down and negotiate a broader agreement to resolve conflicts as among friends rather than adversaries, they will achieve a long-lasting peace in the region. We propose that Middle Eastern States agree to establish a United Middle Eastern States (UMES) Agency with real legal power, independent of any single state's government. This agency can enter into or initiate water projects among states without any parliamentary approval. The UMES Agency would have a representative bureau, also independent of that state's government, in each Middle Eastern State. How this should be done is the subject of other papers. Therefore, we will not address this issue further.

What are the advantages and disadvantages of water cooperation among States?

Some of the advantages of water cooperation are:

- Security of having a Middle Eastern States (UMES) Agency with real legal power, independent of any single state's government, and reaching across national boundaries.

prospect of armed conflicts.

- Prospect of sufficient water to meet the needs of each and every Middle Eastern State for the short- and long term. Freshwater needs will be met for all purposes: home use, agriculture, and industry.
- States' cooperation would provide deeper understanding among all Middle Eastern states.
- Emigration within and out of Middle Eastern countries will cease.
- Water-related projects will provide increased job availability in the region.
- Israel's freshwater security will be preserved indefinitely, as well as Israel's right to exist as affirmed by other Middle Eastern states' parliaments.
- An end to water-related confrontations between Middle Eastern states, leading to a more durable and stable peace, is of paramount importance in the Middle East. This would transform the international system, and have a stabilizing effect on global politics, and any future cross border confrontations would be prevented.
- Political and cultural exchanges between Middle Eastern states will be smoothed, enhanced, and strengthened by the development of better relations via water-related projects.

What are the disadvantages of water cooperation between States? These are the direct, indirect and derived effects that serve as disadvantages for cooperating States.

Some of these disadvantages are as follows:

- Prospects of sufficient water to meet the need of freshwater for all purposes will eventually diminish for each and every Middle Eastern State. States will be without freshwater supplies to meet the basic needs of their citizens.
- If States do not cooperate, this will lead to distrust and misunderstanding among leaders, intellectuals, and citizens.
- Emigration within and out of Middle Eastern States will continue to increase at an alarming rate. Much worse would be an increase of citizens migrating across international borders at same rate as those poor Europeans who sought a better life in North America one century ago. If living conditions improved in the Middle East so that freshwater needs are provided for, they would not have leaved their county.
- Without water cooperation among States, basic work opportunities will become inadequate in both urban and rural areas of the region, and will continue to decrease day by day and year by year, leading to an impossible situation.
- Israel's freshwater security will not be preserved indefinitely, and her right to exist in the region will be continually the subject of arguments, conflicts and questions.

- Escalation of water related confrontations among Middle Eastern States leads to regional instability, and future prospects will be worse than today's. Comprehensive peace in the Middle East will become impossible for the near and distant future. This would turn the region into chaos, and would have an additional destabilizing effect on world politics. This could lead to future cross border confrontations. Aggression would be a daily event, and innocent citizens would face daily crossfire. Many innocent lives would be lost.
- The current emigration from the Middle East will continue, draining nations of citizens who migrate to better lives and fresh water in Europe and North America. This will reach an epidemic scale that these other regions cannot accommodate.
- Political instability resulting from conflicts among Middle Eastern states will continue, and may intensify, compounded with heavy migration from the region.
- A declining demographic momentum, an unstable political landscape, and escalating ethnic conflicts may culminate in a severe economic decline, eventually leading to extreme poverty in each Middle Eastern State.
- Declining conditions may also have a negative impact on the ecology and environment in each and every state in the region.
- Finally, Israel's current water security will be compromised and would forecast the bleak prospect of losing its current water security in the short- and long term, as Middle Eastern states grow in population and experience an explosive awaking. Without a doubt, this would make Israel less secure in the future.

6. Conclusion

We conclude this study on the cooperation between Middle Eastern States for freshwater production or water-related joint projects by offering real alternatives on resolving their political differences. We believe freshwater is the only common denominator encouraging these States to get together, work together, and build mutual trust and understanding, while establishing cultural ties between their societies. By working together on a common goal, States would resolve their political differences and live together in peace in the region. These cooperative water-related activities would also help in creating a cleaner environment, promote urban redevelopment, and increase clean air and freshwater availability; all in harmony with human and ecological health. The water cooperation projects are multi-front windows of opportunities for regional states to get to know each other, build trust and understand via water projects dialogues for achieving much wider peace in this troubled region. We believe that human and ecological health protection should go hand in hand with States' agreements and binding freshwater treaties, in order for States to be fully aware of the human health and ecological risks of nuclear desalination—risks not only for humans, but also for other species—and in order to understand what the effects on the environment might be.

The economic cost and benefit impacts explained by Greenberg, Lahr, and Mantell [6] in terms of natural disasters; while here, regarding States' cooperation on freshwater production projects, the economic impact would be a measure of the cost of fresh water production from nuclear-desalination plants and all types of related impacts on employment, such as construction of any plant related to freshwater generation. In their suggestion to the U.S. Government that "Estimates of the economic implications of redeveloping places in the wake of disasters need to be developed systematically. The key attribute required is the ability to measure cost and benefits…" [6]. This study makes a similar suggestion, in that economic costs and benefits analysis must be carried out by States. This analysis must consider direct, indirect and induced economic impacts using "tools and data for estimating local, state, regional, and national impacts" [5]. Also, prior to building any nuclear desalination plants, States should carry out a basis of benefit cost analysis for freshwater production facilities. Adding multiple nuclear desalination plants to States' output budgets as capital assets would be compared to returns on money invested in any commercial sector area. Next, States must assess their demand versus price for freshwater in the marketplace, and determine whether they should purchase fresh water from neighboring countries with rich water resources, such as Turkey and Egypt, and who have water to sell. It is obvious that water rates reaching the entire Middle Eastern region are insufficient to meet the current demand, let alone those of the near future up to year 2020.

If we consider the exponential population growth of States, there is an urgent need for a greater fresh-water supply, because current freshwater resources from rivers, groundwater aquifers and mountain aquifers are not sufficient to meet the demand of these growing populations. Year by year, the quality of water coming from these sources is decreasing. Therefore, the cooperating States must assess supply and demand versus independent water availability in order to meet their populations' need for the long term up to 2030. They should also consider the total economic impact, which is the sum of direct, indirect and induced economic impacts. States should not discount the induced economic impact, which works as a multiplier or ripple effect, caused by the spending of wages and earned income created by the new nuclear-desalination fresh water production facility. Therefore, States should cooperate to build the suggested nuclear desalination freshwater producing plant as an alternative and additional freshwater source. These plants will desalinate seawater on a large scale, and provide the continued production of freshwater from seawater by nuclear energy desalination.

In sum, we hope that by working as a team on cooperative freshwater projects, our practices and processes will bring States together, building trust among them on larger scale. Working together will enable them to solve their political differences and establish a long lasting peace in this troubled region of the world. We believe that such cooperation will also benefit human and ecological health. The peoples of cooperating States should consider their health as a core value while growing political cooperation is taking place. Any project or cooperative agreement should be accepted or rejected based on human and ecosystem health.

We consider the human and ecosystem health the wealth of States, which are inseparable from each other in the broader context.

In addition, local communities, schools, colleges, and universities, must do their part to take the lead, working together on joint projects other than freshwater. This could lead to a working model for the politicians of these States. Therefore, freshwater production, environmental preservation, and cooperation among States can lead to political and social negotiations, forming a common denominator for these States.

Also, States working together and sharing water can cut the cost of freshwater production in the cooperative projects. In the end, the increase in communication may cultivate more cooperation among States for solving political conflicts, with evenly shared freshwater and other resources. We believe solving the water shortage by water cooperation and peace building is the key in the Middle East. Otherwise we will see frequent to spark tensions and confrontations among States in destabilizing the entire Middle East region for worst for now and in the future. Finally, we would like to mention States like India and Pakistan. In 1960 they signed a cooperative water treaty agreement for sharing Indus River water. This enforceable agreement is working well, and enables these two States to cooperate and work together, despite their political differences and disputes over the State of Kashmir. Water is an emotional issue. It can ignite and escalate rapidly to a high level, and has in fact caused armed aggression between Middle Eastern States in the past.

However, there are challenges of this study do not end with the study, how get States to cooperate on water projects. The States elected officials need political will to see water cooperation projects go forward and strong commitment to working closely with each other and lifelong dedication. Many in States currently oppose the water production using nuclear energy, or cooperation of water projects programs claiming it is harmful or nuclear water threatens our water, or simply put it all nuclear energy use of water production and likely accidents potentially threathen available fragile water resources for freshwater, agricultural and industrial as well as the health of the ecosystem typical examples they cite that the “at Three Mile Island on the third day after the nuclear accident, 172,000 cubic feet of high level. Radioactive water was released into Susquehanna River, which drains into Chesapeake Bay, which is a major fishing port, without public notification. Twenty years after the Chernobyl accident, the radiation level in this region remains high, and the Chernobyl hazard has not necessarily subsided. When nuclear power plants remove water from a lake or river for steam production and cooling, fish and other aquatic life can be affected, water pollutants, such as heavy metals and slats, build up in the water used in the nuclear power plant systems. These as well as the higher temperature of the water discharged from the power plant, can negatively affect water quality and aquatic life [4,18,19]. These results present a clear challenge to States Governments policy makers whether or not for the critical challenge is to interests’ public. The challenge to States Governments are to think hard about how they are going to assure public all nearby nuclear desalination sites are clean and safe. These are serious and hard questions ahead for States. Of course there are others obstacles as well such as public education of necessary public support and private investments for some water projects get involve and make significant investments on the projects for sure expect profitable return when they decide to get involve to implement water projects. Given the current atmosphere of the Middle East it is extremely volatile, emotional difficult is next to impossible to overcome these foreseeable hurdles is securing the necessary cooperation between States build a cooperative freshwater supply policy, unless States’ dedicated senior politicians makes the issues as a lifelong dedication and service. In addition, serious technical issues such as a detailed credible and sound risk assessments and IES work must be undertaken to analyze of risk between nuclear energy use, as well as environmental impact and impact assessment of seawater. We are aware of that these technical works will take considerable long time, while in the middle of that Middle East politics are in full swing with certain sectors strong opposition to nuclear energy and propensity for secrecy among States pose most seriously and threaten realization of cooperation of States. Therefore, to build understanding, support, and education of public is essential governments may need to assuring public health and safety as well as the value of their investments will be protected. It is also equally important environmental health preservation and protection of the water production using nuclear energy and all related water cooperation projects. The nuclear desalination plant is alternative strategy for securing reliable freshwater supply other is using coal power with disproportionate environmental risks placed on the environment. However, the consequences of not using nuclear energy desalination for large-scale freshwater production are that States will suffer when greater demands for water are made in the future. The States and local governments, allies in the nonprofit and profit constituencies need to focus on how to develop water projects cooperation opportunity for freshwater and building peace in the Middle East. The freshwater is a crucial State’s resource otherwise

water shortages in the Middle Eastern regions would continue to increase while public will suffer unless a rational We propose that Middle Eastern States agree to establish a United Middle Eastern States (UMES) Agency with real legal power independent decision making of any states government.

This agency can manage, initiate and enter into water projects among states without parliamentary approval. The UMES Agency would provide a representative bureau independent of state government in each Middle Eastern State. We hope that water, much needed by all States, can play a role as a catalyst for peace instead of conflict, despite enormous difficulties to overcome in this much-troubled region of the world including young generation taken over political power, in their respective countries, to establish freshwater related projects and to implement six point matrix criteria of a policy framework for Middle Eastern States to long-term solution adopted by the States.

build a cooperate freshwater policy in their respective countries so that peace can be long lasting.

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We used extensively the excellent textbook by Greenberg [5] entitled Environmental Policy Analysis and Practice, published by Rutgers University Press. We adopted Greenberg's approach for a six-point matrix policy analysis and decision making for Middle Eastern States building for a cooperative freshwater supply policy.

Therefore, we are grateful to Professor Greenberg for introducing us to the concept of six-point matrix of systematic analysis of policy decision-making and communication tools for environmental policy analysis and practice.

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