# CRWR Online Report 04-12

## Indicators of Water Resources-National Security Policy Linkages

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**May 2004**

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*Abstract*

Water resources and national security policies have become entwined in several international river basins. This linkage creates additional constraints for the water resources professional that might be avoided if it were possible to predict where such linkages could occur and to adopt policies to forestall that eventuality. The author summarizes four international river basin case studies, suggests common factors, reviews other authors' suggested indicators of conflict and suggests several more indicators and a framework that may refine predictions of a linkage between national security and water resources.

## *Introduction*

The occurrence of a linkage between water resources and national security is probably much more significant to water resources professionals than it is to a country's national security apparatus. For the national security professional, this linkage means that water is another factor to be dealt with in the effort to protect a nation and its interests. For the water resources professional, concerned with, among other things, optimal use and allocation, the linkage represents a major additional constraint and a factor that tends to be a trump card in policy debates. The arena of national security policy is normally secretive and often enigmatic. Policies are generally cautious and risk-averse, concerned more with certain security than optimization or cost-efficiency. To some, an attractive aspect of inclusion in the national security policy arena may be increased attention. Additional funding may become available to a sector deemed critical to a nation's security. For example, funding and construction of the Interstate Highway System in the United States, beginning during the Eisenhower administration, was tied to national security.

On the other hand, an examination of the effects of a national security linkage on a nation's water resources policy reveals several undesirable possibilities. Possible drawbacks may include restrictions on information sharing, limits or prohibitions on cooperation with neighbor states, increased infrastructure costs, constraints on development options and secondary effects in agriculture, energy and industry. Each of the case studies reported below shows evidence of at least one of these undesirable effects resulting from a strong national security-water relationship. From a water

resources perspective, avoiding these problems, especially in developing countries, presents perhaps the strongest argument for knowing the likelihood – and if possible preventing – a water resources-national security policy linkage.

## *Methods Used*

This project reviewed a number of published works that deal with conflict and water resources from a basin-wide, country-specific or thematic perspective. Many of these works were used primarily as historical sources, but several provided invaluable insight and conclusions relevant to a discussion of linked national security and water resources policies. Results of the analyses are presented in case study summaries of selected countries in four international river basins – the Nile, Jordan, Indus and Tigris-Euphrates. As the summaries reflect, the analysis concentrated on countries in each basin where the relationship between water resources and national security policy was deemed informative. This is not to suggest that these countries are the only ones in their respective basins where a national security-water relationship is evident. For example, in the Nile basin only Egypt, Sudan and Ethiopia are considered, neglecting the other seven basin countries. The decision not to discuss some countries reflects a desire for brevity and clarity and a judgment, after initial review, that the additional discussions would not add significant new concepts or factors to the analysis.

Drawing from the case studies, a number of common causal/contributing factors are presented followed by a summary of what others have suggested as indicators of conflict in international river basins. These indicators are discussed with regard to their possible utility in forecasting the likelihood of a water resources-national security policy

linkage in countries where that does not yet exist. Finally, additional indicators and a framework for analysis are presented, applied to the case studies and discussed.

## *Case Studies*

### *The Nile River Basin: Ethiopia, Sudan and Egypt*

The Nile Basin includes the sub-basins of two main tributaries, the White Nile and the Blue Nile. Flowing north from Lake Victoria, which sits astride the Equator, the White Nile carries water from Kenya, Tanzania, Burundi, Rwanda, Uganda, and the Democratic Republic of Congo into Sudan. The Sobat River from Ethiopia joins the White Nile in southern Sudan. Further north at the Sudanese capital, Khartoum, the Blue Nile, also originating in Ethiopia, joins the White Nile and the two become the Nile proper. The Atbara, flowing from both Ethiopia and Eritrea, empties into the Nile in northern Sudan. More than a hundred kilometers before it crosses the Sudan-Egypt border, the Nile becomes Lake Nasser, a 6000 $km^2$ reservoir created by Egypt's Aswan High Dam. Below the dam, the Nile continues north, with virtually all of Egypt's development and population contained in its narrow valley. The Nile forms a large delta and empties into the Mediterranean Sea some 6,650 kilometers from the source of the White Nile. For an excellent and concise description of the physical, economic and political geography of the Nile Basin, see Elhance, *Hydropolitics in the 3$^{rd}$ World* (1999).

Perhaps the two largest reasons for the water resources-national security link in the Nile Basin are Egypt's complete dependence on the river and its status as a regional power. Elhance states in a discussion of the Nile Basin that its hydropolitics can be understood only if it is recognized outright that without the Nile's water, Egypt would cease to exist as a viable state. Certain figures support his claim; underground aquifers, Egypt's other major source of water, supply only 4% of Egypt's water.[1] It follows logically that if a regional power considers water resources an element of its national security, other states within its sphere of influence will follow suit. This is the case in the Nile Basin.


Though development along the Nile in Egypt has taken place for centuries, it was only in the early twentieth century that the prospect of development in upstream areas began to threaten significant effects on Egypt's water resources. While most of the countries in the basin were under European colonial rule[2], there was minimal conflict over water. Egypt was

[1] Elhance (1999), 57.

[2] Ethiopia is the only state in the region that was never truly colonized, though Italy occupied the region of the country that is now independent Eritrea. Italy did make some agreements with other European powers

the first to achieve independence from colonial rule, in 1922. In 1929, Egypt signed a treaty with the British government securing a promise that Britain (then governing Kenya, Tanzania, Uganda and Sudan) would undertake no development impacting the Nile's flow into Egypt without Cairo's prior assent. When upstream states gained independence, starting with Sudan in 1956 and followed shortly thereafter by all the other basin states except Eritrea[3], leaders of these new countries all repudiated the restrictions of the 1929 Treaty.

At this point, unsure about the new neighboring governments and faced with likely upstream development, Egypt first openly linked water and national security during a dispute with Sudan.[4] The brief period of hostility with Sudan was ended when a Sudanese military coup installed a government friendly to Egypt. The newfound cooperation between Egypt and Sudan produced the Treaty of 1959, titled the "Agreement for Full Utilization of the Nile Waters." It allocated the waters of the Nile between Egypt and Sudan, essentially ignoring the future needs of upstream countries. No other basin countries accept the validity of the Treaty of 1959.[5]

Egypt's inauguration of the Aswan High Dam in 1971 (constructed with significant assistance from the Soviet Union) represented a major achievement for the nation and has since allowed Egypt to more fully exploit the waters of the Nile, with current usage estimated at 99% of the available flow.[6] The ability of upstream states to affect Egypt's water resources is underscored by the fact that 86% of the water reaching

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purporting to represent all of Ethiopia, but the various governments of Ethiopia have never acknowledged the validity of any of these agreements.

[3] Eritrea gained independence from Ethiopia in 1993 after a nearly 40 years of armed resistance to Ethiopian rule.

[4] Klare (2001), citing Waterbury, *Hydropolitics of the Nile Valley*, 77-86.

[5] Klare (2001), 153 and Elhance (1999), 70.

[6] Kiser (2000), 36.

the Aswan High Dam originates in Ethiopia.[7] Ethiopia has done little to develop its own water resources potential in the northern highlands where this flow originates. This is certainly due in some part to a long civil war followed by several shorter wars with neighboring Eritrea, but Egypt's inclusion of water in its national security policy has no doubt also had a large influence. In 1978 when the Ethiopian government announced plans to divert water from the Blue Nile for irrigation, Egypt threatened to bomb any facilities that would impede the Nile's flow.[8] Doubtless these threats weighed heavily on Ethiopian policy makers as Egypt made peace with Israel that same year and became a recipient of a large continuing stream of aid from the United States. This aid, much of it in the form of military hardware, has widened the power gulf between Egypt and the other Nile Basin countries.

While Egypt's significant economic[9] and military advantages may have served to prevent armed conflict over water for several decades, this stability continues at the expense of potential benefits in the upstream countries. Ethiopia and several other upstream states have significant undevloped hydroelectric and/or irrigation potential. Perhaps the most undesirable result of the water resources-national security linkage in the Nile Basin has been inhibited development.

[7] Kiser (2000), 36.
[8] Klare (2001), 158 citing Beschorner, *Water and Instability in the Middle East.*
[9] 2002 per capita GDP: Egypt: $4,000, Sudan: $1,400, Ethiopia: $700 (CIA World Factbook)

*The Jordan River Basin: Syria, Israel and Jordan*


The Jordan Basin includes portions of Syria, Lebanon, Israel and Jordan as well as the disputed territories of the West Bank and Golan Heights. Sources of the upper Jordan River include the Hasbani River (Lebanon), the Banyas River (Syria and the Golan Heights), the Dan River (Israel), and the Yarmuk River. The Yarmuk drains areas of Jordan and Syria, flowing along Jordan's northern border with Syria and the Golan Heights until it reaches the Jordan River. The Hasbani, Banyas and Dan contribute to the inflow to the Sea of Galilee, also known as Lake Tiberias or Kinneret. Ten kilometers below the Sea of Galilee, the lower Jordan receives significant flow from the Yarmuk. The lower Jordan River continues southward, forming the border between Jordan and Israel and then the border between Jordan and the West Bank, before finally emptying into the Dead Sea.

As seen in the Nile Basin, events of the last century have caused a linkage between water resources and national security policy. Following World War I and the breakup of the Ottoman Empire, the Middle East was divided into British and French Mandates. The French granted independence to Lebanon in 1943 and to Syria in 1946. British Mesopotamia and Palestine became Iraq (1932), Jordan (1946) and Israel (1948).

When the United Nations voted to divide Palestine into Arab and Jewish areas, the Arab areas included the West Bank, which Jordan occupied shortly thereafter in the Arab-Israeli war of 1948. Jordan formally annexed the West Bank in 1950, but this annexation was not widely recognized and Jordan has since symbolically relinquished its claim on the West Bank to the Palestinian people.

In the 1950's, Israel, Syria and Jordan all crafted plans for use of the waters in the Jordan Basin. The United States, hoping to score a victory for cooperation in the region, also crafted a plan, known as the Johnston Plan, in cooperation with Israel, Jordan and Syria. After securing tentative agreement from technical representatives of all sides, the plan fell apart when rejected by political leaders. Reportedly, Israeli leaders were unwilling to sign away any rights to the upper Jordan and Sea of Galilee and Arab leaders were unwilling to agree to anything that could be interpreted as recognition of the State of Israel.[10] Another view is that the U.S. refusal in 1956 to fund construction of the Aswan High Dam in Egypt caused Egypt's President Nasser to abandon the Johnston Plan, thus ruling out Arab approval.[11]

Exclusive development plans continued, with Israel constructing its National Water Carrier, a system of canals, pump stations and tunnels, to transport water from the Sea of Galilee to coastal areas and southern Israel. This transfer is significant from a technical standpoint because it moves water out of the basin, going against a commonly stated international principle that water should not be diverted outside a, international basin unless all states in the basin have enough water. The National Water Carrier was steadfastly opposed by the Arab states, and in 1953 Syrian artillery fired on construction

[10] Klare (2001), 168.
[11] Cooley (1984), 12-13.

sites, forcing relocation of some facilities.[12] Separately, Jordan proceeded, aided by an agreement with Syria and funding from the United States, with a plan to divert irrigation water from the Yarmuk River upstream from Israel. The East Ghor Canal was built to transport the water south to agricultural areas. The East Ghor Canal was completed in 1963 and the Israeli National Water Carrier in 1964.

The Arab states and Israel were each unhappy with the other's diversion plans and tensions rose throughout the early 1960's. At an Arab summit in 1960, unhappiness with Israel's National Water Carrier led to an "All-Arab" plan to divert water from tributaries of the upper Jordan, effectively routing it around the intake of the National Water Carrier. Learning of the plan, Israeli leaders issued stern warnings that Israel would treat any diversion as an attack on its vital interests and a threat to peace. When construction of the diversion works began four years later, Israel made good on its threat, repeatedly bombing and shelling the construction sites. Confrontation between Israel and the Arab states, primarily Syria and Egypt, grew over this and other issues, culminating in the Six Day War of June 1967.

In the Six Day War, Israel occupied the Golan Heights and the West Bank, accomplishing what no other nation has done by force in recent times: changing its status from lower to upper riparian. Occupation of the Golan Heights gave Israel control over the headwaters of the Banyas as well as complete control over the shores of the Sea of Galilee and strategic terrain essential to protect key low-lying water resources in Israel. By denying this terrain to Syria, Israel ensured the security of its most critical and vulnerable water resources.

[12] Cooley (1984), 10.

Occupation of the West Bank gave Israel increased access to the Jordan River, but more important to Israel's water security, it gave Israel control over the Mountain Aquifer. This aquifer underlies most of the western half of the West Bank and flows toward Israel. Not only does occupation of the West Bank give Israel increased access to the Mountain Aquifer, but it allows Israel to control all withdrawals from the aquifer and limit activities that might pollute the groundwater before it flows into Israel.

Since 1967, discussion of the occupied territories and demands for their return to Syria and the Palestinian people has overshadowed the debate over water resources. To some extent the occupation has made the water situation more stable, though not more equitable, in the Jordan Basin. Since Israel is both the most powerful state and an upper riparian (with the exception of the Hasbani and Yarmuk rivers), there is less chance of conflict over water. Nonetheless, all the countries concerned still have significant and growing water needs in the face of a finite or perhaps diminishing supply. Water resources policy in the region remains interwoven with national security and national identity.

John Cooley, a longtime correspondent in the Middle East, writes that the water issue was central to the formation and the policies of the Palestine Liberation Organization (PLO) and Yasir Arafat's group, Fatah. He concludes that it was no accident that the first attack carried out by Fatah against Israel was an attempt to sabotage the Israeli National Water Carrier in December 1964.[13] Tension between Palestinian groups and Israel continued into the 1980's and spread to include larger portions of the Palestinian population when the first *intifadeh* began in 1987. Concern over unfair water

[13] Cooley (1984), 15.

policies in the occupied territories and the Israeli "usurpation" of water is cited as a one of many factors fueling the uprising.[14]

The 1990's saw renewed peace efforts and some limited results. Israel and the Palestinian Authority recognized each other in 1993. Jordan and Israel signed a peace treaty in 1994 that included a section on water which allocated the flow of the Yarmuk between the two countries. In 1995 the Palestinian Authority and Israel signed an Interim Agreement that acknowledged certain Palestinian rights to water and allowed the Palestinian Authority a role in water allocations in the West Bank. Since 1995, the general situation in the occupied territories has worsened and there has been little additional progress on the diplomatic front. The second *intifadeh* began in 2000 and continues as of this writing.

The strong policy linkage between water resources and national security that exists in the Jordan Basin needs to be viewed in the context of the Arab-Israeli conflict. Water concerns contribute to the conflict itself, but the conflict also has an effect on water policies, causing basin states and the Palestinian people to view water in the context of national security.

*The Indus River Basin: India and Pakistan*

Though the primary issue of contention between India and Pakistan has long been the status of disputed Kashmiri territory, their water policies were for a short time linked to national security. Some analysts conclude that water policy in the Indus Basin may

[14] Klare (2001), 171.

again enter the national security arena if current trends of rapid population growth and environmental decline lead to food shortages in the future.[15]


The Indus River has its source in western Tibet and flows briefly through Chinese territory before entering Indian controlled Kashmir and then flowing into Pakistan. In northern Pakistan it is joined by the Kabul River, which flows out of Afghanistan. Four other rivers which arise in northern India or Indian controlled Kashmir, the Jhelum, Ravi, Chenab and Sutlej combine to form the Panjnad River, which joins the Indus in central Pakistan. From this point, the Indus remains in Pakistan along its course to the Arabian Sea.

Modern development of water resources in the Indus Basin began under British colonial rule in 1859. By 1915, canals crisscrossed the basin, providing for irrigation and flood control. In one of the earliest examples of basin-wide management, the British harnessed much of the potential of the rivers to greatly increase the region's agricultural productivity. In August 1947, the partition of colonial India into the states of India and Pakistan resulted in a split in the basin's water resources. The territory of Pakistan included the majority of the basin's canal network and agricultural land, but the upper reaches of the Indus as well as the headwaters of all the major tributaries of the Panjnad

[15] Klare (2001), 188.

lay in India. This placed India, already the more powerful state, in the position of upper riparian, though most of the benefit of the basin's waters was given to Pakistan.

A temporary Standstill Agreement governed operation of the canal network, but when it expired on March 31, 1948, India stopped supplying water to several key canals flowing to Pakistan. The results were crop failure in over one million acres of irrigated Pakistani farmland and a widespread famine.[16] Pakistanis reacted angrily with calls for military action, but the Indians downplayed the issue as a misunderstanding. Negotiations led to another temporary agreement. In 1952 the World Bank began mediating the contentious dispute. Eight years of mediation finally produced the historic Indus Waters Treaty (1960) between the two countries. Though the treaty did not re-establish basin-wide development and management, its scheme of divided operation has held up through a war in 1965 and continuing tension between the two states.[17] To date, it has successfully suppressed the linkage between water resources and national security in the Indus Basin.

*The Tigris-Euphrates River Basin: Turkey, Syria and Iraq*

Both the Tigris and Euphrates Rivers arise in Turkey's southeastern highlands and eventually flow into the Arabian (Persian) Gulf. The Euphrates flows south from Turkey into Syria, flowing then southeast through the most populated areas of the country and crossing into Iraq, where it continues southeast until it meets the Tigris. The Tigris River flows southeast from Turkey across a short stretch of Syrian territory before entering Iraq. The two rivers nearly converge in central Iraq, near Baghdad, and from there they

[16] Klare (2001), 184.
[17] Klare (2001), 186.

follow generally parallel courses through southern Iraq before joining to form the Shatt-al-Arab which flows on to the Gulf. The border between Iraq and Iran runs down the center of the wide Shatt-Al-Arab for a time, and several small tributaries flowing from Iran join the Shatt shortly before it empties into the Gulf.


Syria is highly dependent on the Euphrates and Iraq is completely dependent on the two rivers. Though not as dependant as its southern neighbors, Turkey has the most ambitious development plans for the rivers. The Southeastern Anatolia Project (commonly known by the Turkish abbreviation GAP) is an ongoing $32 billion multi-year effort involving the construction of 21 dams and extensive infrastructure to spur economic development and job creation in Turkey's southeast.

History records numerous conflicts over and involving water in this basin – some more than two thousand years ago, however, these are not particularly informative in the context of modern water resources or national security. Modern instances of the relationship between national security and water policy were brought into public view in 1975 and 1990.

Following the 1973 Arab-Israeli war, Iraq openly criticized Syria's military losses on a number of occasions, and the Syrians responded by altering the flow of the

Euphrates to interfere with Iraqi agriculture. In 1975 Syria impounded much of the spring flood to fill the reservoir behind a new dam. Iraq, accustomed to receiving the entire spring flood and counting on it for its farmers, reacted with angry rhetoric. Tensions ratcheted up quickly. The two countries cancelled commercial air links, withdrew military attachés from each other's capitals and stationed additional armed troops on their shared border. Only through mediation by the Saudi Crown Prince and the Soviet Union did the two countries back down and Syria agree to release additional water to Iraq.[18] Though Saudi Arabia proposed a plan for sharing the waters of the Euphrates, Syria and Iraq did not reach agreement until the next crisis convinced both countries of the need to do so.

In meetings throughout the 1980's it became clear that the claims of the three countries on the waters of the Euphrates significantly exceeded the average flow. Turkey agreed to provide Syria a minimum flow, but the flow equaled the amount demanded by Iraq, which would leave Syria able to consume nothing.[19]

In late 1989, Turkey announced plans to use the entire flow of the Euphrates for one month to begin filling the giant reservoir behind Ataturk Dam, the largest dam in the GAP. Though Syria and Iraq protested, Turkey went ahead with the diversion for exactly one month and the flow of the Euphrates subsided to a trickle. Though this event occurred during the winter and caused little actual harm, it convinced Syria and Iraq of the need for a water sharing agreement. They signed one several months later.

Following the Ataturk Dam incident, Iraq was occupied with its invasion of Kuwait and subsequent ejection by the United States and a large coalition. Syria, less

[18] For a more complete discussion, see Klare (2001), 176-177 and Elhance (1999), 142-143.
[19] Elhance (1999), 143.

occupied but unable to seriously challenge Turkey militarily, stepped up support for Kurdish Workers Party (PKK) rebels, most significantly by allowing the use of bases in Syria. Throughout the 1990's the conflict between Turkey and the PKK intensified until Turkey declared in 1998 that Syria's support for the PKK constituted an undeclared war. Turkey moved large numbers of troops to the border region and threatened an air assault and ground invasion. Regional leaders met to try to diffuse the crisis and in October 1998 Syria agreed to close PKK bases and hand over the PKK leader to Turkey.

Elhance concludes that Turkey's position as upper riparian and most powerful state in the basin allows it to treat the two rivers as though they are not international rivers to which Syria and Iraq have rights.[20] Klare suggests that recent history and Turkish development plans for the two rivers have set the stage for a series of recurring crises over water in the Tigris-Euphrates Basin.[21] It seems clear that Syria and Iraq will continue to maintain a strong link between their national security and water resources policy, especially since Turkey appears to be continuing a development policy that gives its southern neighbors reason to worry about the future quality and quantity of their main water resources.

## *Discussion*

Several common factors seem to be present in all of these case studies. Each of the basins contains a country or countries with arid climates and significant irrigated agriculture. All basins exhibit a military and/or economic power imbalance between basin states. Each basin also has significant, non-water-related disputes. In some form or

[20] Elhance (1999), 145.
[21] Klare (2001), 181.

another, development has taken place and/or is proposed that does not consider the needs of key basin states. Finally, each basin has been and/or continues to be influenced by outside powers such as colonial powers or superpowers.

In the Nile Basin, Egypt is the driving force in establishing the link between water resources and national security. While militarily and economically the strongest state, it is the most vulnerable with respect to water. Egypt's policies have effectively inhibited development of water resources in other basin countries by threatening their national security. Colonial governance in the early Twentieth Century and the influence of superpowers during and since the Cold War has added to the power imbalance that favors Egypt and to the inequitable development of basin resources.

In the Jordan Basin, the overall Arab-Israeli conflict and the Israeli-Palestinian conflict provide a volatile setting that combines with scarce water resources to place water resources firmly in the national security arena. Using military superiority, the world's leading efficient irrigation techniques and extensive engineering, Israel has improved its water resources position. Unfortunately, this has come somewhat at the expense of Jordan, Syria and the Palestinian people.

India's military dominance in the Indus Basin has been somewhat equalized since Pakistan revealed its own nuclear capability, but India still maintains large advantages in conventional military forces and economic power. The linkage between water resources and national security developed rapidly in the antagonistic atmosphere that surrounded partition. Another key factor was that infrastructure built in the colonial period did not lend itself to workable operations in the post-partition political layout of the basin.

In the Tigris-Euphrates Basin the linkage between water resources and national security is largely based on probable future outcomes of known development plans. Turkey's economic and military dominance, strong upper riparian status and willingness to act unilaterally has convinced downstream states that the future bodes ill for their water resources. Given the dependence of Syria and Iraq on the waters of the Tigris and Euphrates, it is clear why each would see this as a threat to its national security.

Postel and Wolf suggest that three trends common in basins with water-related conflict may serve as indicators of possible future conflict.[22] These are: (1) An attempt to unilaterally develop an international river, often by a regional power. (2) A large or rapid change in the physical setting (such as a new dam or irrigation scheme) or in the political setting (such as break-up of a country) that creates new riparians or new international rivers. (3) That existing institutions or mechanisms are unable to cope with the change(s).

At first glance these seem reasonable as indicators of possible conflict. If applied to each of the four basin case studies examined previously, they would forecast likely conflict. In each of the basins, a link developed between water resources and national security policies. So might these indicators also be used to forecast a linkage between water resources policy and national security policy? How similar is the likelihood of conflict to the likelihood of a linkage of policies?

Postel & Wolf's first two indicators, concerned with physical or political changes and unilateral development, apply reasonably well to a forward-looking analysis. Though political changes are not always easy to predict, one can postulate multiple possible outcomes of current situations and estimate the associated water resources

[22] Postel & Wolf (2001), 63-64.

effects of each. Predicting the effects of physical change is comparatively straightforward, with the possible exception of the debated issue of climate change. Uncertainty notwithstanding, policy makers may well find that unilateral development and physical or political change remain useful indicators of likely conflict in international river basins. These indicators should also be useful in determining whether a water resources-national security linkage is likely.

Unfortunately, Postel & Wolf's third indicator is not nearly as useful for a forward looking analysis. It is correct to state, and fairly simple to determine from a retrospective analysis of conflict, that existing institutions or mechanisms were unable to cope with change. The four cases examined earlier bear this trend out, but it seems to be a catch-all description for a multitude of unique factors. Given the complexity of international relations and the uniqueness of each international river basin, how easy is it to determine if existing institutions or mechanisms – subject to the vagaries of personality, politics and bureaucracy – are capable of coping with a possible future change? Even if a basin has no institutions or mechanisms set up to handle water disputes, might not one be created in response to a dispute? This is essentially what happened in the Indus Basin. Partition was soon followed by dissolution of the water resources management mechanism, but the ensuing dispute provided impetus for the signing of the Indus Waters Treaty. The treaty has effectively suppressed conflict over water and prevented a water resources-national security policy linkage since.

If it is too difficult to predict in advance whether mechanisms and institutions will be able to cope with change, what else might one use to accurately estimate the likelihood of a water resources-national security policy linkage? After all, change in some form is

as certain as the continuing human need for water. The author suggests two additional indicators that, when used in conjunction with the two proposed by Postel and Wolf, form a more complete framework for predicting the emergence of a water resources-national security policy linkage. The framework is summarized in the following table:

| **I.**<br>**At least one applies:** | | **II.**<br>**At least one applies:** |
|---|---|---|
| *Unilateral Development*<br><br>An attempt to unilaterally develop an international river, often by a regional power.<br>*(Postel & Wolf)* | | *Non-Water Tensions*<br><br>Significant non-water-related tensions exist in the basin. |
| | **and** | |
| *Major Change*<br><br>A large or rapid change in the physical setting (such as a new dam or irrigation scheme) or in the political setting (such as break-up of a country) that creates new riparians or new international rivers.<br>*(Postel & Wolf)* | | *Scarce/Vulnerable Water*<br><br>At least one basin state's water resources are vulnerable or nearly fully utilized (or both). |

In this framework if at least one indicator from each column exists, the conditions are present for a water resources-national security policy linkage. The presence of three or four indicators signifies an even higher likelihood of such a policy linkage. Certainly, there are other situational factors too complex and numerous to discuss here that will play into any state's decision on whether to link policies. The author's hope is that a simple framework such as this may provide a tool for water resource professionals to assess

whether national security concerns are likely to impinge on water resources policy discussions. A preliminary examination of this framework is possible by revisiting the Jordan, Nile, Tigris-Euphrates and Indus basin case studies.

*Framework application: Nile Basin*

The Nile Basin offers strong past examples of *unilateral development* and *scarce/vulnerable water*. *Major changes* and *non-water tensions* are less applicable to the past but perhaps more likely to be conditions found in the future.

Egypt's *unilateral development* of the Aswan High Dam enabled more regulated and efficient usage of the waters of the Nile. This has allowed Egypt to use more of the water that flows across the Sudan-Egypt border – in fact nearly all of it. As a result Egypt has become a prime example of *scarce/vulnerable water*, with water resources that are near full utilization and vulnerable. Egypt's greatest concern with water is that upstream states will reduce or manipulate the flow in a way that conflicts with its usage. The clear linkage between Egypt's national security policy and its water resources policy stems largely from this issue.

Considering the future of the Nile Basin, it is not clear how much the emergence of Eritrea as an independent state will affect water policies. A much more worrisome change is the possible two-state solution to Sudan's long-running civil war. In the unlikely event Sudan were divided into a predominately Arab northern state, almost certain to maintain close ties to Egypt, and a predominately Christian southern state, more likely to oppose Egypt and perhaps side with Ethiopia, the entire political landscape of the Nile Basin would experience a *major change*. It is unlikely that the tensions that

have fueled Sudan's civil war would dissipate entirely with a two-state solution, and any remaining disputes would now be interstate disputes, representing *non-water tensions*. From this brief analysis, the framework would indicate that the water resources-national security policy linkage is likely to continue, perhaps strengthening, in the coming years. A fairly recent development of note is the launch in 1998 of the Nile Basin Initiative (NBI), a "cooperative framework" including all basin states except Eritrea. At this time, it is unclear whether the NBI will be successful in weakening the linkage between national security and water resources policies, but it appears to be a positive step in that direction.

*Framework application: Jordan Basin*

In the latter half of the 20th century, the Jordan Basin saw conditions fitting all four indicators. Looking forward, conditions appear likely to reflect at least three of the indicators for the near future.

The basin underwent *major change* in the 1940's as states gained independence from European Mandate authority. Formation of the State of Israel in 1948 and the three subsequent wars between Israel and its neighbors have been defining political changes. Until the mid-1990's *unilateral development* was the norm in the basin, with Jordan, Syria and Israel each undertaking major projects at one time or another. The Jordan basin is perhaps the best example of *non-water tensions* influencing a link between water resources and national security. Finally, *scarce/vulnerable water* conditions are found in Jordan and Israel – both extremely dependent on the Jordan River.

*Scarce/vulnerable water* conditions seem almost certain to prevail in the future unless desalination becomes more affordable and much more widely used. *Non-water tensions* will persist until Israel, its Arab neighbors and the Palestinian people make peace. Ironically, any such peace settlement will most likely produce new *major changes* in basin politics and political boundaries. The riparian claims of any new Palestinian state are almost sure to conflict with current usage of Jordan River waters by Israel and Jordan. Significant *unilateral development* seems like the indicator least likely to recur. Jordan and Israel have shown a willingness to cooperate on water projects, and Israel and the Palestinian Authority even cooperate to some extent in the water sector. On the other hand, Israel's recently increased interest in unilateral security solutions may cast doubt on this assumption.

*Framework Application: Indus Basin*

Applying the framework to the Indus Basin, past conditions reflected three indicators. Looking to the future, it seems likely that conditions will persist for only one indicator.

The partition and independence of India and Pakistan in 1947 represented a *major political change* for the Indus Basin. *Non-water tension* over Kashmir rapidly emerged. When the standstill agreement for operation of the shared canal network expired in 1948, India curtailed flow in key canals feeding Pakistani agriculture. This represented a *major physical change* for Pakistan. It also highlighted Pakistan's *vulnerable water* position as lower riparian. Signing of the Indus Waters Treaty in 1960 has so far effectively suppressed the water resources-national security policy linkage.

The likelihood of a reemergence of a policy linkage between water resources and national security in the Indus Basin looks fairly low. Since the Indus Waters Treaty has effectively addressed the conditions of *major change* and *vulnerable water* resources, it appears that the only persistent indicator will be *non-water tension* over Kashmir.

*Framework Application: Tigris-Euphrates Basin*

In the Tigris-Euphrates Basin, past conditions reflect all four indicators and future conditions may exhibit all four as well. Turkey's Southeastern Anatolia Project (GAP) is *unilateral development* that has had a great impact in the basin. The diversion of 100% of the Euphrates' flow for a month to fill Ataturk dam was a *major physical change*, albeit temporary, for Syria and Iraq, and it signaled Turkey's power and willingness to manipulate their *scarce/vulnerable water* resources. Though Turkey has not taken such dramatic actions again, both downstream countries remain vulnerable to Turkey's continued plans to develop the rivers within its own borders. Significant *non-water tension* existed between Turkey and Syria over the Kurdish separatist movement.

Looking forward, the future of post-Saddam Hussein Iraq appears to be the largest single source of *major political change* in the basin. The recent war, occupation and ongoing transition to a democratic government are significant political changes for the region. It remains to be seen if any new alliances will emerge in the basin. Should Iraq devolve into multiple independent states rather than the federation currently envisioned, one of those states would almost certainly be a Kurdish majority state in the north of today's Iraq. This state would be a lower riparian from Turkey but an upper riparian with

respect to the remainder of Iraq. The impact on Tigris-Euphrates hydropolitics of such a redrawing of borders could be dramatic.

It is also unclear today whether the political changes in Iraq will increase, decrease or just change tensions in the region. It is likely that some *non-water tension* will remain, especially between Turkey and whatever Kurdish entity eventually emerges in or from Iraq. The framework indicates a high likelihood of a continuing, perhaps strengthening, water resources-national security policy linkage.

## *Summary and Conclusions*

It may not always be detrimental to progress in the water resources sector to have a link to national security, but in general, it will dramatically change the factors under consideration by policy makers. Efficiency and sustainability may take a back seat to other concerns seen as more pressing to the security or interests of the state. Therefore it seems useful, especially for water resources professionals, to be able to look ahead and determine if this linkage is likely. It may not always be possible to avert the policy linkage, but it is hard to imagine a situation where early warning would not be helpful.

Basin-wide management is strongly advocated by many as the solution to many problems in international river basins, yet nations remain the primary actors and policy making entities in most of those river basins. Therefore it is appropriate to consider how nations will formulate water resources policy vis-à-vis the other states in the basin. Among the many concerns that affect international relations, national security is one of the most forceful. States are least willing to accept interference in their affairs or cede

control to any multinational organization when they judge that issues of national security are at stake.

War over water has been the subject of much discussion and writing, and while it may be interesting to debate whether the coming years will bring wars over water, it seems much more useful to consider how the policies that affect water will be made. Postel and Wolf make the point that trying to determine when and where the next war over water will happen misses the point. They do not deny the possibility of another war over water in the next century, but pointing out that the last such war was 4,500 years ago in Mesopotamia, they assert that it is more important to recognize that scarcity of water causes damaging tensions within and between nations. [23] In a sense this paper looks at the other side of the coin and comes to a similar conclusion. From a water resources perspective, it seems more useful to consider whether or not nations will treat water resources in the context of their national security policy. The answer to this question will be much more relevant to most countries in international river basins than a debate over water wars.

[23] Postel & Wolf (2001), 60.

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