Understanding environmental security: water scarcity, the 1980s' Palestinian uprising and implications for peace

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DID WATER SCARCITY precipitate the 1980s' *intifada* – the violent conflict between the Palestinians and the Israelis? This difficult question is the type of issue with which environmental security researchers grapple. Obviously, violent conflict results from multiple factors, such as ethnic tension, failed deterrence, and misperception. The environmental security analyst must untangle the sources of conflict to determine whether the violence would have occurred had not environmental resource scarcity been a factor. In other words was Israeli and Palestinian water scarcity the precipitating factor for the *intifada*?

Environmental security is an emerging and vigorously debated subfield of security studies. Although Cold War issues have dominated the international security research agenda for the past fifty years, a different set of global dangers – earlier overshadowed by the East–West conflict – now receive more attention (Lynn-Jones and Miller, 1995). In the field of security studies, the focus has now changed, for example, from how to reduce the risk of nuclear war between the superpowers to how to alleviate a broader range of potential global and regional conflicts (Dabelko and Simmons, 1997; Matthew, 1995). The growing attention given to renewable resource scarcity and to its negative impact on human welfare is redefining security to encompass environmental issues (Mathews, 1989; Ullman, 1983; Brown, 1977). In redefining security studies, some analysts have challenged the status quo *statist* approach for examining environmental scarcity (Myers, 1993; Gurr, 1985). In response, more traditional security scholars have argued that the definition of environmental security dilutes the true meaning of security. Security ought to be left narrowly focused on military threats, they argue, if it is to be a useful concept and effectively operationalized. In particular, security studies' scholars such as Stephen Walt and Lawrence Freedman object to including the environment in the research agenda. Freedman argues that 'once anything that generates anxiety or threatens the quality of life in some respects becomes labelled a "security problem", the field risks losing all focus' (1998: 53; Walt, 1991).

Indeed not all environmental problems are relevant to security studies. Most environmental issues have more to do with international co-operation, economics and demography than with questions of force and conflict (Haas, Keohane and Levy, 1993). Some environmental problems, though, in particular resource scarcity, can be a source of political tension and may contribute to violence within and between states. The environmental security subfield has dodged the tricky issue of defining security by initially focusing on instances where environmental problems clearly lead to acute conflict, because, as Paul Diehl and Nils Gleditsch point out, the 'conceptual debates about whether to include environmental security in the realm of traditional security studies are moot if there are no empirical connections between the environment and violent conflict' (2001: 3). The focus, then, for many environmental security scholars is not to debate the definition of security, but rather to examine the linkage between resource scarcity and violent conflict and to understand the relationship between the politics of scarcity and international relations (Homer-Dixon, 1999; Homer-Dixon and Levy, 1996).

Water scarcity is a pivotal environmental security issue. Fresh, renewable water is a precious resource today in much of South Asia, northern China, parts of Africa and in the Middle East. These regions find it increasingly difficult to provide sufficient water for agriculture, industry and household needs. In regions such as the Middle East that suffer from seasonal drought, if not from continual water crises, perceived discrimination in the distribution of resources is a highly sensitive question. Many affected riparians, as well as specific domestic groups, view water scarcity as a threat to their existence, and so well worth fighting for. Moreover, water scarcity issues inevitably become co-mingled with other factors and so may play a significant role in heightening tensions among feuding parties. Some of the most enduring conflicts in the international arena, including the Arab–Israeli conflict, the India–Pakistan dispute and the Syrian–Turkish conflict, to name only a few, have all involved serious disagreements over sharing common water resources (Elhance, 1999). Additionally, when riparians are engaged in an extended cold war, strained political and military relations make co-operation more difficult and outright conflict more probable. This is the case in the Middle East, the region most likely to experience future conflict over water. By looking at this region, we are better able to understand the issue of water scarcity and conflict, and to develop and test an approach to analysing environmental security, in general. In this chapter, the term 'environmental security' is most appropriate when states or domestic groups are experiencing intense renewable resource scarcity and where a lack of effective domestic or international institutions further aggravates the problem.

This chapter first clarifies those concepts that have led to confusion in the water scarcity and environmental security literature. The second section offers

arguments why water scarcity rarely causes war, and then considers how scarcity under certain circumstances can nevertheless lead to acute conflict. Examined here is a 'most likely' case, which is intended to validate the environmental security hypothesis that water scarcity under certain conditions can lead to violent conflict. The focus here is on warlike acts in relation to water disputes prior to the advent of the 1987 Palestinian uprising. Finally, the implications of water scarcity for the ongoing Middle East peace process are examined. In this case, water scarcity is perceived as an important factor prior to the onset of violence. There is an important relationship between water scarcity and violence, although other variables are also at work.

A better understanding of water and politics

For environmental security to be a productive subfield of security studies, it must have focus. Environmental security analysts cannot merely state that 'water is a big issue!' or claim that 'there are serious risks of future "water wars"' (Gannon, 2000: 6). Environmental security scholars must be precise about what they are explaining, about causal relations, and in defining key concepts. This section differentiates between domestic and international water conflicts, explains the causal relationship between water scarcity and conflict, and clearly defines the terms 'violent water conflict' and 'environmental scarcity'.

To better understand the connection between scarcity and conflict, it is important to differentiate between water conflicts that are *intra-national* (for example, the *intifada*) and those that are *international* in scope (for instance, the 1960s Jordan River clashes between Israel and Syria). Since the end of the Second World War, most of the violent conflict around the globe has occurred in or between developing countries. Slow development and modernization, weak government and ethnic conflicts create instability within these states. Deep-seated ethnic, political, economic and regional animosities can drive intra-national conflicts. Furthermore, intra-state water conflict may result from unequal social distribution of water, from relocation of large numbers of people due to the construction of dams and other major water projects, and from weak or failed states that are unable to provide a sufficient or expected quantity of water for their citizens. These domestic problems, in turn, can put pressure on governments to increase the water supply from international sources at the expense of other states, so that 'domestic' problems are often inter-state problems in the making. In the past fifty years international water conflicts have rarely occurred, and never between industrialized states. Such conflicts usually involve developing states that share a common water source and rely heavily on their agricultural sector. Often developing world riparians lack the political and institutional expertise to resolve their scarcity dispute peacefully.

While scholarly and popular discussions of the subject tend to muddle the different levels of water conflict, this study differentiates between water wars, water-related acute conflict, and tactical attacks on water facilities. Unlike the other two categories of water conflict, tactical attacks on water facilities occur during wars and are a result of military and not political objectives. For example, during the 1991 Persian Gulf War, both sides targeted dams, desalination plants and water-conveyance systems because they had a tactical military value during the war, not because the warring states had a water dispute. In a water war, by contrast, mass organized violence is the method for resolving a water conflict between states and it results, by definition, in over 1,000 civilian and combatant deaths (Singer, 1972). It is true, as geographer Aaron Wolf notes that in the last 4,000 years 'there has never been a single war fought over water' (1997: 8). However, water scarcity certainly has been one of many issues that initiated violence, not as a precipitant, but as an intermediate or long-term factor. An acute conflict, unlike war, has limited scope and size but still involves violence,¹ as was the case in the 1960s Israeli attacks on Syrian and Lebanese Jordan River diversion projects. While water was a primary reason for the conflict, it was not the only cause of the fighting, and, unlike a war, the violence was limited (Baechler, 1998: 8).² These conflicts may be contributing factors to a larger conflict, as illustrated by the events leading to the 1967 Arab–Israeli War (Bickerton and Klausner, 1998). This chapter deals primarily with the political tension that conceivably leads to acute conflict. The challenge is to understand how and why water scarcity leads to political tension and then how those pressures result in acute conflict.

Since the function of water scarcity varies from case to case – ranging from mere background noise to a direct trigger of violent conflict – it is important to clarify its role. A trigger is anything that serves as a stimulus and initiates a reaction. More specifically, a trigger can predispose an actor, who previously preferred non-violence, to seek violent action. For example, the damming of a river can result in acute water problems for lower riparians, and if this action is carried out to deny access to resources, the water issue is a trigger. In this case, the water issue becomes an exogenous or necessary factor for violent conflict – in other words, the conflict would not otherwise have occurred without the water scarcity issue (Baechler, 1998: 35–8). On the other hand, the water issue can also provide a secondary reason for conflict. Unlike a trigger, a secondary reason is background noise that can vary in importance, but is not an exogenous causal factor. This chapter's focus is on international and intra-national acute conflict over scant renewable water resources to determine when water scarcity should be considered an exogenous causal factor.

A distinction should be made, as well, between the two types of natural resource – those that are non-renewable, such as oil and gold, and those that are

renewable, such as river water, most groundwater, and air. A non-renewable resource, by definition, has a finite supply, while a renewable source receives incremental additions over a period of time. A renewable that is not degraded or depleted will continue to be available, although if it is over-exploited it can become non-renewable. For the most part, non-renewables are not interdependent and so are less difficult to study (Homer-Dixon and Blitt, 1999: 2). For instance, depletion of oil does not affect a nearby supply of gold. However, renewables such as water and air are usually part of an ecosystem and thus are interdependent. Given this fact, renewable analysis should consider all relevant environmental factors that affect the supply, such as pollution, global warming and human population growth.

Isolating how individual factors affect renewable resources can prove difficult because of this interconnection. We can reduce water scarcity and environmental scarcity in general to three types: increased demand (either because of population growth or greater per capita consumption); decreased supply (due to pollution); or unequal social distribution (as occurs when a government concentrates a limited supply in the hands of one part of the population while the rest experiences shortages). These factors usually interact with one another, though, and are pivotal in understanding the dynamics of scarcity (Homer-Dixon and Blitt, 1999: 5–7). Given the fact that international conflict affects the status of renewable resources so profoundly, the field of environmental security focuses only on this class of resources.

The water non-conflict thesis

Although this chapter sees water scarcity as an important factor in some conflicts (and therefore as a legitimate subfield of security studies), it is important to recognize that water scarcity rarely leads to violent conflict, and never *precipitates* war by itself. Proponents of the water non-conflict thesis primarily argue that this is because states and domestic groups utilize human ingenuity through market mechanisms to mitigate the negative impact of water scarcity. This point of view sees international rules and laws as helping to decrease state insecurities over water scarcity. Informal or formal international institutions or regimes enact rules between states that prescribe roles, constrain activities and shape expectations (Keohane, 1989: 383). They also provide critical information, reduce transaction costs, establish focal points for co-ordination, and facilitate reciprocity (Keohane and Martin, 1995: 42). This is critical for states that seek to co-operate in an international environment but lack the means to enforce agreements, since, according to the institutionalist literature, cheating or non-compliance is the greatest obstacle to co-operation (Keohane, 1995; Kratochwil, 1995). These obstacles to co-operation are of course, exacerbated in a protracted conflict.

While general international water law has been ineffectual, bilateral and multilateral treaties that address the issues of water allocation, pollution and other aspects of joint management have been effective in reducing water related conflicts. In fact, some 145 water-related treaties have been ratified in the past 100 years (Wolf, 1997: 10). Both the International Court of Justice and the 1997 Convention on Non-Navigational Uses of International Water Courses encourage states to negotiate water disputes and to carry out joint-management activities. State leaders have multiple interests: thirsty states might need water but they also have other priorities, such as foreign aid and trade, which might be negatively impacted by aggressive military action to capture water resources. For instance, a powerful state not directly involved in the water dispute, such as the United States (US), might use its influence to prevent a water dispute or a violation of an agreement from degenerating into violent conflict by threatening economic sanctions against the aggressor. And, in general, governments are reluctant to use violence to realize their water-related interests. A strong international norm exists, which member states codified in the United Nations Charter, which obligates states to resolve all disputes peacefully. While wars do occur, states are usually hesitant to challenge this principle of international law. In addition, waging war is a complicated prospect. If an upstream state builds a disputed dam, then a more powerful downstream state has a tactical target. Capturing a source of water is difficult unless a state is willing to be an occupying force, which today has many political, military and economic drawbacks (Orme, 1997–98: 143). Because inter-state war is not an attractive option, states have often resolved their water disputes through means other than violent conflict.

Proponents of the non-conflict thesis argue that when the larger political environment improves, water politics also improve. In basins where analysts predicted acute conflict, such as the Jordan and Ganges, conflicting riparians have recently signed treaties (Wolf, 1997: 14–15; see also Postel, 1997). Although the economic argument against a state fighting a water war is that water is a cheap commodity compared to the costs of war, in these cases it was not economics or hydrology, but regional and international politics, that mitigated the problem of scarcity and conflict. Water disputes and protracted conflicts necessarily complicate each other. With the end to the protracted conflict or important changes in international relations that directly influence the feuding riparians – the end of the Cold War, for example, or domestic political changes such as new national leadership – the chances of international co-operation become more probable (Lowi, 1993).

Human ingenuity and the role of the market are especially important, in the non-conflict thesis, for reducing the chances that scarcity will lead to violent conflict. Political scientists Daniel Deudney and Ronnie Lipschutz maintain that resource wars, in general, are unlikely for the foreseeable future because, as

many economists argue, governments can often procure resources through trade ('virtual water' or buying water intensive products, such as cotton and oranges through international trade instead of producing it domestically). Additionally, technology has made it possible to develop substitutes for many materials (through desalination for fresh water), greater efficiency and conservation (Deudney, 1990: 470; Lipschutz, 1989). In fact, some economists argue that scarcity is not a problem or a source of conflict, but a catalyst for human ingenuity. According to this approach, scarcity pushes mankind to search for a substitute, to conserve and recycle, so that in the end the service provided by the original resource costs less. For example, the cost of copper and oil over the last 100 years has declined because scarcity has promoted ingenuity (Simon, 1981: 46).

Most dry countries have strengthened domestic water management through policy changes, such as improved pricing, efficiency and conservation initiatives that have successfully lessened the impact of resource scarcity. These countries have avoided the need to develop new sources of water supply by carrying out intelligent water conservation and demand management programmes, for instance, installing efficient new equipment and applying appropriate economic and institutional incentives to maximize efficiency. Such policies have successfully reduced water use through efficiency without sacrificing economic productivity or personal welfare. In fact, a trend has been emerging since 1980 in which developed states, such as the US, have been steadily decreasing water use even though their population and economy continue to grow. This trend runs counter to the conventional belief that water use inevitably rises along with population and economic growth. It shows that states do not necessarily need to find new sources to develop economically; rather, they need a bureaucracy that can institute means for using the resource more efficiently (Stevens, 1998).³

Proponents of the non-conflict thesis point out that technological advances ease the pressure of water scarcity. When states make the largest water-using sector – agriculture – more efficient, supplies are freed up for other sectors and total demand is reduced. In fact, in most developing countries agricultural water use is inefficient because old or poorly constructed pipes and aqueducts lose water. Policy analyst Sandra Postel estimates that more than half of all water diverted for agriculture never produces a crop, so advanced irrigation technologies would substantially decrease the quantity of water used and increase crop yields. In fact, in certain countries, drip irrigation in combination with other policies has produced dramatic increases in crop yields while cutting water consumption by up to two-thirds (Postel, 1997: 103–7). Because drip irrigation calls for planning and financial capital, albeit in the short run, it is easier and cheaper to use flood irrigation, which is extremely wasteful, than to deliver water through a network of small porous pipes that are installed on or below the soil

surface. Such a system serves water directly to the crops' roots, keeping down evaporation and seepage losses and maintaining water efficiency at approximately 95 per cent. When farmers automate the system with computers and monitors, they can sense the best time to distribute the water. Still, such a system is expensive, requiring an initial outlay of \$1,500–3,000 per hectare (Postel, 1997: 103–4). Moreover, the farmers need to be trained on how to use the equipment.

Other technological advances, such as the use of alternative types of water, have also increased the supply but they, too, require expertise and capital. Israel has an extensive wastewater reclamation programme that treats and uses a large percentage of waste water for the agriculture sector. Some Israeli analysts speculate that within a couple of decades fresh water will go first to cities and industries and the only reliable source for agriculture will come from the use of treated waste water (Gleick, 1998: 28–9). Building waste-water treatment plants and the piping system to distribute reclaimed water is a multi-million dollar endeavour that calls for significant bureaucratic and technical planning, as does another important technological advance – desalination. Although there is a virtually endless supply of accessible seawater available to numerous water-poor states, the resource is not economically feasible because desalination plants require substantial investments of energy, technology and capital. Consequently, most of the world's desalination plants are in the energy rich countries of the Persian Gulf and are not economically feasible solutions for most resource-hungry developing states. With recent technological advances, desalinated water is becoming more economically feasible for drinking water, but is still too expensive for agricultural use.⁴

In addition to technological advances, economic solutions, such as instituting a market-based water-pricing system, would increase efficiency, but elites are reluctant to introduce such measures. More realistic pricing, combined with metering, stimulates the agricultural and industrial sectors to use water more wisely. Pricing also encourages users to re-evaluate their overall use of water. It alters the perception that because water is renewable and comes from nature it is a common good that should be free. Since governments allocate a large portion of available water to agriculture, even a small shift away from irrigation can make a considerable difference for a national water budget. Moreover, the economic returns from water used in irrigated agriculture are far less than in domestic and industrial use. However, this economic reality remains largely invisible when the state subsidizes water for agriculture. Overall, a rational water policy becomes difficult if not impossible when water pricing does not reflect all the costs of delivery and regulation.

Supporters of the non-conflict thesis are correct in saying that good domestic and international institutions and human ingenuity have decreased the water scarcity leading to violent conflict. Purchasing water-intensive crops

through international trade, where water-poor states import 'virtual water' is an example of this kind of thinking. To grow an orange in water-poor Gaza, farmers use many gallons of water, but by importing that produce, the water can be used for needed human consumption or for higher economic yield crops such as flowers or planting seeds (Allen, 1996: 76). Of course, a state must have the financial resources to be a food buyer on the international market. The problem with the optimism of the non-conflict approach, then, is that some less developed states do not have sufficiently strong institutions to facilitate ingenuity, enough capital to invest or even the requisite political stability. Water-conflict thesis proponents build on this real-world problem.

The water-conflict thesis

A recent CIA report acknowledges the real world obstacles to instituting the ameliorative measures emphasized by the non-conflict approach:

Measures undertaken to increase water availability and to ease acute water shortages – using water more efficiently, expanding use of desalinization, developing genetically modified crops that use less water or more saline water, and importing water – will not be sufficient to substantially change the outlook for water shortages in 2015. Many will be expensive; policies to process water more realistically are not likely to be broadly implemented within the next 15 years, and subsidizing water is politically sensitive for the many low-income countries short of water because their populations expect cheap water . . . Water shortages occurring in combination with other sources of tension – such as in the Middle East – will be most worrisome. (Central Intelligence Agency, 2000: 17 and 18).

Proponents of the water conflict thesis have these obstacles in mind when they argue that in the past fifty years both growth in population and development of industry and agriculture have resulted in increased water pollution and demand, which, in turn, have augmented the odds of violent conflict over scarce water resources (Gleick, 1995: 85; Gleick, 1993: 9). Contradictory international water law, weak international institutions, conflictual political relations, government bureaucracy, and the marketplace's inability to adapt to the new demands of scarcity will all intensify this trend. Population growth itself exacerbates scarcity in a somewhat complex fashion. Environmental scarcity heightens demand, which leads to either degradation or unequal social distribution of renewable resources. In the most direct case, water pollution from growing industrial and agricultural sectors can reduce the available supply of this scarce resource. Even without industrial pollution, though, ecosystems are sensitive and depletion itself can lead to pollution of the remaining supply. For example, over-pumping ground water will not only diminish the resource but may induce salt water to invade and pollute the remaining freshwater supply, such as has occurred in the Gaza Strip (Homer-Dixon and Blitt, 1999: 5–7).

Thomas Homer-Dixon argues that violent conflict results from the interaction of many variables, only one of which is environmental resource scarcity. However, this variable needs to be better understood because of its increasing importance in the chain that often ends in violence (1991). Homer-Dixon's more recent research on environmental scarcity and acute conflict focuses on fresh water scarcity in addition to other renewable resources such as firewood and fish stock (1999; 1996a; 1994). Environmental scarcity increases migration and inter-group tension, and reduces economic productivity. Weakened states that are unable to adapt are more prone to ethnic conflicts, government instability, and deprivation of the masses, which occasionally can lead to intra-state acute conflict. Homer-Dixon concludes that 'environmental scarcity rarely, if ever, causes inter-state war. Instead, it contributes to chronic and diffuse strife within countries' (1996a: 46). However, he does argue that 'the renewable resource most likely to stimulate interstate war is river water' (1996a: 48).

Peter Gleick, who focuses on water scarcity threats, agrees, contending that while most water resource disputes do not lead to violent conflict, in certain regions, water scarcity is accelerating. Moreover, water's importance for economic and agricultural development has been increasing. As a result, 'water is evolving into an issue of "high politics", and the probability of water-related violence is increasing' (1995: 7). In regions such as the Middle East, states perceive water as a crucial strategic resource. Disruption of access to adequate water supplies can have a critical impact on a state's capability to fight wars and to develop economically. As for inter-state conflicts, Homer-Dixon points out that

wars over river water between upstream and downstream neighbours are likely only in a narrow set of circumstances: the upstream country must be able to restrict the river's flow; there must be a history of antagonism between the two countries; and, most important, the downstream country must be militarily much stronger than the upstream country. Research shows that conflict and turmoil related to river water is more often internal than international; this conflict often results from dams and other major water projects that relocate large numbers of people. (Homer-Dixon, 1996a: 48; see also Lowi, 1993: 203)

Kimberly Kelly and Homer-Dixon explain the causal chain that leads from intra-state water scarcity to violent conflict: water scarcity leads to agricultural decline and health problems; this, in turn, exacerbates economic decline, weakens state legitimacy, and increases grievances against leadership; the weakened state then is unable to handle popular dissatisfaction and violence results (Homer-Dixon and Blitt, 1999: 67–107). Peter Gleick suggests several indices for predicting the likelihood that the water issue will lead to violent conflict: first, the degree of water scarcity; second, the extent to which two or more states or intra-state groups share the supply; third, the relative power of those riparians

or groups; and, fourth, the ease of access to alternative sources (Gleick, 1998: 108; 1995: 104–9).

Proponents of the water-conflict thesis are pessimistic about the likelihood of a peaceful long-term outcome here, given the pressures on water resources. Today, half the world's inhabitants live in urban areas. In the past half-century many cities have tripled or even quadrupled in size. The growing world economy together with the demographic explosion has placed great pressure on the planet's renewable resources. Today, 'per-capita water demands are increasing and per capita water availability is declining due to population growth and trends in economic development' (Gleick, 1998: 1). This reality, some argue, is damaging developing countries' natural resource base, the national assets upon which their economies and stable political order rely (Kahl, 1998: 81).

Global fresh water resources are not evenly distributed, a fact of nature that could be overcome if financial resources were available. In some desert regions there is almost no precipitation and in some tropical areas 30 feet of rain fall in a single year. To make matters worse, in many water-poor regions precipitation does not occur during the summer period, the time of greatest water demand. Unfortunately, developing states lack an infrastructure such as irrigation networks to move water to where it is sought and to store it in reservoirs for when it is needed.

To complicate matters, economically struggling states are drawn into a water development dilemma. Developing countries first look to agriculture to grow the economy through export earnings, to supply jobs, and to stem the flight to overcrowded cities. For this policy to be successful, the agricultural sector depends on a sustained supply of water that is cheap and reliable. Most developing states, even those with a water deficiency, need to use 70–90 per cent of all their fresh water supply for agriculture. A swelling population and growing cities lead to water supply cutbacks to agriculture, but less farming means fewer rural jobs, lower export revenues, and more flight to urban areas. Reductions in agriculture also threaten a state's policy of food security even where a country is not as vulnerable to an international embargo of food as, for example, Iraq was during the 1990 Gulf crisis.⁵ In many states, moreover, the agriculture sector is politically powerful: policy changes relating to its water supply are perceived as a threat to farmers' and landowners' livelihood and thus opposed vigorously.

On the international level, water-conflict theorists point out that riparians share water supplies and thus states become vulnerable to the actions of others. A significant portion of fresh water resources flows through international river basins and this geographical dependence has led to disputes over common water resources, including the Nile, Euphrates, and Indus. Indeed, some thirty states receive more than 30 per cent of their surface water supply from across their borders. In arid or semi-arid regions, where international rivers are the primary

source of water and agriculture is a pivotal economic development component, riparians deem these sources of fresh water to be critical national interests worth defending. From a strategic perspective, upstream states have a geographical advantage in controlling the water, with downstream riparians more vulnerable to the actions of the higher riparians, but relative military strength, as discussed earlier, is also important. An upstream state that is weaker than a downstream state will be reluctant to challenge the stronger state's vital water interests.

For the most part, international law and institutions do not have the capacity to resolve these difficult disputes involving shared water resources. International courts and arbitrators might make rulings in specific disputes based on international water law, but enforcement depends on the good will of the parties involved. Over the past fifty years international water law, like international jurisprudence generally, has been ineffectual in settling difficult conflicts. If the water-sharing environment was not conflictual, riparians tended to negotiate agreements to share their common resource efficiently, but when the situation was conflictual and the riparians were unable to agree on a system of sharing a river, the ambiguous elements of water law became a tool to legitimize each party's position.

In addition to the impact of population growth and weak international legal institutions, poor state management also has exacerbated water scarcity. In fact, water-conflict theorists argue that this inability to supply the ingenuity needed to solve scarcity may be the core problem. Many developing states lack capital, a trained work force, and a competent bureaucracy. In addition, they are not able to rehabilitate infrastructure, reform institutions, provide incentives to encourage conservation, invest in new technology or properly regulate users (Homer-Dixon, 1995; 1996b). Some farmers and industries pollute scarce water resources with fertilizers, insecticides or industrial waste, for example, and weak states cannot stop them. Also, because water pricing subsidies to the agricultural sector offset the economic punishment that results from wasting water, farmers in dry areas occasionally grow water-intensive crops and use inefficient infrastructure and methods, such as flood irrigation, that result in the considerable loss of water to evaporation and ground seepage. Additionally, developing states' urban centres waste as much as 50 per cent of their water supplies through poor delivery systems and theft. Together, these domestic factors greatly exacerbate a state's need for additional water. These core problems are all present in the following case study.

Intra-state conflict: the advent of the *intifada*

It is well documented that in Israel, Gaza and the West Bank⁶ the human population and water pollution are on the rise and that fresh water quantity and

quality are on the decline. Growing demand and scarce supplies have been problems for the region for the past half-century (Lonergan and Brooks, 1994). This case shows how structural scarcity evolves and how the resulting environmental scarcity, along with weak domestic institutions, played an important role in the advent of the *intifada*.

On 9 December 1987, an Israeli truck collided with oncoming Palestinian cars in Gaza, killing four Palestinians and wounding seven others. This automobile accident was the precipitating factor in the popular Palestinian uprising, known as the *intifada*, or 'shaking off' (Bickerton and Klausner, 1998: 230). By mid-1990, over 800 Palestinians had been killed by Israeli security forces and the Palestinians had killed forty-seven Israelis (Bickerton and Klausner, 1998: 236). But to understand this violent conflict one must go beyond the precipitating factor. The intermediate factors were many: the Palestinians suffered under high unemployment and low living standards, as well as frustration with other Arab states and with the exiled Palestinian Liberation Organization (PLO) for not representing their political interests. The Arab Summit held in Amman in November 1987, for instance, was preoccupied with the Iran–Iraq conflict, and failed to raise the Palestinian issue, while for the first time West Bank and Gaza Palestinians were starting to feel the need to take matters into their own hands. While the deep or long-term issue was certainly the political desire for Palestinian self-determination and an end to the Israeli occupation, water scarcity did play an important part as an intermediate factor in the *intifada*.

Between 1948 and 1987, West Bank and Gaza Palestinians had almost no autonomous institutions which could foster the ingenuity necessary to mitigate water scarcity because those institutions were dependent on the occupying power. During Jordanian rule of the West Bank and the Egyptian administration of the Gaza Strip, investment in water infrastructure was minimal. Moreover, by June 1967, Israel was dependent for approximately one-third of its total consumption⁷ on ground water that originated in the West Bank and flowed underground to Israel. Once Israel took control of the West Bank during the 1967 Arab–Israeli War, it limited Palestinian water use through administration of the territory and its water system, a policy that helped to maintain Israel's historical usage of West Bank ground water. In an effort to preserve water resources for Israel and to increase Palestinian water efficiency, Israeli water policy restricted the number of permits granted for digging new agricultural wells. This policy was intended to augment agriculture productivity by more efficient use of existing resources and by increased control over water use at the individual farm level (Kahn, 1983: 26). In fact, while the Labour Party did increase structural scarcity for Palestinians by diverting a larger percentage of West Bank water to Israel, Israeli institutions prior to 1977 also attempted to address supply and demand issues. The guiding principle of the Labour Party's

West Bank policy was that Israel must retain sections of the West Bank to have defensible borders. However, they did not settle the densely populated Arab hill regions, anticipating that they would trade this area in a 'land for peace' agreement with Jordan.

Unlike the Labour Government, the Likud coalition did not concern itself with maintaining the West Bank status quo. Between 1977 and 1992, Likud led governments – at times in a national unity government partnership with Labour – concentrated Israel's resources on enlarging the West Bank's Jewish population. Government policy moved from Labour's security-based settlement plan to Likud's treatment of the West Bank as Israel's religious and historical heritage (Alpher, 1994: 10). Likud continued Labour's policy of strict control over Palestinian water use, but the Likud's motivation differed from that of Labour: it restricted Palestinian water use so that more water would be available for the growing number of Israeli settlements. Likud's new policies heightened Palestinian tension over water because they increased scarcity. The Israeli water agency Mekorot, which in 1982 took responsibility for managing the West Bank water system, developed water sources primarily for settlements and continued to make water use difficult for Palestinians (Elmusa, 1993b: 2; Schiff and Ya'ari, 1991: 97; Davis, Maks and Richardson, 1980: 13). The state comptroller's office – Israel's official watchdog agency – reported one case where Mekorot expropriated land from an Arab owner to drill a well for a nearby Jewish settlement, but failed to obtain permission from the Civil Administration and initially did not compensate the owner for his land. Only later, after some news reports of the case surfaced, did the company offer to compensate the owner (Schiff and Ya'ari, 1991: 97). Israeli drilling of new deep wells in the West Bank to supply water for irrigation of Jewish agricultural settlements in the arid Jordan Valley lowered water tables and dried up some Palestinian springs and shallow wells. One example of the impact of this drilling was that two-thirds of the farmers in the Jordan Valley village of al-Ouja had to abandon their land when their 150-year-old spring went dry (interview by author with Research Institute analyst, Bethlehem, 13 May 1996; Beschorner, 1992–93: 14; United Nations, 1980: 13–15). The state comptroller reported that Jewish farmers were overusing their water quotas by as much as 44 per cent, while Arab allocations continued to be strictly monitored. Additionally, because of subsidies in 1987 from non-governmental organizations, Jewish settlers obtained their water at a lower price than the Palestinians.⁸ The Likud Government made developing land in the West Bank increasingly difficult for Palestinian farmers and increasingly easy for Jewish settlers (Lowi, 1993: 190).

As a result of these policies, the rate of farm production growth and income decreased in the West Bank Arab agriculture sector. Furthermore, Israel reduced government assistance for West Bank agriculture – and for Israeli agriculture, for that matter. Subsidizing West Bank settlements became the Government's

priority, and development initiatives for Arab agriculture became an activity of the past (Benvenisti, 1986: 1–3; Kahn, 1983: 118). By the mid-1980s, West Bank Palestinian farming could no longer function properly given the existing water and economic constraints imposed by the Israeli Government. Moreover, with a general economic downturn in the Middle East, job markets in Israel, Jordan and the Gulf States were no longer able to supply employment opportunities for West Bank and Gaza Palestinians. The shrinking Palestinian agriculture sector, which, prior to 1967, provided the majority of jobs, did not have the capacity to hire the returning labourers. Rising Palestinian unemployment combined with the Likud's settlement policy intensified Palestinian awareness of the inequitable water distribution between Israel and the West Bank and between Palestinians and settlers. According to Brigadier F. Zach, Israeli deputy co-ordinator for the occupied territories, West Bank Palestinians used 119 cubic meters (cm) of water per capita, while Israeli settlers used almost three times that amount in 1990 ('A Dwindling Natural Resource', *Washington Post*, 13 May 1992, A29). In Gaza, unequal water distribution and general scarcity of resources were even worse than in the West Bank. Although the Gaza Strip does not share a major ground water source with Israel, severe water scarcity has heightened tensions and instability between Gaza Palestinians and Israel. The Gaza Strip is on the coastal plain bordering the Mediterranean Sea, the Sinai desert and Israel. The climate is arid, with less than 200 millimetres (mm) of precipitation annually. Surface water is only available following rainfall and groundwater is contained in two shallow aquifers. But unlike the West Bank's aquifers, Gaza's are shallow and easy to tap, and, historically, over-pumping has been allowed by occupying powers. As well, during this period Gaza's population was expanding.

Currently, Palestinians in Gaza pump water from more than 2,000 wells, primarily for irrigation. They withdraw approximately 110 million cubic meters (mcm) per year, while the natural recharge provides only 70 mcm annually (Water Resources Action Programme Task Force, 1994: 6). With hundreds of illegal wells, many farmers use approximately 90 per cent of the pumped water and water extract beyond their quotas. Palestinian farmers' high water use for citrus fruit accounts for two-thirds of Gaza's agriculture – a water intensive crop, citrus remains Gaza's economic mainstay. The ongoing problem of over-pumping has resulted in salt-water intrusion, both from the Mediterranean and from lower saline aquifers. Additionally, heavy use of fertilizers and pesticides, as well as poor sewage control, has polluted the aquifer. As a result, many Gaza residents have been consuming contaminated water and are unable to use water from their taps at home (Water Resources Action Programme Task Force, 1994: 6–7; Shawwa, 1993).

Between 1967 and 1977, Israel did attempt to regulate Gaza water usage to prevent any further deterioration of the supply that occurred with the

over-pumping permitted by the Egyptian administrators prior to 1967. However, under the Likud Government in the late 1970s, Israel also became laxer in regulating Palestinian pumping, a policy that can be attributed to the fact that Gaza's drinking source was not connected to Israel's (interview by author with former water commissioner, Tel Aviv, July 1995). As a result, the hydrological situation in Gaza deteriorated even further. Along with severe poverty, Gaza Strip Palestinians lacked clean drinking water on a daily basis. In 1986, estimated per capita consumption by Gazans was 142 cm, while that of the settlers was 2,240 cm (Elmusa, 1993a: 61; Roy, 1987).⁹ Prior to the advent of the *intifada*, Gaza was experiencing all three environmental scarcity types: demand, supply, and unequal social distribution. From 1967 to 1987, Israelis often disregarded the economic and political needs of Arabs living under their control and even came to look upon Palestinians as passive subjects. The inclination to ignore growing water scarcity in Gaza and the West Bank was part of this picture. The Palestinian *intifada* forced Israelis to pay greater attention to the plight of the Palestinians and eroded Israeli public support for maintaining the status quo.

In the summer and fall prior to the December 1987 outbreak of the *intifada*, the Israeli Government and individual ministers took a number of actions with strong symbolic significance that intensified Palestinian anxieties about the intentions of the Israeli Government.¹⁰ For example, the water commissioner and Mekorot announced plans to drill inside the West Bank and to transfer some of this water to Jerusalem's Jewish neighbourhoods. The plan was in direct opposition to Israel's stated policy of not mining West Bank water for transfer across the Green Line to Israel proper. A quarter to a third of the pumped water was to go to Arab communities, with the remainder to go to Jerusalem and to Jewish settlements. Large shafts were to be dug and 18 to 20 mcm were to be pumped annually. The depth and scale of the wells, some Palestinian hydrologists believed, threatened to dry out shallower wells serving large Arab communities in the surrounding West Bank area (Tessler, 1994: 846, n. 5; see also 'Rabin Okays West Bank Water Drilling Project', *Jerusalem Post*, 3 July 1987; 'New Plan to Have West Bank Water Pumped to Israel', *Jerusalem Post*, 26 June 1987). The drilling site was to be near Herodion, southeast of Bethlehem, where Israel was already pumping water for both Jewish settlements and Arab communities in the Hebron and Bethlehem areas. Bethlehem Mayor Elias Freij insisted that 'this plan threaten[ed] our [the Palestinians'] very existence' (Peretz, 1990: 29). Freij also stated that 'those who try to obtain my agreement to the plan do not understand that anyone who supports it will be considered an unpardonable traitor' (Schiff and Ya'ari, 1991: 98). Jordan, Egypt, the United Nations, the European Community and the United States all opposed the plan. The US state department's legal advisers argued that Israel, as an occupying power, had the right to exploit West Bank water sources for the benefit of

the local inhabitants. However, Israel was not entitled to transfer the water to its own territory (Schiff and Ya'ari, 1991: 98).

In reply to Palestinian and international concerns, Israel promised to safeguard Palestinian interests, but the plan was ultimately dropped because of opposition from all sides. Israel's Co-ordinator of Activities in the Territories Shmuel Goren stated that 'if Arab rights are harmed, we will not allow this project to get underway' ('No Water Project If Arab Rights Aren't Guaranteed', *Jerusalem Post*, 7 July 1987). He pledged to commit this to a legally binding contract and promised that the civil administration would demand compensation for Arab communities if their water costs increased because of the project ('No Water Project If Arab Rights Aren't Guaranteed', *Jerusalem Post*, 7 July 1987). He also vowed that Palestinian needs would receive first priority – should existing Palestinian wells in any way be damaged by the new Herodion wells, Israel would compensate the Arabs with water from other sources. Upon hearing this offer, Jewish settlers themselves rejected the plan as discriminatory. Palestinians, for their part, believed that if the Israeli Government drilled these wells linking Israel to such a large water source, the likelihood of Israeli withdrawal from the West Bank would diminish significantly. Palestinians perceived the plan not only as another scheme to steal Palestinian water, but also as part of a broader strategy to reduce Arab control of the West Bank, which would increase the likelihood of Israeli annexation. And opposition to the plan within Israel also existed. The head of the West Bank's civil administration, Brigadier General Ephraim Sneh, resigned during the Herodion plan controversy because he had adamantly opposed the project and its handling by his superior, Goren. It should be noted that Sneh planned to enter politics and had many serious differences with Goren, but to him the water plan truly represented an unacceptable policy change ('Sneh Resigns Over Drilling', *Jerusalem Post*, 16 September 1987). Soon after, in October 1987, Israel dropped the plan because of division within the Israeli National Unity Government and because of international opposition. Nevertheless, these actions exacerbated Palestinian tensions over Israeli water policies and West Bank directives. Two months later the *intifada* began.

It is true that the *intifada*'s origin stemmed from a complex mixture of political and economic forces. In fact, water was one of many functional and political issues that played an important role in the advent and continuation of the *intifada*. But, as Homer-Dixon argues, 'water scarcity and its consequent economic effects contributed to the grievances behind the uprising both on the West Bank and Gaza' (Homer-Dixon, 1994: 14). The uprising began in Gaza refugee camps, largely because of poor socio-economic conditions there that were partly produced by water scarcity. Lack of clean drinking water was an important source of frustration, as was high unemployment due, in part, to a shrinking Arab agricultural sector that did not have enough water supply

to thrive.¹¹ The resulting popular support for and continuation of the uprising was due largely to political motivations – the desire for Palestinian self-determination, and frustration with Israel's policies of reducing Palestinian control and furthering *de facto* Israeli annexation of the West Bank. Suspicions of Israeli water 'stealing' and plans for water transference, through, were important symbolic issues that heightened Palestinian–Israeli tensions before and during the *intifada*.

In fact Schiff and Ya'ari have argued that socio-economic rather than political factors precipitated the uprising, noting that the initial riots by Gaza refugees were directed against both Israeli targets and against richer Arab neighbourhoods. Granting their claim that the first stage of the *intifada* was motivated by poverty and frustration with the socio-economic situation, it becomes clear that water scarcity, the resulting unemployment, and the general lack of fresh drinking water are exogenous factors. To be sure, theorists like Salah argue that the advent of the *intifada* was wholly political; he asserts that it is 'impossible to make a direct causal connection between economic trends and the rise and decline of the national struggle' (Nassar and Heack, 1990), a claim that would discount water scarcity as a necessary factor. In the end, though, Schiff and Ya'ari's analysis is the most convincing because it is supported by empirical evidence. Schiff and Ya'ari in fact interviewed the first wave of detainees, and states that they had not yet developed the requisite political or national consciousness for starting an uprising.

Implications for the peace process

Israel and the rest of the Jordan River basin are in the midst of a critical water shortage. As Mekorot, Israel's water utility company, warned, by 2001 all three primary reservoirs would reach unprecedented low levels, and would be unavailable as a water source. In the midst of a serious drought, how will water scarcity impact peace talks and what policy prescriptions can we cull from the above discussion on water scarcity and acute conflict? First, an Israeli–Palestinian peace agreement must include a water annex. That part of the treaty should incorporate an international component addressing such issues as how water would be divided and how the parties would avoid pollution and over-exploitation. Moreover, there ought to be a domestic water management section in the international treaty, specifying that the parties agree to implement a market-value pricing system for water. This would increase its efficient usage and promote important domestic institutions for providing innovation and ingenuity, when needed.

Although the core issues of the peace talks include refugees, borders, security and the status of Jerusalem, Israel will need to be especially conscious of the

Palestinian ingenuity gap regarding water scarcity. Today, Israel is a developed state capable of adapting to environmental scarcity. For the first time in Israel's history, it plans to import water from Turkey as an emergency measure. A discharge terminal will be built south of Ashkelon to receive the transported water, and from there water will be pumped to a nearby reservoir. The project will require laying a 13-km-long pipeline, and a converted 250,000-ton oil tanker for transport and will cost a total of \$20 million ('Emergency Summer Water Imports "Unavoidable" – Mekorot', *Ha'aretz*, 20 June 2000). As a developing state, by contrast, a future Palestine will experience a water-related gap between scarcity and the ingenuity needed to address it, in other words, an ingenuity gap. It simply does not have the domestic institutions to address water scarcity.

As well, verification and compliance were issues already stressed during the Oslo II negotiations, when Israel emphasized to the Palestinians that it could not permit unsupervised water drilling in the West Bank. After Israel withdrew from the Gaza Strip, some Palestinians drilled hundreds of unlicensed wells and it seemed clear to Israel that the Palestinian Authority had lost control over its own people in dealing with water conservation. Israeli policy makers feared that such uncontrolled drilling would seriously damage the shared West Bank ground water if the Palestinian Authority permitted it (interview by author with senior Israeli water talks negotiator, Tel Aviv, 17 November 1995; also see 'Again Forgetting the Water', *Ha'aretz*, 11 August 1995, B1 [in Hebrew]). Agriculture Minister Yaakov Tsur stated that 'water is the most political issue of all because there is a shortage of water and water is linked to life. There is no doubt that we will not be able to leave the [West Bank] area without supervisory measures to prevent drilling' ('Tzur on Water Accord Supervision', *Qol Yisrael*, 24 August 1995, [FBIS-NES-95-165, 25 August 1995, 17]). 'Israel can't leave the area', he stressed, 'without the question of water being fully defined', a strategy that includes monitoring water pumping and quality. 'We have to check what they are pumping. We also have to check the sewage. If they don't treat the sewage, it will affect the groundwater.'¹² Such comments suggest that water resource management and institutions are gaining the importance they deserve in the peace process.

In the end, this case has demonstrated a strong connection between environmental resource scarcity and violent conflict. Therefore, it adds to the argument for including environmental security in overall security studies. It also illustrates why policy makers need to go beyond points of conflict *between* states. To realize environmental security, in particular water security, riparians and users of a common river basin must focus on both the international politics of scarcity and the peace partner's ingenuity gap, in particular by trying to strengthen its domestic institutions.

NOTES

- 1 Homer-Dixon defines acute conflict as one 'involving a substantial probability of violence' (1991: 77).
- 2 Wolf argues that there have been only seven such incidents in the past fifty years, two of which occurred in the Jordan River basin (1997: 7–8).
- 3 The energy sector has also been successful for the past three decades in the wiser use of electricity and gas, while cutting consumer cost and use at the same time.
- 4 At present desalinated sea water costs consumers \$1 per cubic meter. Water priced higher than \$0.85 is not economically viable for agriculture, the biggest user. Unlike oil or other natural resources, water cannot be transported economically in large quantities.
- 5 Complete self-sufficiency in food has proved unattainable in the Middle East, since all states in the region must import large quantities of comestibles, especially cereals, because of water scarcity.
- 6 This area is also known as Judea and Samaria, the administered territories and the occupied Palestinian territories. No political intent is implied by the term West Bank.
- 7 This figure is based on Israel's total consumption of 1,400 mcm and use of West Bank water. Israel's other main water resources are the Lake of Tiberias and the coastal aquifer.
- 8 The comptroller reports that Jewish settlers pay Mekorot only 15 *agorot* pcm for agricultural supplies while Arab farmers pay the civil administration almost five times that amount (70 *agorot* pcm) for Mekorot-supplied water. Local Arab authorities charge 1–1.60 new Israeli *shekels* per cm for domestic use by Palestinians while Mekorot charges settlers only 23 *agorot* ('Territories' Water Supply Drying Up with Overuse', *Jerusalem Post*, 2 July 1987). Also see Kahn, 1983: 114.
- 9 The settler population in Gaza (1988–89) used 2 mcm or 3 per cent of the total ground water, while the Arab population consumed 92 mcm or 97 per cent (Elmusa, 1993a: 61; Roy, 1987).
- 10 Israel took control of most of the East Jerusalem Electric Company, then Industry and Trade Minister Ariel Sharon purchased an apartment in the Muslim Quarter of the Old City. See Shalev, 1991.
- 11 By 1987 the West Bank's economy was dependent on outside employment. Increased water supply would have created more jobs, but would not have created enough employment to absorb all of the returning Palestinian workers.
- 12 Tsur pledged to keep supplying West Bank settlements with water. Major settlements will continue to be linked to separate Mekorot lines, and smaller settlements will be connected to the Palestinian Water Authority but provided with emergency reserves in case the Palestinians interrupt their supply ('Water Dispute: No Immediate Solution On Tap', *Jerusalem Post*, 21 July 1995, 11).

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