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Conflict and Water Use in the Middle East

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Scarcity and Conflict

International and transboundry water use conflicts are never simple. The components of such disputes are in themselves invariably complex, none more so than the two that are most basic and omnipresent: scarcity and security.

Scarcity is the first strand—security being the other—of a double helix along whose intertwined curves lie the constituent elements of hydropolitical conflict. At the most basic level, actual scarcity may be said to exist when real demand (i.e. need) exceeds real supply. Although the maxims of supply and demand may determine actual shortages, the concept of water scarcity encompasses many discrete but interrelated factors that govern supply for any given demand: climate, perceived and real need, quality (complicated by a wide variety of standards in river basins across the globe), location and reliability of source, consumption, technical capacity, accessibility, demographic growth patterns, distribution of population and water resources, efficiency, organization and management, use of fertilizers, loss and waste, extant, available, and safe-yield stocks of water, and policy decisions on the rate of consumption and distribution. There is also a kind psychological scarcity—scarcity in the eye of the beholder. This kind of scarcity exists when, for whatever reason, people perceive or believe a shortage exists, whether the physical reality justifies the impression, and they behave accordingly. Perceptions of the amount and quality and availability of water are usually a part of a people's attitude toward the environment.[1]

While there are numerous reasons for water scarcity, they all tend to be variations on six basic causes which, taken together, will delimit supply and demand: climate changes (principally drought); degradation of water quality by human activity at a rate faster than the souce can be renewed; depletion of a source, such as an aquifer, at rate faster than it can be replenished; out-of-basin diversion or storage of surface water; redistribution for other uses or to another place; and consumption. In the Middle East, these causes stem, in one way or another, from a single overriding, immutable determinant of scarcity that accounts for the region's aridity—for that matter, the aridity of other parts of the globe as well: the way in which the earth functions as a stupendous heat pump run on solar energy which generates a constant process of intense evaporation within a broad zone that encompasses the Middle East region.[2]

The consequences of scarcity are as complex as its causes. For example, water and other associated environmental scarcities often set afoot large-scale migrations from the countryside to the cities, creating large, dislocated, underemployed or unemployed floating multitudes—particularly in third world countries where this phenomenon is more typical—that become serious drains on the economy, create political hazards, and generate a distortion in the national

economic balance in favor of city over rural dwellers. Such conditions raise the possibility of conflict. In situations of high population growth, increasing strain on water resources, and behavior that depletes the resource at an unsustainable rate or even destroys it, resource scarcity then promotes social inequities, political tensions, state weakness, and authoritarian regimes; it thus becomes a determinant of both security and conflict.[3]

In the Middle East, the composite effects of climate, poor supply, maldistribution and escalating populations are revealed in exponential discrepancies of water supply per person across the region, ranging from a per capita supply of 115 m^3 in Libya to as much as 5000 m^3 in Iraq (in rainy years). A disturbing related trend has emerged in recent decades: over the last 30 years, the average available supply of water for the entire Middle East has fallen rapidly from somewhat more than 2000 m^3 per capita to less than 1500 m^3 per capita.[4] Presently, 64% of all Middle Eastern countries are confronting serious water shortages.

Given that the region has very little margin of safety where water supply is concerned—especially in face of a population that is projected to double within the next quarter century—unless this situation is reversed without further delay, several key actors in the major river basins—Jordan, Israel, the Occupied Territories, Egypt, Syria, and Iraq—face a series of destablizing economic and political crises within the foreseeable future, the consequences of which will reverberate throughout the region and in much of the western world. Scarcity, especially mismanaged scarcity, contributes significantly to the creation of an environment of uncertainty and instability in the basic political, economic, and social institutions of society, most destructively in situations where the integral factors of ecological marginality and rising poverty obtain—a condition that characterizes most Arab countries.

Security and Conflict

The idea of security and the causes of conflict have been historically and conceptually tightly interlaced. The concept of security in the modern epoch has been explained in terms of perceived threats of violence in some form of organized mayhem, usually warfare, to national sovereignty—or territorial integrity—by an outside force. This notion of security involving a threat to an established group's power or possibly to its existence, by an outside or "other" agent, has applied as well to civil wars with "loyalist" or "insider" factions contending against "rebels" or "outsiders".

Contemporary ideas about what constitutes security remain closely linked to the nation-state, although in an increasingly international political environment the connection has been stretched somewhat to regional and international levels. However, the nation, encompassing religion and ethnicity and expressed ideologically as nationalism, remains the most virulent, widespread, emotional, and influential mode of political and cultural identity, especially when it is coterminus with ethnicity. Religious or quasi-religious

ideology is a normal concomitant of almost all brands of nationalism, lending them mantels of morality and legitimacy. The abiding potency of the idea of nationhood in world affairs has received ample confirmation in the vicious internicene wars in the post-communist era. These conflicts give the appearance on all sides of deriving from an atavistic revival of tribalism, nourished by religio-ethnic myths, that has created what has been aptly tagged as "Tribes With Flags."[5] Such powerful self-consciousness engenders an integral and equally powerful sense of the "other" or "them" as opposed to "us" mentality which promotes a very strong bent toward a self-absorbed cultural nationalism. This inherently aggressive outlook, with its built-in tendency to assume the role of an injured innocent, creates a very dangerous security situation prone to conflict.

Like water itself, the concept of security (and that of conflict) is complex and multifacited.[6] Those who subscribe to political realism in international affairs define security in variations on the following theme: the capacity of a state to secure its safety and perceived national interests from violence by means of such assets as military power (projectable or defensive), population (size and competence), and vital resources, relative to other states who are seen as real or potential enemies or whose status or relationship is deemed important. Thus, a state will always attempt to maximize means to security in direct ratio to felt threats.

It cannot be argued that military power, economic structure, and state interest—the heart of realist/rational choice theory and its variations—are not fundamental determinants of security and foreign policy in all nations. But it can be demonstrated that overweighing these elements and deemphasizing others—such as environmental and water resource problems—which cannot not be confined only to a single country, distorts reality. Because this analytic approach is based on constricted assumptions, realists are apt to..."squeeze environmental issues into a structure of concepts including 'state,' 'sovereignty,' 'territory,' 'national interest,' and 'balance of power.' The fit is bad, which may lead theorists to ignore, distort, and misunderstand important aspects of global environmental problems."[7]

While the traditional meaning of security, focussed as it is on machines of war and economic arsenals together with strategies for employing them is sound as far as it goes, it is obviously too cramped. A world approaching a new millenium with too many inhabitants, with its vital natural resources diminishing too rapidly, with the scale of its political and ecological problems growing quickly from local to global levels, such a world that is also interdependent and technololgically driven clearly requires a new, meaningfully extended definition of security. A sample list of issues—most of which involve water and other resources—that could legitimately be included under an enlarged security rubric is not difficult to compile:

- Agriculture, which is militarily and economically important and represents food security, which is different

from food sufficiency. Food security requires a guarantee of enough food to satisfy a population's minimal nutritional needs over a long period of time, a policy usually expressed as self-contained, domestically produced sufficiency; food sufficiency requires that there is on-going sufficiency of food for the needs and development of a society, attained chiefly by trade from whatever sources; food security in the arid Middle East will always be a wasteful and ill-fated policy; the ultimate reality about food security is that it is absolutely dependent on water security; food sufficiency, on the other hand, while more realistic does require an economy that generates enough exports to cover the cost of large food imports; agriculture also falls under the rubrics of environmental and resource (i.e. water) security.

•Demographic pressures which lead to overconsumption, and in combinaiton with other factors such as drought, can produce large-scale migrations placing enormous pressure on the resources not only of the receiving nation but on whole regions, creating stress often exacerbated by ethnic tensions.

•Resource scarcities, especially water, often have transboundry consequences and may be accompanied by the danger of environmental colonialism, a vulnerability widely felt among poor and weak nations (if a resource such as water or oil is a significant source of economic or political power, then it can be fitted into a realist or power analytical frame); because nations cannot survive without enough water, water is intrinsically a security issue which is also a link between environmental degradation and security since environmental abuse limits water supplies.

•Health issues, some of which—such as Aids—can have a devastating impact on a nation's capacity to maintain basic economic and military security by wiping out much of its youth, especially in poorer countries whose medical establishments can be easily overwhelmed by a deadly epedemic.

•Ideological and cultural differences involving human rights, nationalism, religious extremism, and authoritarianism.

•Nuclear or chemical accidents.

•A variety of economic issues wherein product dumping can lead to trade wars or serious economic shocks in a single key nation such as the U.S., Japan, or Germany, can

> repercuss across the globe, or because of interdependence, large multinational corporations operating on a global scale in basic enterprises can lead to a subtle loss of national sovereignty.

These are only issues created by human societies. There are plenty of natually occuring calamities that have security implications: Floods, drought and desertification, earthquakes, and contagions are a few typical examples.[8]

Moreover there are serious methodological and analytical difficulties. The causal relationship between a specific resource, environmental, or demographic problem and a security (or conflict) issue is neither plain nor linear. Such problems tend to have complex feedback interactions with other complex political, social, and economic issues, resulting in a non-quantifiable reciprocity that produces multiple effects. In a situation of constant tension and hostility, such as exists, for example, in the Jordan and Euphrates basins, a resource issue like water scarcity is a constant underlying security factor that could act as a trigger for conflict; but precisely how and why it would trigger warfare rather than another reaction is not clearly known, as water could in the same circumstances act as a catalyst for negotiations. Thus many problems that may be hung on an environmental peg, especially water, must be examined as dependent variables of other factors such as population, culture, social relations, values, political, military, and economic conditions, etc.[9]

The multilayered linkages between environmental factors (broadly defined) and security and conflict are as yet poorly understood; consequently, sound generalizations are difficult to make. Historical parallels or comparisons can be misleading unless allowance is made for the evolution of the international system from past to present. Further insights into the cause and effect relationships between degradation of the natural environment and national security from violence, together with the mechanics involved, need to be gained before a new workable, theoretically solid, definition of security can be put forward. In this regard, it would be well to give careful heed to a warning sounded about the dubious wisdom of binding environmental/resource security concepts with those of realist national security:

> ...the nationalist and militarist mindsets closely associated with national security thinking directly conflict with the core of the environmentalist world view....If the nation-state enjoys a more prominent status in world politics than its competence and accomplishments warrant, then it makes little sense to emphasize the links between it and the emerging problems of global habitability. Nationalist sentiment and the war system have a long-established character that are likely to defy any rhetorically conjured redirection toward benign ends. The movement to preserve

> the habitability of the planet for future generations must directly challenge the tribal power of nationalism and the chronic militarization of public discourse.[10]

Another useful approach to redefining security as a policy issue would be to eschew attempts at forging a single newly synthesized meaning and accept that there are in reality at least two distinct classifications of security belonging to the same social scientific genus which are organically connected and share common attributes. In the first instance they could be differentiated as traditional and nontraditional or, equally well and interchangeable, as conventional and unconventional types of security—admittedly none of these terms is scientifically precise, but are nonetheless helpful as labels for distinguishing two closely related categories. In this context, traditional notions of security emphasize the political, military, and economic protection of the nation while nontraditional concepts emphasize broadly conceived environmental safety which applies both within and transcends national boundries. While many factors, such as vital natural resources and population, straddle each kind of security, underpinning both definitions is a common policy design: to ensure survivability and sustainability, whether applied to regime, nation, region, tropical forests, transboundry water systems, oceans, air, etc. Because of close interconnections, both goals—conventional and unconventional—must ultimately be achieved to attain either.[11]

The Idea of Conflict

Conflict is as complicated a concept as security, and then some. The concept requires for its fuller comprehension a prior grasp of notions such as *issues, situations,* and its opposite, *cooperation*. Moreover, one must take into account such factors as values, ideologies, symbols, motivations, goals, and origination and processes of conflict, while, at the same time, making necessary distinctions among all of these elements.[12] There are many types of conflict that are generally recognized, and often given their own definitions, attesting to the the elasticity of the term. Political, economic, ethnic, religious, racial, resource, trade, tribal, clan, and family dissensions are among the most common that may be indexed under a typology of conflict. The size and importance (which is what is usually meant by "scale" and "level" in these discussions) and intensity of a disagreement must also be taken into account in rendering a definition of conflict.

Moving up from individual or small groups, a conflict (violent and non-violent) may be acted out at a local, village, national, regional, interstate, multinational or global level, and the most widespread conflicts can involve state participants who do not share borders but rather are situated far from one another geographically—though because water is normally used within basin systems, hydro-conflicts commonly involve contiguous and other basin actors.[13]

It should be borne in mind that not all conflicts are violent, that is, violence need not be involved for strife or friction to qualify as conflict; in fact conflict can exist in a latent state until animated by such events as scarcity or perceived frustration of need or desire. Disagreements can (and do) simmer along for very long periods of time without resolution, but not without damage.

As posited, all of the factors that enter into considerations of security—conventional and nontraditional—are integral to conflict as well. The intracacies of conflict have been made more dense in the latter half of this century by the rapid degradation of the environment on a global scale, in significant part as a function of rising demographic trends and concomitant economic development, resulting in very serious resource scarcities in many regions of the world. This circumstance has increased competition for resources, animated aggressive nationalist senitments, and created many flashpoints of possible conflict, subjecting the international system to greater strain than ever before and making the resolution of conflicts exponentially more complex, therefore more difficult to attain. The reasons that this latter characteristic is especially peculiar to conflicts over water, is that water is vital, pervasive, has so many essential usages, does not respect national boundries in the course of its flow, and is complicated by the sheer number of factors always present in water problems: atmospheric, hydrological, chemical, technological, managerial, political, socio-economic, legal, and strategic to name a few of the more obvious ones. Not only must all such factors be taken into account in the quest for solutions, but the inherent complexities are compounded by the web of feed-back relationships among conflict factors particularly when two or more national actors contend over the same supply of water in an international basin.

Attempts to understand the many-layered relationship between water and conflict can be greatly helped by good, "fine-grained" theory—whose function it is to explain. As in the case of security theory, useful conflict theory must also encompass and explain environmental/ecological caused strife on a scale and complexity heretofore unaccounted. Although there is a growing body of theoretical literature on the nature and causes of conflict—more than two dozen original and adapted theories, and only a fewer models, have been offered in the last two decades—"Unhapplily, general conflict theories are not very well developed and, at best, furnish too coarse-grained a perspective to illuminate specific water issues." And as regards water conflicts "...general conflict theory is, simultaneously, not really general (it omits important aspects of conflict phenomena) and too general (it does not bring out the key features of water resource conflict as distinct from any other type of conflict)."[14]

For purposes of this study, theories and models which have certain intrinsic commonalities and differences, are defined in terms of their uses. Both can be used for prediction and both are based on logical deduction, but are functionally separate. Generally speaking, a theory is a systematic synthesis of assumptions or principles that describes, analyzes and explains behavior, while a

model is a provisional verbal, graphic, or mathmatical representation of a theory or system that accounts for its known traits and describes the process or logical outcome of the behavior or interactions of its component parts. The explanations of theories and the processes and outcomes of models must be consistent with their supporting data, and, in final analysis, make good common sense.

No single theory or model has as yet been developed that can deal with the layered political, socio-economic, legal, and strategic entanglements of fresh water that underlie hydro-conflicts. Consequently, a high level of uncertainty attaches to virtually all of them. If existing water conflict models are to work at all, they must be based on narrowly conceived, fairly simple assumptions and relatively small data sets too restricted to contain all the intracacies of water, thus running the risk of being overwhelmed by complexity or possibly producing very circumscribed, over-simplified results, that could be either self fulfilling or self evident, or worse, erroneous.

Because water is so multifaceted, has so many applications, is so cross-cutting of issues, and involves so many interrelationships, it tends to defy easy or comprehensive categorization in conflict typologies and theories. Any attempt to categorize water as a conflict issue must therefore employ a multidimensional typology or a combination of typologies. This makes accurate predictions of behavior in potential water-based conflicts elusive at best. Consequently, most predictive theories of conflict tend to break down in specific hydropolitical case studies.

Among predictive models, there is one, the Power Matrix model, which, though simple, does nevertheless capture enough of the key politically significant qualities of water—*extreme salience, scarcity, maldistribution, and sharing*—to work at an elementary level. It currently produces results that allow rough-hued, reasonably accurate, predictions for the conflict potential of water.[15] This model is employed with a small variation below in another part of this discusssion on water and conflict.

Law, Water, and Conflict—Part I: Basic Principles

The cornerstone of international fresh water law is the assumption that the allocation of scarce resources requires legal means, rather than coersive force, if sharing is to be equitable and conflict is to be avoided. In principle, long-term cooperation among sovereign riparians, particularly where water is scarce, would be well nigh impossible outside the butressing framework of law.[16] But international riparian law can be efficacious only when riparians commit themselves to law as the first means for the delineation and regulation of rights and responsibilities, and the amelioration of grievance.

Historically, international riparian law has been underdeveloped, eluding the efforts of jurists to sort out its complexities and persuade nations to subject their competing claims to a standardized code of legal principles. Those complexities have sometimes made the process appear muddled. Although in

the era of the United Nations some headway in this direction has been made, progress has been so slow and achievement so meagre that some observers have concluded that no universal code of international riverine law is possible. Nevertheless, experience, scholarship, and jurisprudence (and, perhaps, not a little blind faith) have produced four basic legal principles that are generally invoked when riparians contend: absolute sovereignty, absolute or territorial integrity, community of co-riparian states, and limited territorial sovereignty.[17]

Absolute sovereignty (sometimes called the Harmon doctrine) decrees that a riparian may do what it will with the water (or any resource) within its boundries without constraints—use it up, pollute it, dam it, send it downstream in any quantity or condition; in contradistinction, the principle of territorial integrity requires that the river's natural flow be uninterrupted in its downstream course, that the lower riparians have a right to the full flow and quality of the water; the theory of co-riparian communalism stipulates that the entire river basin constitutes a single, geographic and economic unit that transcends national boundaries, whereby the basin's waters are either invested in the whole community or shared among the co-riparians by agreement, the underlying assumption being that optimum use of the basin's waters mandates a cooperative, integrated development of the entire drainage basin; the notion of limited territorial sovereignty supplants the opposed principles of absolute sovereignty and absolute integrity by according recognition to a riparian's jurisdiction over the transboundary waters that flow through its territory, but places limits on the exercise of its control over those waters in such ways as to insure the downstream states a reasonable share of that water in reasonable condition. Older principles such as first-in-use-first-in-right, historical utilization, beneficial (or optimal) use, good neighborliness, etc., are generally subsumed under these four principles. Whatever the legal principle, all of the rules devised for the sharing and apportionment of water are rooted in the notion that nations are obliged to cooperate in matters involving vital natural resources, especially when scarce.

Law—Part II: Equitable Utilization and No Appreciable Harm

In modern times, a blending of the traditional notions of co-riparian community and limited territorial sovereignty has produced a hybrid legal principle that has gradually emerged as the preferred approach among juridical scholars, international law organizations, and state litigants. At the heart of this concept are the basic principles of equitable utilization and no appreciable harm (as will be seen, in this context equity does not connote equal).

In customary international law, every state is under an obligation not to cause harm to another, not only by direct action, but by allowing the use of its territory in ways that result in harm to the rights of other countries. No appreciable harm provides that while a state is entitled to use the waters of a river that traverses its territory, it may not do so in such a way as to cause

appreciable harm to the river's other riparians. This proposition does not explicitly proscribe *any* harm whatsoever, and though "appreciable harm" has proven impossible to define precisely, it clearly means more than merely "perceptible" but not necessarily "substantial." That is, it must be harm of a certain gravity or significance beyond simple inconvenience. In its forthieth session the International Law Commission of the U.N. (ILC) adopted this definition believing that the concept could be objectified and that compliance could be judged on factual bases and thus embody factual standards of behavior and liability.[18]

Equitable utilization (or equitable apportionment), states that riparians of an international waterway are obliged to use, develop, and protect the watercourse in an equitable and reasonable manner and are duty-bound to do so cooperatively. Each riparian has a right of utilization—reasonably and beneficially— equal to that of every other co-riparian. "Equitability" in this context does not mean a precisely equal share of the water; it is the *right of utilization* that is equal for riparian neighbors. Rather, equitability implies the idea of *proportionality*, a share and usage proportional to a riparian's population and its social and economic needs, consistent with the rights of its co-riparians. Reasonable (or rational) usage may be explained as exploitation of water, or any other natural resource, in such a way as to conserve the resource "for the benefit of the present and future generations through careful planning and management."[19]

It is worth noting that both the ILC and the Institut de Droit International, have publically embraced the "no appreciable harm" concept as the paramount rule governing international fresh water issues, particularly as regards the problem of water quality. However, that position is not unequivocal. Many members of those legal bodies, along with a sizeable number of legal scholars believe that "equitable utilization" should be the cardinal prescript in practice. Clearly, the two rules are closely related and both are often invoked, whether primarily or secondarily, in the same instances.[20] In fact, the literal, narrow, nationalistic way in which some governments insist on interpreting "no appreciable harm"—that is, arguing that any action that causes a reduction of flow or the useability of the water, however small, without prior agreed-upon arrangements, constitutes appreciable harm—virtually negates "equitable utilization," and if carried to its logical conclusion this consruction of the "no appreciable harm" idea becomes self-nullifying (Egypt, Israel, and Agentina are among those nations who have adopted this posture).

The Nile River affords a good case in point. Egypt, for whom any sustained, significant reductions in the flow of the Nile could spell disaster, has taken a narrow view of the no appreciable harm proposition and argued that this principle should be the standard legal reference rather than equitable utilization. Supposing, hypothetically, Ethiopia, as part of its economic development and recovery program were to build a dam substantially above 15 meters on the Blue

Nile, a major feeder of the main stem of the river, and use the captured water in-country. That would reduce the flow of the Nile to Egypt by a certain amount annually. Supposing further that the Egyptians decided to adjudicate the issue rather than to settle it by the superiority of their arms; they would certainly invoke the principle of no appreciable harm, narrowly construed (probably along with absolute sovereignty), and reject Ethiopian arguments based on rights conferred by equitable utilization (and absolute integrity). If the principle of appreciable harm prevailed, either by a court judgement or imposed by military force, equitable utilization would be negated, but at the same time, Ethiopia would be denied the legitimate right of economic development, thus causing it appreciable harm. Conversely, were the Ethiopian stance to prevail, Egypt would be appreciabley harmed. In this circumstance, the result of a judgment either way would be a high social cost. When the successful invocation of the no appreciable harm principle produces substantial social costs and inflicts significant harm to the economic and legal rights of another party—as is clearly possible—the principle contradicts itself.[21]

This hypothetical case study was a little simplified for the sake of making a point. But it is important to understand generally how the law functions in this context. Basically, what the legal process does, for both domestic and international actors, is to enable (or empower) them by legitimating their claims, and, conversely, to constrain them by limiting the claims they are permitted to make. But to do so effectively, it must have the necessary legal institutions in place—courts, police forces, various government bodies that legislate and regulate by some codified legal system and represent the legitimate interests of the citizenry at individual and corporate levels, etc.

This same institutional requirement applies in the international sphere as well, in the form of international courts and organizations that are supranational and are empowered to enforce judgments by recognized international legal means. In the international sphere, treaties are the key legal instruments, but to enable the judicial process to function effectively, treaties must include arrangements for settling conflicts by rules of law through appropriate legal institutions. These goals have been difficult to achieve in international law, particularly as regards transboundry and international rivers. Thus, riparian and other conflicts continue for the most part to dealt with by specific treaty agreements or by power relationships or, somtimes by mediation in combination with the other two choices, but without necessary reference to or application of law: "In the absence of a neutral enforcement mechanism, international law has nothing better to offer for sanctioning violations than the law of the vendetta."[22]

Law—Part III: Groundwater and the Bellagio Draft Treaty

Until recently, the rules governing surface water sharing were applied to groundwater as well, but that circumstance has been changing since the appearance of the Bellagio Draft Treaty Concerning Transboundary Groundwater and the 1991 ILC report. As connected parts of surface water systems, groundwaters constitute, legally and politically, international or transboundary watercourses. Like counterpart surface water, groundwater does not respect political boundries, often traversing several as it flows seeking its own level or outlets. For example, the Northeastern African aquifer moves under Libya, Egypt, Chad, and Sudan; Saudi Arabia, Bahrain, and the UAE, overlie the same aquifers while the Qa Disi aquifer underlies both Saudi Arabia and Jordan. The most legally and politically controversial shared groundwater in the region—the West Bank mountain aquifer or the Yarqon-Taninim—lies mainly under occupied Palestinian terrain but is wholly contolled by Israelis by virtue of the occupation and percolates into Israel across the Palestinian-Israeli Green Line.

The chief difficulty hampering jurists who aim to establish precise definitions and devise rules for the sharing of underground water is a serious paucity of data on most aquifer systems; many important aquifers are not even fully mapped yet. Consequently, adequate international law and legal institutions for the peaceful and equitable management of transboundary groundwater resources barely exist, and those few laws and institutions that do are notoriously weak. The need for an effective model treaty has become urgent.[23] The Bellagio Draft Treaty is founded on the principles that underground water rights should be regulated by mutual respect, good neighborliness, reciprocity, and collective agreement, and it acknowledges that the fulfillment of these notions requires joint management of the resource. The fundamental goal of the 20 article draft treaty is to promote optimum utilization of available groundwaters, facilitated by strategies for conflict avoidance or resolution in the face of rising demands for very limited supplies.

Law—Patr IV: Islamic Water Law

There is another body of water law, *sharia*, or Islamic law, which by its nature is religious law, whose rules regulated water issues in the Middle East for almost a millenium and a half. Although *sharia* has been largely superceded by westernized codes of law in the last century and a half, it is still applied in many Islamic nations where, in some instances, the spirit of traditional Islamic water law has been incorporated into more recent secular legal codes that have been adopted. With the resurgence of religious fervor in the Muslim world there have come demands for the application of*sharia* in all aspects of life in Muslim societies. What Islamic law has to say about the hydrologic culture of the Middle East region, and the relevance of Islamic law to present water conditions must therefore be seriously considered. Indeed, this is a basic requisite since in Islam,

a Muslim society is defined as one that adheres to *sharia*.[24] Moreover, Islamic water law, compares very well with western canons on water.

The significance of water in Islamic legal thought is disclosed in the double meaning that the word *sharia* carries. In the first instance, it reveals the moral path that Muslims must pursue to attain salvation, and at the same time, in a more technical (and perhaps older) sense, it denotes access to the source of pure drinking water that must be preserved for humans. Specific hard and fast rules of Islamic law are relatively few (general moral guidelines are more characteristic), and where water is concerned—unlike other areas of Muslim jurisprudence—*sharia* tends to be less rigid and is applied more in the spirit of the law than in the letter; that is, more by the application of custom (*urf*) and reasoning than by strict doctrine. By and large, because received customs represent the collective norms of the group and contain rules of behavior considered essential to the well being of the community, societies tend to feel bound to observe them.[25]

Law—Part V: Customary Law in Islam and the West

Although customary laws differ from one Muslim society to the next, and though there are differences between Muslim and western customary laws, they do share certain common traits. Customary water law is of fundamental importance to western legal systems and to *sharia* alike, and further common to both, customary law as a juridic model combines advantages with serious vexations. Rooted in communal experience, custom offers societies living under both legal systems the benefits of legitimacy, familiarity, adaptability, and flexibility which allow for positive, practical rulings. Given the wide ranging diversity of conditions and situations from river basin to river basin the world over, the exploitation of these qualities is often essential to conflict avoidance.

Beyond the general characteristics of *urf*, it is worth noting certain other qualities of Islamic law that have a bearing on water issues: *sharia* is not a national law in the sense that American or European, or Japanese legal systems are. Generally, Islamic law has been applied regionally. Because there are four major schools (*madhahab)* of *sharia* which are employed diversely in different parts of the Islamic world, there have always been wide variations in the interpretation and application of Islamic law according to the different schools and even within the same school as practiced in different Muslim nations.

However, the significance of the extra-national or extraterritorial nature of *sharia* is that, by this quality, it is constitutionally international. That is not to say it is formally or institutionally codified as "international" in the way that there is a separate body of law in the west that is designated as such, and to which individual nations are asked to adhere. It is, rather, a generalized set of divinely ordained moral guidelines for living an ethical life, which are organized into systems of positive law based on evidence and precedents. These broad moral

rules are incumbent upon both the Muslim individual and the community, that is, nation. Sharia, being the literal, perfect word of God, is considered to comprehend all circumstances and exigencies of the human condition, universally, without national or international distinction. *Sharia* recognizes and embodies the concept of a law of nations, and since at least the nineteenth century when Muslim nations began practicing reciprocal diplomacy according to European rules, western and Islamic understanding of that notion have been in harmony.[26] There is, therefore, no innate reason why *sharia* is not adaptable to any of the contemporary international principles of water law being proposed by various international legal organizations.

Law—Part VI: A Profile of Islamic Water Law

Islamic law per se offers few specific, hard-and-fast rules governing the sharing and use of water. Water appears in the Quran only about half a hundred times, without a clear legal character or sanctions; rather, the emphasis is on water as the source of life: *Have not the unbelievers then beheld that the heavens and the earth were a mass all sewn up, and then We unstitched them and of water fashioned every living thing?* The traditions (*hadith*) of the Prophet Muhammad offer no more precise legal language than the Quran, as for example: *He who withholds water in order to deny the use of pasture, God withholds from him His mercy in the Day of Resurrection.*[27]

Sharian water law derives in principle and for purposes of taxation from juridical rules governing land. Muslim jurists have consistently treated water, land, and crops as indivisible, and water rights have generally been restricted to amounts considered to be adequate for a given crop area. This is based on one of the few stipulations the Prophet is said to have articulated in a *hadith* concerning water, that the sum of water to be drawn was not to exceed that which is needed to cover a cultivated plot to two ankles' depth.[28] This provision hypothetically fixed the basic legal principle for allocating water in Islamic law. By and large, the relatively few *hadith* concerning water appertain to the rights of ownership to wells and springs, to rights of access to water, the obligation to share water, and prohibitions on selling water. Although for purposes of use, allocation, and adjudication water is segregated according to source—river, well, and spring water, and further into rain, snow, and hail—*sharia* in fact recognizes only two broad categories of water within which all others are comprehended: owned and not owned.

Most Muslim jurists consider water generally to be beyond the pale of private ownership—*mubah* or *res nullius*—that is, a substance which cannot be owned unless it is taken in full possession, such as water contained in a jar. If water is claimed by the state, the ruler is considered to hold it in trust for the community or nation because the Prophet is said to have declared in a *hadith* that *"...mankind are co-owners in three things: water, fire, and pasture."* No person or ruler may appropriate a river or sell, rent, or lease its water nor may he tax such a

resource; only a product that results from its use may be subject to a levy by the state.[29]

A profile of the legal personality of Muslim water law reveals it to be highly pragmatic, largely customary, and supple in its aplication of moral principles as guidelines; in summary thus: no persons may be denied water that is necessary for their survival or livlihood; while animals have clear legal rights to water, humans take precedence in use; drinking water for man and beast and for domestic uses take priority over agricultural needs; once all drinking and domestic requirements of the community are satisfied, those living upstream have antecedent rights based on the assumption that the natural course of canalization and therefore settlement proceeds from the upper reaches of a watercourse onward downstream; on the principle of first-in-use, first-in-right, upstream riparians enjoy priority—again, because in Islamic law, in the absence of convincing proof otherwise, they are presumed to be the first settlers; but when new societies are settled upstream after the establishment of downstream communities, the usage rights of the new community are subject to adjudication and their withdrawals must not adversely affect historical prior rights; the hoarding of surplus water, even if all of the needs of the community are met, is forbidden; water is considered to be an overriding community interest, and both Islamic law and the Prophet's traditions deem as immoral its treatment as a product for commerce or speculation. Finally, as an addendum to this summary, sharia rules governing the appropriation of water originate in those that regulate the appropriation of land, to wit, expropriation and use must derive from an input of labor, e.g., building an irrigation canal. Only the fruit of labor matters. It is the irrigation channel and the irrigated field and its crop that may be owned in inalienable right (*mulk)* by virtue of the labor that created them, not the water that flows through the one into the other. Water is the product of Allah's labor, not man's, and therefore can be used only transitorily in accordance with *sharia* and *urf*.[30]

A word is in order about the apparent anomoly in the presumption that the sequence in which a watercourse is settled is from upstream to downstream and the first-in-right principle based on that assumption. One might easily conclude that perhaps only desert dwellers with no experience of river basin settlement could make such an error, but the governing factor was probably the direction in which canalization of water proceeded. In point of fact, historically, settlement in most river basins, particularly those that involve heavy off-stream use of water, normally proceed from the lower end of the basin because it tends to be more level, which affords easier agricultural development and urbanization than more elevated upstream regions. Thus, priority in utilization as a principle of law has usually favored the downstream users.

Law—Part VII: Law, Treaties, and Conflict

Although riparians who make contentious claims over shared rivers rarely resort to legal measures in international courts of law—in this respect, the Middle East is prototypical—they nevertheless always adopt that particular legal theory that bests suits their position on the disputed waterway in order to justify their demands, using it more as a bargaining ploy than serious legal argument. International law as an instrument of regulation on transboundary fresh water issues is at present inconclusive and weak. This circumstance has allowed riparian water issues to be manipulated as part of the power relationships not only in the Middle East, but in other world regions as well. There is nothing inherently lacking in legal theory or in law itself—Islamic and western—that has produced such a condition. The basic problem—it is precisely at this point that politics and law come together where water is concerned—is the absence of prior formal political agreements—treaties—that govern the general and specific terms of shared waters, together with essential international or inter-riparian oversight that assures compliance among the users.

Worldwide, some 286 international fluvial and other fresh water treaties have been concluded. Of those, about two thirds concern North American and European river systems, the rest are scattered around the globe. In the Middle East region, with one notable exception, international treaties regulating the sharing, use, and quality control of water are virtually non-existent; it follows that there are no legal institutional arrangements either. The exception, the previously cited 1959 Egyptian-Sudanese apportionment agreement on the Nile, involves only two of the ten Nile riparians. Political and ideological rancor or outright hostilities have defeated sporadic efforts to fashion multilateral (or even bilateral) cooperative schemes for the use of the other major river basins in the area, the Jordan, Euphrates, and Tigris.

Such agreements are the essential first steps toward transforming legal theory into the institutional application of law. Only with the political agreements in place—whether they are multinational, such as the law of the seas, or simply basin focused, such as the 1959 Egytpian-Sudanese treaty which deals only with a major part of a single river basin—can there be created an adequate array of effective legal instruments for solving disputes that arise over shared water resources. While law cannot provide all the needed answers, and must await political settlements, law is nevertheless indespensible to finding and maintaining legitimate, sustainable solutions.

Water Use Conflicts in the Middle East

Water conflicts are notorious in the history and mythology of world civilizations. Gun fights over watering holes are a familiar feature of American westerns while other famous water-inspired conflicts, such as the rivalries over the wells of Beersheba between Abraham and the Philistines—and later between Isaac and Guar over a well called Esek (which itself means "quarrel)—come to us from biblical "easterns." (The latter disagreement was settled simply by the

digging of a new well: Genesis: 19-22). Islamic jurists have traditionally gone to considerable lengths to interpret the law in ways to avoid conflict over water, but in the end, there are reliable hadith that justify the use of arms to gain access to water: "If I were not to find a passage for the water but on your belly I would use it!"—ᶜUmar b. al-Khattab, companion of the Prophet and second Caliph.[31] The word *rival*, is derived from the Latin *rivalis*, meaning "one living on the opposite bank of a stream from another, or one using the same stream as another."

Why does water cause so much conflict? Generally, because it is essential to life: "There is virtually no human artifact or commodity that is produced in the absence of water; agriculture is impossible without it and so are most manufacturing processes." But specifically, because water flows: "Its unregulated flows are likely to be erratic, and in an arid country, the consequences for any user unable to capture water the moment it is needed are likely to be dire. Also, the unpredictable character of stream flow can create a tense environment of uncertainty that is disruptive of social relations."[32] In the Middle East, water exhibits all of these elements of conflict.

As a contemporary issue of security and international relations, water displays certain distinguishing characteristics:

- Water as an issue is pervasive, highly complex, and utterly vital (it cannot be supplanted for human use).
- Because of its complexity, water is fragmented as a strategic and foreign affairs issue tending to be dealt with piecemeal, problem by problem rather than comprehensively, both domestically and internationally.
- Water is always a terrain security issue, especially when scarce, since all concerned parties feel compelled to control the ground on or under which water flows.
- The relationship between water dependency and security is perceived as absolute, i.e., as zero-sum, especially where two or more mutually antagonistic actors compete for the same water source.
- As a zero-sum security issue, water carries a constant potential for conflict.
- International law as a means of settling and regulating fresh water issues remains rudimentary and relatively ineffectual without prior treaty arrangements in place.

In sum, the inescapable strategic reality of water is that under severe shortage—which is the prognosis for the Jordan River basin—water becomes..."a highly symbolic, contagious, aggregated, intense, salient, complicated zero-sum power-and-prestige-packed crisis issue, highly prone to conflict and extremely difficult to resolve."[33]

But, if water is such a volatile strategic issue, why has it not led to more conflict in the modern Middle East as it did in antiquity? The short answer is that it has, but usually as a contributing factor submersed within the context of other contentious issues among parties already embroiled. Moreover, people everywhere tend to have a condemnatory attitude toward conflicts that result in depriving someone of water, and in the latter half of this century, as the world has become more economically interdependent and politically complex, and as the number of sovereign nations has increased, the consequences of water wars tend to ramify more broadly, causing the international community to exert a greater restraining influence.

A fuller answer is much more complicated and, in part, must be extracted from the tangled relations among natural resources, the environment, population growth, and the state. Each of these factors is in itself a putative source of conflict, but it is rare that only a single one of them will produce strife. They always interact reciprocally with one another and with other causal factors, directly and indirectly; the combinations can become daunting. So it is not always easy to spy out water or some other environmental factor as being a root or secondary cause of a conflict. However, if a regime cannot deal effectively with the results of resource scarcity and environmental degradation by maintaining the delivery of essential social services, the consequences could be discontent, anger, and challenges to its authority, all of which could lead to serious conflict.[34]

Resource and environmental issues and situations can be integral to the roots of conflict in at least three ways: as proximate causes, as the means of conflict, and as the rationalization of conflict. Historically, vital resources such as water have been used more as the means or rationalization of conflict than as its causes, and water has tended to play a multiple role in generating conflict. In the causal equation of conflict, renewable resources are more important than non-renewable ones as the roots and proximate causes of conflict, and will become progressively so if current environmental trends continue. (A renewable resource is one that is usable without depletion or its renewal is significantly greater than its depletion; a non-renewable resource is one that is used in significantly greater quantitiy than its renewability or it is not renewable at all).[35] Technology can also play an indirect role in precipitating water and other resource conflicts by making possible exponentially greater extractions of the resource, by indirectly damaging or destroying the resource through the technologically caused overuse of an interdependent resource (e.g. logging, mining), and by producing side-effects or by-products that severely damage or destroy the resource (e.g. pollution). Thus, how a resource is used is as important as whether it is renewable or non-renewable; but in the end, "Humankind is more dependent on environmental conditions than on technology."[36]

Pivotal among all of the linkages related to conflict is the human factor, specifically in its growth trends. The dynamics of rapidly escalating population

growth (natural increase plus immigration)—unsustainable in arid and semi-arid regions of the world such as the Middle East—in combination with economic growth and technological progress, raise popular expectations of higher standards of living, and engender a spiraling demand for resources which creates increasingly serious deficits, especially if a resource is already meagre or maldistributed and cannot be substituted, as is water in the Middle East. These scenarios are real and replicated around the globe; they are generally associated with resource and environmentally related conflict.[37]

In the modern era, another possible constraint on water-driven conflicts in the region has been the influence of a principle called "superordinate goals" (or interests) which, presumably can function even in the absence of trust among actors. Simply put, when cooperation clearly benefits all concerned—particularly if the issue revolves around something so vital as water—otherwise hostile groups, acting on interests that are superordinate (overriding), tend to exhibit a willingness to seek an accomdation or to cooperate rather than to confront or fight one another. Furthermore, such cooperation may produce positive changes in how the actors perceive one another making other issues of contention more tractable.[38] Thus, rather than conflict, most water disputes have led to negotiations.

Hypothetically, the anxiety that always attends water scarcity could, in some of the Middle East's river basins, animate a consciousness of common, overriding goals, but not without "uncommon leadership and luck."[39] Some valid evidence in support of the superordinate principle can be adduced. For example, between 1953 and 1955, Eric Johnston, President Eisenhower's special envoy, mediated discussions among Israel, Jordan, and Syria over the apportionment of the Jordan River's waters. Although negotiations over the Johnston Plan failed, and despite continued animosity and distrust, the principle users of the Jordan system adhered approximately and informally to the technical terms of the 1955 Johnston Plan until the 1967 Six Day War radically altered the situation. In 1959, Egypt and Sudan negotiated a treaty on sharing the Nile. This pact remains in force and contains a clause mandating arbitration, mediation, or referral of disagreements to the World Court. The influence of superordinate interests may be discerned in the hydropolitics of other regions of the world as well. Despite three full-scale wars and numerous low-scale clashes, India and Pakistan—with facilitation from the World Bank—not only agreed on an equitable apportionment of the Indus River, but in all of their clashes spared one another's water installations and did not allow hostilities to obstruct the work of a joint Indo-Pakistani water management administration.[40]

Given the unrelenting state of hostility among most Middle Eastern riparians and the number of occasions when those animosities could have erupted into substantial warfare, there have been relatively few instances of sustained belligerency over unalloyed water issues. However, in the Middle East, the superordinate principle has not been sufficiently strong to inspire a

more positive disposition between Arabs and Israelis (or, for that matter, between Turks and Arabs, between Arabs and Iranians, and among some Arabs) except perhaps in a limited way between Egypt and Israel which produced the 1979 Camp David Accord and subsequent cold—but no less real—peace.

The superordinate principle, while valid in some circumstances, is nevertheless subject to limitations and variations where water is concerned. Chief among these is the matter of power relationships among a basin's actors and related to this pivotal issue are the factors of interest (or need) and riparian position. The key to whether the superordinate principle will function is the power symmetry or asymmetry in a given basin. If the relative power among a basin's users is approximately symmetrical, there is a greater chance that superordinate goals will influence policies. However, in some circumstances, for example where hostility is deep and intense and the actors are roughly equipollent, then the chances for conflict increase. Such would be the case in the Jordan basin. If power is asymmetrical, that is, one actor holds such a predominant or hegemonic position in relation to the other users as to be able to determine whether and in what circumstances and configuration cooperation will occur, then superordinate interests will induce cooperation only if they are sufficiently compelling to the basin's hegemon. Without the concurrence of the basin actor with overriding projectable power or sufficient defensive power, cooperation will not occur (unless the issue is so unimportant that an indifferent or passive stance is adopted; virtually never the case where real or potential water scarcity exists).[41]

Only when Egypt—the Nile's premier power—agreed, was the 1959 treaty with the Sudan signed. Repeated efforts at establishing a cooperative regime for the Euphrates among Turkey, Syria, and Iraq have been unproductive for a combination of reasons: intense ill-will between the regimes of Syria and Iraq; the radically altered situation in the basin since Iraq's defeat in the Gulf War; historical grievances and mistrust by the two lower riparans toward Turkey; and because Turkey, the upper riparian with sufficient defensive power—and since the end of the Gulf War in February 1990, the basin actor with the most projectable power—has not felt a compulsion for energetically promoting one. In the Jordan basin, if superordinate interests inspired Syria, Jordan, and Israel—respectively the upper, middle and lower riparians before 1967—to cooperate tacitly on the Johnston Plan, that influence was too feeble in the early sixties to overcome the animosities generated by the diversion of some of the basin's waters for Israel's national water carrier on the one hand, and the Arab threat of a counter diversion on the other. Water later became a factor in the outbreak of the 1967 war. Since 1967, any hope for cooperative water sharing in the Jordan basin without a prior political settlement, has evaporated. Israel, the indisputably dominant power, has been able to satisfy its own needs unimpeded and has not as yet been compelled by an overriding superordinate motive to alter the situation. Neither Syria nor Jordan, singly or in some political/military

coalition, have demonstrated an ability to improve their hydropolitical status vis á vis Israel, or to produce change through cooperation.

Asymmetrical power alone cannot definitively explain the relationship between water and conflict. Other casual agents such as interest/need and riparian position, which are functions of relative power relationships must also be factored. Taken together they provide, at an elementary level, the matrices of a three-part model—a power matrix—of water conflict: Interest or need, including the perceptions and motivations of the actors; riparian position; and projectable/defensive power. It may be useful to stress again in this context that need is a factor relevant to water per se in ways that do not apply to other conflict issues.[42]

The first matrix, riparian need or felt interest, determines the motivations and perceptions of riparian actors and directs them toward cooperation or strife. If interests are seen as being advanced or reinforced by other parties, the impulse will be toward collaboration; if needs are perceived as being frustrated by others, the pressure will be toward conflict. If the hinderance is sensed as deliberate, unnecessary, and illegitimate, and if it occurs near the point of need satisfaction, the likelihood of conflict is heightened. The impact of such factors is cumulative. Frey has pointed out that owing to certain power considerations, blockage does not necessarily result in hostilities. The actor perceiving itself as harmed may possess too little power to alter matters or even if it is potent enough, it may reckon the costs of exercising its power too high to warrant action.

The second power-related matrix is riparian position which accords special advantages to the upstream powers over downstream competitors. The upstream riparian is in a position to determine the quantity and quality of water passing downstream by such tactics as consumption, diversion, contamination, and regulation of flow. Such control obtains only if a riparian is situated at the main source of the river. Being upstream but above the major flow of the river carries little advantage.

The third and most important factor is projectable power, though defensive and internal power can also be significant influences. A riparian's projectable power is its ability to impose its own will on its rivals at whatever distance necessary thereby enabling it to govern their behavior in water issues. Defensive power, if sufficient, allows an actor to use its protective capacity as a deterrence to enforce change in the behavior of other actors. Moreover, by its defensive strategies such an actor can also shape the behavior of competing water users. For example, in a purely hypothetical situation, if Syria were powerful enough to deter aggression by its upper and lower riparian neighbors in the Euphrates basin, she could not be forced to cooperate in any Iraqi-Turkish agreement over apportionment, use, or flow of the water thereby preventing consumation of such an accord and forcing Turkey and Iraq either to drop the matter or find another means for dealing with it.

Internal power exercised to control water-related actions, particularly as regards water distribution and costs may have a significant effect on external riparian policies. When in the late '50s ands early '60s Israel built its national water carrier to distribute drinking and irrigation water more widely and open the Negev for settlement, it diverted Jordan River water out of basin for the purpose over the objections of its Arab neighbors. This added a hydropolitical dimension to Israel's Arab policies which was manifested in Israeli threats of military attacks against any attempts by the Arab riparians to undo Israel's actions by river diversions of their own, including the aborted Maqarin Dam on the Syrian-Jordanian border.

This paradigm of riparian power matrices yields the following assessment of conflict potential when applied (by way of example) to two of the region's principal river systems, the Jordan and the Nile. On the basis of available hydropolitical and military data, an analysis of the data, and the experience and perceptions of the analyst, each nation is assigned a weighted value in accordance with the relative strength of each factor. i.e., interest/need, position, and power; then an overall ranking is given as determined by the sum of the three criteria. In this instance, in order to reflect reality in the Jordan basin, military power is given a weightier value for Israel owing to Israel's overwhelming conventional military strength coupled with its possession of a considerable nuclear arsenal and the means to deliver it anywhere in the Middle East. None of Israel's potential enemies in the area can presently match these advantages, even collectively.

[Insert Tables 1 and 2]

There are three hypotheses underlying this analysis:

1) The greatest potential for conflict exists when a lower riparian is a more powerful actor than the upper controlling riparian and perceives its needs to be deliberately frustrated. As indicated, such was the case in the Jordan basin when prior to 1967 Israel was in a disadvantageous lower position, possessed the most relative power, and had very high interest and need which it saw threatened by its rivals; the prospects for strife were high and strife there was: as asserted, water as an issue was a major factor in the out-break of the Six Day War.

The building of the Aswan High Dam in Egypt, which was in part intended to symbolize Egypt's place in the van of Arab politics and of Arab acheivement in general, has had a significant impact on virtually all major sectors of Egypt's economy and has even altered the environment. The dam is essential is to Egypt's continued economic growth, especially in light of the country's population explosion; therefore, a sufficient flow of the Nile to ensure the dam functions at full potential is a matter of exquisite sensitivity to Egypt's rulers, who are never forgetful of the country's position as lowest but most powerful

riparian. Thus, it is an axiomatic policy of every Egyptian regime that it will go to war to prevent either of its closest upper riparian neighbors, Sudan and Ethiopia, from reducing in any way the flow of the Nile.

2) When an uppermost riparian is the most powerful actor in an international basin, that disparity (or asymmetry) of power inhibits conflict potential. After 1967, Israel's seizure and annexation of the Golan Heights resulted in its control of the headwaters of the Jordan; this circumstance combined with Israel's dominant military power as to preclude major conflict except on those occasions when Israel initiated invasions of Lebanon as in 1982. Turkey's advantage in controlling some 96 percent of the headwaters of the Euphrates River was augmented by the destruction of Iraq's projectable power in the 1990 Gulf War, giving Turkey greater-than-ever dominance in the basin, but in this case, Turkey's lower degree of need has so far restrained aggressive assertion of that ascendancy.

3) When relative power symmetry coexists in a basin with asymmetry in interest and position, there will be a moderate but consistent potential for conflict. Tacit or informal cooperation often characterizes such circumstances, especially with third party intervention (this was approximately the condition in the Jordan basin in the 1950s and early 1960s). However, this balance is always precarious, especially where tensions normally tend to be high and can quickly escalate to flash points. It will be threatened in times of prolonged critical scarcity, and when water becomes a significant element in a persistent and comprehensive inter-riparian political rivalry. The conflict potential of water then rises relative to the probability of politically motivated hostilities, and once water becomes directly involved, it may seriously enlarge the conflict.

The implications of the relationship between water and conflict in international river systems are the obvious ones: the key determinants of water-driven strife are scarcity and maldistribution, followed closely by perceived need and the relative power status of the international basin's riparians; these factors are reciprocal, and in combination reinforce one another thus tending to magnify the potential for conflict in times of crisis; moreover, each of these hydropolitical elements is often part of or significantly influenced by larger aggregated, perhaps basin-wide or regional, hostilities thereby broadening the potential for conflict.

These are precisely the conditions that pervade the Middle East, particularly as regards the Jordan basin. The time of critical scarcity has arrived and events show that the scope for tacit collaboration and tolerance has all but eroded. Water has already been a major rallying cry for the Palestinian *Intifada* in the Occupied Territories and for the Likud Party in the Israeli media. Once an issue becomes a slogan in the streets and media, it becomes very difficult to manage through normal channels of negotiation. The potential for water inspired conflict in the Middle East is integral to the region's milieu of pervasive tension and rises accordingly as tensions are heightened.

The bond between water-based problems and their social repercussions, such as destablization and conflict—particularly where water is scarce or seriously degraded and is shared in a tense environment (exactly the case in the Jordan basin)—is, like all other apects of water, complex and not easily analyzed, and makes policy formulation difficult. Conflict-laden hydropolitical factors are often concealed in ideological, ethnic and political strifes and can make them more complex and violent.[43] Accordingly, water conflicts can take many forms in addition to hostilities between or among nations, often in the absence of or preliminary to such belligerency: intersectoral rivalries, competetition among interest groups, propaganda and ideological warfare, internal strife, and so on, usually in combination and all, if serious or prolonged, contributing to the political destablization of a given basin.

Such basic quality of life factors as adequate food, water, health, housing, employment, and education, can no longer endure the perennial neglect and deferral for the sake of ideology and/or security that has characterized past governmental policies in the area. Frustration over the stalemate in the Israeli-Palestinian conflict, the carnage in Lebanon, the bitter Iraq-Iran war, and Iraq-~~U.S.-led Coalition~~ Gulf war, with their destablizing aftermaths, the disappointment of aspirations regionwide, all have led to an increased instability that makes radicalism—religious and political—an attractive alternative to large sections of the region's populations, particularly the majority youth. It is precisely in these conditions that potential water-driven crises tend to ~~flash.~~

Whether each party will be attracted to bi-or-multilateral cooperation in solving mutual water problems will be determined by the nature and size of the interests they perceive to be involved and whether there is sufficient payoff in joint efforts to satisfy those interests. In few instances will those interests be constituted purely of water issues unalloyed with political, economic, and security considerations which are integral to water. Water being inherently political is another reason why attempts to use water as a matrix within which ideology and politics can be ~~subordinated enough to achieve~~ cooperation, is a very difficult trick to bring off successfully—particularly as in the instance of the Jordan basin where there exists little trust and where there is a significant disparity (or asymetry) in power and control among the basin's actors. In such circumstances, full fledged cooperation would require powerful incentives and very probably mediation and international assistance, and considerable courage and will among the political leaders.

Therefore, one should not assume in the absence of treaty agreements among the Arabs and Israelis (accords that would have to be underpinned by some kind of international guarantees) that more than marginal basin cooperation can be achieved. Treaty agreements with the necessary legal obligations and structures to uphold them are the key to successful hydropolitical basin and/or regional cooperation in the Middle East.

The peace-seeking negotiations between Israel and its various Arab neighbors are focussed on the ~~final~~ definitive territorial disposition of the Jordan basin and south Lebanon. Hence, paramount question arising out the hydropolitical phase of the negotiations is this: Given Israel's control of virtually all of the basin's major water resources, its overpowering military superiority, together with a deep reluctance to yield up significant portions—if any—of the territories it presently holds and with them its hydrological advantages, what incentives or power can the Arabs use, singly or collectively, to persuade the Israelis to accept substantial territorial and political changes in the status quo?

In default of a clear answer at present, certain steps can nevertheless be taken in the direction of cooperation even in the absence of sufficient trust or treaty arrangements, steps that would, at all events, be necessary for eventual full cooperation. At least two factors make these actions possible: All the key actors finally appear to be serious about preferring negotiation to conflict, and the mounting scale of the basin's water crisis—aggravated by rising populations and declining economies—has been a compelling motive. Like the main issues, interim actions must involve the principles of flexibility, equitability, proportionality, data sharing, law, and a sense of fairness. And, since all of the negotiants, especially the Arabs, are practicing what I call "side-effect" diplomacy, and seek to use the tactic of "strategic discrepancies" in making trade-offs, outside assistance and/or mediation will be required even for preliminary measures.

Recently, I have elsewhere offered in print thirteen proposals that would lay the bases for eventual cooperation without absolutely requiring a prior political settlement and should even help promote one. I want here to focus on only two reciprocal ideas which are salient because they involve real cooperation in areas where all parties agree common grounds exist. These will ~~sound~~ appear familiar to most of you.

1) Since it is unlikely that cooperation can be coerced or induced at the highest political levels, the most promising approach would be to encourage cooperation at a lower but still significant level, amont scientists and technical experts. If scientists and technocrats in the area, together with the officials they advise, can communicate sufficiently to develop shared understanding of the water situation, of available and new technologies, and of potential solutions, they could constitute a community of informed specialists throughout the region, and become a strong force for cooperation by pressing for and guiding effective water policies.

2) For the creation of such a community of experts, it would be necessary to constitute a technical infrastucture for hydropolicy that addresses water problems at both basin and regional levels by establishing two types of water institutes: one for river basins and another for comprehensive regional hydrological issues. They would be so situated either within the region or, if necessary, outside ~~but proximate~~ for an interim period, so as to reduce

ideological barriers to participation. The work of these institutes would empasize science and technology. These institutes, comprising staff, fellows, trainees, and other personnel from the region and from other of the world's major basins, would perform several functions: conduct basic and applied research, they would provide the expertise, research, ecucational opportunities, and data necessary to develop the entrepreneurial, human, and technical resources presently lacking; they would generate databases and hydrologic, economic, and other social scientific analytical tools; act as conference settings; serve as centers for accurate record keeping and information dissemination; and foster interaction among basin and regional specialists.

Since 1960, water in the Middle East has become increasingly militarized while at the same time the region's water problems have grown more acute. Consequently, there have been more shooting incidents associated with water since 1967 than in all of the previous decades of the century. It would appear that the superordinate principle will, within the decade of the 1990s, be put to its severest test: whether under the combined pressures of demographic changes, security threats, and high levels of militarization, a severe water crisis will result in a basinwide or regional conflict, or whether the competition for water—so vital to life—can serve as a catalyst for cooperation among the regions riparians as the price of mutual survival.

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[1] Cotgrove, S., *Catastrophe or Cornucopia: The Environment, Politics, and the Future*, J. Wiley & Sons, NY, 1982; Dunlap, R.E., Gallup, G.H., Gallup, A.M., *The Health of the Planet Survey*, G.S., Gallup International Institute, Princeton, May 1992; White, G.F., "Formation and Role of Public Attitudes," Kates, R.W., and Burton, I., eds., *Geography, Resources, and Environment*, vol. I, Univ. of Chicago Press, Chicago, 1966, and Whyte, A.V.T., "From Hazard Perception to Human Ecology," *ibid.*, vol. II, Chicago, 1986.

[2] Kolars, John, explains this process in a little more detail in "The Course of Water in the Arab Middle East," Arab-American Affairs, Summer 1990, no. 33, 59.

[3] Mathews, "Redefining Security," 162-77; Gurr, *op. cit.*, 55-58; Ophuls, *op. cit.*, 8-9; Postel, Sandra, *The Last Oasis. Facing Water Scarcity*, Norton, New York, 1992, chs. 1 and 2.

[4] These data emerged at a seminar on water and the multilateral peace negotiations held at the Department of State April 1-2, 1993; see also Kolars, J., "Water Resources of the Middle East,"*Canadian Journal of Developmemnt Studies, Special Issue : Sustainable Water Resources Management in Arid Countries*, 1992, 103-106, and Tables 1 and 2; and Tvedt, T., "The Struggle for Water in the Middle East," in *Ibid*, 14-33.

[5] David, Peter, "Tribes With Flags," *The Economist. Survey of the Arab East*, February 6, 1988.

[6] Romm, J.J., offers a concise historical synthesis of definitions of national security in *Defining National Security*, Council on Foreign Relations, Occasional Paper, 1992, and Gleick, P. gives another somewhat different review in "Environment, Resources, and International Security and Politics," *Science and International Security: Responding to a Changing World*, Arnett, E., ed., (AAAS), Washington, D.C., 1990, 501-23. For a sampling of realist literature on security see the following: Buzan, Barry, *People, States, and Fear: The National Security Problem in International Relations*, Chapel Hill, 1983; Jervis, Robert, "Cooperation Under the Security Dilemma," *World Politics*, Vol. 30, No. 2, 1978, 167-214; Keohane, R., ed., *Neorealism and its Critics*, New York, 1986; Walker, R.B., "Realism, Change, and International Political Theory," *International Studies Quarterly*, vol. 31, Mar. 1987, 65-86; Wolfers, A., "National Security as an Ambiguous Symbol," *Discord and Collaboration: Essays in International Politics*, Baltimore, 1965; Waltz, K., *Theory of International Politics*, Reading, MA, Addison-Wesley, 1979; Gilpin, Robert, *War and Change in World Politics*, Cambridge, CUP, 1981; Dougherty, J.E., and Pfaltzgraff, R.L., *Contending Theories of International Relations*, New York, 1971; for a sampling of analysts who call for a redefinition of security, see the following: Sprout, Harold and Margaret, *The Ecological Perspective on Human Affairs with Special Reference to International Politics*, Princeton, 1965; Ullman, R., "Redefining Security," *International Security*, Vol. 8, No. 1, Summer 1983, 129-153; Mathews, Jessical T., "Redefining Security," *Foreign Affairs*, vol.68, no. 2, 1989, 162-77; Ronnie Lipschutz, "Sustainable

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Resource Management and Global Security," *Resources and Security*, Working Paper No. 5, Pacific Institute, Berkeley, CA, Oct. 26, 1989b, and *When Nations Clash: Raw Materials, Ideology and Foreign Policy*. Cambridge, MA, Ballinger, 1989; Gleick, P. "Environment and Security," *op. cit.* ; Homer-Dixon, T., "On the Threshold: Environmental Changes as Causes of Acute Conflict," *International Security*, Vol. 16, No. 2, Fall 1991, 76-116; Brown, N., "Climate, Ecology, and International Security," *Survival*, vol. 31, no. 6, Nov.-Dec. 1989, 519-32. More difficult to categorize, but falling interestingly between the two general approaches is Deudney, Daniel, "Environment and Security: Muddled Thinking," *The Bulletin of Atomic Scientists*, vol. 47, no. 3, April 1991, 22-28.

[7] Homer-Dixon, "On the Threshold," 84-85.

[8] Typical proponents of making the definition of security more inclusive are listed in note 6, above; in addition see Kirk, E.J., "The Greening of Security: Environmental Dimensions of National, International, and Global Security After the Cold War," *New Perspectives for a Changing World Order*, E.H. Arnett, ed., AAAS Publication No. 91-40s, Washington, 1992, 58-66, and in the same book, Choucri, N., "Resource Scarcity and National Security in the Middle East," 101-107; Forsberg, R. and Gaffney, F., comments in "Redefining National Security: New Opportunities and U.S. Responses," *Critical Choices: Setting Priorities in the Changing Security Environment*, Colloquium Proceedings, AAAS, Washington, D.C., 1990. See also Gleick, "Water and Conflict", 6.

[9] Kirk, "The Greening of Security," 58; Homer-Dixon, "Environmental Change," 5-6; Gleick, "Climate Change," 333 and "Water and Conflict," 5-6.

[10] Deudeny, "Muddled Thinking," 28, who argues that the causes and solutions to national security and environmental problems have little in common.

[11] Other analysts are exploring this approach in varying but similar ways, e.g., Drs. Steven Lonergan and David Brooks, respectively of the Centre for Sustainable Regional Development (CSRD), University of Victoria, Canada, and the International Development Research Centre (IDRC), Canada; Dr. Elizabeth Kirk, of the American Association for The Advancement of Science, Washington, D.C.; and Arthur H. Westing of the International Peace Research Institute of Norway; see Lonergan, "Redefining Security," *Delta*, Newsletter of the Canadian Global Change Program, vol. 3, no. 2, Fall 1992, 8-9; Kirk, "The Greening of Security," 65-66; and Westing, "The Environmental Component of Comprehensive Security," *Bulletin of Peace Proposals*, vol. 20, no. 2, 25-57. See also Gleick, "Environment, Resources, and International Security and Politics," in *Science and International Security*, Arnett, E.H., ed., AAAS, Washington D.C., 1990, 500-511; slightly out of this context, but important in an ancillary way because economic development is a serious factor in envirnomental degradation, see De Long, J.B., "The 'Protestant Ethic' Revisted: A Twentieth Century Look," *The Fletcher Forum of World Affairs*, vol. 13, no. 2, summer 1989, 229-41.

12 Frey, F., offers a recent and concise analysis of the nature of conflict in "The Political Context of Conflict," 57-59; important parts of this treatment are based on this article and on several discussions with Prof. Frey. See also Coser, L.A., *The Functions of Social Conflict*, New York, 1956; Blalock, H.M., *Power and Conflict: Toward a General Theory*, Sage, Newbury Park, CA, 1989; and Dahrendorf, R., *Class and Class Conflict in Industrial Society*, Stanford, 1959.

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[13] Gleick, "Water and Conflict," 4.

[14] Frey, "The Political Context of Conflict," 57, 59; in this same article Frey provides a concise critical review of some of the most widely discussed conflict theories and models; Homer-Dixon in "Environmental Change and Violent Conflict," offers a more detailed description and analysis of some seventeen conflict theories from the general conflict liteature; and Peter Rogers analyzes Pareto Admissibility, Superfairness, and Game Theory, in "International River Basins: Pervasive Undirectional Externalities," a paper presented at a conference on The Economics of Transnational Commons, University of Siena, Italy, April 25-27, 1991 (52pp). For samples from the general body of conflict literature, see Dahrendorf, R. *Class Conflict* (note 121 above), Gilpin, R. *War, and Change in World Politics*, Cambridge, 1981, and Walztz, K., *Theory of International Politics*, Reading, MA, 1979 (both of the latter authors represent a neorealist view).

[15] Frey and Naff, "Water: An Emerging Issue in the Middle East?," *Annals*, AAPS, v. 431, special issue, November 1985, 77-79 (the model was developed by Prof. Frey); for examples of the application of the model see Naff and Matson, *Water in the Middle East*, 192-94, and Frey, "The Political Context of Conflict," 61-62.

[16] Dellapena, Joseph, "Water in the Jordan Valley. The Potential and Limits of Law," *The Palestine Yearbook of International Law*, vol. V, 1989, 37; generally, for this section useful reference may be made to the following: Naff and Matson, *Water in the Middle East*, 158-180; Teclaff, L.A., *The River Basin in History and Law*, The Hague, 1967 and *Water Law in Historical Perspective*, New York, 1885; Teclaff, L.A., and Albert Utton, eds., *Interntional Groundwater Law*, 1981; Utton and Teclaff, eds., *Transboundry Resources Law*, 1987; U.N. (Legislative Series), *Legislative Texts and Treaty Provisions Concerning the Utilization of International Rivers for Other Purposes Than Navigation*, New York, ---; U.N., Natural Resources/Water Series No. 1, *Management of International Water Resources*, 1975 (reproduces the texts of the Helsinki Rules (1966), the Salzburg Declaration (1961) and various treaty texts); International Law Association, *The Helsinki Rules on the Uses of the Waters of International Rivers*, Report of the 52nd Conference, Helsinki, Aug. 14-20, 1966; International Law Commission, *Report on the Law of Non-Navigational Uses of Rivers*, Yearbook of the International Law Commission, A/CN.4/Ser. A, 1971-1988; Saliba, Samir, *The Jordan River Dispute*, The Hague, 1968, 46-70. (Most of the sources for this study were drawn from the AMER (Associates for Middle East Research) database in Philadelphia).

[17] On the history of international riparian law and on the various principles and theories summarized below, the following sources are best consulted: Teclaff, L., *The River Basin in History and Law*, The Hague, 1967; Caponera, Dante, *Principles of Water Law and Administration, National and International*, Rotterdam, 1992, 212-27, and*The Law of International Water Resources*, Legislative Study No. 23, FAO, U.N., Rome, 1980; Garreston, A.H., Hayton, and Olmstead, C.J., eds., *The Law of International Drainage Basins*, New York, 1967; McCaffrey, Stephen C., *Seventh Report on the Law of the Non-Navigational Uses of International Watercourses*, International Law Commission, 43rd Session, 29 April-19 July, 1991, U.N. A/CN.4/436, and Supplement N. 10, (A/46/10); Bilder, R.B. "International Law and Natural Resources Policies," *Natural Resources Journal*, vol. 20, July 1980, 451-86; Bourne, C.B., "The Development of International Water Resources: The Drainage Basin Approach," *The Canadian Bar Review*, vol.47, no.1, March 1969, 62-82; Institut de Droit International (IDI), *Annuaire de l'Institut de Droit International—Session de Salzbourg*, Basle, 1961; U.N., Report of the Panel of Experts, *Management of International Water Resources: Institutional and Legal Aspects*, Natural Resources/Water Series No. 1, NY, 1975.

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18 U.N., *Yearbook of the International Law Commission*, A/CN.4/Ser.A/1988/Add. 1.

19 Barberis, *Groundwater*, 49.

20 See McCaffrey, S. "Water, Politics, and International Law," in a forthcoming publication, *Water in Crisis*, Peter Glieck, ed., Oxford, 1993; McCaffrey, former Special Rapporteur of the ILC, cites in support of equitable utilization, among many sources, 14 multilateral treaties and a considerable body of evidence of customary international law; a leader in the debate to make equitable utilization the paramount relevant principle is Charles B. Bourne—see his "The International Law Commission's Draft Articles on the Law of International Watercourses: Principles and Planned Measures," *The Colorado Journal of International Environmental Law and Policy*, vol. 3, no. 65, 65-92. Professor Bourne is also the chair of the Water Law Committee of the ILA (and thus something of a guardian of the Helsinki Rules).

21 For further discussion of these two principles and the debate surrounding them, see Bourne, "Watercourses," *passim*, and Dellapenna, J., "Building International Water Management Institutions: The Role of Treaties and Other Legal Arrangements," unpublished conference paper, courtesy of the author, 54 pp (Henceforth "International Water Management"). I am indebted to Professor Dellapenna (Villanova School of Law) for his guidance and insights which have strengthened this chapter; he is, of course, in no way responsible for any of its shortcomings.

22 Dellapenna, "Ingternational Water Management," 8-9, and Bilder, R., "Some Limitations of Adjudication as an International Dispute Settlement Technique," *Virginia Journal of International Law*, 1, 1982, 23 (cited by Dellapenna).

23 On groundwater law, see the following sources: Barberberis, *Groundwater*, 1-64; Caponera, *Principles*, 153-4, 247-59; Tecklaff, L.A., and Tecklaff, E., "Transboundry Groundwater Pollution: Survey and Trends in Treaty Law," *Natural Resources Journal*, vol. 19, 1979, 629-667; Tecklaff and Utton, A.E. *International Groundwater Law*, London, New York, 1981, *passim*; Hayton, R.D., "International Aquifers and International Law," *Water International*, vol. 6, 1981, 158-65, and "The Law of International Aquifers," *Natural Resources Journal*, vol. 22, 1982, 71-93.

24 This summarized treatment of Islamic water law is based largely (but not exclusively on the following sources: Mawardi, Ali b. Habib al-Basri, *Al-ahkam al-sultaniyya*, Cairo, Dar Ashabab li Tibaa^{c}, 1983 (Henceforth *Al-Ahkam*); Al-Rahbi, ^{c}Abd al-^{c}Aziz b. Muhammad, *Fiqh al-muluk wa mitlah al-ritaj al-mursad*, Al-Irshad Press, Baghdad, 1973 (Henceforth *Fiqh al-muluk*); Al-Nabban, Muhammad Faruq, *Al-itijah al-jama^{c}i fi'l tashn^{c}i al-iqtisadi al-Islami*, Dar al-Fikr Press, Cairo, 1970 Henceforth *Al-itijah*); Adam, Yahya Ben, *Kitab al-kharaj*, A. Ben Shemesh, ed. and tr., Brill, Leiden, 1967; Caponera, D.A., *Water Laws in Moslem Countries*, FAO, I, irrigation Papers No. 20/21, 1973, and *Principles of Water Law and Administration, National and International*, Rotterdam/Brookfield, 1992; Teclaff, L.A., *Water Law in Historical Perspective*, New York, 1985;Wilkinson, J.C., "Muslim Land and Water Law," *Jouranal of Islamic Studies*, I, 1990, 54-72 and "Islamic Water Law With Special Reference to Oasis Settlement," *Journal of Arid Environment*, i, 87-96 and *Water and Tribal Settlement in Sourheast Arabia*, Oxford, 1977; Watson, A.M., *Agricultural Innovation in the Early Islamic World*, Cambridge, 1983; Lambton, A.K.S., *Landlord and Peasant in Persia*, Oxford, 1969 and "Aspects of Agricultural Organization and Agrarian History in Persia," *Handbuch der Orientistik. Wirtschaftsgeschichte des Vordern Orients in islamischer Zeit*, pt. 1, 264-79; Mazaheri, A., *La*

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25 Lloyd, Dennis, *The Idea of Law*, London, 1966, 201-2; Maktari, A.M.A., *Water Rights,and Irrigation Practices in Lahjh*, CUP, Cambridge, 1971, 6-7; Wilkinson, "Muslim Land and Water Law," 54-56.

26 On the international dimensons of *sharia*, see Muhammad b. al-Hasan al-Shaybani, *Sharh kitab al-siyar al-kabir*, Salah al-Din al-Munajjid, ed., 3 vols. Cairo, 1958-60, which is a standard classical work on Muslim law and international relations; on what makes *sharia* compatible with modern international law and the Muslim adoption of western systems of foreign relations, see T. Naff, "The Linkage of History and Reform in Islam: An Ottoman Model," *In Quest on an Islamic Humanism*, A.H. Green, ed., Cairo and London, 1984, 123-138; "The Ottoman Empire and the European State System From the Fifteenth to the Nineteenth Centuries," *The Expansion of International Society*, Hedley Bull and Adam Watson, eds., Oxford, 1984; and "Reform and Diplomacy in the Reign of Selim III," *Journal of the American Oriental Society*, vol. 83, no. 3, July-Sept., 1963.

27 Sura xxi, 30, in A.J. Arberry, *The Koran Interpreted*, London, vol. II; on the hadith see Mawardi,*al-Ahkam* Cairo, 158; Yahya Ben Adam, *Kitab al-kharaj*, 76; (both the sura and hadith are cited by Maktari, *Water Rights*, 22); references to water in the Quran are in Water Authority of Jordan, *The Qur'an and the Water Environment*, selections from the Quran, distributed by the Royal Scientific Society of Jordan (cited also by Brooks, D.B., "Adjusting the Flow: Two Comments on the Middle East Water Crisis," *Water International*, vol. 18, no. 1, March 1993, 35-39)

28 Al-Mawardi,*al-Ahkam*, 156; also, Yahya Ben Adam, *Kitab al-kharaj*—Yahya Ben Adam added that in the case of the Mahsur torrent, the Prophet ruled that palm tree owners had a right to the water to the depth of two heels , and that sowers have a right to water as high as two straps of the sandal, after which the water is sent to those lower down, 71-72; on springs, rivers, and selling surplus water, see 71-76.

29 al-Rahbi, *Fiqh al-muluk*, 636-638, 646-48; Al-Nabhan,*Al-itijah* , 247; (in the *hadith* the word "Muslims" is used instead of "mankind," but it is commonly taken to connote the latter and is so used); also regarding common or communal ownership of water, see Wilkinson, "Muslim Land and Water Law," 60-62, and "Islamic Water Law," 87-89; Maktari, "Water Rights," 13-16; EI^2, "Ma'," 860-61.

30 This profile is based on the sources contained in notes 24-29 above.

31 Al-Rahbi, *Fiqh al-muluk* 651.

32 Maas, A. and Anderson, R.L., *....And the Desert Shall Rejoice. Conflict, Growth, and Justice in Arid Environments*, MIT Press, Cambridge, MA, 1978, 2.

33Frey and Naff, "Emerging Issues", 77; Naff and Matson, *Water*, 8.

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[34] Goldstone, J., *Revolution and Rebellion in the Early ModernWorld*, Berkeley, 1991, 1-62, 349-497 and "Resource Depletion and the State," comments given at a conference on the environment, resource depletion, and conflict, sponsored by the Amercian Academy of Arts and Sciences, Washington, D.C., May 11-12, 1992.

[35] Holdren, J., University of California, Berkeley, comments at a conference on The Environment, Resource Depletion, and Conflict, American Academy of Arts and Sciences, May 11-12, 1992; see also, Lipschutz, R. and Holdren, J. "Crossing Borders: Resource Flows, the Global Environment, and International Security," *Bulletin of Peace Proposals*, vol. 21, no. 2, 1990, 121-33.

[36] Homer-Dixon, T., "On the Threshold: Environmental Changes as Causes of Acute Conflict," *Internatinnal Security*, v. 16, no. 2, Fall 1991, 85-98, and comment made at the AAAS conference on Envirnonment, Resource Depletion, and Conflilt; the quotation is by John Holdren, from his comments at the same conference.

[37] Choucri, N., "Resource Scarcity and National Security in the Middle East," *New Perspectives for a Changing World Order*, E.H. Arnett, ed., AAAS, Washington, D.C., 1991, 99-107.

[38] Muzafer Sherif, "Superordinate Goals in the Reduction of Intergroup Conflict," *American Journal of Sociology*, v. 63, no. 4, 349-56; Frey and Naff, "Emerging Issue," 67.

[39] Frey and Naff, "Water," 78.

[40] Biswas, A.K., "Indus Water Treaty: The Negotiating Process," *Water International*, v, 17, no. 4, December 1992, 201-209; Teclaff, L., *The River Basin*, 163-65, 183-84; Caponera, D.A., "Pattern of Cooperation in International Water Law: Principles and Institutions," in Utton, A.E., and Teclaff, L., Transboundry Resouces Law, #5459, 1-26; Many examples of possible superordinate interests (including the Egptian-Sudanese/Indian-Pakistani agreements) may be found in the various treaties and conventions compiled in U.N., *Treaties Concerning the Utilization of International Water Courses for Other Purposes than Navigation*, Natural Resources/Water Series No. 13, Department of Technical Cooperation for Development, New York, 1984.

[41] Naff and Matson, *Water*, 11, 182-96, and Frey and Naff, "Emerging Issue," 66-79. For a review of conflict theories and associated literature see, in addition to Frey and Homer-Dixon, cited above in note 14, Naff, "The Idea of Conflict," (forthcoming).

[42]The model is devised by Frederick Frey; this section is also based largely on Frey and Naff, "Emerging Issue," 77-80; Frey, "Political context of Conflict," 59-60; and Naff and Matson, *Water*, 184-96; see also T.F. Homer-Dixon, *Environmental Change and Conflict*, Occasional Papers Series, American Academy of Arts and Sciences, no.4, June 1990; D.G. Lemarquand, *International Rivers: The Politics of Cooperation*, Westwater Research Centre, U.B.C, Vancouver, B.C., 1977; J. Linnerooth-Bayer, "Negotiated River Basin Management," in *Water: Rethinking Management in an Age of Security*, E. Vlachos, A.C. Webb, I.L. Murphy, eds., Worldwatch Institute Paper #62, Washington D.C., 1984; and W.S. Thompson, *Power Projection: A Net Assessment of U.S. and Soviet Capabilities*, National Strategy Information Center, New York, 1978.

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[43] Homer-Dixon, T., "Environmental Change and Violent Conflict. Understanding the Causal Links," *Emerging Issues, Occasional Papers Series*, American Academy of Arts and Sciences, Committee on International Security Studies, March 1990, 4-5; for an historical treatment of the political consequences of resource and environmental degradation see Goldstone, J.*Revolution and Rebellion*, Introduction and Chapters 1 and 2, and "Resource Depletion and the State," unpublished paper delivered at the Academy of Arts and Sciences conference on the environment, resources depletion, and conflict, Washington, D.C., May 11-12, 1992.

II

Water Use Conflicts

I. Scarcity and Conflict

Intractable & transboundary

Water use conflicts are never simple. The components of such disputes are in themselves invariably complex, none more so than their two most basic, omnipresent components: scarcity and security. Scarcity is the first strand—security being the other—of a double helix along whose intertwined curves lie the constituent elements of hydropolitical conflict. At the most basic level, actual scarcity may be said to exist when real demand (i.e. need) exceeds real supply. Although the maxims of supply and demand may determine actual shortages, the concept of water scarcity encompasses many discrete but interrelated factors that govern supply for any given demand (~~bearing in mind that demand, actual supply, and real consumption are not necessarily in alignment~~): climate, perceived and real need, quality (complicated by a wide variety of standards in river basins across the globe), location and reliability of source, consumption, technical capacity, accessibility, demographic growth patterns, distribution of population and water resources, efficiency, organization and management, use of fertilizers, loss and waste, extant, available, and safe-yield stocks of water, and policy decisions on the rate of consumption and distribution. There is also a kind psychological scarcity—scarcity in the eye of the beholder. This kind of scarcity exists when, for whatever reason, people perceive or believe a shortage exists, whether the physical reality justifies the impression, and they behave accordingly. Perceptions of the amount and quality and availability of water are usually a part of a people's attitude toward the environment.[1]

The consequences of scarcity are as complex as its causes

~~Other factors can play an ancillary role.~~ For example, water and other associated environmental scarcities often set afoot large-scale migrations from the countryside to the cities, creating large, dislocated, underemployed or unemployed floating multitudes, particularly in third world countries where this phenomenon is more typical, that become serious drains on the economy, create political hazards, and create a distortion in the national economic balance in favor of city over rural dwellers. Such conditions raise the possibility of conflict. In situations of high population growth, increasing strain on water resources, and behavior that depletes the resource at an unsustainable rate or even destroys it, resource scarcity then promotes social inequities, political tensions, state weakness, and authoritarian regimes; it thus becomes a determinant of both security and conflict, and must be envisaged accordingly.[2]

While there are numerous reasons for water scarcity, they all tend to be variations on six basic causes which, taken together, will delimit supply and demand: climate changes (principally drought), degradation of water quality by human activity at a rate faster than the souce can be renewed, depletion of a source such as an aquifer, at rate faster than it can be replenished, out-of-basin diversion or storage of surface water, redistribution for other uses or to another

place, and consumption. In the Middle East, these causes stem, in one way or another, from a single overriding, immutable determinant of scarcity that accounts for the region's aridity—for that matter, the aridity of other parts of the globe as well: the way in which the earth functions as a stupendous heat pump run on solar energy which generates a constant process of intense evaporation within a broad zone that encompasses the Middle East region.[3]

In the Middle East, the composite effects of climate, poor supply, maldistribution and escalating populations are revealed in exponential discrepancies of water supply per person across the region, ranging from a per capita supply of 115 m^3 in Libya to as much as 5000 m^3 in Iraq (in rainy years). A disturbing related trend has emerged in recent decades: over the last 30 years, the average available supply of water for the entire Middle East has fallen rapidly from somewhat more than 2000 m^3 per capita to less than 1500 m^3 per capita.[4] Presently, 64% of all Middle Eastern countries are confronting serious water shortages.

Given that the region has very little margin of safety where water supply is concerned—especially in face of a population that is projected to double within the next quarter century—unless this situation is reversed without further delay, several key actors in the major river basins—Jordan, Israel, the Occupied Territories, Egypt, Syria, and Iraq—face a series of destablizing economic and political crises within the foreseeable future, the consequences of which will reverberate throughout the region and in much of the western world. Scarcity, especially mismanaged scarcity, contributes significantly to the creation of an environment of uncertainty and instability in the basic political, economic, and social institutions of society, most destructively in situations where the integral factors of ecological marginality and rising poverty obtain—a condition that characterizes most Arab countries.

II. Security and Conflict

The idea of security and the causes of conflict have been historically and conceptually tightly interlaced. The concept of security in the modern epoch has been explained in terms of perceived threats of violence in some form of organized mayhem, usually warfare, to national sovereignty—or territorial integrity—by an outside force. This received notion of security involving a threat to an established group's power or possibly to its existence, by an outside or "other" agent, has applied as well to civil wars with "loyalist" or "insider" factions contending against "rebels" or "outsiders".

Contemporary ideas about what constitutes security remain closely linked to the nation-state, although in an increasingly international political environment the connection has been stretched somewhat to regional and international levels. However, the nation, encompassing religion and ethnicity and expressed ideologically as nationalism, remains the most virulent, widespread, emotional, and influential mode of political and cultural identity, especially when it is coterminus with ethnicity. Religious ideology is a normal

or quasi-religious

concomitant of ~~virtually~~ almost all brands of nationalism, lending them mantels of morality and legitimacy. The abiding potentcy of the idea of nationhood in world affairs has received ample confirmation in the vicious internicene wars in the post-communist era. These conflicts give the appearance on all sides of deriving from an atavistic revival of tribalism, nourished by religio-ethnic myths, that has created what ~~one author~~ has aptly been tagged as "Tribes With Flags."[5] Such powerful self-consciousness engenders an integral and equally powerful sense of the "other" or "them" as opposed to "us" mentality which promotes a very strong bent toward a self-absorbed cultural nationalism. This inherently aggressive outlook, with its built-in tendency to assume the role of an injured innocent, creates a very dangerous security situation prone to conflict.

Like water itself, the concept of security (and that of conflict) is complex and multifacited. Largely because of the close identity of security theory with the nation-state and military prowess, one school of thought—the so-called realist/rational choice school—has, in recent times, tended to speak most prominently in debates on how to define security and of the role of security in international affairs and has, consequently, given the exchanges a particular analytic bias.[6] Those who subscribe to political realism in international affairs define security in variations on the following theme: the capacity of a state to secure its safety and perceived national interests from violence by means of such assets as military power (projectable or defensive), population (size and competence), and vital resources, relative to other states who are seen as real or potential enemies or whose status or relationship is deemed important. Thus, a state will always attempt to maximize means to security in direct ratio to felt threats.

It cannot be argued that military power, economic structure, and state interest—the heart of realist/rational choice theory and its variations—are not fundamental determinants of security and foreign policy in all nations. But it can be demonstrated that overweighing these elements and deemphasizing others—such as environmental and water resource problems—which cannot not be confined only to a single country, distorts reality. Because this analytic approach is based on constricted assumptions, realists are apt to..."squeeze environmental issues into a structure of concepts including 'state,' 'sovereignty,' 'territory,' 'national interest,' and 'balance of power.' The fit is bad, which may lead theorists to ignore, distort, and misunderstand important aspects of global environmental problems."[7]

While the traditional meaning of security, focussed as it is on machines of war and economic arsenals together with strategies for employing them is sound as far as it goes, it is obviously too cramped. A world approaching a new millenium with too many inhabitants, with its vital natural resources diminishing too rapidly, with the scale of its political and ecological problems growing quickly from local to global levels, such a world that is also interdependent and technololgically driven clearly requires a new, meaningfully

extended definition of security. A fairly long list of issues that could easily and legitimately be included is not difficult to compile:

- Agriculture, which is militarily and economically important and represents food security, which is different from food sufficiency. Food security requires a guarantee of enough food to satisfy a population's minimal nutritional needs over a long period of time, a policy usually expressed as self-contained, domestically produced sufficiency; food sufficiency requires that there is on-going sufficiency of food for the needs and development of a society, attained chiefly by trade from whatever sources; food security in the arid Middle East will always be a wasteful and ill-fated policy; the ultimate reality about food security is that it is absolutely dependent on water security; food sufficiency, on the other hand, while more realistic does require an economy that generates enough exports to cover the cost of large food imports; agriculture also falls under the rubrics of environmental and resource (i.e. water) security.
- Demographic pressures which lead to overconsumption, and in combinaiton with other factors such as drought, can produce large-scale migrations placing enormous pressure on the resources not only of the receiving nation but on whole regions, creating stress often exacerbated by ethnic tensions.
- Resource scarcities, especially water, often have transboundry consequences and may be accompanied by the danger of environmental colonialism, a vulnerability widely felt among poor and weak nations (if a resource such as water or oil is a significant source of economic or political power, then it can be fitted into a realist or power analytical frame); because nations cannot survive without enough water, water is intrinsically a security issue which is also a link between environmental degradation and security since environmental abuse limits water supplies.
- Health issues, some of which—such as Aids—can have a devastating impact on a nation's capacity to maintain basic economic and military security by wiping out much of its youth, especially in poorer countries whose medical establishments can be easily overwhelmed by a deadly epedemic.
- Ideological and cultural differences involving human rights, nationalism, religious extremism, and authoritarianism.

- Nuclear or chemical accidents.
- A variety of economic issues wherein product dumping can lead to trade wars or serious economic shocks in a single key nation such as the U.S., Japan, or Germany, can repercuss across the globe, or because of interdependence, large multinational corporations operating on a global scale in basic enterprises can lead to a subtle loss of national sovereignty.

These are only issues created by human societies. There are plenty of natually occuring calamities that have security implications: Floods, drought and desertification, earthquakes, and contagions are a few typical examples.[8]

Moreover there are serious methodological and analytical difficulties. The causal relationship between a specific resource, environmental, or demographic problem and a security (or conflict) issue is neither plain nor linear. Such problems tend to have complex feedback interactions with other complex political, social, and economic issues, resulting in a non-quantifiable reciprocity that produces multiple effects. In a situation of constant tension and hostility, such as exists, for example, in the Jordan and Euphrates basins, a resource issue like water scarcity is a constant underlying security factor that could act as a trigger for conflict; but precisely how and why it would trigger warfare rather than another reaction is not clearly known, as water could in the same circumstances act as a catalyst for negotiations. Thus many problems that may be hung on an environmental peg, especially water, must be examined as dependent variables of other factors such as population, culture, social relations, values, political, military, and economic conditions, etc.[9]

The multilayered linkages between environmental factors (broadly defined) and security and conflict are as yet poorly understood; consequently, sound generalizations are difficult to make. Historical parallels or comparisons can be misleading unless allowance is made for the evolution of the international system from past to present. Further insights into the cause and effect relationships between degradation of the natural environment and national security from violence, together with the mechanics involved, need to be gained before a new workable, theoretically solid, definition of security can be put forward. In this regard, it would be well to give careful heed to a warning sounded about the dubious wisdom of binding environmental/resource security concepts with those of realist national security:

> ...the nationalist and militarist mindsets closely associated with national security thinking directly conflict with the core of the environmentalist world view....If the nation-state enjoys a more prominent status in world politics than its competence and accomplishments warrant, then it makes little sense to emphasize the links between it and the

> emerging problems of global habitability. Nationalist sentiment and the war system have a long-established character that are likely to defy any rhetorically conjured redirection toward benign ends. The movement to preserve the habitability of the planet for future generations must directly challenge the tribal power of nationalism and the chronic militarization of public discourse.[10]

Another useful approach to redefining security as a policy issue would be to eschew attempts at forging a single newly synthesized meaning and accept that there are in reality at least two distinct classifications of security belonging to the same social scientific genus which are organically connected and share common attributes. In the first instance they could be differentiated as traditional and nontraditional or, equally well and interchangeable, as conventional and unconventional types of security—admittedly none of these terms is scientifically precise, but are nonetheless helpful as labels for distinguishing two closely related categories. In this context, traditional notions of security emphasize the political, military, and economic protection of the nation while nontraditional concepts emphasize broadly conceived environmental safety which applies both within and transcends national boundries. While many factors, such as vital natural resources and population, straddle each kind of security, underpinning both definitions is a common policy design: to ensure survivability and sustainability, whether applied to regime, nation, region, tropical forests, transboundry water systems, oceans, air, etc. Because of close interconnections, both goals—conventional and unconventional—must ultimately be achieved to attain either.[11]

III. The Idea of Conflict

Conflict is as complicated a concept as security, and then some. The concept requires for its fuller comprehension a prior grasp of notions such as *issues, situations,* and its opposite, *cooperation*. Moreover, one must take into account such factors as values, ideologies, symbols, motivations, goals, and origination and processes of conflict, while, at the same time, making necessary distinctions among all of these elements.[12] There are many types of conflict that are generally recognized, and often given their own definitions, attesting to the the elasticity of the term. Political, economic, ethnic, religious, racial, resource, trade, tribal, clan, and family dissensions are among the most common that may be indexed under a typology of conflict. The size and importance (which is what is usually meant by "scale" and "level" in these discussions) and intensity of a disagreement must also be taken into account in rendering a definition of conflict.

Moving up from individual or small groups, a conflict (violent and non-violent) may be acted out at a local, village, national, regional, interstate,

multinational or global level, and the most widespread conflicts can involve state participants who do not share borders but rather are situated far from one another geographically—though because water is normally used within basin systems, hydro-conflicts commonly involve contiguous and other basin actors.[13] It should be borne in mind that not all conflicts are violent, that is, violence need not be involved for strife or friction to qualify as conflict; in fact conflict can exist in a latent state until animated by such events as scarcity or perceived frustration of need or desire. Disagreements can (and do) simmer along for very long periods of time without resolution, but not without damage.

As posited, all of the factors that enter into considerations of security—conventional and nontraditional—are integral to conflict as well. The intracacies of conflict have been made more dense in the latter half of this century by the rapid degradation of the environment on a global scale, in significant part as a function of rising demographic trends and concomitant economic development, resulting in very serious resource scarcities in many regions of the world. This circumstance has increased competition for resources, animated aggressive nationalist senitments, and created many flashpoints of possible conflict, subjecting the international system to greater strain than ever before and making the resolution of conflicts exponentially more complex, therefore more difficult to attain. The reasons that this latter characteristic is especially peculiar to conflicts over water, is that water is vital, pervasive, has so many essential usages, does not respect national boundries in the course of its flow, and is complicated by the sheer number of factors always present in water problems: atmospheric, hydrological, chemical, technological, managerial, political, socio-economic, legal, and strategic to name a few of the more obvious ones. Not only must all such factors be taken into account in the quest for solutions, but the inherent complexities are compounded by the web of feed-back relationships among conflict factors particularly when two or more national actors contend over the same supply of water in an international basin.

Attempts to understand the many-layered relationship between water and conflict can be greatly helped by good, "fine-grained" theory—whose function it is to explain. As in the case of security theory, useful conflict theory must also encompass and explain environmental/ecological caused strife on a scale and complexity heretofore unaccounted. Although there is a growing body of theoretical literature on the nature and causes of conflict—more than two dozen original and adapted theories, and only a fewer models, have been offered in the last two decades—"Unhapplily, general conflict theories are not very well developed and, at best, furnish too coarse-grained a perspective to illuminate specific water issues." And as regards water conflicts "...general conflict theory is, simultaneously, not really general (it omits important aspects of conflict phenomena) and too general (it does not bring out the key features of water resource conflict as distinct from any other type of conflict)."[14]

For purposes of this study, theories and models which have certain intrinsic commonalities and differences, are defined in terms of their uses. Both can be used for prediction and both are based on logical deduction, but are functionally separate. Generally speaking, a theory is a systematic synthesis of assumptions or principles that describes, analyzes and explains behavior, while a model is a provisional verbal, graphic, or mathmatical representation of a theory or system that accounts for its known traits and describes the process or logical outcome of the behavior or interactions of its component parts. The explanations of theories and the processes and outcomes of models must be consistent with their supporting data, and, in final analysis, make good common sense.

~~While each of these theories and models could help explain or perhaps predict some aspect of water and other resource conflicts,~~ no single theory has as yet been developed that can deal with the layered political, socio-economic, legal, and strategic entanglements of fresh water. Consequently, a high level of uncertainty attaches to virtually all of them. If existing water conflict models are to work at all, they must be based on narrowly conceived, fairly simple assumptions and relatively small data sets too restricted to contain all the intracacies of water, thus running the risk of being overwhelmed by complexity or possibly producing very circumscribed, over-simplified results, that could be either self fulfilling or self evident, or worse, erroneous.

that underlie hydro-conflicts

Because water is so multifaceted, has so many applications, is so cross-cutting of issues, and involves so many interrelationships, it tends to defy easy or comprehensive categorization in conflict typologies and theories. Any attempt to categorize water as a conflict issue must therefore employ a multidimensional typology or a combination of typologies. This makes accurate predictions of behavior in potential water-based conflicts elusive at best. Consequently, most predictive theories of conflict tend to break down in specific hydropolitical case studies.

Among those predictive models described above, there is one, the Power Matrix model, which, though simple, does nevertheless capture enough of the key politically significant qualities of water—extreme salience, scarcity, maldistribution, and sharing—to work at an elementary level. It currently produces results that allow rough-hued, reasonably accurate, predictions for the conflict potential of water.[15] This model is employed with a small variation below in another part of this discusssion on water and conflict.

IV. Water Law and Conflict: Basic Principles

The cornerstone of international fresh water law is the assumption that the allocation of scarce resources requires legal means, rather than coersive force, if sharing is to be equitable and conflict is to be avoided. In principle, long-term cooperation among sovereign riparians, particularly where water is scarce, would be well nigh impossible outside the butressing framework of law.[16] But international riparian law can be efficacious only when riparians commit

themselves to law as the first means for the delineation and regulation of rights and responsibilities, and the amelioration of grievance.

Historically, international riparian law has been underdeveloped, eluding the efforts of jurists to sort out its complexities and persuade nations to subject their competing claims to a standardized code of legal principles. Those complexities have sometimes made the process appear muddled. Although in the era of the United Nations some headway in this direction has been made, progress has been so slow and achievement so meagre that some observers have concluded that no universal code of international riverine law is possible. Nevertheless, experience, scholarship, and jurisprudence (and, perhaps, not a little blind faith) have produced four basic legal principles that are generally invoked when riparians contend: absolute sovereignty, absolute or territorial integrity, community of co-riparian states, and limited territorial sovereignty.[17]

Absolute sovereignty (sometimes called the Harmon doctrine) decrees that a riparian may do what it will with the water (or any resource) within its boundries without constraints—use it up, pollute it, dam it, send it downstream in any quantity or condition; in contradistinction, the principle of territorial integrity requires that the river's natural flow be uninterrupted in its downstream course, that the lower riparians have a right to the full flow and quality of the water; the theory of co-riparian communalism stipulates that the entire river basin constitutes a single, geographic and economic unit that transcends national boundaries, whereby the basin's waters are either invested in the whole community or shared among the co-riparians by agreement, the underlying assumption being that optimum use of the basin's waters mandates a cooperative, integrated development of the entire drainage basin; the notion of limited territorial sovereignty supplants the opposed principles of absolute sovereignty and absolute integrity by according recognition to a riparian's jurisdiction over the transboundary waters that flow through its territory, but places limits on the exercise of its control over those waters in such ways as to insure the downstream states a reasonable share of that water in reasonable condition. Older principles such as first-in-use-first-in-right, historical utilization, beneficial (or optimal) use, good neighborliness, etc., are generally subsumed under these four principles. Whatever the legal principle, all of the rules devised for the sharing and apportionment of water are rooted in the notion that nations are obliged to cooperate in matters involving vital natural resources, especially when scarce.

Law IV.1 **Equitable Utilization and No Appreciable Harm**

In modern times, a blending of the traditional notions of co-riparian community and limited territorial sovereignty has produced a hybrid legal principle that has gradually emerged as the preferred approach among juridical scholars, international law organizations, and state litigants. At the heart of this

concept are the basic principles of equitable utilization and no appreciable harm (as will be seen, in this context equity does not connote equal).

In customary international law, every state is under an obligation not to cause harm to another, not only by direct action, but by allowing the use of its territory in ways that result in harm to the rights of other countries. No appreciable harm provides that while a state is entitled to use the waters of a river that traverses its territory, it may not do so in such a way as to cause appreciable harm to the river's other riparians. This proposition does not explicitly proscribe *any* harm whatsoever, and though "appreciable harm" has proven impossible to define precisely, it clearly means more than merely "perceptible" but not necessarily "substantial." That is, it must be harm of a certain gravity or significance beyond simple inconvenience. In its forthieth session the ~~ILC~~ Intnat'l Law Comm. of the U.N. (ILC) adopted this definition believing that the concept could be objectified and that compliance could be judged on factual bases and thus embody factual standards of behavior and liability.[18]

Equitable utilization (or equitable apportionment), states that riparians of an international waterway are obliged to use, develop, and protect the watercourse in an equitable and reasonable manner and are duty-bound to do so cooperatively. Each riparian has a right of utilization—reasonably and beneficially— equal to that of every other co-riparian. "Equitability" in this context does not mean a precisely equal share of the water; it is the *right of utilization* that is equal for riparian neighbors. Rather, equitability implies the idea of *proportionality*, a share and usage proportional to a riparian's population and its social and economic needs, consistent with the rights of its co-riparians. Reasonable (or rational) usage may be explained as exploitation of water, or any other natural resource, in such a way as to conserve the resource "for the benefit of the present and future generations through careful planning and management."[19]

It is worth noting that both the ILC and the Institut de Droit International, have publically embraced the "no appreciable harm" concept as the paramount rule governing international fresh water issues, particularly as regards the problem of water quality. However, that position is not unequivocal. Many members of those legal bodies, along with a sizeable number of legal scholars believe that "equitable utilization" should be the cardinal prescript in practice. Clearly, the two rules are closely related and both are often invoked, whether primarily or secondarily, in the same instances.[20] In fact, the literal, narrow, nationalistic way in which some governments insist on interpreting "no appreciable harm"—that is, arguing that any action that causes a reduction of flow or the useability of the water, however small, without prior agreed-upon arrangements, constitutes appreciable harm—virtually negates "equitable utilization," and if carried to its logical conclusion this consruction of the "no appreciable harm" idea becomes self-nullifying (Egypt, Israel, and Agentina are among those nations who have adopted this posture).

The Nile River affords a good case in point. Egypt, for whom any sustained, significant reductions in the flow of the Nile could spell disaster, has taken a narrow view of the no appreciable harm proposition and argued that this principle should be the standard legal reference rather than equitable utilization. Supposing, hypothetically, Ethiopia, as part of its economic development and recovery program were to build a dam substantially above 15 meters on the Blue Nile, a major feeder of the main stem of the river, and use the captured water in-country. That would reduce the flow of the Nile to Egypt by a certain amount annually. Supposing further that the Egyptians decided to adjudicate the issue rather than to settle it by the superiority of their arms; they would certainly invoke the principle of no appreciable harm, narrowly construed, and reject Ethiopian arguments based on rights conferred by equitable utilization. If the principle of appreciable harm prevailed, either by a court judgement or imposed by military force, equitable utilization would be negated, but at the same time, Ethiopia would be denied the legitimate right of economic development, thus causing it appreciable harm. Conversely, were the Ethiopian stance to prevail, Egypt would be appreciabley harmed. In this circumstance, the result of a judgment either way would be a high social cost. When the successful invocation of the no appreciable harm principle produces substantial social costs and inflicts significant harm to the economic and legal rights of another party—as is clearly possible—the principle contradicts itself.[21]

Basically, what the legal process does, for both domestic and international actors, is to enable (or empower) them by legitimating their claims, and, conversely, to constrain them by limiting the claims they are permitted to make. But to do so effectively, it must have the necessary legal institutions in place—courts, police forces, various government bodies that legislate and regulate by some codified legal system and represent the legitimate interests of the citizenry at individual and corporate levels, etc.

This same institutional requirement applies in the international sphere as well, in the form of international courts and organizations that are supranational and are empowered to enforce judgments by recognized international legal means. In the international sphere, treaties are the key legal instruments, but to enable the judicial process to function effectively, treaties must include arrangements for settling disputes by rules of law through appropriate legal institutions. These goals have been difficult to achieve in international law, particularly as regards transboundry and international rivers. Thus, riparian and other conflicts continue for the most part to dealt with by specific treaty agreements or by power relationships or, somtimes by mediation in combination with the other two choices, but without necessary reference to or application of law: "In the absence of a neutral enforcement mechanism, international law has nothing better to offer for sanctioning violations than the law of the vendetta."[22]

Law-IV 3: **Groundwater and the Bellagio Draft Treaty**

Until recently, the rules governing surface water sharing were applied to groundwater as well, but that circumstance has been changing since the appearance of the Bellagio Draft Treaty Concerning Transboundary Groundwater and the 1991 ILC report. As connected parts of surface water systems, groundwaters constitute, legally and politically, international or transboundary watercourses. Like counterpart surface water, groundwater does not respect political boundries, often traversing several as it flows seeking its own level or outlets. For example, the Northeastern African aquifer moves under Libya, Egypt, Chad, and Sudan; Saudi Arabia, Bahrain, and the UAE, overlie the same aquifers while the Qa Disi aquifer underlies both Saudi Arabia and Jordan. The most legally and politically controversial shared groundwater in the region—the West Bank mountain aquifer or the Yarqon-Taninim—lies mainly under occupied Palestinian terrain but is wholly contolled by Israelis by virtue of the occupation and percolates into Israel across the Palestinian-Israeli Green Line.

The chief difficulty hampering jurists who aim to establish precise definitions and devise rules for the sharing of underground water is a serious paucity of data on most aquifer systems; many important aquifers are not even fully mapped yet. Consequently, adequate international law and legal institutions for the peaceful and equitable management of transboundary groundwater resources barely exist, and those few laws and institutions that do are notoriously weak. The need for an effective model treaty has become urgent.[23] The Bellagio Draft Treaty is founded on the principles that underground water rights should be regulated by mutual respect, good neighborliness, reciprocity, and collective agreement, and it acknowledges that the fulfillment of these notions requires joint management of the resource. The fundamental goal of the 20 article draft treaty is to promote optimum utilization of available groundwaters, facilitated by strategies for conflict avoidance or resolution in the face of rising demands for very limited supplies.

Law-IV, 4: **Islamic Water Law**

There is another body of water law, *sharia*, or Islamic law, which by its nature is religious law, whose rules regulated water issues in the Middle East for almost a millenium and a half. Although *sharia* has been largely superceded by westernized codes of law in the last century and a half, it is still applied in many Islamic nations where, in some instances, the spirit of traditional Islamic water law has been incorporated into more recent secular legal codes that have been adopted. With the resurgence of religious fervor in the Muslim world there have come demands for the application *sharia* in all aspects of life in Muslim societies. What Islamic law has to say about the hydrologic culture of the region, and the relevance of Islamic law to present water conditions must therefore be seriously

considered. Indeed, this is a basic requisite since in Islam, a Muslim society is defined as one that adheres to *sharia*.[24] Moreover, Islamic water law, compares very well with western canons on water.

The significance of water in Islamic legal thought is disclosed in the double meaning that the word *sharia* carries. In the first instance, it reveals the moral path that Muslims must pursue to attain salvation, and at the same time, in a more technical (and perhaps older) sense, it denotes access to the source of pure drinking water that must be preserved for humans. Specific hard and fast rules of Islamic law are relatively few (general moral guidelines are more characteristic), and where water is concerned—unlike other areas of Muslim jurisprudence—*sharia* tends to be less rigid and is applied more in the spirit of the law than in the letter; that is, more by the application of custom (*urf*) and reasoning than by strict doctrine. By and large, because received customs represent the collective norms of the social group and contain rules of behavior considered essential to the well being of the community, societies tend to feel bound to observe them.[25]

Customary Law in Islam and the West

Although customary laws differ from one Muslim society to the next, and though there are differences between Muslim and western customary laws, they do share certain common traits. Customary water law is of fundamental importance to western legal systems and to *sharia* alike, and further common to both, customary law as a juridic model combines advantages with serious vexations. Rooted in communal experience, custom offers societies living under both legal systems the benefits of legitimacy, familiarity, adaptability, and flexibility which allow for positive, practical rulings. Given the wide ranging diversity of conditions and situations from river basin to river basin the world over, the exploitation of these qualities is often essential to conflict avoidance.

Beyond the general characteristics of *urf*, it is worth noting certain other qualities of Islamic law that have a bearing on water issues: *sharia* is not a national law in the sense that American or European, or Japanese legal systems are. Generally, Islamic law has been applied regionally. Because there are four major schools (*madhahab)* of *sharia* which are employed diversely in different parts of the Islamic world, there have always been wide variations in the interpretation and application of Islamic law according to the different schools and even within the same school as practiced in different Muslim nations.

However, the significance of the extra-national or extraterritorial nature of *sharia* is that, by this quality, it is constitutionally international. That is not to say it is formally or institutionally codified as "international" in the way that there is a separate body of law in the west that is designated as such, and to which individual nations are asked to adhere. It is, rather, a generalized set of divinely ordained moral guidelines for living an ethical life, which are organized into

systems of positive law based on evidence and precedents. These broad moral rules are incumbent upon both the Muslim individual and the community, that is, nation. Sharia, being the literal, perfect word of God, is considered to comprehend all circumstances and exigencies of the human condition, universally, without national or international distinction. *Sharia* recognizes and embodies the concept of a law of nations, and since at least the nineteenth century when Muslim nations began practicing reciprocal diplomacy according to European rules, western and Islamic understanding of that notion have been in harmony.[26] There is, therefore, no innate reason why *sharia* is not adaptable to any of the contemporary international principles of water law being proposed by various international legal organizations.

In a related sense, another aspect of the genius of Islamic culture, which explains in considerable measure its success, has been its capacity for borrowing and adapting the ideas, technology, and practices of other cultures, then Islamicizing the borrowings—particularly customs and institutions—thereby conferring on them a moral legitimacy. However, where water is concerned, more than one scholar has warned of the snare in assuming that "because a society is Muslim, what it does is Islamic."[27]

Islamic law per se offers few specific, hard-and-fast rules governing the sharing and use of water. Water appears in the Quran only about half a hundred times, without a clear legal character or sanctions; rather, the emphasis is on water as the source of life: *Have not the unbelievers then beheld that the heavens and the earth were a mass all sewn up, and then We unstitched them and of water fashioned every living thing?* The traditions (*hadith*) of the Prophet Muhammad offer no more precise legal language than the Quran, as for example: *He who withholds water in order to deny the use of pasture, God withholds from him His mercy in the Day of Resurrection*.[28]

Sharian water law derives in principle and for purposes of taxation from juridical rules governing land. Muslim jurists have consistently treated water, land, and crops as indivisible, and water rights have generally been restricted to amounts considered to be adequate for a given crop area. This is based on one of the few stipulations the Prophet is said to have articulated in a *hadith* concerning water, that the sum of water to be drawn was not to exceed that which is needed to cover a cultivated plot to two ankle's depth.[29] This provision hypothetically fixed the basic legal principle for allocating water in Islamic law. By and large, the relatively few *hadith* concerning water appertain to the rights of ownership to wells and springs, to rights of access to water, the obligation to share water, and prohibitions on selling water. Although for purposes of use, allocation, and adjudication water is segregated according to source—river, well, and spring water, and further into rain, snow, and hail—*sharia* in fact recognizes only two broad categories of water within which all others are comprehended: owned and not owned.

Most Muslim jurists consider water generally to be beyond the pale of private ownership—*mubah* or *res nullius*—that is, a substance which cannot be owned unless it is taken in full possession, such as water contained in a jar. If water is claimed by the state, the ruler is considered to hold it in trust for the community or nation because the Prophet is said to have declared in a *hadith* that *"...mankind are co-owners in three things: water, fire, and pasture."* No person or ruler may appropriate a river or sell, rent, or lease its water nor may he tax such a resource; only a product that results from its use may be subject to a levy by the state.[30]

A profile of the legal personality of Muslim water law reveals it to be highly pragmatic, largely customary, and supple in its aplication of moral principles as guidelines; in summary thus: no persons may be denied water that is necessary for their survival or livlihood; while animals have clear legal rights to water, humans take precedence in use; drinking water for man and beast and for domestic uses take priority over agricultural needs; once all drinking and domestic requirements of the community are satisfied, those living upstream have antecedent rights based on the assumption that the natural course of canalization and therefore settlement proceeds from the upper reaches of a watercourse onward downstream; on the principle of first-in-use, first-in-right, upstream riparians enjoy priority—again, because in Islamic law, in the absence of convincing proof otherwise, they are presumed to be the first settlers; but when new societies are settled upstream after the establishment of downstream communities, the usage rights of the new community are subject to adjudication and their withdrawals must not adversely affect historical prior rights; the hoarding of surplus water, even if all of the needs of the community are met, is forbidden; water is considered to be an overriding community interest, and both Islamic law and the Prophet's traditions deem as immoral its treatment as a product for commerce or speculation. Finally, as an addendum to this summary, sharia rules governing the appropriation of water originate in those that regulate the appropriation of land, to wit, expropriation and use must derive from an input of labor, e.g., building an irrigation canal. Only the fruit of labor matters. It is the irrigation channel and the irrigated field and its crop that may be owned in inalienable right *(mulk)* by virtue of the labor that created them, not the water that flows through the one into the other. Water is the product of Allah's labor, not man's, and therefore can be used only transitorily in accordance with *sharia* and *urf*.[31]

A word is in order about the apparent anomoly in the presumption that the sequence in which a watercourse is settled is from upstream to downstream and the first-in-right principle based on that assumption. One might easily conclude that perhaps only desert dwellers with no experience of river basin settlement could make such an error, but the governing factor was probably the direction in which canalization of water proceeded. In point of fact, historically, settlement in most river basins, particularly those that involve heavy off-stream