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Symposium: Water, conflict, economics

Symposium: Trade and conflict

Symposium: Insurgency, occupation and reconstruction

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This journal raises and debates all issues related to the political economy of personal, communal, national, international, and global peace and security. The scope includes implications and ramifications of conventional and nonconventional conflict for all human and non-human life and for our common habitat. Special attention is paid to constructive proposals for conflict resolution and peacemaking. While open to non-economic approaches, most contributions emphasize economic analysis of causes, consequences, and possible solutions to mitigate conflict.

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Abstracts

Frederic L. Pryor. "Water stress and water wars." This essay argues three propositions: (1) by 2025 roughly one third of the world's population will be living in countries which are water-stressed, at least by conventional criteria; (2) nevertheless, macro evidence does not portend that the world will be unable to feed its growing population at that time; (3) interstate armed conflicts over water, which were not very important in the last quarter of the twentieth century, seem unlikely to become more intense in the coming decades, especially since most countries have not utilized the enormous possibilities for saving scarce water.

David J.H. Phillips. "Reducing the cost of inter- and intrastate conflict over water in the Jordan river basin." The five riparians of the Jordan river basin share a number of transboundary watercourses. These include the surface waters of the Jordan river itself; several other smaller surface waters; and a number of aquifers. Interstate conflict between the riparians is well documented and has been ongoing for the last 60 years, with tensions over access to fresh waters being considered a significant contributory factor. But much less has been published to date on intrastate conflicts relating to access to the same watercourses, and these are reviewed here. The financial costs of continuing conflicts in the region are documented to far outweigh those pertaining to the resolution of the regional water deficiencies, which would rely on increased levels of desalination and wastewater re-use, plus the possible importation of bulk water supplies from elsewhere. Such a resolution of the water-related conflicts would lead to improved intra and interstate relationships, and could be an important trigger for a much broader peace initiative for the region.

Marwa Daoudy. "Benefit-sharing as a tool of conflict transformation: applying the Inter-SEDE model to the Euphrates and Tigris river basins." The concept of benefit-sharing, as employed in the Inter-SEDE model, analyzes potential security, economic development, and environmental-related benefits to sharing the waters of the Euphrates and Tigris river basins. The article finds that Iraq scores fairly high on security and economics-related indicators, revealing the country's vulnerable downstream position. Syria's security score highlights this actor's vulnerable position as the mid-stream riparian. Turkey is favorably differentiated on some of the economic indicators. To enhance the potential for spill-over between water-cooperation and conflict prevention, durable and peaceful relations among riparian states require that water-related benefits be shared.

Rebecca A. Adler, **Marius Claassen**, **Linda Godfrey**, and **Anthony R. Turton**. "Water, mining, and waste: an historical and economic perspective on conflict management in South Africa." Lack of government intervention in South Africa's mining industry has worsened conflicts associated with limited water resources. With the advent of democracy, new legislation demands that all South African citizens have the right to a clean, safe environment, including access to potable water, and that the country develop in a sustainable manner. But conflict remains due to the historical partnership between the government and the mining industry, as well as due to cumulative impacts associated with mining, which has polluted natural ground water sources. In this article, an historical overview of the mining industry in South Africa is presented, along with a simple economic model to describe behavior of the mining industry over time. Legislative frameworks used to address mine waste and mine water management are evaluated and suggestions are made for how to use an understanding of resource driven conflict to improve the outlook of mining and access to water for all in South Africa.

Alyssa M. Neir and **Michael E. Campana**. "The peaceful resolution of U.S.-Mexican transboundary water disputes." To deal with boundary and transboundary water issues along their border, the United States and Mexico established the International Boundary and Water Commission (IBWC) in 1889. Initially dealing only with surface water flows, its flexibility permitted changes such that groundwater and water quality issues could be addressed. In 1994, the U.S., Mexico, and Canada adopted the North American Free Trade Agreement (NAFTA) primarily to facilitate trade, but which can govern water as an article of commerce. Both NAFTA and the IBWC have been instrumental in promoting peaceful solutions to water issues. The article examines three cases: (1) Mexico's protesting of a U.S. plan to line the All-American Canal on the Mexico-California; (2) the underdelivery of Mexican Rio Grande water to the U.S. state of Texas; and (3) the case of an aquifer entirely within Mexico whose supply is being stressed because of a shift in agricultural production prompted by NAFTA. The article concludes that both countries should: (1) develop a more formal system for groundwater issues and (2) exercise vigilance with respect to NAFTA's ability to treat water solely as an economic good.

Marko Keskinen, **Mira Käkönen**, **Prom Tola**, and **Olli Varis**. "The Tonle Sap Lake, Cambodia: water-related conflicts with abundance of water." By examining diverse water-related tension and conflict situations from the Tonle Sap area of Cambodia, the article seeks to contest the view that water-related conflicts are always about water scarcity. Tackling different dimensions of water-related conflicts, the three cases studied here all point to the importance of social, political, and historical aspects in water-related resource management. They also indicate that the water and resource conflicts in Tonle Sap are strongly related to problems with existing property and access rights. Challenges of access to and control over resources, rather than changes in the abundance of water and related resources, have lead to increasing tensions in the area. With the negative impacts that upstream development in the Mekong Basin – particularly the construction of hydropower dams – are likely to cause to the area, these tensions will most probably just increase in the future.

Solomon W. Polachek. "How trade affects international interactions." A viable peace is one that comes about naturally and persists without the need for outside intervention. At least since Baron de Montesquieu's statement that "peace is the natural effect of trade. Two nations who traffic with each other become reciprocally dependent: for if one has the interest in buying, the other has the interest in selling and thus their union is founded on the mutual necessities" (1748)" a number of economists and political scientists maintained that trade among nations leads to peace. That logic is as follows: if a target country that is the recipient of conflict retaliates by cutting its trade ties with the conflict instigator, then a portion of the costs of conflict born by the instigator results from its lost gains from trade. Conflict is more costly the higher these gains from trade losses. This article summarizes some of the empirical work testing this proposition.

Enrique S. Pumar. "Transnational threats and security in the Americas: patterns, contradictions, and more." The article examines conflict patterns in Latin America since the second half of the twentieth century. It seems paradoxical that the region is one of the most peaceful in terms of interstate conflicts while contending with numerous domestic crises. The article first examines the peace studies literature and argues that neither the micro, macro, or more recent meso approach fits the Latin American experience well. Instead, a different approach proposes incorporating the effects of transnationalism, especially of transnational security concerns, into any consideration of peace in the region. Transnational threat perception diverts attention, suggests the need to handle a common enemy, increases the cost of fighting a conventional war, and involves issue-linkages. These factors along with the traditional absence of ethnic rivalries and the presence of international actors sustain the long peace in Latin America.

Prasad S. Bhattacharya and **Dimitrios D. Thomakos**. "Trade, openness, and domestic conflict: an empirical investigation for Latin America." The article reports results of an empirical investigation into trade, openness, and domestic conflict for several Latin American countries. It addresses two main issues: (1) whether variations in trade openness affect the likelihood of the onset of domestic conflict and (2) once initiated, how variations in openness affect conflict duration. For the period 1973-1995, and controlling for numerous sociopolitical, institutional, and economic factors, our findings suggest that (1) increased trade openness reduces the chance for domestic conflict onset as well as the intensity of domestic conflict and (2) over-reliance on agricultural exports, which can be a consequence of increased openness, is the main factor sustaining conflict. Conflict mitigation policies should keep in mind the role tradable agricultural goods play in this region of the world.

Archontis L. Pantsios. "Trade and conflict: the dyad of Greece and Turkey." The conflict-trade paradigm has been dominated by the liberal and realist schools of thought, which try to explain how and why trade affects conflict and cooperation. While the liberal point of view predicts a positive effect of levels of trade on cooperation, realists counter by arguing a negative or negligible effect at best. The article presents the basic theoretical arguments and extensions of the conflict-trade relation as espoused by the liberal school of thought and applies them to the Greco-Turkish dyad. Foreign policy conclusions are drawn from a Greek point of view, and are related to trade volume, type of trade, state of democratization, country size, contiguity, tariffs, foreign aid, and third-party effects. With few qualifications, it is shown that it would serve Greece's best interests and promote peace in the region if Turkey were to become a full member of the European Union.

Saumitra Jha. "Maintaining peace across ethnic lines: new lessons from the past." This policy overview draws upon two studies, one theoretical and one empirical, to explore lessons from medieval Indian Ocean trade for supporting ethnic tolerance in contemporary settings. The overview begins by sketching a model of inter-ethnic trade and violence in environments where there are "local" and "non-local" ethnic groups. The model suggests that three conditions are necessary to support peaceful coexistence between these groups over time: complementarities between groups, a high cost to replicate or expropriate the source of another group's complementarity, and a mechanism to share the gains from inter-group exchange. The article then describes how these conditions were satisfied among Hindu and Muslim traders in medieval Indian ports from the rise of Islam to European ascendance in the 17th century. The article characterizes the institutions that emerged to bolster religious tolerance in these towns during the medieval period and that continued to support religious tolerance two centuries after the decline of Muslim dominance in overseas trade. Finally, the article draws lessons from the theory and India's institutional legacy to understand why ethnic tolerance fails and how tolerance may be fostered in contemporary settings.

Christopher Coyne. "Deconstructing reconstruction: the overlooked challenges of military occupation." In the post-Cold War period, the main threat to the United States and other Western nations comes from weak, failed, and conflict-torn states. The viability of military occupation and reconstruction as strategies to deal with these threats is an open issue. I explore two central, but often overlooked, issues that every occupation and reconstruction must face. First, I consider the "knowledge problem," which refers to the lack of understanding of how to establish the foundations of liberal democratic institutions where they do not already exist. I then consider the "public choice problem," which focuses on the decisionmaking process within the United States. Oftentimes, the incentives created by political institutions generate policies that run counter to the end goals of reconstruction efforts abroad. Formulating effective policies toward weak, failed, and conflict-torn states requires the recognition and understanding of these challenges and the constraints they impose.

Rupayan Gupta. "Some factors affecting independence movements: an overview." The article outlines a game-theoretic framework that can be used to analyze the nature and outcomes of independence movements in disputed or occupied regions. It is seen that the nature of an independence movement depends on a complex interplay among personal characteristics of movement leaders, personal characteristics of the occupier, the proclivity of the citizens to participate in the movement, and the cost structure of the occupier. To a large extent, the results described in this article depend on whether the strategies of the conflicting parties are complements or substitutes.

Water stress and water wars

Frederic L. Pryor

The conventional view is pessimistic about future freshwater availability and foretells an increased probability of interstate war over water. This article disputes this view: while water shortages may become critical, they need not lead to war.

In recent years, the conventional view expresses pessimism about the world's future freshwater availability. For instance, according to the United Nations Environment Program, "The world water cycle seems unlikely to be able to cope with the demands that will be made of it in the coming decades."[1] Similar claims are made by others, such as Lester Brown and Sandra Postel.[2] Alongside this view, an increased probability of war over this resource is predicted. Many cite approvingly a 1995 statement of a former World Bank vice president, Ismail Serageldin: "If the wars of this century were fought over oil, the wars of the next century will be fought over water."[3] In this article I argue that if we look at the numbers, such pessimism is unwarranted and turns our attention from addressing some real problems concerning water and international conflict.

The conventional view argues that to accommodate a fast-growing world population and to reduce malnutrition, we will need to grow ever more food in the future. Although food production can be increased by expanding the land under cultivation, the additional arable land is becoming more scarce and increasing food production by more use of fertilizers, pesticides, and better seeds is reaching the point of diminishing returns. Although food production can also be increased through more irrigation, which played a major role in the higher productivity achieved through the "green revolution," we are also running into limits due to the rapidly rising expense of new dams and irrigation systems. To feed their population in the coming decades, countries will need more irrigation water and, therefore, wars over freshwater will become more frequent.

To develop more accurate ideas about water stress and water wars, three issues need examination: (1) Is there an impending shortage of freshwater? (2) Is there an impending food crisis because of water shortages? (3) Will future wars be triggered by water shortages? I argue that water-stress, according to conventional criteria, may become quite serious by 2025, but this will not necessarily lead to either a food crisis or international war.[4]

Is there an unsustainable stress on freshwater?

How can we measure a water crisis?

Four initial caveats deserve mention: The data on the availability of freshwater in many countries are not very good, and the comparability of such data from country to country is limited. Projections of future water stress are fraught with even more perils, and long-term predictions have varied enormously. Moreover, endogenous effects of water stress, such as migration, are difficult to take into account. Finally, great uncertainties in projections arise because of possible impacts on the availability of freshwater due to climate changes arising from global warming and other factors. I must leave it to others to discuss the highly technical issues about climate change.[5]

For this article several concepts used in the measurement of a stress on freshwater (a supply-side approach) need brief mention. *Renewable water* means merely that the water taken from lakes or the ground (including aquifers) does not result in a lowering of the water level of these sources. *Freshwater* includes all non-saline water. Few sources provide information on the purity of this water, so in this study we must consider all surface and ground water as fresh. A *water withdrawal* occurs when humans take water from rivers, lakes, or the ground, or collect it from rain. If freshwater is not recycled or reused by consumers, actual use is less because some usable water is lost through evaporation, runoff, or seepage along the way. In addition to water withdrawals, freshwater can be obtained through desalinization or by importation from other countries (shipping it on tankers, towing icebergs, etc.). Finally, *water-stress* arises when less freshwater for a jurisdiction is available than that indicated by conventional norms. This is different from a *water scarcity* which occurs when the demand for water at the current price is greater than the supply.

No single indicator gives a complete picture of a water stress. I use three supply-side measures for the physical availability of freshwater.[6] Other more complex indicators are also available but they are difficult to interpret and supply few additional insights. First, the *freshwater-availability indicator* focuses on the per capita availability of renewable freshwater, including water from rivers in international river basins.[7] Taking all uses of water into account, she designates nations with 1700 cubic meters per person per year of available water as having infrequent water shortages, 1000 cubic meters of water per person per year as being "relatively water-stressed," and 500 cubic meters or less per person per year or under as indicating a "chronic water scarcity." I use 1000 cubic meters per person per year (2740 liters per person per day) as one of my measures of water-stress. This indicator has the advantage that it is easy to calculate and understand. Combined with a population projection, it can also serve to approximate the per capita amount of freshwater available in the future, other than that obtained through desalinization or importation. At the same time it has several notable disadvantages. It approaches the problem from the supply side, measuring only renewable surface and groundwater flows, and does not take the demand side into account. It also says nothing about how

Table 1: Countries projected to be water-stressed in 2025

Sub-Saharan Africa
Burkina Faso, Burundi, Cape Verde, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Malawi, Rwanda, Somalia, South Africa, Swaziland, Sudan

North Africa and Near East
Afghanistan, Algeria, Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, U.A.E., Western Sahara, Yemen

Rest of Asia except former USSR
Maldives, India, Korea (South), Pakistan, Singapore

Europe, former USSR
Armenia, Azerbaijan, Belgium, Cyprus, Lithuania, Kazakhstan, Malta, Moldova, Portugal, Spain, Turkmenistan, Ukraine, Uzbekistan

North and South America, Oceania
Barbados, St. Kitts and Nevis, Peru

Note: The countries listed are deemed water-stressed by one or more of three criteria discussed in the text: water-availability (less than 1000 cubic meters per person per year), relative-water-stress (water withdrawals to water availability greater than 40 percent), or water-reliability (equal to four). Countries meeting these criteria for all three indicators are underlined. Data were not available for all three indices for the following countries: Barbados, Malta, St. Kitts and Nevis, and Western Sahara. The sources of data for the water-availability and relative-water-stress indices are discussed in note 6. The water-vulnerability calculations come from Raskin, *et al*. (1997).

the freshwater is used and whether the potential availability of water is realized in an efficient manner which depends in part on the nation's infrastructure. For instance, in 2001 Israel had a renewable freshwater availability of about 198 cubic meters per person per year and yet it has been able to function as a modern nation by employing sophisticated water usage techniques.[8]

Second, the *relative-water-stress indicator* focuses on freshwater withdrawals. More specifically, it is the ratio of annual water withdrawals to the annual freshwater availability. High stress is considered to be a ratio of more than 40 percent; medium-high stress, from 30 to 40 percent; and medium stress, from 20 to 30 percent. These limits of course are arbitrary and accordingly a country such as Belgium is considered a nation of high water-stress even though its current ratio seems sustainable for the indefinite future. The relative-water-stress measure requires a projection of future water withdrawals, a calculation which, as indicated before, is not easy to make. The projections by Shiklomanov which I use here predict that on an aggregate basis water withdrawals will increase about 32 percent between 2000 and 2025.[9]

Third, the *water-reliability indicator* has been calculated by Raskin and co-workers and is a composite of three separate measures: a measure of the ratio of water storage to water usage (this ratio takes into account the use of monsoon water in other parts of the year), a coefficient of variation of precipitation, and the dependency on water from an international river basin.[10] Each of these three criteria is rated on a scale of one to four, running from no-stress to high-stress, and are added to form the combined index. For the analysis that follows, I select only those countries with an overall evaluation of "high-stress."

Water-stressed countries in 2025

Table 1 lists countries projected to be water-stressed in 2025 if they meet any one of the three discussed indicators. Several features of this listing deserve brief comment. First, as we would expect, the largest single block of water-stressed nations are in North Africa and the Near East. Second, a stricter definition of water-stress by any of the three criteria would reduce the number of listed countries. For instance, by defining stress, as measured by the water-availability index, to be 500 (rather than 1000) cubic meters per person per year, we would eliminate six nations from the list (Burkina Faso, Comoros, Eritrea, Ethiopia, Malawi, and Cyprus). Third, water-stress is exacerbated by high population growth. Of the 56 nations for which water-stress is predicted, 25 (44.6 percent) have a projected annual population growth of 1.5 percent. And forth, 30 nations (53.8 percent) in table 1 have 1.6 hectares of arable land per person or less.

Table 2 aggregates the data to provide a global perspective for 2025 and also presents several new indicators measuring personal access to freshwater. Using the criteria for water-stress from table 1, the data show that roughly one tenth of the world's population now live in water-stressed countries but that this figure will jump to about one-third by 2025, estimates that accord with those of other researchers.[11] A major factor underlying this increase is the inclusion of India among the water-stressed nations in 2025, but not 2000. If India were excluded from consideration, the increase in population living in water-stressed nations between 2000 and 2025 would be roughly seven percentage points and the problem of the increasing worldwide water stress would not seem so severe.[12] China is not included among the water-stressed nations, but if North China were a separate nation, it would probably be water-stressed by the criteria discussed above and would have to be added to the totals.

Part A of table 2 suggests that, according to conventional criteria, a significant

Table 2: Percentage of the world's population in countries with current or projected water-stress, 2000 and 2025

	2000	*2025*
A. Supply side		
- All countries with water-stress according to any of the three criteria	11.8	35.5
- India alone (included as water-stressed in 2025, but not in 2000)	16.8	17.4
- North China alone (China as a whole is not included as water-stressed)	3.3	2.9
B. Demand side		
Countries with a low percentage of population having access to safe drinking water		
- Less than 50 percent of population with access to safe drinking water	5.1	–
- 50 to 75 percent of population with access to safe drinking water	7.6	–
Countries with a low percentage of population having enough water for basic human requirements		
- Less than 50 percent of population meeting basic water needs	8.7	–
- 50 to 75 percent of population meeting basic water needs	8.6	–

Sources for Part A: see note 9 and table 1. I have roughly estimated that the population in the water-stressed areas of north China numbered 200 million in 2000. According to Revenga, *et al* (1988) in the early 1980s the Yellow River basin had a population of 153 million, and I have projected the same population growth rate for this area as for the rest of the country (as estimated by the United Nations, 2003). *Sources for Part B*: Data on access to freshwater come from Gleick (2002, table 3) and WHO (2000); data on population meeting basic water requirements for human activities are from Gleick (1996). Since access to freshwater or to meet basic water needs depends on infrastructure investment, reliable projections cannot be made.

share of the world's population will be living in water-stressed countries in 2025. As argued later on, however, this does not necessarily lead to food shortage given the enormous amount of fresh water that is wasted.

Part B of table 2 presents data on issues not yet discussed, namely, the share of the world's population in countries without access to safe drinking water and in countries without sufficient water for cooking, health, and other human purposes. In recent years "access" is defined as 20 liters per person per day from a source within one kilometer of the user's dwelling; "safe" is defined in terms of the technology used for obtaining the water, rather than by a direct measurement of its purity. Access to safe drinking water has of course obvious implications for health. The available data also show little correlation with the other indices of a water shortage on the supply side, and only three unfortunate countries, Oman, Qatar, and Yemen, reveal water stress on both the supply and demand indicators. A related indicator is the percentage of the population obtaining at least five liters per person per day which one expert roughly calculates is the minimum needed only for drinking, sanitation, washing, and other personal needs.[13]

These demand indicators do not necessarily measure a supply shortage, but rather poverty and the lack of suitable infrastructure to get available water to households. Such measures are also a glaring sign of the failure of international assistance to help fulfil a vital development and health need.

Is there an impending world food shortage because of water stress?

Various economists and organizations dealing with agriculture and water have made sophisticated projections of the world's food supply in 2025. Rather than focus on the details of these forecasts, I will discuss the broad assumptions that underlie these predictions.

Food requirements

According to median projections of the United Nations, in 2025 and 2050 the world's population should be respectively 29 and 47 percent higher than in 2000.[14] If the composition of agricultural production remains the same, the value of food production must increase by at least these amounts for the global population to have the same per capita food consumption as in 2000. As per capita incomes rise, however, the composition of food production changes, primarily in a water-using direction. For instance, greater consumption of meat requires water for the animals, as well as for the crops they eat. As a generous guess, let us assume that this would increase the value of food production by one third, so that in 2025, food production would have to increase 38.5 percent, not merely 29 percent.

Moreover, if we wish to reduce malnutrition in the world, then global food production must grow faster than the population. Various international organizations have estimated that between 14 and 21 percent of the world's population was undernourished in 2000. For the sake of safety let us assume the higher estimate and, arbitrarily, that these undernourished would need to consume 25 percent more food to achieve a proper diet. This means that world food production would have to

increase by an additional 5.5 percent. Thus, to eliminate malnourishment by 2025 and to meet the rising food demand from a greater population and higher incomes, food production between 2000 and 2025 must increase 40.6 percent, or far less than half a percentage point per year.

Perspective can be gained by noting three facts. First, between 1975 and 2000, the annual total food production increased 2.3 percent a year.[15] Second, over this period there was no sign of a deceleration of this average annual growth in food production. Third, as discussed later on in greater detail, during the same period land productivity (food per hectare of arable land) also increased rapidly and showed no sign of decelerating. For these reasons it should not be surprising that between 1970 and 2000, the world price indices for food (and also for agriculture as a whole) fell considerably.[16]

Arable land

Between 1975 and 2000, arable land in use increased only 5.5 percent. For the same period a marked deceleration in the increase of arable land use is also apparent.[17] Although land classified by the FAO as agricultural (but used for pasture, rangeland, and other non-crop purposes) is roughly 3.5 times greater in extent than arable land under use, much of it has quite low-quality soil. Most specialists seem to believe that the potential for intensive food production on such land is relatively low. It is not entirely clear how much of this low potential is due to previous use that degraded the soil, e.g., by wind and water erosion, and how much is due to naturally poor soil fertility and climatic conditions. Although rich agricultural lands are still being opened in some countries, such as Brazil, it is possible that the world's total crop lands will not be significantly greater in 2025 than in 2000. This is due to problems associated with poor land or water management, such as erosion, water logging, salinization, or other oft-discussed farming problems.

Irrigated land

The percentage of irrigated arable land in use increased from 11 percent in 1961 to 14 percent in 1975 and to 20 percent in 2000.[18] Over this period, however, the annual increase was decelerating and, on a per capita basis, actually declined by a few percentage points. Four reasons suggest that the area under irrigation will not greatly increase. First, the cost of building irrigation dams is rising, in part because the most economical sites have already been used. Although the number of large dams (defined in terms of height and reservoir storage) which have served as one source of irrigation water increased ninefold between the end of World War II and the end of the twentieth century, dam construction hit a peak in the 1970s and, in the 1990s, fell drastically.[19] At this point there were few large rivers left that have not already been controlled in this way. Second, these dams often carry high environmental, social, and economic costs. As a result of the Nasser Dam, for instance, considerable land in the lower Nile has lost fertility, and river fishing in the Nile delta has greatly suffered as well. Also, dam's capital and maintenance costs are seldom covered to a significant degree by fees for irrigation water. Third, higher energy costs often add considerably to the expense of irrigation. Fourth, salinization of irrigated land reduces land productivity. Roughly 20 percent of irrigated land is adversely affected by moderate or higher salinization, and another 4 percent of the non-irrigated land is similarly affected.[20]

Productivity-enhancing measures other than irrigation led to an increase in food production in the last quarter of the twentieth century between 60 and 64 percent.

A slow increase in irrigated land is, however, not catastrophic because the aggregate effect of irrigation on agricultural production is often highly overestimated. Of course, the relative productivity depends on local conditions, but for the world as a whole the FAO estimates that when total *irrigated* land was 16 percent of total *arable* land, it produced between 30 and 40 percent of the world's food.[21] This suggests that, on an aggregated basis, irrigated land was 2.25 to 3.5 times more productive than non-irrigated land. If this average held between 1975 and 2000, the increase in irrigated land accounted for an increase in food production of somewhere between 6 and 10 percent. Taking into account the increase of arable land used in agriculture, such a calculation suggests that productivity-enhancing measures other than irrigation led to an increase in food production in the last quarter of the twentieth century between 60 and 64 percent.

If such productivity trends continue for the next quarter century, then even without an increase in irrigated land area more food than necessary will be produced, both to feed the growing world population at current standards and to eliminate malnourishment (if lack of crop production is the basic cause). Of course, some have questioned the underlying assumption about the increase in agricultural productivity. They have suggested that crop yields are peaking and cannot go much higher. Some have even raised alarm about decelerating (or even declining) crop yields due to salinization and erosion. When using an index of total food production per hectare, I find no evidence of decelerating or declining land productivity in the 1975-2000 period.[22] Decades of research on agriculture productivity for tropical areas have also begun to achieve a payoff, which should continue for some decades. In brief, the projected necessary increase in world food production does not seem to require the vast extension of irrigation with its concomitant demand for more water that occurred in the last quarter of the twentieth century. Rather, the rise in land productivity attributable to other factors such as better farming practices, better crops, and more efficient use of the currently available freshwater, may be more than sufficient.

This conclusion, however, focuses on food supply and demand for the entire

world. In 2025, individual countries may of course produce less food than is necessary to feed their populations. This problem can be resolved by importing food, but such an economically efficient solution means that the goal of national food self-sufficiency must be scrapped, a price that some policymakers may find politically painful to pay, particularly for grains.

Will future wars be triggered by water shortages?

Some believe that gaining access to freshwater has been an important cause of past wars. In a study of 412 international crises for the period 1918-1994, however, Aaron Wolf finds only seven conflicts directly related to access to freshwater.[23] Moreover, in three of these, no shots were fired. To assess directly the possibility of water wars, we must consider past experience carefully and look at the future in terms of possible water resource-based flashpoints for armed conflict in the various international river basins.

Possible lessons from past wars over water

A major difficulty in analyzing water wars arises from loose terminology. Words such as "conflict," "dispute," "tensions," "hostile actions," and "war" are often conflated. Moreover, water is sometimes only one of many factors leading to armed conflict between nations, so that it is often difficult to assess the importance of water *per se* as the cause of war. In the following discussion I distinguish between *all-out wars* with formal declarations from *major military conflicts* involving invasions and the use of heavy, military equipment and *minor military conflicts* involving military skirmishes and limited fighting. It must also be noted that he "record of acute conflict over international water resources is overwhelmed by the record of cooperation ... Furthermore, once cooperative water regimes are established through treaties, they turn out to be impressively resilient over time, even when between otherwise hostile riparians, and even as conflict is waged over other issues."[24]

Table 3 lists military engagements between countries that probably arose from disputes over water control in the last quarter of the twentieth century. It shows no instances of an all-out war over water, but this is partly a matter of interpretation. For instance, some analysts, such as Klare, argue that the Arab-Israeli war of 1967 "was largely triggered by fighting over control of the tributaries of the Jordan River."[25] When border or other issues were also involved, it is often difficult to determine whether water was the critical cause for armed conflict.

Several aspects of table 3 deserve note. First, in this period relatively few armed conflicts arose over the allocation of water, which accords with the general decline in inter-state warfare.[26] Second, in five of the seven engagements that did occur, either one or both nations were water-stressed in 2000, according to at least one of the three criteria discussed earlier on (the two exceptions were the conflicts in the Orange and the Karnaphauli river basins). Third, armed conflicts over water were much more frequent in the previous quarter-century from 1950 through 1974. Nevertheless, if we exclude those that concerned the Jordan river basin and clashes between Israel and its neighbors in this period, the number of armed conflicts was roughly the same in the

Table 3: Interstate military engagements over water, 1975-2000

A. Wars listed by the International Peace Research Institute, Oslo (PRIO)

Cenepa Peru-Ecuador 1995	Engagement near river; primarily a war over territory rather than a water dispute *per se*. PRIO lists this war with as one of "minor intensity" with probably less than 100 casualties.
Orange South Africa-Lesotho 1998	South African troops occupied the Katse and Mohale dam areas when taking side in an internal Lesotho conflict. PRIO lists this entire conflict as one of "minor intensity" with slightly less than 120 deaths.

B. Other military engagements but not classified as interstate wars by PRIO

Tigris-Euphrates Iraq-Syria 1975	Dispute about filling of upstream dams; transfer of troops; closing of air space.
Tigris-Euphrates Iran-Iraq 1986	Iranian-Kurdish guerillas attacked Dukan dam; water issues are unclear but appears part of Iran-Iraq war, 1980-88.
Karnaphauli Bangladesh-India 1991	Shootout between paramilitary police about an irrigation channel.
Kura-Araks Armenia-Azerbaijan 1992	Armenia gained control of Sarsangskaya dam in Nargorno-Karabakh; appears a part of the Armenia-Azerbaijan war (1991-94), rather than a separate war over water.
Senegal Mali-Mauritania 1999	Mali herdsmen refused to let Mauritanian horsemen use a water hole; small battle ensued.

Notes: The river involved is listed on the top line of the first column, then the countries involved, and finally the date. This list excludes cases where the dispute did not escalate to use of military force but remained at the level of massing of troops and serious threats. The data on water disputes come from lists by Gleick (2004) and Wolf (n/d). The PRIO lists are found at PRIO (2005).

two twenty-five-year periods.

The relative infrequency of water wars suggests that from a cost/benefit perspective, the gains from armed conflicts over water are often dubious, especially when long-term expenses of occupation and costs of handling subsequent tensions are taken into account. Even when a powerful downstream nation simply destroys an upstream dam and then withdraws, this could have not only a severe short-term physical impact downstream but a costly long-term financial one, resulting from the loss of the upstream neighbor's cooperation in other areas and the necessity to maintain a large army. Such a cost/benefit calculation does not require a high degree of rationality. Buying water also seems less expensive in the long run that fighting wars and occupying other nations to obtain it.

Future wars over water?

Some commentators argue that for wars over water, the past does not serve to predict the future. Consensus is lacking, however, on the critical conditions that would incite armed conflict over water resources. Klare notes that water shortages need not lead to conflict where states enjoy good relations with one another and have a history of resolving differences through peaceful negotiations.[27] I might add that even enemies can cooperate over the allocation of water.[28] Homer-Dixon argues on the basis of *real-politik* that wars over river water between upstream and downstream neighbors are likely only under a narrow set of circumstances: "[T]he downstream country must be highly dependent on the water for its national well-being; the upstream country must be threatening to restrict substantially the river's flow; there must be a history of antagonism between the two countries; and, most important, the downstream country must believe that it is militarily stronger than the upstream country ... the situation is particularly dangerous if the downstream country also believes it has the military power to rectify the situation."[29] In most, but not all of the cases reported in table 3, the downstream nation started the conflict.

Can we predict future wars over water? Current studies give conflicting results. For data covering the past 100 years or so, several researchers show that armed conflicts over water resulting in at least one death are significantly and positively related to variables such as autocratic regime type, the size of the river basin, and whether a major power is involved. Negative relations are established to variables such as years at peace, the level of economic development of the countries involved, and whether they are allied.[30] For purposes of prediction, objections can be raised because the barrier for defining armed conflict is low – certainly 25 deaths or less does not constitute a major war and, moreover, the definition of water stress is unsatisfactory. One set of researchers reaches conflicting conclusions on the basis of single variable correlations showing that no matter how it is measured, water stress is not a significant indicator of water disputes and, moreover, neither government type nor climate show any pattern of impact on water disputes.[31] But since these correlations do not account for the effect of other variables, their use in predicting the future can be questioned. Hauge and Ellingsen present regression results showing that water-scarce countries are more likely to engage not only in international wars but also experience more domestic armed conflict when other risk factors such as high population density, income inequality, poverty, or non-democratic governments are added.[32] These international wars, however, may not necessarily be over water, which is the focus of this discussion.

Given such divergent results in predicting water wars based on regression studies, it seems more useful to employ a more transparent approach for looking at these issues. The starting point is a list of 261 international river basins which have been listed by Wolf and his associates.[33] The first criterion for isolating the river basins most at risk of armed conflict is the *institutional-physical approach*. This focuses strictly on the role of water-stress as a potential cause of war. Starting with the list of countries predicted to be water-stressed in 2025 (table 1), I apply three criteria that would increase the probability of conflict: (a) that some countries in the international river basin will experience water-stress by 2025; (b) that a significant area of these water-stressed nations lies in the basin; and (c) that the water-basin area in these water-stressed nations covers a significant portion of the entire water basin.[34] The fifteen water basins listed in the upper half of table 4 fit these three criteria. (Because of its size, table 4 is appended to this article.)

The second criterion for isolating river basins most at risk of armed conflict is the *institutional-political approach* which has been advanced in one way or another by a large number of political scientists. Rejecting the notion that water-stress will have much to do with future armed conflicts over water, they instead point to particular characteristics of the nations that might become involved in a military conflict. For instance, Bruce Russett concentrates on factors such as the degree of democracy in the countries involved, trade interdependency, military capability, alliances, and participation in international organizations.[35] Other political scientists argue for other determinants of war. Few of them mention water issues. The most relevant empirical study in this genre which focuses on river basins is by Wolf, Yoffe, and Giordana.[36] They argue that wars over water are more likely to be found in river basins with riparian nations unused to cooperating with each other (a situation intensified by a history of ethnic conflicts) and that lack the institutional capacity to coordinate their basin development projects such as dams or irrigation systems. They calculate the probability of war and, although they do not provide sufficient detail for others to replicate their results, I include in the lower half of table 4 their list of seventeen water basins where armed conflicts are most likely to occur.

It is noteworthy that with the exception of the Incomati, none of the river basins listed in the institutional-physical list (panel A) overlap with those in the institutional-political list (panel B). Of the thirty-two basins, thirteen do not include any water-stressed nations and, of the remaining, eleven have never featured any conflict. To select those basins where armed conflict is most likely, a more systematic approach

is needed and, for this purpose, I construct an index that contains three elements:[37] the lack of past cooperation over water issues in the past; past conflicts (not necessarily leading to fatalities) over water; and geographical factors that increase or decrease the propensity of war. Since so few disputes over water issues have occurred in the past few decades (the period most relevant for making projections), the weights of these three factors can only be subjective, but since the relevant data are provided, readers may reweigh these factors as they please. The PACW index (propensity for armed conflict over water) is a ten-point scale running from 0 (no propensity) to 9 (high propensity) and is the sum of three components.

If we use a PACW score of 4.5 (the midpoint of the scale) or higher to indicate that future water-related interstate armed conflict is likely (by 2025) then only the Tigris-Euphrates, Han, and Salween basins qualify. If the trigger point is lowered to 3.5, then the list expands to include the Indus, Lempa, and Lake Turkana basins. Of these six, indicator B shows that armed conflict over water arose in the last quarter of the twentieth century in only two of them (the Indus and the Tigris-Euphrates). Since the Lempa and Salween basins do not include any water-stressed nations, they can be dropped from further discussion. Three of the remaining four river basins – the Tigris-Euphrates, the Indus, and the Han – include countries where political tensions over a variety of issues, not just water, have been endemic in the last few decades. Whether disputes over water will serve as a flashpoint or merely as a contributing factor for armed conflict is difficult to say. The remaining river basin, Lake Turkana, did not experience armed conflict over water, although by 2025 one of the nations, Kenya, will be water stressed.

The number of probable loci for water-based interstate conflict by 2025 are few and will probably not exceed those that occurred between 1975-2000. In contrast, intrastate armed conflict over water may increase.

Although this exercise does not allow exact predictions regarding the intensity of future water disputes in these basins, or whether armed conflict will erupt at all, it does suggest that the number of probable loci for water wars up to 2025 are few. These results also suggest that armed interstate conflict over water will probably not be more frequent than they are today. Many commentators reject this kind of macro approach used above, and instead focus on micro issues that possibly might lead to armed conflict. Little agreement can be found among them, however. For instance, Sandra Postel sees five hot spots for serious water disputes: the Aral Sea region, and the Ganges, Jordan, Nile, and Tigris-Euphrates basins.[38] Michael Klare focuses on four river basins: the Nile and the Tigris-Euphrates, where water allocation are the prime issue; and the Jordan and Indus, where water and a variety of political issues are intertwined.[39] For the Nile he emphasizes that Ethiopia, which had roughly the same population as Egypt in 2000, will have a third more than Egypt in 2050 and will be forced to use waters from the Blue Nile to feed its growing population, thus taking water away from Egypt. Homer-Dixon mentions only the Nile as a future trouble spot, claiming that the conditions for armed conflict will not exist for the Indus, Paraná, Euphrates, and Mekong rivers.[40] DuPont, in contrast, claims that water cooperation among riparian nations in the Mekong basin is fragile (although he speaks of "considerable tensions" in the future rather than of armed conflict).[41] Others mention potential conflicts over water between South Africa and its neighbors, or between Turkey and Syria or Iraq.

Whether or not states will be able to work out their differences without armed conflict, it is clear that costs of war over water usually outweigh the benefits, especially when there are many alternatives to war. In particular, the amount of freshwater available to a nation can be vastly increased by its more efficient use. Agriculture now accounts for roughly 70 percent of water withdrawals in the world and currently less than half the water diverted for irrigation actually benefits crops.[42] Moreover, effective water-usage techniques such as drip irrigation are available, so that even more water could be made available for other usage. For many purposes, waste water can also be reused. Waste of freshwater can also be reduced by better methods of pricing schedules. Finally, a variety of institutions have been created in the last few decades to mediate international disputes over water.[43]

Conclusion

I have presented evidence for three propositions. First, by 2025 a significant share of the world's population will be living in countries which are water-stressed, at least by conventional criteria. Since most countries have not yet utilized huge possibilities for water saving, however, the "stress" may have no large-scale negative impacts on agricultural production or the prospects for armed conflict. Second, macro-evidence suggests that the world will be able to feed its growing population, even as growth of food production through irrigation agriculture will not be as important in the first quarter of the twenty-first century as it was in the last quarter of the twentieth. Nevertheless, considerable investments in irrigation will still be necessary. Third, armed conflicts between nations have not been very frequent in the last quarter of the twentieth century and, although water stress is increasing, other conditions do not appear to be changing sufficiently to warrant the expectation that water wars will intensify in the next several decades. This expectation can be bolstered by the development of effective ways of conserving countries' available freshwater which reduce the temptation to appropriate water from a neighboring state, by the increasing effectiveness of new technical methods of monitoring water treaties, and by the increasing availability of institutions and methods for resolving disputes over water.

In brief, the evidence presented in this article suggests that in the coming decades the probability for interstate armed conflict over water is low. In contrast, localized water stress in nations with weak central governments water may increasingly lead to armed interstate civil disputes. These results suggest that direct efforts to prevent

water conflicts, either external or domestic, are misguided. Rather, efforts should be focused on reducing water wastage, increasing water recycling, rational pricing of water (to reduce demand), and on breaking down barriers to trade in food (so that water from water-rich regions can be "transported" via food trade to water-poor regions). In some cases considerable resources will be necessary, e.g., lining irrigation channels to reduce seepage. In other cases, imaginative policy measures must be undertaken, e.g., eliminating the crazy-quilt of water rights in California which leads to irrational water usages. In the long run, however, such measures will most likely be considerably less expensive for all parties involved than armed water conflicts.

Notes

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1. UNEP, 2001.

2. See, e.g., Postel (1999) and Brown (2005).

3. The statement was made in Stockholm in August 1995 and repeats a sentiment common in Egypt at that time. In personal communication with the author, however, Serageldin complained that few of the hundreds citing this quotation include the remainder of his sentence: "... unless we change our approach to managing this precious and vital resource."

4. Small-scale conflicts over water appears to occur more often within a country, rather than between nations, e.g., disputes over dam building in India, pollution or dessication of many inland lakes, the devastation of the Aral Sea, etc. To limit the length of this essay, however, I focus only on international disputes.

5. See, e.g., Alcamo and Henrichs (2002).

6. Data on water availability come from Gleick (2004, pp. 257-262) and refer to 2000 or the closest year that could be obtained. Population data are for 2000 and come from the United Nations (2003), supplemented by data from the U.S. Census Bureau (2004). No data are available for the Western Sahara, but it is listed on the basis of qualitative evidence. Projections of the renewable water availability index are made with the assumption that freshwater availability remains the same as in 2000. Projections of water withdrawals for 79 nations up to 2025 come from Shiklomanov (1998), adjusted for more recent population estimates. For other countries I have based the estimates on Shiklomanov's regional estimates. For more details, see Pryor (2006).

7. See Falkenmark (1989).

8. See Gleick (2004, p. 261).

9. Gleick (2000, p. 59) reports nine forecasts made between 1995 and 2000 of global water use (or withdrawals) in 2025; they ranged from 3635 to 5500 cubic kilometers. For better or worse, I use the Shiklomanov estimates which fall roughly in the middle of the most recent extrapolations under "business-as-usual" scenarios. An interesting alternative measure to the relative-water-stress index is the ratio of the groundwater removed to the estimated groundwater recharged. Such a measure summarizes the change in the water table of a nation. It is, however, difficult to estimate and is available for only a limited number of nations.

10. See Raskin, *et al*. (1997).

11. See, e.g., Seckler, *et al*. (1998).

12. Unfortunately, an indicator of water reliability is not available for 2050. Calculated with only two measures, the water-availability and relative-water stress indicators, the share of the global population in water-stressed nations increases only 3 percentage points between 2025 and 2050.

13. Gleick (1996). This is about double the amount necessary for survival, as calculated by others; it also does not include other uses for water such as agriculture.

14. United Nations (2003).

15. FAOStat (2005).

16. World Bank (2005, table 6.4).

17. FAOStat (2005).

18. FAOStat (2005).

19. World Commission on Dams (2000, p. 9).

20. Gleick (2000, p. 269).

21. FAO (1993, chapter 1).

22. Or, for that matter, in the 1961-2002 period. Calculated from FAOStat (2005).

23. Wolf (1997).

24. Wolf, *et al*. (2003, p. 30).

25. Klare, 2001, p. 139.

26. Gleditsch, *et al*. (2002).

27. Klare (2001, p. 139).

28. Water disputes can be peacefully resolved, even between unfriendly countries. For instance, Israel and Jordan were hostile for many years, but the two countries held secret negotiations to cooperate over water during the period. Their water treaty of 1994 covered not only the allocation of the waters from the Jordan and Yarmouk Rivers but also the Araba/Arava groundwater aquifer and the contamination of these joint water resources. Although India and Pakistan fought two wars, the Indus River Commission survived these conflicts and its members cooperated over water issues (Wolf, *et al*., 2003).

29. Homer-Dixon (1999).

30. Toset, *et al*. (2000), Furlong and Gleditsch (2003), and Gleditsch, *et al*. (2004).

31. Wolf, *et al*. (2003).

32. Hauge and Ellingsen (1998).

33. Wolf, *et al*. (1999).

34. More specifically: (a) the countries must be listed in table 1; (b) at least 10 percent of the land mass of each country must be located in the water basis; (c) at least 10 percent of the land area of the basin is located within the borders of these water-scarce countries.

35. Russett (2006).

36. Wolf, Yoffe, and Giordana (2003).

37. The construction of the described in detail in Pryor (2006).

38. Postel (1999, chapter 7).

39. Klare (2001).

40. Homer-Dixon (1999).

41. DuPont (2001, pp. 126-130).

42. Postel (1993).

43. These alternatives are discussed in much greater detail in Pryor (2006).

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Table 4: International river basins with a potential for armed conflict over water

River basin	*Water-stressed countries in the basin*	*Non-water-stressed countries in the basin*	*Indicator*			*PACW score (0-9)*
			A	*B*	*C*	
A. Institutional-physical approach						
Africa						
Awash	Djibouti, Ethiopia, Somalia	–	3.0	0.0	0.0	3.0
Incomati	South Africa, Swaziland	Mozambique	1.5	0.0	0.0	1.5
Juba-Shibeli	Ethiopia, Kenya, Somalia	–	2.0	0.0	0.5	2.5
Lake Turkana	Ethiopia, Kenya, Sudan	Uganda	3.0	0.0	05	3.5
Maputo	South Africa, Swaziland	Mozambique	2.0	0.0	0.0	2.0
Nile	Burundi, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan	Congo (Zaire), Tanzania, Uganda	0.5	0.5	1.0	2.0
Asia						
Aral Sea basin	Kazakhstan, Turkmenistan, Uzbekistan	Kyrgyzstan, Tajikistan, China	2.5	0.2	0.0	2.7
Indus	India, Pakistan	Afghanistan, China	1.5	0.1	2.0	3.6
Jordan	Egypt, Israel, Jordan, Lebanon, Syria	–	0.0	0.3	0.5	0.8
Tigris-Euphrates	Iran, Iraq, Jordan, Saudi Arabia, Syria	Turkey	2.5	2.0	1.5	6.0
Europe						
Danube	Moldova, Romania	15 nations including Hungary, Serbia, Austria, and Germany	0.5	1.6	0.0	2.1
Dniester	Moldova, Ukraine	Poland	1.0	0.0	0.0	1.0
Dour/Duero	Portugal, Spain	–	0.5	0.0	0.0	0.5
Guadiana	Portugal, Spain	–	0.5	0.0	0.0	0.5
Tegus/Tejo	Portugal, Spain	–	0.5	0.0	0.0	0.5

(Table 4 continued on next page.)

Table 4 (continued)

B. Institutional-political approach: Wolf-Yoffe-Giordano (2003, p. 52)

Africa						
Incomati	–	South Africa, Mozambique, Swaziland	2.0	0.0	0.0	2.0
Kunene	–	Angola, Namibia	1.5	1.0	0.0	2.5
Lake Chad	Algeria, Sudan, Libya	C.A.R., Cameroon, Chad, Niger, Nigeria	1.0	0.0	0.5	1.5
Limpopo	–	Botswana, Mozambique, South Africa, Zimbabwe	2.0	0.0	0.0	2.0
Okavango	–	Angola, Botswana, Namibia, Zimbabwe	2.5	0.0	0.0	2.5
Orange	–	Botswana, Lesotho, Namibia, South Africa	2.0	0.9	0.0	2.9
Senegal	–	Guinea, Mali, Mauritania, Senegal	1.0	0.3	0.5	1.8
Zambezi	–	Angola, Botswana, Congo (Zaire), Malawi, Mozambique, Namibia, Tanzania, Zambia, Zimbabwe	2.0	0.5	0.0	2.5
Asia						
Ganges-Brahmaputra	India, Bangladesh	Bhutan, China, Myanmar, Nepal	0.5	0.2	1.0	1.7
Han	Korea (South)	Korea (North)	3.0	0.0	2.0	5.0
Kura-Araks	Armenia, Azerbaijan, Iran	Georgia, Russia, Turkey	1.5	0.3	0.0	1.8
Mekong	–	Cambodia, China, Laos, Myanmar, Thailand, Vietnam	1.5	0.0	0.0	1.5
Ob	–	China, Kazakhstan, Russia	2.5	0.0	0.0	2.5
Salween	–	China, Myanmar, Thailand	3.0	0.0	1.5	4.5
Tumen	–	China, Korea (North), Russia	3.0	0.0	0.0	3.0
Americas						
La Plata	–	Argentina, Bolivia, Brazil, Paraguay, Uruguay	1.5	0.1	0.0	1.5
Lempa	–	El Salvador, Guatemala, Honduras	2.0	0.0	1.5	3.5

Note: Data on the area of river basins in each country come from Wolf, *et al*. (1999). The most downstream nations in each basin are underlined. See the appendix in the extended paper at Pryor (2006) for the definitions of the components of the PACW (propensity-for-armed conflict over water) index and how it is computed.

Reducing the cost of inter- and intrastate conflict over water in the Jordan River basin

David J.H. Phillips

As shown in Figure 1, five riparians are present in the Jordan river basin (Lebanon, Syria, Israel, Jordan, and the West Bank – the latter representing part of the Occupied Palestinian Territories).[1] The region constitutes a focal point of long-term conflict in the Middle East, and remains a key driver of global geopolitical instability. The availability of water resources is arguably an important element of the historical and ongoing conflict among the countries in the basin, the water-related concerns being driven especially by the arid nature of much of the region, and the past and present inequities in the distribution of fresh water.[2] The only attempt to date to allocate fresh water in a basin-wide fashion involved the production of the Johnston Plan which was finalized at the end of September 1955, and was based on a consideration of irrigable areas only, ignoring groundwater resources. It has been argued that this approach does not match the present-day philosophy for determining the equitable and reasonable use of transboundary watercourses, and that the Johnston Plan proposals are therefore of limited utility at the current time.[3]

While considerable attention has been paid by previous authors to interstate conflicts over water resources in the Jordan river basin (and the region provides some of the best examples of significant conflicts being triggered at least in part by problems connected to water resource allocation and availability),[4] much less has been published concerning intrastate tensions of this nature. The present article addresses this, providing reflections on the connection between water allocations and conflicts in the countries of the basin as a whole, and comments on several economic aspects of relevance.

The nature of conflict and cooperation

Conflict and cooperation are not absolute; each varies along a continuum, as shown in Table 1. At a gross scale, it has been demonstrated that in most transboundary basins (including so-called "basins at risk"), cooperation tends to be more frequent than conflict – and armed hostilities triggered by water are in fact exceptionally rare (Figure 2). This has given rise to the notion that cooperation over shared water resources could be employed as the trigger for broader political cooperation between nations, although it has been emphasized that there is no universal relationship between these factors, and each transboundary basin varies in this regard.[5]

In relation to conflict and/or cooperation over water resources, the interactions between communities inhabiting distinct areas within a single state may reflect those

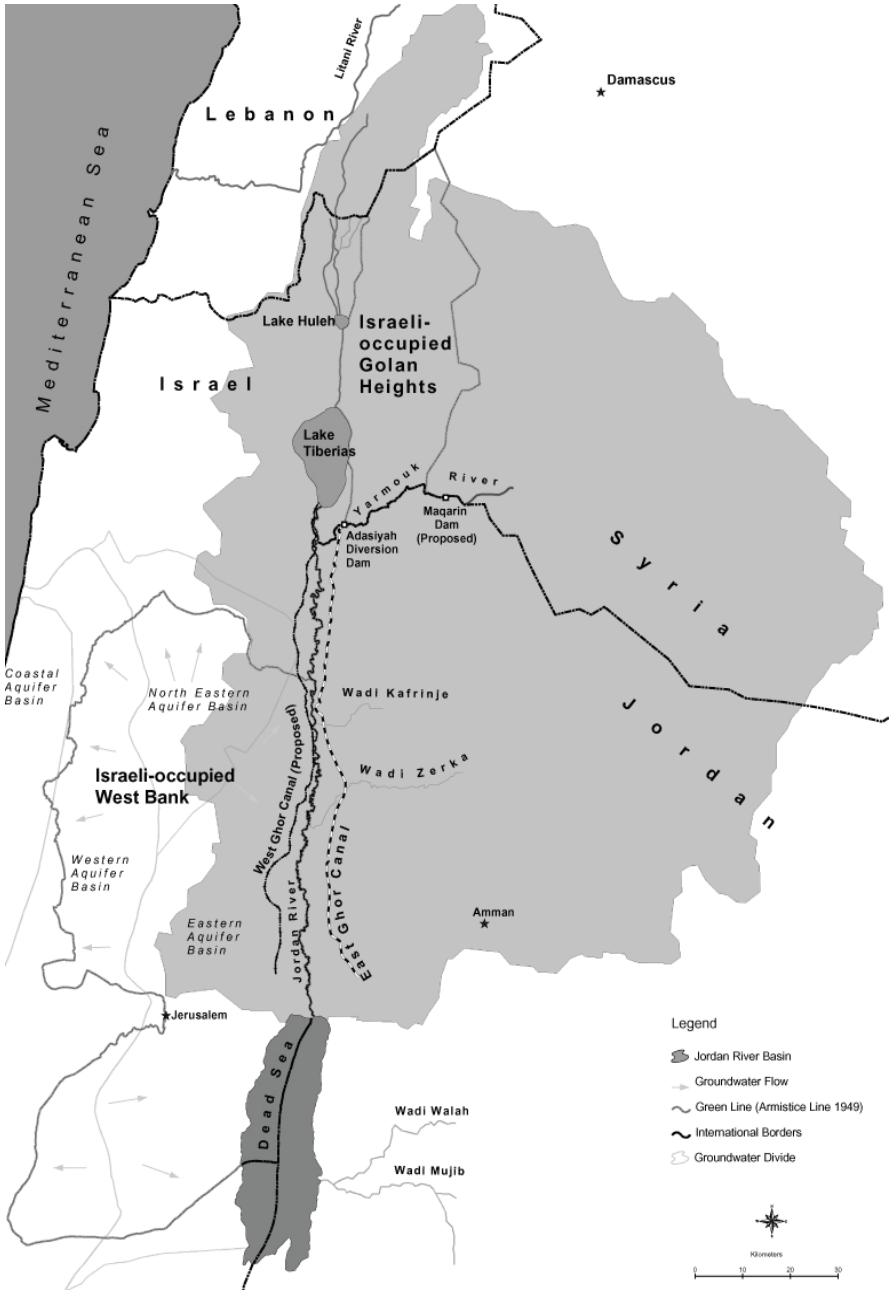

Figure 1: The Jordan river basin, and key watercourses.

Table 1: The scale of intensity for conflict and cooperation

Scale	*Example of event*
-7	Formal declaration of war.
-6	Extensive war-like acts causing deaths, dislocation or high strategic costs.
-5	Small-scale military hostilities.
-4	Political-military hostile actions.
-3	Diplomatic-economic hostile actions.
-2	Strong verbal expressions displaying hostility in interaction,
-1	Mild verbal expressions displaying discord in interaction.
0	Neutral or non-significant acts for the inter-nation situation.
1	Minor official exchanges, talks or policy expressions; mild verbal support.
2	Official verbal support of goals, values, or regime.
3	Officially sanctioned cultural or scientific support (non-strategic).
4	Non-military economic, technological or industrial agreements.
5	Military, economic or strategic support.
6	Major strategic alliances (e.g. an International Agreement).
7	Voluntary unification into one nation.

Source: Adapted from Yoffe and Larson (2001).

observed between entire countries. The following sections of the present article consider both interstate and intrastate relationships pertaining to water resources, among the five riparians of the Jordan river basin.

Interstate relationships and water resources

As has been widely documented, the riparians of the Jordan river basin have competed for the available regional water resources, and this has been ongoing effectively since the partition of Palestine (creating the state of Israel) in 1947 – or possibly even before this, when attempts were made to ensure that Israel's borders would extend to the Litani river in the north (in Lebanon).[6] After partition, the efforts in the mid-1950s to generate a solution through the Johnston Plan sought to provide sufficient quantities of fresh water for all parties, emphasizing the plight of the refugees from the 1948 war.[7] Since that time, conflicts over water have resurfaced on a number of occasions (e.g., frequent skirmishes in the mid-1960s connected to the construction of the National Water Carrier by Israel; the bombing by Israel of the East Ghor Canal in

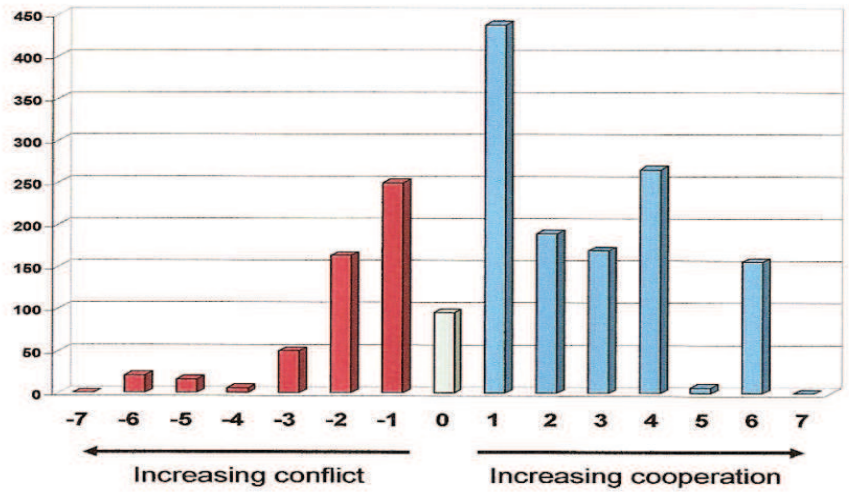

Figure 2: The numbers of recorded events among 1,831 events in total relating to conflict or cooperation over trans-boundary water resources in basins at risk. *Sources*: Yoffe (2001); Giordano and Wolf (2003).

1969; military operations by Israel in the area of the Litani and Hasbani rivers in southern Lebanon in 1978 and 1982). Some parties contend that the 1967 "Six Day War" between Israel and its neighbors was triggered in part at least by concerns relating to the availability of water,[8] and recent tensions between Israel and Lebanon concerning the abstraction of water by the latter party from the Wazzani Springs/Hasbani river reveal that the topic remains of importance in determining political relationships in the region.[9] Indeed, some authors have continued to pursue arguments that the Litani river is hydrologically connected to the Jordan river basin,[10] although these appear to be unfounded.

Interestingly (and providing proof that conflict and cooperation can exist in parallel), certain of the parties within the basin have cooperated significantly over water resources in recent years, e.g., in the signing of the Peace Treaty of 1994 between Israel and Jordan, containing a specific Annex on water; and in the attainment of an agreement for the construction of the Al-Wehdah (Unity) Dam, which remains ongoing on the Yarmouk river. While some parties have claimed that the continuation of the Joint Water Committee with Palestinian and Israeli representation during the period of the second Intifada (uprising) suggests a significant degree of cooperation over water between those parties also, Selby has rightly contested this, noting the ongoing subjugation and marginalization of the Palestinians in relation to their access to the regional water resource.[11]

Intrastate conflicts over water

Internal conflicts over water resources and their allocation have been observed at many of the levels shown in Table 1 in all the riparians to the Jordan river basin. While these are less frequently reported (and hence, are much less visible) than the interstate rivalries, they are probably more common, and are pervasive. Examples include the following five. First, tensions exist over the regional use of water in Lebanon, especially in connection to plans to expand the agricultural uses of water in southern Lebanon.[12] The latter concerns respond to some degree to the fact that Lebanon has never been able to use the volumes of water from the Jordan river basin as proposed in the Johnston Plan (35 million cubic meters/year), and that the hydrological studies proposed in the Johnston Plan relating to the water resources in southern Lebanon were never completed.[13] There remains scope for further consideration of the water resources available in southern Lebanon.

Second, competition occurs for water among various users in Syria.[14] Syria is unusual among the riparians in the Jordan river basin, in that its per capita use of fresh water remains high, primarily due to a relatively recent drive towards national "food security" and the consequent very high allocation of water to the thirsty and highly inefficient agricultural sector in that nation.[15] The use of groundwater has increased markedly in recent years in Syria in an attempt to meet the elevated water demand, and some of the groundwater resources are being heavily over-utilized.[16] While sources vary considerably in their citations to over-pumped basins in Syria (due to poor data availability, in general), the Aleppo, Bawada/Araj, and Khabour basins all appear to be in this category at present, and the problem is becoming more acute over time as populations grow inexorably.

Third, the allocation of water to the agricultural sector in Israel is also a cause for significant concern. The droughts experienced in 1999-2001 brought this matter into sharp focus, culminating in a highly critical report from a parliamentary committee, which has arguably been a key trigger for a renewed drive for the rapid development of additional desalination facilities in Israel, on a large scale.[17] The use of water by Israeli settlers in the West Bank is particularly profligate, as was also the case in Gaza prior to so-called "disengagement" in September 2005.[18] The massive subsidies applied to fresh water provided to the agricultural community in Israel (and to settlers) have served to create great pressure on the use of the regional water resources,[19] with internal conflicts being evident, in addition to interstate conflict with Palestine and Israel's other neighbors.

Fourth, Jordan faces limited options in relation to its supplies of fresh water,[20] and the per capita availability of water in Jordan remains very low at present, at about 150m^3/year. This has generated competition in-country for the water resources, despite considerable efforts to introduce elevated levels of wastewater re-use and to maximize the abstraction rates from aquifers – some of which are fossil resources, such as the Disi Aquifer.[21] Farmers in the East Ghor (the eastern side of the lower Jordan river valley) have increasingly resorted to the re-use of wastewaters and to on-site desalination techniques, in attempts to garner sufficient water resources for their needs.[22] The Red Sea—Dead Sea conduit may also be further considered as a possible source of desalinated water supplies in the future,[23] although this water would be expensive once it has been pumped to the major demand centers.

The economic value of the regional water resources is far outweighed by the cost of armed hostilities. For example, costs of desalination are approximately US$0.60/m^3, implying that 1 billion cubic meters of fresh water (almost half of the annual use in Israel as a whole) would cost about US$600 million. By comparison, the month-long hostilities between Israel and Lebanon in July-August 2006 are estimated to have cost approximately US$20 billion.

And fifth, in Palestine, a crisis exists relating to the so-called Gaza Aquifer (which is in reality merely a geographical portion of the much larger Coastal Aquifer stretching from northern Israel through Gaza, into north-eastern Egypt). The over-abstraction of water in Gaza (mainly by Palestinians, and due to the high local population and inadequate controls on drilling wells) has led to saline intrusion, and significant contamination by wastewaters exacerbates the situation.[24] The scenario in the West Bank is also of great concern, with per capita fresh water availability averaging less than 70m^3/year, and being eroded constantly over time by increases in the population.[25] Many of the villages in the West Bank possess no piped water supplies, and rely on road tanker deliveries or hand-carried supplies, the latter usually deriving from natural springs.[26]

Under such circumstances, it can hardly be considered surprising that access to fresh water resources constitutes a matter of great concern – and sometimes of societal tension – to many of the communities in the riparians of the Jordan river basin. It has been noted that the imposition of higher prices for water (reflecting the costs of delivery, or scarcity in particular basins) could represent a cause for social unrest in Syria,[27] and the affordability of water is problematic in all of the Arab riparians to the Jordan river, including Palestine in particular.[28] Most reports of such difficulties do not reach the national press, far less the international literature. Nevertheless, it is clear that interstate tensions over the allocation of fresh waters are reflected within each of the riparians, with a grumbling discontent among the populations over perceived inequities, coupled to significant problems in relation to the affordability of the resource, even where it is made available. An example of the latter is provided by the very high price of tankered water offered to Palestinians in outlying villages (and also in Gaza), often amounting to orders of magnitude greater than the cost of piped supplies.[29]

Costs and economic factors

Fisher and co-authors have published extensively on the economic costs of water in the Jordan river basin.[30] This work extended to the use of the so-called WAS (Water Allocation System) model to derive conclusions as to the economic value of water in the region. Estimates were grounded on the replacement costs of water resources, largely on the basis of desalination technology. The studies revealed that the economic value of the regional water resources is far outweighed by the cost of armed hostilities. Thus, for example, the costs of desalination are approximately US$0.60/m^3 using the more recent technologies at a reasonable economy of scale, implying that 1 billion cubic meters of fresh water (almost half of the annual use in Israel as a whole) would cost about US$600 million to generate. By comparison, the month-long hostilities between Israel and Lebanon in July-August 2006 are estimated to have cost approximately US$20 billion in total.[31] The cost of the month-long war between the parties was therefore equivalent to the cost of producing the entire present water supply for Israel by desalination, over a period exceeding thirteen years.

Recently, a positive-sum outcome has been proposed for addressing the problems relating to the water resources of the Jordan river valley.[32] This avoids the zero-sum scenario where water provided to one riparian is lost by another, in equal volume. The positive-sum outcome relies on the provision of "new water" to the riparians through desalination, wastewater re-use, and possible importation. Estimates of the total volume required by the five riparians prior to 2025 approximate 2-3 billion cubic meters/year,[33] implying costs of about US$1.5 billion annually. Once again, these pale into insignificance by comparison to the costs of even somewhat limited armed hostilities in the region.

It might be argued that the affordability of fresh water supplies from new sources is limited among the riparians, and especially the Arab riparians. Indeed, several authors have stated that there is limited ability among the poorer sectors of the riparian populations to pay for water supplies, and there is a clear need for further attention to pricing policies for water in the region, and also to improved demand management.[34] The costs of conflict nevertheless outweigh those for supplying additional fresh water by orders of magnitude, and the former costs have been faced by both the riparians and the international community at regular intervals through the last six decades, in many wars since the creation of the state of Israel. It is clear, therefore, that the provision of additional fresh water supplies to the riparians would be cost-effective, if this were to create so-called "spill-over" into cooperation in the broader political arena.[35] The choice for both the riparians and the international community is clear. Given the previous discussion, it is also evident that improved relationships would extend to the various communities within each of the riparians, and to the various interstate populations – with highly positive geopolitical effects on a global scale.

Notes

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1. For simplicity, the Occupied Palestinian Territories are referred to simply as "Palestine" in the remainder of the article. In cases where the West Bank and Gaza need to be differentiated from each other, they are referred to specifically.

2. See, for example, Lowi (1993); El Musa (1997; 1998); Fredriksen (2003a; 2003b); and Phillips, *et al*. (2006).

3. For a detailed analysis of the Johnston Plan based on recently declassified documents from U.S. archives, see Phillips, *et al*. (2007a).

4. See Wolf and Ross (1992); Wolf (1998a, 1998b); and Wolf and Hamner (2000).

5. Phillips, *et al*. (2006); Jägerskog and Phillips (2006).

6. The attempt to include southern Lebanon within the borders of the eventual Israeli state involved several letters sent in 1920 from Chaim Weizmann, the head of the World Zionist Organization, to various British government officials. See Weisgal (1977); Amery and Kubursi (1992).

7. See note 3.

8. Naff and Matson (1984).

9. Haddadin (2002); McCaffrey (2003); EURRM (2004).

10. Medzini and Wolf (2004).

11. Selby (2003, 2005).

12. Amery and Kubursi (1992); Amery (1993; 2002); ICE (1997).

13. See note 3.

14. Bakir (2001); Salman (2002); Bazza and Najib (2003); Salman and Mualla (2003a).

15. Phillips, *et al*. (in preparation).

16. See note 14.

17. PCE (2002).

18. Phillips, *et al*. (2004; 2005).

19. See note 17.

20. Al-Jayyousi and Shatanawi (1996).

21. Phillips, *et al.* (2006; 2007b).

22. Fardous and Al-Hadidi (2004).

23. Benvenisti (2004).

24. El-Madhoun (2004, 2005); Abushbak, et al. (2005); Yahya (2005).

25. Phillips, *et al*. (2004, 2005).

26. Data from technical files held by the Palestinian Water Authority, Ramallah, the West Bank.

27. Varela-Ortega and Sagardoy (2003).

28. Al-Yaquobi and Hamdan (2005); Scarpa and Abed-Rabbo (2005).

29. Graves (2004).

30. Fisher (1996, 2004); Fisher, *et al*. (2002).

31. Estimates of the cost of the conflict of July-August 2006 between Israel and Lebanon vary somewhat, according to the source used. Most authorities contend that the cost to Israel was between US$2 and 5 billion, while the cost to Lebanon was at least US$15 billion. See Wikipedia (2006) for a range of data sources.

32. Phillips, *et al.* (2006; 2007b).

33. Phillips, *et al*. (in preparation).

34. Amery and Kubursi (1992); Salman and Mualla (2003b); Varela-Ortega and Sagardoy (2003); Al-Yaquobi and Hamdan (2005).

35. Phillips, *et al*. (2006).

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Benefit-sharing as a tool of conflict transformation: applying the Inter-SEDE model to the Euphrates and Tigris river basins

Marwa Daoudy

Inequitable access to water has caused much conflict, especially when water is embedded in larger conflicts of a high-politics nature or where limited economic diversification restricts the range of policy options open to governments. Potential solutions tend to involve agreements on volumetric water allocations rather than focusing on the sharing of more broadly conceived potential mutual benefits. Located in the volatile Middle East, the Euphrates and Tigris river basins are examples of this. Moreover, because this region has one of the highest population growth rates in the world, the potential for conflict is increased.

Three dilemmas and the concept of benefit-sharing

Although not heading for water wars, lack of cooperation does carry security implications and can result in sub-optimal water management with adverse consequences for economic development and usually also for the environment. To mitigate actual and potential conflict actually or ostensibly related to water, states need to overcome a "power and security dilemma" while also delivering economic development.[1] The dilemma is aggravated inasmuch as in many international river basins, power is asymmetrically distributed.[2]

Over the last decade, views have matured. Rather than aiming at conflict resolution – which implies full elimination or control of an ongoing conflict – some argue for the more modest goal of conflict transformation.[3] Thus, the discussion has begun to emphasize options for cooperation and the amicable sharing of benefits resulting from professionally managed watersheds. Instead of "securitizing" water – viewing water through the lens of national security concerns – this has been referred to as the "de-securitization of water resource management" and opens the way to negotiated agreements between and among states and the consequent sharing of benefits.[4] The application of the concept of benefit-sharing is the central focus of this article.

Another dilemma in international river basins – in addition to water as a security issue – is that optimal water-usage solutions may not be congruent with the principle of equitable utilization. With spiraling water shortages, optimal solutions should be sought but this usually compromises the desire to achieve usage equity at the same time. Threat perceptions based on historic circumstances occurring outside the water sector then often push the issue of water-related equity in the direction of securitization. For example, from a purely technical point of view it may be more efficient to locate dams in basin headwaters, but against this no guarantee may exist for the equitable distribution of benefits such dams may deliver. Unless specific, feasible, and enforceable guarantees can be constructed and unless the nature of regional politics supports such arrangements, this would render optimal technical solutions politically unsuitable.

Instead of "securitizing" water – viewing water through the lens of national security concerns – "de-securitization" of water resource management opens the way to negotiated agreements between and among states and the consequent sharing of benefits. The application of the concept of benefit-sharing is the central focus of this article.

A third dilemma relates to global public goods and ecological sustainability. It is well established that unregulated access to common pool resources results in unsustainable use, to the final disadvantage of all.[5] International watersheds constantly run the risk of lacking coherent regulation, either through the prisoner's dilemma rationale whereby affected parties wish to behave as free riders while hoping that others restrain (or are forced to restrain) their abstraction rates, or simply through the lack of legal harmonization and coordinated policies. The inevitable consequence is the overexploitation of the resource, damaging the ecosystems and the services they provide. This is a particular problem with transboundary waters because upstream parties may overuse the resource and downstream states may be powerless to stop this or be unable to extract appropriate compensation.

Pursued as a policy tool especially at international conferences and workshops, where it appears to be more frequently cited than within academia, the concept of benefit-sharing through international watershed management may help address these dilemmas. The simplest and most useful general framework to date divides benefits from cooperation over a shared river basin into environmental, economic, political, and catalytic categories.[6] From there, levels of conflict or cooperation are largely determined by the incentives co-riparians face. Indeed, the approach is compellingly simple: if there are sufficient incentives to cooperate, states will do so. Yet we also know that in most cases such a solution remains elusive. This triggers the questions of what joint watershed management benefits exist in the first place and how such benefits may best be shared. Developed by Philips, Daoudy, McCaffrey, Öjendal, and Turton, the Inter-SEDE model first analyzed potential security, economic development, and environmental-related benefits of sharing international river basins for the cases of the Jordan, Kagera, and Mekong river basins.[7] This article applies the model to the cases of the Euphrates and Tigris river basins.

The water divide: negotiation and conflict transformation among Turkey, Syria, and Iraq

Along the Euphrates and Tigris rivers, relations between Turkey – home to the rivers' headwaters – and Syria and Iraq are characterized by an upstream-downstream geographic asymmetry. This asymmetry is accented by economic and military advantages that favor the upstream riparian, Turkey (see Figure 1 and Table A1).

Since 1980, Turkey has been working on a mega-development project called the Great Anatolian Project or GAP (*Güneydogu Anadolu Projesi*), consisting of the construction of 22 dams and 19 hydro-electric power plants on the Euphrates and Tigris rivers. Turkey aims to compensate for its lack of oil resources while developing and stabilizing one of its most underdeveloped regions, southeast Anatolia, where the majority of its Kurdish population is living. To date, 44 percent of the GAP have been achieved; this contrasts to only 12.8 percent of all agricultural projects, but 75.4 and 58 percent, respectively, of its energy and social projects.[8] Although Turkey considers this to be a domestic enterprise, at the regional level, GAP's impact on downstream countries will be quite significant. According to international experts, the full implementation of GAP will ultimately withdraw a maximum of 70 percent of the Euphrates' natural flow, and about 40 percent of its observed flow.[9] A combination of upstream projects in Turkey and in Syria will affect the farthest downstream riparian, Iraq, especially harshly. But in light of its high water dependence ratio (80 percent of its water resources arise from outside its borders) and the centrality of the Euphrates basin for its overall water supply (65 percent of total water volume), the consequences for Syria are also highly problematic. Considering the 44 percent GAP project completion level, the current issue is less quantitative than qualitative. For example, the GAP master plan does not include proper drainage of the return flows from irrigation, and waters reaching Syria and Iraq are increasingly polluted with pesticides and herbicides.

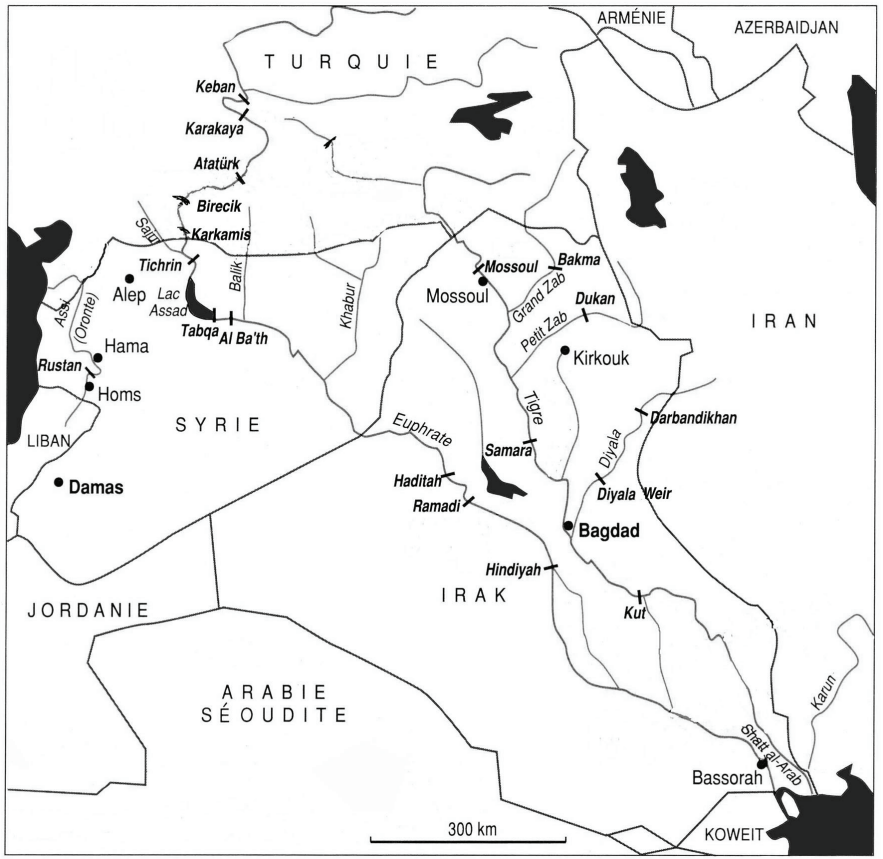

Figure 1: The Euphrates and Tigris rivers, other waterways, and major dams. *Source*: Daoudy, 2005.

Bilateral negotiations, unstable agreements, and benefit-exhaustion

Since 1962, Turkey, Syria, and Iraq have been meeting regularly to discuss water developments in the Euphrates basin. Amid steady conflict, the meetings have resulted in the signing of three bilateral agreements.[10] A first hydro-political crisis erupted in 1974 between Syria and Iraq. A combination of planned upstream extraction in Syria (and Turkey), severe drought, and political tension brought the two countries to the verge of war. Fortunately, in addition to exceptionally high precipitation levels in March 1974, a combined Saudi and Soviet mediation effort prevented the conflict from escalating.[11] As to Turkey and Iraq, political rapprochement favored trade in oil (the Yumurtalik pipeline) and cooperation on the Kurdish file – through a mutual territorial pursuit agreement – and an interruption of water negotiations with Syria until 1983. Regarding the third bilateral country pair, in 1987 Turkey committed within a broad-based economic cooperation protocol to let a minimum volume of 500 m^3/second of water pass through to Syria. In cases where the monthly flow fell below this level, Turkey agreed to make up the difference during the following month.[12] Thus, a bilateral water agreement was reached for the first time.

Following the Turko-Syrian agreement, the two downstream countries convened to distribute the remaining waters of the Euphrates, Syria's share amounting to 42 percent and Iraq's to 58 percent of the water volume. Thus, a second bilateral agreement was reached. But when, in early 1990, Turkey undertook a drastic cut of the Euphrates' flow in order to fill its Atatürk dam for a full month, Turkey and Syria were on the brink of war. Instead of pursuing negotiations, the two riparians

exchanged official notes and mutual complaints through their embassies and by means of official position papers. Only in 2001 were direct water-related meetings renewed. Issuing a Joint Communique on 23 August 2001, followed up with an Implementation Document of 19 June 2002, the two countries' water administrations committed to implementing common research and projects, as well as training programs.[13] But this third bilateral agreement failed to address volumetric allocations, the pending issue of water quality, and the status of the third co-riparian, Iraq.

In the aftermath of the Iraq war (ongoing since 2003), the resurgence of the United States' dominance in the region, and the rise to power of Iraq's Kurdish minority, Turkey and Syria now have reached an understanding that revolves around their regional strategic interests. Syria, in particular, has agreed to put her water claims aside, giving priority to its wider regional concerns. But core issues of water allocation and polluted return flows from agriculture still remain to be addressed, together with the impact of Turkey's and Syria's upstream projects on downstream Iraq.

Issue-linkage between water-sharing and the upstream country's security concerns over Syria's support of the Kurdish insurgency brought Turkey and Syria to an agreement on minimal water allocation in 1987.[14] But because agreements of this type tend to be bilateral (ignoring other co-riparians), they are at least somewhat unstable, and benefits that can arise from issue-linkage become exhausted over time. More generally, bilateral agreements cannot be considered to reflect a key principle of customary international water law, namely, equitable utilization. In reality, co-riparians compete for available fresh water resources, with little coordination with each other. Basin states thus form potentially unstable geopolitical regions. In the Middle East, this instability is augmented by ethnic and other forms of tension. In contrast, the de-securitization of water issues induced by the recent Turko-Syrian rapprochement has favored the promotion of cooperation.

The Inter-SEDE model: identifying and applying categories of benefits

The Inter-SEDE model embraces benefit-sharing as its core principle. Because the arenas of security, economic development, and the environment underpin regional development, the model can become the basic framework for conceptualizing benefit-sharing in the Euphrates, Tigris, and other river basins. Security is a fundamental issue. By itself it underpins the very existence of human civilization. Insofar as water resource management can provide a platform for regional, national, societal, and human security, this should be understood as a high-order potential benefit. Likewise, economic development drives and is driven by the human cooperative spirit. But both security and economic development are nested within the natural environment. Providing secure access to environmental resources allays threat perceptions and de-securitization can start to gain acceptance. Similarly, humans are part of the environment, sustaining livelihood from it, but also adversely affecting it. Thus, the environment is a sink that translates into thresholds of sustainability. Environmental protection becomes a specific management objective that by itself can start to drive the type of cooperative spirit needed for any form of benefit-sharing.

Table A1 (in the appendix) lists 8 security-related, 9 economic development-related, and 5 environment-related factors that jointly make up the Inter-SEDE model. The table also reports the associated quantitative and qualitative raw data for Iraq, Syria, and Turkey. For selected factors, Table A2 (also in the appendix) illustrates how the raw data are transformed into ranked data.[15] Table 1 contains the ranked data for all variables. Lower ranks reflect more desirable events or outcomes.

Conflict transformation in the Euphrates and Tigris river basins

Though not exhaustive, the Inter-SEDE model provides a useful basis to identify existing and future mutual benefits. For example, a comparison of the security-related indicators reveals certain trends (see Table 1). First, military expenditure varies greatly among the co-riparians, being especially high in Iraq as a percentage of GDP. High expenditure indicates a tendency toward greater securitization. Second, the three riparians are ranked as moderately successful in terms of intra-basin cooperation. Moderate cooperation can defuse tendencies toward greater securitization. As noted, cooperation among the co-riparians has been uneven, shifting from a Syria/Iraq coalition against upstream Turkey in the 1980s and 1990s to the Turkey/Syria rapprochement since the early 2000s. From unarmed conflict to acute episodes of threats of violent military confrontation between Turkey and Syria in 1990, 1993, and 1998, conflict has persisted in relation to water and security over the Kurdish issue. Water-related agreements among the co-riparians remain of a bilateral nature. A multilateral deal would be preferable. Third, in terms of migration, while Turkey's and Syria's scores are fairly unremarkable, Iraq scores very badly, mainly because large numbers of Iraqi refugees continue to enter Syria and Jordan. But Syria and Turkey also deal with certain migration issues. For example, when the Euphrates and the Atatürk dams started to impound the river's waters in 1974 and 1990, respectively, this led to intrastate displacements for some of the Kurdish populations in southeast Turkey and farmers in northeastern Syria. Fourth, the water dependency ratio reveals drastic asymmetries between upstream Turkey and the downstream riparians, Syria being the most dependent on sources arising from outside its borders. High ratios tend to promote greater securitization. Fifth, water availability/use is also ranked as a security indicator because high availability defuses securitization. With fewer resources at her disposal, Syria scores relatively higher on this criterion than do either Turkey or Iraq.

Summing the security-related ranks, Iraq scores highest (32), followed by Syria (27) and Turkey (21). This suggests that Iraq is most likely to securitize water. Water-related problems between and among Turkey, Syria, and Iraq are a source of past and perhaps future regional destabilization. Past conflict has been handled through

negotiation and bilateral agreements. Future cooperation will be influenced by security-related initiatives and incentives. There are significant concerns on all of the inter and intrastate scales within the two river basins: at the regional level because of continued political tensions among the co-riparians, at the national level because military expenditure could be reduced and channeled toward sustainable development, and at lower geographical scales concerns arise due to competition for resources (including water) by distinct segments of the affected populations.

As regards economic development, Table 1 suggest major differences among the basin states, with Turkey being more developed regarding GDP per capita and literacy rates than either Iraq or Syria. While Turkey's population living below the poverty line is rank-equivalent to Syria's, its infant mortality rate is lower than that of its downstream neighbor. Iraq shows very low GDP per capita, reflecting the continuous humanitarian and economic disaster borne by its population since the early 1990s. The high summary scores suggest that poverty-related aspects of benefit-generation and sharing are important concerns for the riparian states, especially for Iraq (35) and, somewhat less so, for Syria (24) and Turkey (22). The co-riparians' economies are heavily dependent on the agricultural sector, always the "thirstiest" in terms of the need for water. The sectoral contributions to GDP are particularly revealing, with Turkey and Iraq's agricultural activities contributing relatively less to GDP but demanding more than 70 percent of their available water resources provided at significant subsidies. Syria's agricultural sector contributes the highest share to GDP and receives more than 80 percent of water allocations with high subsidies. It is clear that a regional change in water supply and demand management is inevitable if conflict is to be avoided in the future. This must include a shift from an almost totally agriculturally-based economy toward high value-added use of water in industrial applications. Among the other economic indicators, the per capita water availability data reveal differences between relatively water-rich Turkey and Iraq and water-poorer Syria. A high level of water availability and use are indicative of the potential for significant economic improvement. The overall average for the average economic indicator across the three countries (27.0/9 = 3.0) is only slightly higher than that for the countries' average security indicator (26.5/8 = 3.3). This suggests that water-related poverty alleviation would likely play an important role in the de-securitization of water.

Concerning potential environmental benefits, water pollution problems are of greater significance to the two downstream riparians, and here mostly to Iraq which is farthest downstream. The degradation of water quality is an important concern. In terms of the summary environmental score, Iraq and Syria score the highest of the three co-riparians; this means that they would benefit the most from resolving water-related issues. For example, while Turkey's GAP project continues to unfold, return flows from upstream Turkey to Syria will need to be addressed. The sustainable management of the available water resources is a key objective, but it is clear that this has not happened to date. The lack of basin-wide agreements (or of widespread

Table 1: The Inter-SEDE model. Security, economics, and environment-related rank indicators in the Euphrates and Tigris river basins

Indicator	*Iraq*	*Syria*	*Turkey*	*Avg.*
Security-related indicators:				
Military expenditure (% of GDP)	5	4	4	4.3
Water availability/use (m^3/person/year)*	3	4	3	3.3
Water dependency ratio (%)*	4	5	1	3.3
History of water-related agreements	3	3	3	3.0
Intra-basin cooperation (institutionally)	2	2	2	2.0
Geopolitical/governmental stability	5	3	3	3.6
Immigration/emigration	5	2	2	3.0
Level of regional integration	5	4	3	4.0
Totals: security indicators	32	27	21	26.5
Economic indicators:				
GDP per capita (PPP, US$)	5	4	3	4.0
Population below poverty line	5	2	2	3.0
Life expectancy at birth [M/F]	3	1	2	2.0
Infant mortality rate	5	3	2	3.3
Literacy rate [M/F]	5	3	2	3.3
Energy use (kwh/person/year)	2	2	2	2.0
Agriculture as % of GDP	2	3	2	2.3
Industry as % of GDP	5	4	4	4.3
Water availability/use	3	2	3	2.6
Totals: economic indicators	35	24	22	27.0
Environmental indicators:				
Importance of flow regime	2	3	4	3.0
Water quality index (pollution, salinization)	5	4	3	4.0
Environmental flows (base flows)	5	5	5	5.0
Sustainability of water use	5	4	3	4.0
Biodiversity	4	4	3	3.7
Totals: environmental indicators	21	20	18	19.7

* Water availability and water dependency (i.e., the percentage of water in the overall water volume that is generated outside of national borders) are introduced as security and development factors.

cooperation) constitutes a primary reason for this, but it is also clear that holistic development plans are absent in most cases.

It is also notable that "pure" environmental indicators such as base river flows and biodiversity are generally given short shrift in the region. The relatively higher average for the average environmental indicator (19.7/5 = 3.9) suggests the importance of potential environmental benefits in the Euphrates and Tigris river systems. Biodiversity is generally low and the co-riparians have opted to develop and utilize the water resources to the maximum extent possible, ignoring all requirements for environmental/base flows in rivers. The past and projected upstream withdrawals by Turkey on the Euphrates and Tigris (and to some extent by Syria on the Euphrates) will eventually and markedly reduce the level and quality of the rivers.

Conclusion

Interactions among the co-riparians have become predominantly cooperative. Yet despite recent declarations regarding the resumption of trilateral talks, the roots of their water conflicts have not been fully acknowledged or addressed. From a conflict transformation perspective, de-securitization of water-related issues requires one to focus on three core variables: interests, power, and rights. The identification of the actors' core interests provides direct and indirect measures of the entanglement of water with security issues. An actor has an intrinsic interest if it values agreement on an issue per se. This is the case for downstream Syria and Iraq. The interest becomes instrumental when placed in relation to major collateral or future advantage. Some actors have an intrinsic interest in delineating a lasting settlement to the hydraulic issue – sometimes involving both the search for water and for food security – while others seek to satisfy wider strategic interests tied to regional security, such as upstream Turkey's interest in increasing its security by agreeing only to minimal transboundary flows. As its GAP project unfolds, questions regarding the ultimate impact on Syria and Iraq's water consumption and use remain unanswered.

The output from an expanded version of the Inter-SEDE model is of particular interest here. Perhaps surprisingly, in terms of the average indicator scores, incentives for environmental cooperation would seem even more important than those in the security and economic fields (scores of 3.9, 3.3, and 3.0, respectively).[16] The potential for spill-over from water cooperation to conflict prevention is important. This is especially so if a heavy securitization dynamic already exists and viable options can nevertheless be found to induce the parties to agree on solutions concerning water availability. In certain transboundary basins, enhanced cooperation on the sharing of water (or the benefits arising from water resources) offers real promise for defusing tensions and reducing broader conflicts. Recent de-securitization trends within the Euphrates and Tigris basins have clearly shifted the focus to economic benefits related to water-sharing. In effect, the economic indicators describe both the degree of poverty and the development potential within each country. Reliance on agriculture and industry measures the potential for water to be utilized in applications with higher value-added, hence contributing to increased economic prosperity. A transition toward industrial uses of water would lead to positive economic development in the predominantly agriculturally-based economies of Turkey, Syria, and Iraq.

The expanded model's results reveal important differences between and among the co-riparians. For example, Iraq scores the highest on all three sets of indicators (for an average of 4.0, as compared with 3.2 and 2.8 for Syria and Turkey, respectively), revealing the country's vulnerable downstream position, even as it has undergone and still experiences major human and economic crises. While for all three countries, the average environmental score is the highest, Syria's relatively high average security score, in relation to her average development indicator, highlights it's vulnerable position as the mid-stream riparian, especially in terms of its high ratio of water dependence. Turkey clearly stands apart on some of the economic indicators (reflecting differences in poverty level across the countries). As drivers of potential interstate conflict within the basins, such asymmetries are of very considerable importance, especially if they are coupled to inequitable allocation of water flows or benefits which may arise from the use of shared water resources. It is clear that where a basin hegemon – Turkey in this case – is also an advantaged party in relation to water allocation and economic prosperity, the potential for conflict is significant and the need for equitable readjustment considerable. Mutual bargaining can be made more explicit when incentives are seen as positively affecting the overall pay-off matrix such as for example pipeline transit fees received by Turkey from Iraq or security assurances from Syria on the Kurdish matter.

Durable and peaceful relations between and among riparian states require that benefits are shared, as only then can sustainable and equitable practices be realized. Robust regional and international institutions are important in providing much-needed infrastructure for the promotion and coordination of benefit-sharing. The process of de-securitization can hence be supported by emerging legal rules and norms of state behavior if they can be enforced internally and externally. Any serious analysis of potential benefits should therefore be based on a highly nuanced understanding of fundamental processes at work in the field of hydro-politics and conflict prevention.

Notes

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1. Buzan (1991).

2. See, e.g., Daoudy (2005).

3. Miller (2005, pp. 26-27).

4. Turton (2003, p. 96).

5. Hardin (1968); Ostrom (1990).

6. Sadoff and Grey (2002).

7. Philips, Daoudy, McCaffrey, Öjendal, and Turton (2006).

8. Republic of Turkey (2005a).

9. Kolars and Mitchell (1991); Kliot (1994).

10. For an extensive analysis of the negotiation process among Turkey, Syria, and Iraq see Daoudy (2005).

11. Bari (1977); Kienle (1990).

12. Protocol on Economic Cooperation (1987).

13. Republic of Turkey (2001, 2002).

14. Daoudy (2004; 2005).

15. Upon request, full details on the transformation for the cases of Iraq, Syria, and Turkey are available from the author. The ranking and banding procedures used in the generation of data for the general Inter-SEDE model are provided in Annex 2 in Philips, *et al*. (2006, pp. 227-249).

16. Expanding slightly upon the Inter-SEDE model's methodology, one can compute the following average score per state, per indicator, and per state/indicator:

	Iraq	*Syria*	*Turkey*	*Av. per state*	*State av. per indicator*
Security (n=8)	32/8=4.0	27/8=3.4	21/8=2.6	80/3=26.7	26.7/8=3.3
Economic dev. (n=9)	35/9=3.9	24/9=2.7	22/9=2.4	81/3=27.0	27.0/9=3.0
Environment (n=3)	21/5=4.2	20/5=4.0	18/5=3.6	59/3=19.7	19.7/5=3.9
Av. indicator	88/22=4.0	71/22=3.2	61/22=2.8		

where *n* refers to the number of indicators in each category.

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Table A1: Selected indicators for the co-riparians of the Euphrates and Tigris river basins

Indicator	*Iraq*	*Syria*	*Turkey*
Security-related indicators:			
Military expenditure (% of GDP)	7.5	5.9	5.3
Water availability/use (m^3/person/year)	3.287	1.000	3.439
Water dependency ratio (%)	53.3	803	1.0
History of water-related agreements	few; bilateral	few; bilateral	few; bilateral
Intra-basin cooperation (institutionally)	mod.	mod.	moderate
Geopolitical/governmental stability	low	mod.	moderate
Immigration/emigration	massive	mod.	moderate
Level of regional integration	very low	low	moderate
Economic indicators:			
GDP per capita (PPP, US$)	184	1,252	4,172
Population below poverty line (%)	nd	20	25.6
Life expectancy at birth [M/F]	59/62	70/73	68/73
Infant mortality rate/1,000 births	83	26.3	24.6
Literacy rate [M/F %]	56/25	81/67	93/80
Energy use (kwh/person/year)	1,412	1,357	1,184
Agriculture as % of GDP	12.6	29.9	10.1
Industry as % of GDP	8.8	25.4	24.4
Water availability/use (m^3/person/year)	3.287	1.000	3.439
Environmental indicators:			
Importance of flow regime	high	moderate	minor
Water quality index (pollution, salinization)	major problems	moderate to high	minor problems
Environmental flows (base flows)	not addressed	not addressed	not addressed
Sustainability of water use	very low	low	moderate
Biodiversity	low	low	moderate
Other indicators:			
Gini index	nd	nd	0.42
Population growth rate (%/year)	2.68	2.40	1.26
Services as % of GDP	nd	44.7	65.5
Water management, incl. sectoral subsidies	subsid. agric.	subsid. agric.	subsidized agriculture

Note: Data is abstracted from the the FAO Aquastat database for water end environment indicators, the U.N. ESCWA Member Countries 2007 (for Iraq and Syria), the Republic of Turkey's Statistical Yearbook 2005 for socio-economic indicators (2005b), and the CIA World Factbook for military expenditure. nd: No data available.

Table A2: Converting raw to rank data for the Inter-SEDE model

Country	*geopolitical/ government stability (band)**	*immigration/ emigration (band)***	*energy use (kwh/person/yr) (band)****	*agriculture as % of GDP (band)*****
Iraq	unstable (5)	massive (5)	1,412 (2)	12.6 (2)
Syria	moderate (3)	moderate (2)	1,357 (2)	29.9 (3)
Turkey	moderate (3)	moderate (2)	1,184 (2)	10.1 (2)

* 1: stable; 2: somewhat stable; 3: moderate; 4: low; 5: unstable. High stability reduces a tendency toward greater securitization.

** 1: low; 2: moderate; 3: high; 4: very high; 5: massive. High immigration/emigration enhances a tendency toward greater securitization.

*** 1: >2,500; 2: 1,000-2,500; 3: 500-1,000; 4: 100-500; 5: <100. A high per capita use of energy is indicative of a raised standard of living and suggests poverty-related concerns are less important as drivers.

**** 1: <10; 2: 10-20; 3: 20-40; 4: 40-50; 5: >50. A low dependence on subsistence agriculture is indicative of a raised standard of living and suggests poverty-related concerns are less important as drivers.

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Water, mining, and waste: an historical and economic perspective on conflict management in South Africa

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Limited water resources have been a source of international conflict for centuries, often as part of wider religious, ideological, political, or economic challenges. The first recorded accounts of such disputes can be traced to Sumeria around 3000 BC, although water resources continue to underlie disputes.[1] Due to the continent's geography and climate, as well as its severe poverty, Africa's variable and unreliable resources have contributed to numerous conflicts, predominantly water, agriculture, and livestock. Subsequent conflicts between European settlers over access to mineral resources in South Africa magnified problems within the water sector, typified by the blatant use of government policies during the apartheid era to favor the mining industry at the expense of the population majority. Following the advent of democracy in 1994, South Africa's challenges have been based on upholding citizens' constitutional rights to have equal access to water and other natural resources.

If left unmanaged, the current struggle over constitutional rights – exemplified by the struggle of a portion of the country to attain access to water – represents a real potential for conflict. If a significant portion of the population remains without access to potable water and the mining industry continues to visibly pollute and modify the water table without consequence, the current government risks losing its legitimacy. The effects of this could vary from a loss of foreign direct investment in South African industries to social unrest, or even civil war. Already a significant decline is seen in the number of South Africans who participate in the political process through voting and voicing their opinions through public participation processes; if this pattern continues, even more are likely to become inactive citizens. Additionally, since access to modern water delivery infrastructure is divided among racial lines,[2] the failure of the government to provide quality water to all could further contribute to the high level of violent crime and continued racial tension within the country. There is, thus, a need to understand the drivers of this conflict at a practical level and to develop – and improve on – new, sustainable, and implementable policy solutions.

In accordance with this need, this article focuses on water problems associated with the mining industry. It outlines the history of the industry in the context of water-resource driven conflict. This background is used to focus on two drivers of conflict pertaining to the mining sector at the subnational level: (1) the *laissez faire* approach by government to regulation of the mining industry following the Anglo Boer war and (2) the negative externalities associated with mining activities, including but not

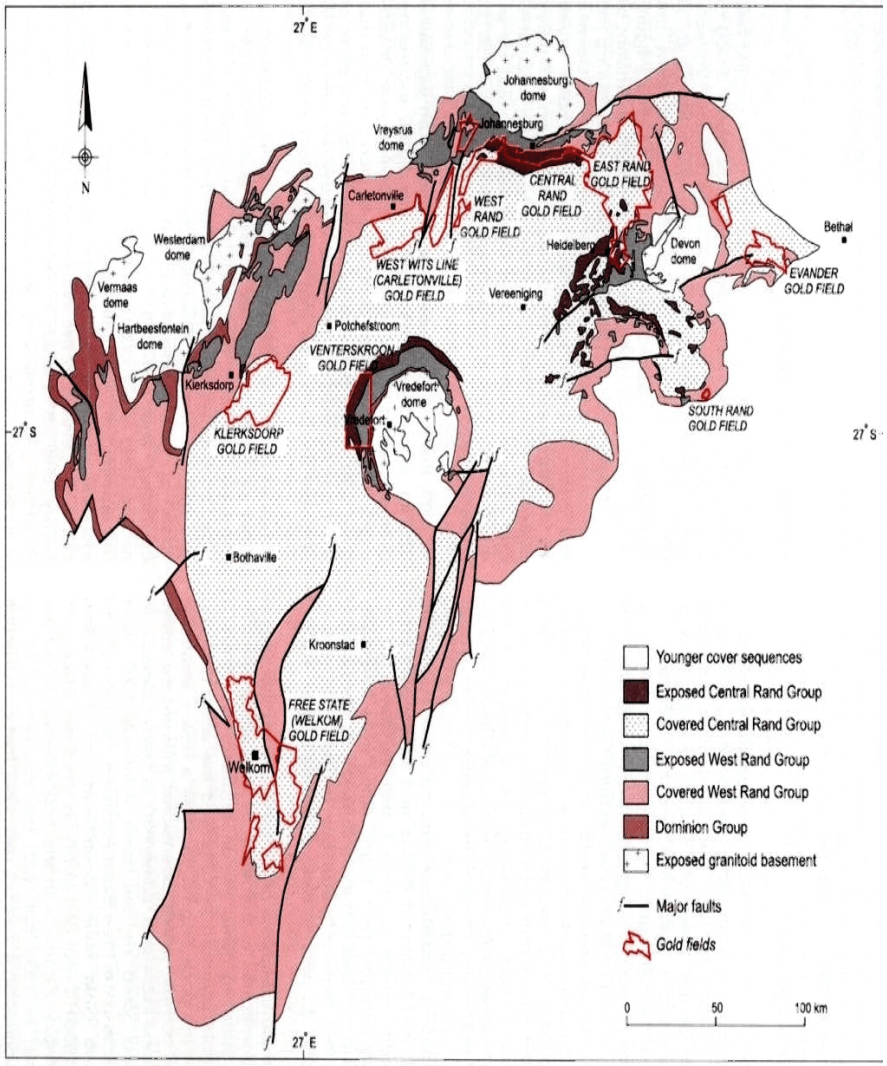

Figure 1: Simplified map of the Witwatersrand goldfields. Located at S27º, E27º, this is South Africa's largest and most lucrative mining area. The geological groups and sequences of the Witwatersrand goldfield include the Younger cover sequences, the Exposed Central Rand Group, the Covered Central Rand Group, the Exposed West Rand Group and Covered West Rand Group, the Dominion Group, and the Exposed granitoid basement. Major goldfields are denoted in red; major faults in black. Figure modified from Robb and Robb, 1998, p. 350.

limited to contamination of ground and surface water and the subsequent damage to human and environmental health and ground stability, as well as socioeconomic, political, and financial effects. Both of these drivers are unified under an elementary economic model. The understanding of South Africa's past and the recognition of behavioral patterns described by economic theory together can be used to develop and implement better policy that addresses the conflict associated with mining and the resulting access to potable water.

A brief history of mining in South Africa

Following the discovery of immense gold resources in South Africa in 1886, the mining industry played a central role in the country's economic, political, and social environment. Because minerals in South Africa are highly diversified, plentiful, and profitable,[3] government has allowed the industry to be privileged, enabling it to maximize profits. But South Africa recently incorporated objectives of sustainability and social justice into its constitution.[4] To understand the coevolution of these two goals – profits and justice – in South African history, it is beneficial to look at the mining industry in two phases. The first of these centers on the struggle to profit from the largest gold reserve in the world and is exemplified by the Anglo Boer war.[5] The second and current phase is characterized by the recognition of the cumulative impact of a century of privileged mining under which the industry maximized profits and externalized costs. The discussion provides a foundation for understanding mine-related water conflict in South Africa today.

Not based on notions of sustainability, the early gold-economy was simply an extractive industry with little consideration given to possibly adverse long-term effects. Supported by decades of water policies that classified water use by the mines separately from water use by other industries,[6] the mining-based economy developed in the Far West Rand which held the largest gold deposit in the world. Awesome in their value, these deposits lay at great depth that made extraction technically complex and physically dangerous, in part because they were overlain by large dolomitic aquifers. To extract the maximum amount of gold, the industry employed elaborate pumping systems to draw groundwater from the sunken shafts. Unintended consequences included a lowered natural water table and compromised ground stability. It also caused much of the groundwater to be exposed to pyrite and other minerals which had an adverse impact on water quality through acidification and subsequent heavy metal contamination. Although farmers complained about the changes in water quantity and quality as early as 1905, there was little response from the government until 1956 when an Interdepartmental Committee (IDC) was established to investigate the effects of mine dewatering practices.[7] The final report of an IDC subcommittee, known as the Jordaan Commission Report, was released in 1960. Based on detailed cost-benefit analysis, it recommended the dolomites be dewatered.[8] Even after taking into account pumping costs, water replacement schemes, and the long-term consequences of dewatering, the value of the additional gold produced over a period of 60 years, the report said, would be at least 3.5 times greater than if the mines were not dewatered.

Government continued, as it had in the past, to profit from the industry by collecting about 57 percent of all mining profits in the form of taxes and levies.

The government adopted the Commission's recommendations. Sufficient mine closure plans were not developed, and regulatory measures were "amicable agreements" rather than new and enforceable legislation.[9] Government continued, as it had in the past, to profit from the industry by collecting approximately 57 percent of all mining profits in the form of taxes and levies.[10] In this sense, entrepreneurial and profit interests of the large mining houses merged with those of the state. This led in essence to the abandonment of regulatory responsibility. Ordinarily, the expectation would be for government to act in behalf of its citizens, regulate the industry, setting standards, and ensuring adherence to those standards. Instead, government allowed its definition of mineral ownership, based on Roman-Dutch Common Law, to justify its passive position toward the industry in support of an unsustainable, yet highly lucrative extractive process. Government failed in its regulatory role, leaving the mining industry to self-regulate.[11]

With the transition to democracy in 1994, the philosophy regarding the ownership of natural resources changed. In the past, those who owned land owned the water and the mineral resources that lay above and below the surface. The adoption of the new Constitution and the Minerals and Petroleum Resources Development Act changed this.[12] Natural resources became the people's collective property, with government acting as the central custodian. In addition, stakeholders were given the right to access information and to inform the policymaking process.[13] Although many social justice issues were addressed with this legislation, deficiencies in current legislation remain, as do challenges pertaining to policy enforcement. Additionally, cumulative adverse effects of mining need to be rectified.

Economic theory of unsustainable mining

Mine owners took advantage of weak governmental regulation by externalizing costs. According to elementary microeconomic theory, a firm maximizes profit by producing output so long as its marginal private benefit exceeds its marginal private cost. When a mine can deflect certain short- and long-run production costs – e.g., adverse socio-economic and environmental effects – onto third parties, the mine's private costs are held artificially low and overmuch production results. Called negative externalities, these deflected costs are imposed on stakeholders other than the firm itself; they are not internalized by the firm as it makes production decisions. Achieving efficiency in an economic sense would require that marginal *social*, rather

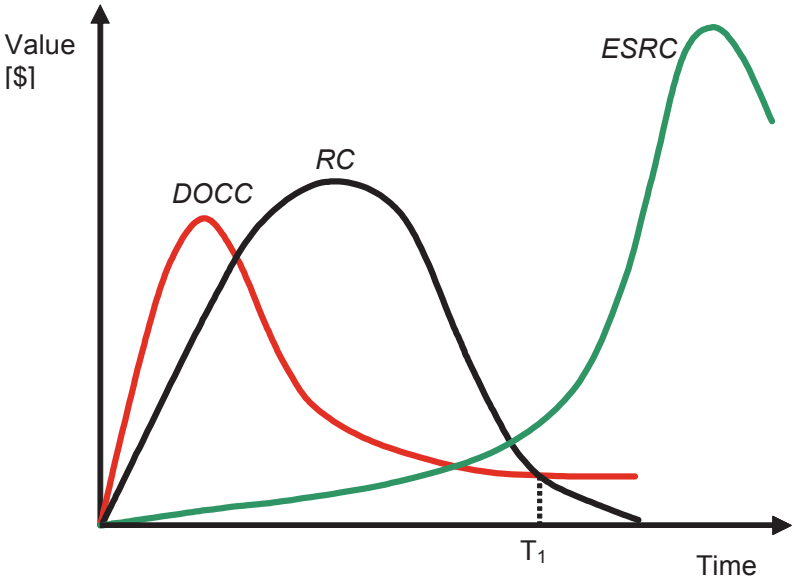

Figure 2: Theoretical representation of the externalization of costs by the gold-mining industry in South Africa. The Development and Operational Cost Curve (DOCC) is in red, the Revenue Curve (RC) is in black, and the Environmental and Social Remediation Curve (ESRC) is in green. Note that the sustainability of the industry is not a matter of total profitability at any point in time, but is a function of the total area under each curve. Following mine closure (T1), the ESRC costs continue to accrue, whereas revenue and development costs approach zero within a relatively short time span.

than private, costs per unit of extraction be equated with marginal *social* benefits. But in the absence of government intervention to compel internalization of negative externalities, the socially optimal (i.e., lower) output level is not obtained. Instead, the social cost is absorbed by the surrounding communities and other stakeholders.

These economic concepts can also be applied to the life-cycle of a mine, i.e., costs and benefits of commissioning, mining, and decommissioning. Importantly, negative externalities associated with mining are often delayed, and accumulate for decades after mineral extraction.[14] For this reason, the social costs associated with mining are difficult to predict and to regulate. Meanwhile, in the short term, these delayed – and hence less "visible" – costs make the total social cost appear deceptively low.

Figure 2 represents costs and benefits associated with gold mining. The vertical axis expresses value in monetary terms (i.e., US$ or local monetary equivalent), and the horizontal axis represents time. The Development and Operational Cost Curve (DOCC) refers to the cost of developing and operating a specific mine. This includes costs of prospecting, sinking of mine shafts, pumping of ground water, cooling of shafts, along with developing and employing water treatment facilities and complying with other environmental regulations. The Revenue Curve (RC) represents the revenue generated by the mine. The area under the curves thus equals cumulative development and operational costs and cumulative operational revenues. The difference between the two lines *at any one point in time* equals profit earned by the mine at that instance. The difference between the *total areas* under DOCC and RC reflects lifetime profitability of the mining operation.

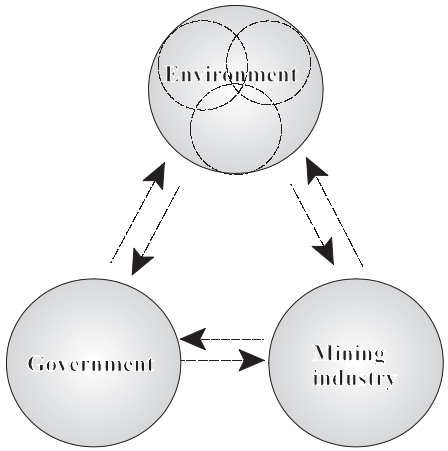

Figure 3: Adapted Trialogue Model. The trialogue model captures interactions among (1) government, (2) mining industry, and (3) environment (including society, economy, and the natural environment, each of which is denoted in its own sphere). Each sector places pressure on the others, as represented by the double arrows.

The financial success of a mine has historically been represented by the cost of development and operation (DOCC) and the revenues generated (RC). These are balance sheet items reported to shareholders. Mine closure occurred when revenue streams dropped below the cost of operating the mine (to the right of T1).

The third curve in Figure 2, the Environmental and Social Remediation Curve (ESRC), represents the costs associated with rehabilitation of mining operations after decommissioning, including the cost to human and environmental health and the social legacy of people employed, supported, and attracted to the mine and its surrounding areas. Importantly, this factors in impacts on affected populations that live off-mine, something that is never brought onto any balance sheet. This curve is slow to gain amplitude because the environmental impacts of mining are cumulative and typically require several decades to take effect. By the time environmental and socioeconomic consequences become noticeable, the mines have typically closed or become insolvent and thus cannot be compelled anymore to contribute to remediation, either financially or through other actions.

The outcome of these effects can be described in terms of a governance Trialogue Model[15] (Figure 3). It shows how regulation (or lack thereof) can result in conflict among industry, government, and environment (which includes society-at-large).[16] The historical relationship between government and the mining sector, and the

emphasis on the promotion of economic development in South Africa, has resulted in a public perception of government being unable or unwilling to properly regulate and manage mine-water and mine-waste. As a consequence of this sentiment, and of cumulative adverse mining effects over the past several decades, society – bearing the majority of the environmental and social costs – has become a third partner in the Trialogue. Pressure is therefore exerted by society on government and the mining sector to remedy environmental and social impacts associated with mining practices.

Crossroads of past and future: remaining challenges facing government and industry

Understanding the historical interaction between mining industry and government, and seeing how the economic model demonstrates the effect of this relation, permits one to acknowledge weaknesses within existing frameworks and recognize the crucial need for new, strong, and coherent legislation. Because the issues facing the mining industry are inherently complex, regulation must be geared toward management of a variety of factors. In this section, challenges associated with mineral residue and mine waste management, along with mine water management are discussed. Attention is paid to existing vulnerabilities within the current legislative framework, and how an understanding of the historical legacy and of basic economic theory can be used to address present and future conflict.

Lack of interdepartmental coordination

Although water, mine, and waste legislation has been redrafted following the collapse of apartheid, many of the changes have not been successfully implemented. The mines exploited these weaknesses to continue to externalize some of their costs. Among the main reasons for the non-implementation of legislation are insufficient specificity and interdepartmental disagreements about which policies are primary. For example, mine water management is handled through four primary and several secondary pieces of legislation and by three different government departments. Even more fragmented, mining waste[17] is addressed through at least two primary and eleven secondary pieces of legislation and by three primary and six secondary government departments. There is no unifying policy outlining how mining waste and mine water issues are to be addressed. As a consequence, the factors driving the management of mineral residue and mine waste are heavily fragmented between economic development and environmental protection (Figure 4).

Although many believe that potential conflicts among national, provincial, and municipal powers with regard to water, mining, and waste has been addressed by the delegation of powers among agencies in the Constitution,[18] there remain ambiguities. For example, the national government is empowered to regulate issues pertaining to the environment, pollution control, and soil conservation. But although various

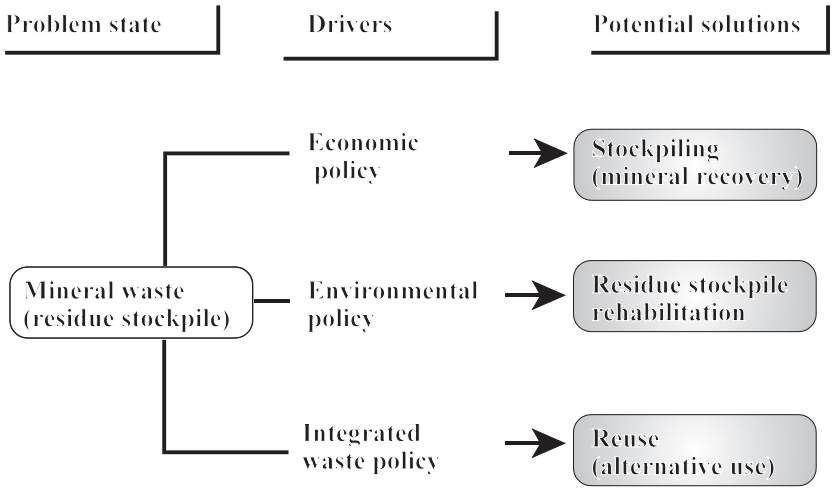

Figure 4: Drivers of mineral waste management in South Africa. The decision of how to handle mineral waste is driven by (1) economic policy, (2) environmental policy, and (3) integrated waste policy. Each of these favors different potential solutions, e.g., stockpiling, rehabilitation, and reuse. Note that these solutions can be used in combination.

government departments are charged with administering policies in these areas, regional or provincial representatives of the national agencies are empowered to enforce these policies at the local level.[19] In terms of mining waste, the provincial government is responsible for establishing a detailed inventory of all potentially polluting sites within their jurisdiction and for developing hazardous waste management plans.[20] The plans should include waste minimization, recycling, and reuse initiatives for both industrial and mining waste. Hazardous waste reduction at source and responsible disposal, including alternative treatment options, should feature in the initiatives. Municipal governments are empowered to legislate on matters listed in Part B of Schedules 4 and 5 of the Constitution,[21] which include control and management of waste as well as water and sanitation services. Both provinces and municipalities are empowered to administer any laws that they have passed. But in all cases, national government may override provincial or municipal authorities in instances in which it becomes necessary to maintain national security, economic unity, essential national standards, the provision of minimum standards for the rendering of services, or to prevent unreasonable provincial action, which will be prejudiced or to the interest of another province, or the whole country.

By creating concurrent legislative competencies among different spheres of

government, the possibility for conflicting legislation is created. For example, water quality standards will be imposed at a national level; however, local governments are responsible for legislation concerning the treatment of water and sanitation services. There is potential for legislative conflict in this situation, as well as a likelihood that instead of promoting integration, it will create division. This is a result of the seemingly *ad hoc* appearances in Sections 4 and 5 of the Constitution of certain pollution control functions without the whole picture having been adequately considered. The Constitution, however, requires that the responsibility for waste management functions is to be devolved to the lowest possible level of government, in accordance with the right to self-determination.[22]

The interdepartmental conflicts are magnified by the shortage of governmental officials, and the high turnover of government officials tasked to enforce policies pertaining to water and waste. The inability to integrate across government departments through policy leads to the mismanagement or abandonment of the mine-abandoned residue stockpiles and "dumps" that scatter the South African landscape. Where abandoned mine dumps remain on privately owned property, property owners have neither the mandate nor finances to remine, reuse, or rehabilitate them, making the underlying land a personal liability and difficult to sell. The result is a loss in private land value due to on-site abandoned mine dumps over which the landowner has no legal right but bears environmental and social liability, and the loss in private land value due to environmental degradation from neighboring abandoned mine dumps. Additionally, these stockpiles and dumps compromise local water quality through the mobilization of chemicals from run-off and airborne particulates that accumulate in water sources or sediment.

In terms of international legislation, the division of powers among national, provincial, and municipal bodies is one of the primary factors that separates mature mining from immature mining policies.[23] Until existing legislation can be enforced in a logical, organized fashion at all levels, and until the various government departments can learn how to coordinate with one another to maximize overall efficiency, conflict arising from the lack of government enforcement of current policies and their cumulative impacts will persist in South Africa.

Proactive versus reactive governance

Existing frameworks place government in a reactive position. This is evident in the pricing structures and enforcement mechanisms used to discourage pollution using the polluter-pays principle (PPP), in the legal framework which outlines requirements for environmental impact assessments (EIAs), and in the disagreement about key terms that must be understood for policy enforcement. Until government can be proactive, historical trends will continue, potentially eroding public confidence further.

The PPP, as outlined by the White Paper on Environmental Management Policy for South Africa and the National Water Act of 1998, stipulates that those who are responsible for producing, permitting, or causing pollution, should be held liable for the clean-up costs and the costs of legal enforcement associated with that pollution.[24] One problem with this approach is that it not only requires government to establish what body is doing the polluting, and by how much (it is technically difficult to assess pollution released through non-point sources), but also allows the polluter to hire private consultants to assess damage and establish an appropriate remediation plan. While government expects these consultants to report accurately, their incentive is to produce data that is to the best advantage of the polluter.

Most countries require EIAs prior to the initiation of new mining projects. Indeed, this is now considered international best practice. Yet because they are reactive, short-sighted, and largely incomplete or inaccurate, EIAs can be considered as a lip-service to legislation. This is inherent in the way in which they are conducted. Since an EIA, in South Africa as elsewhere, is created following the feasibility study of a mining project, it is often based on incomplete geotechnical information and engineering designs. Furthermore, EIAs are conducted at the beginning of the project. Yet mining projects and the surrounding areas are not static; they change over time.[25] For these reasons, the information on which legislation is based may lead to an underestimate of the eventual environmental and socio-economic impacts, allowing costs to be externalized, particularly if the industry is self-regulating in a fledgling democracy with a history of social injustice. At present, policies pertaining to mining waste and mine water management pay little attention to the short-term and long-term impacts of mining activities on human health. Currently, the only health-related concerns that are addressed by the legislation pertain to occupational health and safety of mine workers themselves, ignoring off-mine populations. Health impact assessments conducted prior to the establishment of a new mining facility tend to be environmentally focused as part of the EIA but are often superficial and reactive in nature.[26] No high-confidence epidemiological studies of off-mining populations have yet been done, and so there are no baseline data to which to compare changes in a population's health over time.

There are also problems with definitions in the legislation. For example, unlike the cases of the European Union, the United Kingdom, and the United States, South Africa does not currently legally define mineral residue as waste.[27] As a result, residue stockpiles are often left unprotected, causing environmental pollution and hazards to off-mine populations. Defining mineral residue as waste will provide a legal mandate to internalize environmental and social externalities, bringing them onto firms' balance sheets, and ensuring sound budgeting and consideration for post-closure rehabilitation or reuse of mineral waste. In addition, water quality standards are also not explicit and are, therefore, in many instances difficult to enforce.

Conflict as motivation for reform

Recently, there has been a great deal of interest in the issue of mine-contaminated

water, with numerous high profile news stories dedicated to the subject. Generally, there is growing concern that environmental and human health risks are not being adequately addressed.[28] In recent news, Robinson Lake, a mine-waste site with water nearing a pH of 2.0 containing elevated levels of heavy metal contamination,[29] has been sold by a large mining company to a developer with plans to create an up-market complex, including a shopping center, private residences, and a hotel.[30] Acidic mine water is also decanting upsteam into the Cradle of Humankind, a World Heritage Site that contains some of the oldest known hominid fossils[31] and to which many tourists and research scientists are attracted. A close correlation between this decant point and elevated levels of ^{238}U has been observed.[32] Additionally, highly visible scandals involving organized crime syndicates, high ranking government officials, and mining representatives have been reported on. The most notable of these is now known as the Brett Kebble affair in which Kebble, a reportedly corrupt mine magnate, is alleged to have embezzled millions of dollars from the mines and was murdered by criminals with alleged ties to the police commissioner and head of Interpol.[33]

Several publicly available scientific studies reveal alarming levels of heavy-metals and radionuclides downstream of mining activities.[34] Significantly, all have been commissioned post-apartheid as science has been democratized into the service of society. In the absence of national standards on uranium levels in water (something not deemed relevant under apartheid), a series of risk assessments – using Tier 1 Risk Assessment Methodology[35] – were conducted to begin to understand the magnitude of the problem in areas that drain the major mining regions.[36] These studies identified a number of elements that are found in concentrations well in excess of international norms. Risk assessment of ^{238}U using the guideline value of 20 µg/l for the chemical toxicity of uranium in drinking water proposed by Wade and Winde shows a wide distribution of alarmingly high values.[37] In this regard, all of the rivers that drain into the Vaal basin (the source of drinking water for Johannesburg) are contaminated, thus making it an issue of great national significance and a potential driver of conflict if left unmanaged.

These alarming occurrences should not be used to fuel anger, hatred, or resentment toward the mining industry or the current government; rather, they should be used as motivation for the public to participate in the political process and to encourage government to work toward more unified, proactive policy and legislative frameworks. Corruption in the United States business sector, represented by the Enron scandal a few years ago, led to a major reform in U.S. policy. Similarly, the current situation in South Africa could serve to motivate positive results as an informed public engages with their elected political leadership.

Conclusion

Since negative externalities associated with mining were not internalized under apartheid, the mining industry failed to adequately prepare for closure and to dispose of mine water and waste in a manner that is consistent with current international best practice. Following the transition to democracy, government faces conflict caused by the legacy of weak regulation that has exaggerated problems associated with limited natural resources. In particular, cumulative harm to off-mine populations resulting from modified water tables, contaminated ground water sources, acidic mine drainage, and ground instability must be addressed before they lead to even more devastating socioeconomic, political, and environmental damage. New policies have been drafted to address these issues, but in most cases the regulation of mining-related activities is fragmented throughout multiple pieces of legislation, to be enforced by various agencies at the national, provincial, and municipal levels. Additionally, the legislation is reactive, rather than proactive, in addressing externalities. Given these facts, it is necessary that government officials and policymakers recognize that the key to solving South Africa's mining problems cannot originate from legislation alone. Rather, solutions will come from a synthetic understanding of South Africa's complex history, basic microeconomic theory, and the development of enforceable policies. To this end it is hoped that economics-based research can help to inform that process by understanding drivers of conflict in such a way that appropriate policy interventions can be designed and applied.

Notes

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1. Gleick (1998).

2. According to recent statistics provided by the Department of Water Affairs and Forestry (DWAF), approximately 80 percent of white South Africans have access to water delivery infrastructure, as compared to approximately 20 percent of black South Africans.

3. Viljoen and Reimold (1999).

4. DJCD (1996).

5. Barber (1999); Farwell (1999); Nasson (1999); Porch (2000); Turton, *et al.* (2006).

6. Voss (1968; 1978).

7. Adler, *et al.* (2007).

8. Jordaan, *et al.* (1960).

9. Jordaan (1963).

10. Jordaan, *et al.* (1960).

11. For more insight into how the relation between the mining industry and the government evolved, see Adler, *et al*. (2007).

12. DJCD (1996); DME (2002).

13. DJCD (2000).

14. Externalities associated with mining include modification of the water table, acidic mine drainage, and decreased water quality and result in subsequent damage to human and environmental health and cumulative socioeconomic and political damage.

15. The model (see Turton, *et al*., 2007) is adapted to include mining, thereby providing a perspective on mineral-waste governance through the perspective of the mining sector.

16. See Hattingh, *et al*. (2005); Turton, *et al*. (2007); and Godfrey (2007). The environment is defined here in its broadest sense as comprising three systems: social, economic, and ecological (see Mebratu, 1998).

17. As of 1997, South Africa was estimated to produce 533 million tons of waste per annum, 468 million tons (87.7 percent) of which was classified as mineral waste, making the mining industry the country's single greatest polluter. The gold sector alone generates an estimated 47 percent of all mineral waste (DWAF, 2001).

18. For instance, Dale (1997).

19. DJCD (1996, Sections 4 and 5).

20. DEAT (1999), RSA (2000).

21. DJCD (1996).

22. DJCD (1996, Section 235).

23. IIED (2002).

24. DWAF (1998, Sec. 19-20); Taviv, *et al*. (1999).

25. Sassoon (2000).

26. Adler and Rascher (2007).

27. EU: BRGM (2001); U.K.: BGS (2006); U.S.: U.S. EPA (2006).

28. Templehoff (2007a).

29. Coetzee, *et al.* (2005).

30. Templehoff (2007b).

31. Fourie (2005).

32. Coetzee, *et al.* (2005).

33. McGreal (2006).

34. Kempster (1996); IWQS (1999); Wade, *et al*. (2002); Coetzee, *et al.* (2002); Coetzee, *et al.* (2005); Coetzee, *et al.* (2006).

35. Claassen, *et al*. (2001). A Tier 1 assessment for a given substance takes a national standard, or in the absence of a national standard an established international norm, and compares this to the measured value at a given sampling site. This is expressed as a quotient that divides the measured value by the standard. A quotient value of <1 means that the environmental value complies with the standard, whereas values above 1 signify violation of the standard. Values near 1 typically should be subjected to a Tier 2 assessment to reduce uncertainties.

36. Wade, *et al*. (2002); Coetzee, *et al.* (2005); Wade and Winde (2005).

37. Wade and Winde (2005). Uranium is used as an indicator of risk since it is directly associated with Witwatersrand mining activities in the study area (Kempster, *et al*., 1996; IWQS, 1999) and has been identified as the contaminant of most concern in the Wonderfontein Spruit catchment (Wade and Winde, 2005).

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The peaceful resolution of U.S.-Mexican transboundary water disputes

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Transboundary water along the U.S.-Mexican border is managed by bilateral agreements and institutions created by the United States and Mexico. These allocate water, protect the economic benefits derived from transboundary water resources, and provide an avenue for resolving disputes. Recent and ongoing controversies along the border demonstrate that even in the face of competing uses for scarce resources, the countries, their citizens, and interested stakeholders are employing these international tools to resolve disputes. Three examples of the peaceful resolution of water-related conflict involving the United States and Mexico are presented. The first and second regard, respectively, the United States' plan to line the All-American Canal (AAC) and Mexico's fulfillment of agreements to deliver Rio Grande water to Texas. The third case concerns the Hermosillo basin aquifer in the Mexican state of Sonora. Although it does not involve a transboundary water, this case is relevant because it illustrates how an international agreement – in this case, the North American Free Trade Agreement (NAFTA) – can affect water resources that lie wholly within one country.

The U.S- Mexican water-related institutional and legal framework

The United States and Mexico have a well-established framework for managing water that is based on international Treaties, Minutes, and Agreements. Treaties include the Treaty of 2 February 1848; the Convention of 29 July 1882; the Convention of 12 November 1884; the Convention of 1 March 1889; the Convention of 21 May 1906; the Convention of 1 February 1933; the Treaty for Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande in 1944 (1944 Water Treaty); the Chamizal Convention of 29 August 1963; and the Treaty of November 1970.[1] The International Boundary Commission was created in 1889 (and changed to its current name, the International Boundary and Water Commission, IBWC, in 1944) to deal specifically with boundary and water issues.[2]

Minutes, passed by the IBWC, provide an avenue for some degree of adaptive conflict management, allowing the parties to expand their interests in cooperative water resource management. An example is the common interest in groundwater resources and water quality which prompted this passage in Minute 242:

> With the objective of avoiding future problems, the United States and Mexico shall consult with each other prior to undertaking any new development of either the surface [water] or the groundwater resources, or undertaking substantial modifications of present developments, in its own territory in the border area that might adversely affect the other country.[3]

The framework of Treaties, Minutes, and Agreements provides the foundation for water allocation, international boundary delineation, and cooperation. Similar types of bilateral agreements and institutions exist between the United States and Canada to manage transboundary water resources.

The North American Free Trade Agreement (NAFTA)

In 1994, the North American Free Trade Agreement (NAFTA) was adopted by Canada, Mexico, and the United States as a way of cooperating on trade issues. This agreement essentially removed tariffs to facilitate increased trading which would lead to greater economic opportunities for all countries involved. Water is governed by this agreement when it is considered to be an article of commerce.

The successful passage of the 1992 constitutional amendment that allowed for increased water privatization paved the way for Mexican participation in NAFTA, as it was necessary for the government to let the private sector have some sort of autonomy to stimulate investment. However, the citizenry is cautious about these moves because of real and potential abuse by private companies. If the government decides it would rather let the market operate in the realm of water supply, it must actively enforce its own regulations to the benefit of its citizenry and the environment. If the government looks the other way and allows abuses, such as those alleged by urban water customers, then it might cause conflict if it does not act to regulate overpumping of border aquifers and discharge of pollutants into streams and aquifers.

The balance among government, societal, and scientific elements is vital to the success of applying NAFTA to water resources. Due to NAFTA's economic emphasis and its potential to treat water as an article of commerce (water as an "economic good"), it would be easy to make decisions which do not include the scientific process and only address some of society's concerns. The presence of balanced government-science and science-society interfaces is necessary to restrain NAFTA's influence vis-à-vis water resources.

Lining the All-American Canal

The All-American Canal (AAC) parallels the U.S.-Mexican border, running from Imperial Dam to the Imperial Valley in California (Figure 1).[4] The 82-mile (132-kilometer) canal, located entirely within the United States, is owned by the U.S. Bureau of Reclamation (BOR) and has carried water from the Colorado River to California since the 1940s.[5] The unlined canal delivers 3 million acre-feet (AF) (or 3,700 million cubic meters, MCM) of water each year.[6] In 1988, Public Law 100-695

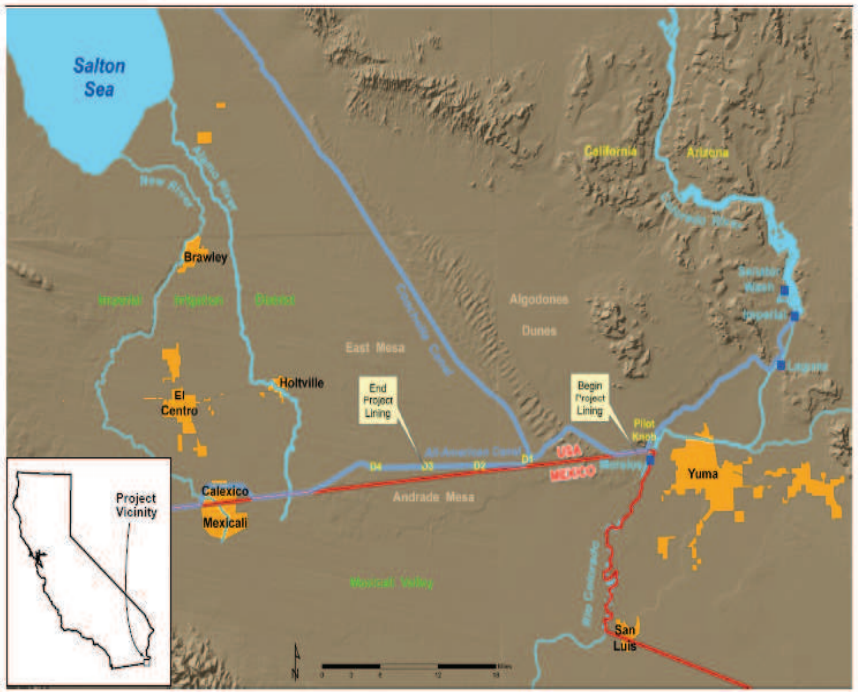

Figure 1: Location of the All-American Canal. *Source*: U.S. Bureau of Reclamation (BOR, 2006). Reprinted with permission.

was passed which gave BOR the authorization to line the All-American Canal.[7] It has taken almost 20 years for the U.S. government to approve funding for the project and additional conveyance infrastructure.[8]

Controversy over the lining of the All-America Canal involves efficiency, economic, and environmental aspects. The United States is attempting to make the canal more efficient by reducing leakage and using the saved water to augment California's water supply. It has been estimated that 70,000 AF (86 MCM) per year could be added to California's water supply by lining the canal.[9] However, the leaking water enters the groundwater system and flows across the border into Mexico, specifically the Mexicali valley area.[10] The cities on the Mexican side of the border rely on the groundwater for domestic and agricultural uses that are the basis for the economy in that area. The groundwater on the Mexican side of the border also is of environmental importance as wetlands in the Andrade Mesa area provide habitat for migrating birds.

As stated, the United States intends to use the conserved water to supply cities in California.[11] California is investing heavily in the project which will cost US$327 million.[12] However, due to decreased groundwater quality, the project will also have economic effects on Mexico. Specifically, an expected "increase in soluble salts will result in a loss of 9% of the area's production and an increase of 13% in energy costs, which in turn constitute 25% of the operational and maintenance costs of the hydro-agricultural infrastructure of Irrigation District 014."[13]

The groundwater flowing across the border also sustains critical wetland habitat, Andrade Mesa, in Mexico.[14] The potential environmental impacts of the project were raised in a 2005 lawsuit by Mexico and by environmental groups from both sides of the border.[15] The project's long history has resulted in an extensive list of different types of actions taken by the United States and by Mexico concerning the project.

The two countries have very different perspectives about who owns the water that is seeping from the canal. The United States claims that the seeping groundwater is part of its allocation under the 1944 Treaty.[16] In contrast, Mexico argues that it has acquired the seepage rights through continuous use of the resource.[17] Furthermore, Mexico uses Minute 242 which pertains to development by one country that may affect the water resources of the other country to support its argument. The difference of opinion lies in a national versus international perspective wherein the United States perceives the issue as national and Mexico as international.

The long history of the AAC project highlights specific characteristics of the countries' relationship concerning water resources. At the forefront of this relationship are the established international dispute resolution mechanisms that were developed through mutual agreement. International dispute resolution mechanisms that have been used in the AAC dispute include an informal protest through the IBWC (1998), an IBWC Discussion (2000), a letter, a discussion at other meetings (2005), a lawsuit (2005), and a stakeholder meeting.[18] Litigation is another option for Mexico; however, engaging in a sharpened level of international dispute resolution may not always be in a country's best interest:

> … a legal solution, much like the unilateral outcome itself, amounts to a zero-sum, loser pays, sub-optimal solution that entails high risks for both parties. While in a narrow technical sense justice might be done by litigating the dispute, a litigated outcome is hardly the best mechanism for advancing binational cooperation or achieving a management outcome consistent with the emerging norms of sustainable development of the region's water resources.[19]

It is clear by Mexico's limited actions throughout the history of the project that it is weighing the pros and cons of the situation; it wishes to preserve the amicable relation of the two countries and resolve the issue within the context of other binational water issues. Since neither country is consistently the downstream country, it is possible for the actions of either to negatively affect the other. This facilitates compromises and trade-offs. For example, Mexico raised its objections to the lining of the AAC when the United States raised the issue of Mexico's Rio Grande water deliveries to Texas:[20]

> In 2005, at a trilateral meeting on security between the governments of the partner countries to the North American Free Trade Agreement, the Mexican government raised the issue of lining the AAC, but only after the government of Texas raised the issue of the historic water debt from the Rio Grande watershed. Since that meeting, both governments have been negotiating a solution to their differences over the AAC lining project.[21]

International transboundary issues are not isolated events in the international arena. The relative power of each country, the health of the relationship, and the relative importance of the dispute within the context of the broader national and international dialogue mean that each country will attempt to balance its interests. This balance may result in compromises or additional power that a country can use in other negotiations.

Mexico's Rio Grande water deliveries to Texas

The second case, that of Mexican water deliveries to Texas, demonstrates how the IBWC was used to resolve Mexico's Rio Grande water delivery deficit and also discusses potential NAFTA implications of that deficit.

The NAFTA implications of Mexico's Rio Grande (known in Mexico as the Rio Bravo) water deliveries to the United States are currently being explored and defined in a legal claim brought by irrigation districts, water right holders, and a water supply company under Chapter 11, Articles 1102 and 1110, of NAFTA.[22] As stated in the 1944 Water Treaty, Mexico is obligated to deliver a certain quantity of Rio Grande water to the United States. Specifically:

> One-third of the flow reaching the main channel of the Rio Grande (Rio Bravo) from the Conchos, San Diego, San Rodrigo, Escondido, and Salado Rivers and the Las Vacas Arroyo, provided that this third shall not be less, as an average amount in cycles of five consecutive years, than 350,000 acre-feet (432 MCM) annually. The United States shall not acquire any right by the use of the waters of the tributaries named in this subparagraph, in excess of the said 350,000 acre-feet (432 MCM) annually, except the right to use one-third of the flow reaching the Rio Grande (Rio Bravo) from said tributaries, although such one-third may be in excess of that amount.[23]

The deliveries are based on five year cycles; however, the Treaty also provides for a contingency plan when Mexico is unable to deliver the required amount:

> In the event of extraordinary drought or serious accident to the hydraulic systems on the measured Mexican tributaries, making it difficult for Mexico to make available the run-off of 350,000 acre-feet (432 MCM) annually, allotted in subparagraph (c) of paragraph B of this Article to the United States as the minimum contribution from the aforesaid Mexican tributaries, any deficiencies existing at the end of the aforesaid five-year cycle shall be made up in the following five-year cycle with water from the said measured tributaries.[24]

Mexico experienced a drought during the 1992-2002 period, which resulted in a water delivery deficit of more than 1.5 million AF (1,850 MCM) by 2002, 1.024 million AF (1,263 MCM) of which accrued during the 1992-1997 five-year cycle.[25] Discussions between the Mexican Section of the IBWC and Mexico's National Water Commission began in 1998 to determine how Mexico would repay the water debt.[26] These talks intensified in 1999, and in 2000 Mexico repaid a portion of the debt.[27]

In 2001, the IBWC led government-to-government negotiations. These culminated in the passage of Minute 307.[28] Minute 307 covered 600,000 AF (740 MCM) of the deficit and provided for continued discussions to completely resolve Mexico's deficit. Furthermore, the Minute demonstrated the desire of the two countries to reach a satisfactory conclusion:

> That the Government of the United States and the Government of Mexico, animated by the spirit of friendship that prevails in the relationship between the two countries and committed to prevent recurrence like the situation considered here will work jointly to identify measures of cooperation on drought management and sustainable management of this basin.

Discussions and negotiations continued into 2002 and another Minute, Minute 308, was signed wherein the two countries agreed to continue their negotiations. In 2005, the two countries finally "…reached an understanding that [would] effectively eliminate Mexico's Rio Grande water debt by September 30, 2005."[29] This plan involved water transfers and additional water deliveries by Mexico.

This case shows how the two countries used their dispute resolution mechanism – the IBWC – as outlined in the 1944 Water Treaty (Section I, Article 2) to satisfactorily resolve the issue of Mexico's Rio Grande water debt incurred during the 1992-2002 drought. As reported by the IBWC:

> Based on implementation of the understandings reached, the United States and Mexico will consider that Mexico's water debt is completely eliminated. Under the 1944 Water Treaty, Mexico is to deliver to the United States an annual average of 350,000 acre-feet [432 MCM] in the Rio Grande basin in cycles of five years. Since 1992, Mexico has accumulated a water deficit, which reached a high of more than 1.5 million acre-feet [1,850 MCM] in 2002.[30]

However, a claim was filed under NAFTA that explores whether NAFTA extends to economic losses during the time that the water deficit was still outstanding (2002-

2005), and the two countries were negotiating to resolve the issue. This suit was brought by water right holders in Texas.

The claim was filed by irrigation districts, water right holders, and a water supply company in Texas (claimants) in 2004. The claimants are suing Mexico for the fair market value of 1,013,056 acre-feet (1,250 MCM) of water. The Texans argue that Mexico's deficient delivery of 1,476,181 acre-feet (1,821 MCM) of Rio Grande water from 1992-2002 under the 1944 Water Treaty deprived them of an estimated US$1 billion from decreased business activity.[31]

The intent of our article is not to discuss the merits of the claimants or of Mexico's arguments, but to highlight that the existing system is being used to manage conflict. The opportunity for legal recourse allows the Texans to resolve their dispute with Mexico peacefully and without resorting to violence or aggressive actions to obtain the disputed water. In addition, this case suggests that there may be potential NAFTA implications from existing water allocation treaties. The outcome of this pending litigation may have significant implications that may create a broad applicability of NAFTA that could include treaties. This may mean that a country may be required to compensate water right holders when it fails to deliver a required amount of water. In effect, this would attach a monetary value to the water allocated to each country.

The Hermosillo basin

The Hermosillo basin aquifer is located in the Mexican state of Sonora (Figure 2). While the aquifer does not straddle the U.S.-Mexican border, a NAFTA-linked spill-over effect exists. The basin's use for agricultural production as a result of NAFTA has caused local conflict due to competing demands. This region typically grew crops for local consumption. But after the removal of trade barriers, many higher valued fruits and vegetables replaced these traditional crops and are primarily shipped to the United States for consumption. The change in what was produced led to the consolidation of many farms in the region with larger farms controlling most of the acreage. The resulting shift in agricultural production has placed a strain on the coastal aquifer with sea-water intrusion threatening many wellfields.[32] At the same time, the municipal government has decided to expand its industrial sector and needs water to do so. The government proposed pumping salt-water from coastal wells and desalting the water; however, this has created tension with the growers who hold the current monopoly over the coastal aquifer.

This case reveals relationships among government, science, and society, and how the eventual decision will affect the different areas. This tension, a partial outcome of trade between the two countries, leaves the aquifer vulnerable to over-exploitation and is a direct result of economic growth in the Hermosillo basin. Any expansion can further reduce groundwater quality by drawing in more seawater. The government will have to decide if the value of new industry outweighs existing agricultural exports, and it may be that a switch to a different industry has a positive effect on the aquifer but might bring in less money to the region. The government knows the scientific and potential societal impacts of its decisions and must determine how to manage the aquifer in a "sustainable" manner so that the entire region does not suffer.

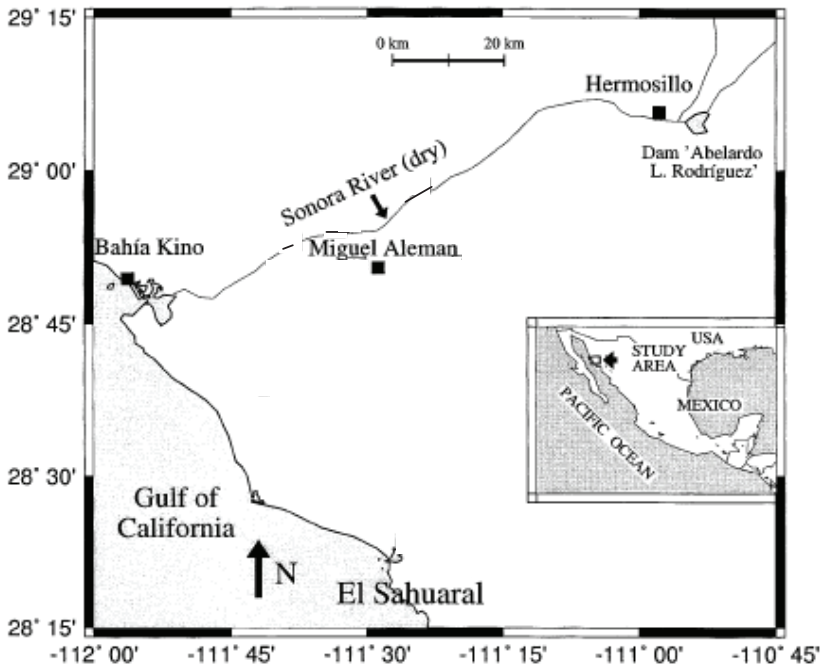

Figure 2: Map of the Hermosillo basin. Source: Steinich, *et al*., 1998. Reprinted with permission.

Summary

The United States and Mexico have developed a solid framework to manage transboundary surface and groundwater resources and associated conflicts over the past 100 years. Each dispute in this long history of conflicts or disagreements provides the foundation for resolving similar disputes in the future. As demonstrated by the passage of Minutes, cooperation between the United States and Mexico changes and adapts to new issues. The international institutions are based on cooperation by both countries. If they choose not to use or abide by the agreements and decisions, then the viability of peaceful resolution diminishes. But as demonstrated by the examples of the AAC lining and 1944 Water Treaty deliveries, the two countries, and even the citizens, are choosing to use the tools available to them to resolve conflicts peacefully.

One of the most complicated issues that can affect the quality and use of transboundary waters is the implementation of NAFTA. This has added another layer to the agreements already established between the countries. NAFTA's power has the potential to create an unbalanced government-society interface and severely limit scientific involvement. The interface has the potential to be unbalanced because NAFTA only recognizes economic uses of water and disregards its environmental and/or ecological uses. This focus on narrowly-understood economics also has the potential to limit the scientific process by acknowledging water-related science only when a monetized value can be attached to water, a disturbing prospect. NAFTA may also influence water issues within a country, even when the water resource is not transboundary. In one instance, a Mexican aquifer in the Hermosillo basin has been heavily stressed because the removal of trade tariffs for certain high-valued fruits and vegetables traded to the United States and has caused changes in water and land use.

Conclusion

The adaptability of the IBWC and its ability to resolve bilateral disputes and promote cooperation between the countries is demonstrated in the examples of conflict and cooperation. Cooperation is demonstrated by the voluntary use of the institutional entities available to each country such that effective management of transboundary water resources is accomplished. The IBWC, while not specifically established to consider groundwater, has managed to function properly whenever groundwater is an issue, thus affecting transboundary groundwater management, if only on an *ad hoc* basis. The unknown factor is NAFTA, whose treatment of water as an economic good may trump other uses and existing agreements and may lead to payments for damages suffered. Time will tell how NAFTA will affect water disputes, but both countries should exercise caution to ensure NAFTA does not supercede all other considerations.

There is no predetermined process that clearly treats transboundary groundwater; both the United States and Mexico should modify existing agreements so that groundwater is specifically included. In light of increasing pressures on the water resources of both countries, this modification is essential and long overdue.

Notes

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1. IBWC (2007b). IBWC is the International Boundary and Water Commission.

2. IBWC (2007a).

3. IBWC (1973).

4. Zamora Arroyo, *et al*. (2006).

5. Zamora Arroyo, *et al*. (2006); Herrera Barrientos, *et al*. (2006).

6. Zamora Arroyo, *et al*. (2006).

7. Zamora Arroyo, *et al*. (2006).

8. Sánchez Munguía (2006a).

9. Zamora Arroyo, *et al*. (2006).

10. Herrera Barrientos, *et al*. (2006).

11. García Acevedo (2006).

12. García Acevedo (2006).

13. García Saille, *et al*. (2006, p. 96).

14. Zamora Arroyo, *et al*. (2006).

15. Zamora Arroyo, *et al*. (2006).

16. Mumme and Lybecker (2006); Sánchez Munguía (2006b).

17. Sánchez Munguía (2006b).

18. Mumme and Lybecker (2006); Medina Robles (2006); García Acevedo (2006); Zamora Arroyo, et al. (2006); Sánchez Munguía (2006a); Sánchez Munguía (2006b).

19. Mumme and Lybecker (2006, p. 186).

20. Sánchez Munguía (2006a).

21. Sánchez Munguía (2006a, p. xxi).

22. Notice of Intent (2004).

23. Section II, Article 4(B)(c).

24. Section II, Article 4.

25. IBWC (2005); IBWC (1999).

26. IBWC (1998).

27. IBWC (2005); IBWC (1999).

28. IBWC (2001).

29. IBWC (2005).

30. IBWC (2005).

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32. Rodriguez (2002); Steinich, *et al*. (1998).

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The Tonle Sap Lake, Cambodia: water-related conflicts with abundance of water

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The past decade has seen increasing discussion on water-related conflicts, water crises, and even water wars.[1] This discussion has ranged from possible types of water-related conflicts to their scales, with a heated debate on whether conflicts will be more likely to occur within or between countries. There have also been arguments that water conflicts are not so much about water *per se*, but about the differences in values attached to water and related resources.[2]

In this article we analyze water-related tensions and conflicts within the Tonle Sap Lake area of Cambodia. We do so with three case studies that focus on different kinds of water uses. Revealing multiple dimensions and levels of water-related conflicts, they indicate that as a source of tension and conflict, prevailing power structures – which include informal and formal arrangements of resource access and use – are far more important than the physical abundance of water itself.

Cambodia: a society in transition

Relatively rich in natural resources,[3] Cambodia is one of the poorest countries in Asia when measured in monetary terms: its GNI per capita in 2005 was estimated to be a mere $380.[4] The majority of its population is deeply dependent on common natural resources for their livelihood, with rice and fish forming the most important livelihood sources. Although the proportion of agriculture in GNI has been decreasing, over 70 percent of the labor force still works in the agricultural sector.[5]

Since the early 1990s, Cambodia has faced the challenges of multidimensional transition, shifting from long years of war to peace, from single-party politics toward democracy, and from command economy to market economy.[6] It has opened up to regional and global economics and politics, and the entire Mekong region has moved toward closer cooperation, particularly in trade. Cambodian society has gone through significant political changes, and the pursuit of participatory democracy has left its mark. The results have often been mixed, and democratic processes currently overlap with different kinds of patronage structures. These dynamic changes have resulted in sociopolitical hybridization.[7]

While Cambodia's economic growth has been relatively rapid, development has been far from equal and the disparities keep growing particularly between urban and rural areas.[8] Among the main challenges for equal development are weak and non-transparent governance; these also contribute to polarization of the society.[9] Political dominance of the ruling party and coalescence of bureaucratic, economic, and military power have influenced natural resources management as, e.g., fish and forest resources offer an easy income source for the well-connected elite.[10] Indeed, as noted by the World Bank, many of Cambodia's development challenges are "fundamentally about 'governance,' that is, how the rules, institutions, and systems of the state operate and how the state relates to citizens, civil society and the private sector in terms of transparency and accountability."[11]

Cambodia's formal governance system suffers from horizontal discontinuities. For example, water-related issues are handled under several ministries with different mandates, ambitions, and policies. Also troublesome are the functioning of vertical links among central government, provincial and local authorities, and villages. Consequently, on-going decentralization programs – including initiatives for community-based natural resource management – aim at strengthening local level governance, facilitating bottom-up processes and improving the two-way flow of information along vertical links. An additional twist in Cambodia's governance system is its aid dependency and the relative dominance of donors and international NGOs in shaping government policies and introducing new approaches such as decentralization and participation.[12]

Tonle Sap Lake: a natural and hydrological wonder

The Tonle Sap Lake (Figure 1) and its resources form a central source of livelihoods and food for well over one million people living in the lake are and its flood plains.[13] However, Tonle Sap's significance extends much further as it is estimated that half of Cambodia's population benefits directly or indirectly from the lake's resources.[14] Despite the relative richness of the area's natural resources and its abundance of water, the Tonle Sap area remains one of Cambodia's poorest when measured in monetary terms.

The Tonle Sap Lake is known for its extraordinary flood pulse system with a remarkable but nevertheless regular seasonal variation in the lake's water volume and level.[15] During the rainy season part of the Mekong's floodwaters flow to the lake, and the lake's surface area quadruples. An exceptional and highly productive flood plain ecosystem has been formed: the Tonle Sap is believed to be among the world's most productive freshwater ecosystems.[16]

Water-related conflicts in the Tonle Sap

The case studies in this article describe conflicts in the Tonle Sap area related to flood plains, agricultural land, and fisheries. These resources are in different ways enabled, supported, and nurtured by water.

While the case studies focus on different aspects and dimensions of water-related conflict, all of them are essentially about the inequality in access to and control over natural resources and thus about different kinds of power structures. One way of

viewing the different interests, power relations, and inequalities in resource allocation is to look at them through the concept of structural violence. It implies that violence can be built into the structures of a society, resulting in unequal life chances.[17] By discussing the mechanisms that marginalize the poor and deny them rights to use natural resources to meet their subsistence needs, the case studies in this article address important aspects of structural violence in relation to natural resource management.[18]

Local, largely subsistence-based livelihood activities directly based on natural resources are often the ones that degrade most with "development."[19] Related governance challenges can thus be seen to reflect prevailing conceptualizations of development and the consequent valuation of water and related resources. This comes close to the discussion on symbolic violence that some see as an important dimension in conflicts over natural resource use.[20] For example, most state-level actors seem to value modernist schemes such as large-scale irrigation and hydropower dam construction more than traditional livelihoods. Also justifications for intervention – e.g., in form of impact assessments – are often done by scientists and even the very language they use excludes local communities from discussions that concerns their future lives.

Case 1: Upstream development threatening flood plain ecosystem and livelihoods

This section is a case study about possible effects that upstream development in other Mekong basin nations is likely to have on the ecosystem and livelihoods of the Tonle Sap flood plain.[21] The case addresses the issue of different scales of water-related conflict and bridges the discussion between intra- and interstate conflict. The section reviews regional cooperation mechanisms and discusses why transboundary impacts – despite their negative effects and consequent tensions between the countries – are unlikely to escalate to interstate conflict.

Transboundary impacts on the Tonle Sap flood plain

The flood plains surrounding the Tonle Sap support local people in many ways; a large variety of flood plain products provide food, traditional medicine, firewood and income for villagers, and flooded forests provide shelter for floating villages during the floods. Flooded forests and shrubs also form a key element of Tonle Sap's ecosystem and play a critical role in sustaining its aquatic production.[22] However, the area of the flooded forest has been shrinking rapidly, e.g., due to firewood cutting and of conversion of the flooded forests into agricultural land.[23]

Recent cumulative impact assessment studies indicate that a planned development in the upstream parts of the Mekong River and its tributaries – most notably the construction of large hydropower dams in China and Laos – are likely to cause an increase in the dry-season water level in the lower parts of the Mekong, and consequently in the Tonle Sap Lake.[24] The rise of dry-season water level means an extension of the permanent lake area and thus changes in the flood plain. The most notable change would be permanent submersion, in essence destruction, of remarkable areas of remaining flooded forests surrounding the lake.[25]

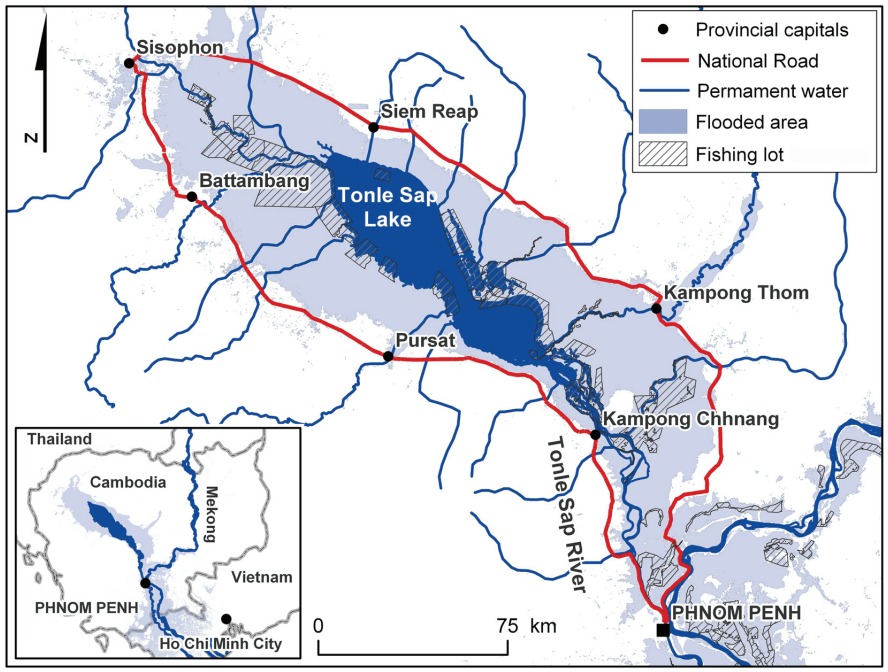

Figure 1: Tonle Sap Lake and floodplains, together with private fishing lot areas. Map by Matti Kummu.

The reduction of flooded forest area would mean loss of livelihood sources for a significant number of people, both due to loss of flooded forests *per se* and due to consequent negative effects on aquatic production.[26] These are also likely to result in increased pressure on other natural resources as more people would rely on fewer remaining resources. Thus, increased water development in other Mekong countries would cause negative effects for the ecosystem and livelihoods of the Tonle Sap flood plain and potentially fuel additional water- and resource-related conflict in the area.

Local impacts not visible in regional discussion

When considering possible transboundary impacts on Tonle Sap, it is important to note that there exist regional cooperation organizations in the Mekong basin that aim to facilitate discussion between riparian countries about impacts and trade-offs of

water development. The best-known organizations are the Mekong River Commission and the Greater Mekong Subregion (GMS) Program.[27] But despite these regional cooperation mechanisms and despite an increasing number of studies indicating adverse transboundary effects, Cambodia's government seems not to be eager to bring them up – at least not publicly.[28]

One of the main reasons for this appears to lie in increasing regional economic cooperation, particularly China's growing economic cooperation and assistance for Cambodia. Apparently, the Cambodian government does not wish to risk its regional economic cooperation by getting into difficult dialogue about possible transboundary impacts with upstream countries. This stance has clearly strengthened over the past few years,[29] concurrent to a remarkable increase in China's economic and technical cooperation with Cambodia, for example in hydropower construction.[30]

While adverse transboundary impacts among riparian states can result in water-related intrastate tensions, local-level adverse effects are not necessarily considered in interstate discussions.

This finding supports the view that riparian countries prefer to cooperate economically rather than to get into substantial conflict over water.[31] At the same time, however, the case also raises an important point in the discussion of interstate and intrastate water conflicts. While it indeed seems possible that transboundary impacts between riparian countries can result in increased water-related tensions within a country, the local level negative impacts are not necessarily considered in the regional discussions between riparian countries' governments.

Case 2: Appropriation of agricultural land in the flood plain

Improving agricultural productivity is seen as crucial for Cambodia's economic growth.[32] This has its implications for the Tonle Sap area as well. Rapid agricultural development, including large-scale irrigation projects, is taking place in the upper parts of the basin. Many of these projects are managed by governmental line agencies and supported for instance by the Asian Development Bank. Also private initiatives for agricultural development are occurring, but they are taking place mainly in Tonle Sap's flood plains. These new phenomena influence the availability of resources to different user groups.

The Tonle Sap flood plains differ in many aspects from the surrounding uplands. Traditionally, large parts of the flood plains – particularly those close to the lake that are submerged for longer periods of time – have not been under clear ownership or cultivation, but have been used for various purposes.[33] Many are so-called communal areas, their use being based on customary user rights without efficient control or "domestication" by government. The drive for agricultural production along with improved accessibility of the Tonle Sap area[34] and increased land value has led private investors – often belonging to the country's elite with connections to investors elsewhere in Southeast Asia – to see the flood plain areas as profitable targets for investment. This has brought its own challenges and increased tensions in the area.

Emerging private irrigation areas in the flood plains

The increased flow of investments to Tonle Sap's flood plains has materialized in the form of a rapid expansion of irrigated agriculture and related structures such as large embankments and reservoirs. These are intended primarily for profitable dry-season rice cultivation.[35] Concessions for these private initiatives are usually granted by provincial or central government, but the granting procedures seem often dubious and many – including government officials – claim that a significant proportion of new irrigation areas and structures are in fact illegal.[36]

The emergence of private irrigation areas in the Tonle Sap flood plain has meant that many local communes have lost areas that they have traditionally used, e.g., for floating rice cultivation and as grazing grounds for cattle, thus undermining local customary rights. As these areas are usually not officially titled to villagers, the villagers have weak possibilities to influence the construction of new structures and have not even been able to get proper compensation for their losses. Moreover, our field surveys indicate that private concessionaires plan to charge local farmers for irrigation water from their reservoirs, and this has caused additional tensions.[37]

Private irrigation areas have also faced resistance. Some of the planned irrigation development projects in different parts of the flood plain have been halted due to increased pressure from local people and NGOs.[38] In addition, some provincial agencies have brought up problems related to the new irrigation projects, including their possible negative impacts on fisheries as well as on local livelihoods.[39] Thus, even though the emerging development is basically supported by central and provincial governments, and concession rights were guaranteed by government officials, these officials are not unanimous about the legitimacy of the land appropriation process.

These differing views of government officials are related to the line agencies' confusion about whom the responsibility for the management and development of the flood plain areas actually belongs to.[40] The confusion is linked with existing institutional rivalries between different ministries over the responsibility – and resources – for agricultural development.[41] Different line agencies also see the possible impacts of the private irrigation development differently: as none of the private irrigation structures include a proper impact assessment process, the irrigation structures' impacts, e.g., to the fisheries has therefore not been appropriately assessed.

The conflict over the use and control of flood plain areas is thus closely linked with the broader governance context and its ambiguities. The roots for the conflict can also be seen in the vagueness of the ownership of flood plain land areas that have traditionally been under community user rights but are now differently recognized by

different parties.

Case 3: Practices of exclusion in Tonle Sap fisheries

Fish forms the main source of income and food particularly to the poorest and most vulnerable groups of people in Cambodia.[42] Well-functioning and equal fisheries management would therefore be crucial for balanced development of the country. Unfortunately this is not the case. Cambodia's fisheries management – like the management of many of its other resources – is dominated by weak implementation of policies, lack of accountability, and non-transparent and unjust practices.[43] Accordingly, different kinds of conflicts related to fishing and particularly to access to and control over different fishing areas exist, two of which are presented in this section.[44]

Conflicts with private fishing lots

Cambodia's fisheries management is marked by appropriations and exclusions from access of the local communities. The epitome of this is the operation of large-scale, commercial fisheries that is based on so-called fishing lot system. Fishing lots are geographical concessions auctioned to the highest bidder for a certain period, usually two years. The lots include lake areas, rivers, ponds, and inundated forest and are typically located in the most productive fishing areas. The owner of the fishing lot has an exclusive right to harvest fish from the lot, to sublease parts of the lots, and to keep everyone else out from the lot area.[45]

The fishing lots are allowed to operate only during the most important fishing season which, in theory, leaves lots accessible for small-scale subsistence fishing for the rest of the year. But many lot owners limit the access to lots throughout the year, and some lots have also extended their areas to community fishing areas, open access areas, and fish conservation zones, creating thus both geographical and temporal conflicts over access to fishing areas. In short, the system excludes most people from the most productive fishing areas during the most productive fishing season.[46]

It is therefore no surprise that the fishing lot system has created serious tensions and even armed conflict between local villagers and fishing lot owners and their guards. Tensions were soaring at the turn of the millennium, when villagers around the Tonle Sap started to protest more loudly against the exclusionary fishing lot system, the extended boundaries of lot areas, and government's inability to respond to the conflict.[47] Responding to the accumulation of fisheries conflict, the government proclaimed in 2001 radical and sudden changes to the country's fisheries management. Half of the total area of the private fishing lots was changed to public fishing lots open for community fisheries. This shift aimed to improve peoples' food security and to ease the growing tensions between local people and fishing lot owners.

Conflicting interests in community fisheries

The emergence of private irrigation areas in the Tonle Sap flood plain has led many local communes to lose areas that they have traditionally used, for example, for floating-rice cultivation and as grazing grounds for cattle.

The fisheries reform of 2001 experienced certain setbacks and some believe that the tensions just took different forms.[48] Although the release of more areas for community fishing was overall a positive shift and eased tensions between fishers and fishing lot owners, management of community fishing areas has turned out to be challenging.[49] Among the main reasons for these challenges is that the institutional arrangements of community fisheries seem often to ignore the heterogeneity of local communities and the complexity of local power structures.[50]

The underlying assumptions for the common ethos of community-based fisheries management are often unrealistic; they assume that all local fishers – including larger scale fishers – would easily become environmental "shepherds" and agree to limit their activities to subsistence levels. This points toward government's and donors' lack of sensitivity to resource users' own perceptions on their resource use as well as to the fact that fishing communities consist of fishers with different scales of activities. An additional challenge for community management is that fish are commonly seen as a commodity by the fishers, not least because of the long moral influence of the private lot system. Tonle Sap is thus rather special in that the development of new institutional arrangements does not originate from the "tragedy of open access," but rather from the "tragedy of privatization."

At the same time, the continued operation of private fishing lots[51] seriously undermines the legitimacy of regulatory measures in community fishing areas and discourages compliance with law. Findings from our field surveys indicate that many villagers saw the community fisheries' regulations that restrict villagers' fishing to subsistence levels hard to justify when compared to the liberties given to private fishing lot owners. This relates to broader questions about the context of and values behind current fisheries governance: who has the right to consider fish a commodity and who is to be restricted to subsistence fishing, and do local fishers have rights to defend their livelihood or just rights to defend subsistence fishing that they are by law restricted to?

Another emerging difficulty in the community fisheries is so-called elite capture. There naturally exist various power relations and interests within a fishing community that are then combined with outside interests. As a result, those with a strong asset base and high social and political capital dominate easily the agenda and activities of the community fisheries. Indeed, findings from our field surveys indicate that many of the current community fisheries management systems in the areas with high prior heterogeneity among the local fishers have failed to take the local power structures

The drive toward greater participation leaves space for silent conflicts, as communicative ideals of participation fail to address the "dark side" of power and politicking within planning institutions, planning practice, communication, and social relations. Silent conflict thus potentially results in continuities of local repressive structures.

properly into account, and are actually maintaining existing local power imbalances.

The wealthier groups in our survey villages were significantly more represented in the management of community fisheries, capturing the best fishing grounds, and at the same time restricting the access of poorer groups – even when official rules and regulations aim to reduce these kinds of exclusive practices. The situation is thus paradoxical: an institutional arrangement designed for subsistence fishers has turned into one that excludes them, and instead provides a negotiation ground for medium or larger-scale fishers as well as a means to control the activities of the poorer ones.

The lack of cultural sensitivity of donor-driven reforms can be seen as one issue explaining this paradox. While decentralized natural resource management aims at more equal allocation of benefits from natural resources, democratic communicative practices might not always reduce local power imbalances, although they might take new forms. Southeast Asian world views are often considered to favor harmony over open discussion that could bring up conflict-prone topics. Although this is naturally a simplification, it has discovered that the drive toward greater participation indeed leaves space for so-called silent conflicts, as communicative ideals of participation fail to address the "dark side" of power and politicking within planning institutions, planning practice, communication, and social relations.[52] Silent conflict thus potentially results in continuities of local repressive structures.[53]

Discussion: the different dimensions of water-related conflicts

We analyzed characteristics of water-related conflicts in three case studies from Cambodia's Tonle Sap Lake focusing on flood plains, agricultural land, and fisheries. The cases encompass different dimensions and aspects of water-related conflicts.

The case study on fisheries (case 3) focused on conflicts between fishers and on the role of fisheries management in those conflicts. Until the fisheries reform of 2001, Cambodia's fisheries management was structurally violent toward local fishers in that private fishing lots excluded local communities from most of the major fishing areas. Although these excluding practices still exist, the situation has improved and many of the fishing areas have been shifted to fall under local community management. Consequently, one interesting finding from the fisheries case is that conflicts should not be seen only in a negative light, but may also be seen as a driver for change. As the fisheries reform showed, the accumulating resistance of local fishing communities that conflicted openly with private fishing concessions was the driver for development of more equal laws, rules, and regulations in fisheries management, thus reducing potential future conflicts. Conflict may thus play a constructive role in facilitating social and economic transformation as well as in shaping social relations and power structures.[54]

Fisheries reform, however, did not come without challenges. One difficulty in this otherwise positive reform was that it was done in a hasty manner without sufficient commitment from state actors and proper involvement of the local level. In addition, the reform was greatly influenced by the donor community. A danger with initiatives driven by the donor community is that the general policies they imply are often rather detached from local reality and therefore likely to cause unintended and undesirable results.[55] As demonstrated by the fisheries case, if new institutional and participatory arrangements are designed without proper understanding of local realities and sociopolitical structures, they are – despite their good intentions – likely to result in participatory processes that merely reproduce dominant power structures.

The case study on land appropriations in the flood plains (case 2) revealed a situation where traditional use of a resource is being undermined by powerful groups. The combination of increased accessibility to the flood plains and unclear legal status of the flood plains areas have left these areas exposed to uncontrolled privatization and resulted in conflicts between local communes and outside appropriators and private investors. The case revealed that formal rules and regulations do not properly recognize local communities' customary user rights – that have existed as practical norms for generations – to utilize agricultural land.

Comparison of these two cases reveals an interesting difference: whereas the flood plains areas are increasingly being transformed from common to private areas, the fishing domains are being reconverted from private concessions to community user groups. Different water-related resources have different histories and are perceived differently by local users. Consequently, without sensitivity to the resource users' own perceptions on their resource use, attempts to understand tensions related to resource use are likely to fail. Local communities are not homogenous entities; they entail different user groups with differing perceptions on the resources they use.

While the cases on fisheries and agricultural land focused on conflicts within the Tonle Sap area, case 1 elaborated on possible adverse transboundary impacts from upstream Mekong countries. The case also addressed the diverse conceptualizations of development and differing values attached to natural resources by actors in different levels and scales. The discussion on why water-related conflicts are unlikely to scale up to the regional level indicated that national decisionmakers seem not to be aware of – or are even ignorant toward – concerns about transboundary impacts at the local level. The political elites, irrespective of their country, seem to have similar modernization aspirations and common economic interests, and they are thus more likely to find consensus than to end up in serious conflict over water development in

the basin. Discussion about interstate water conflict is thus not likely to be meaningful in the Mekong basin. However, this conclusion shows only one side of the coin as at the same time the seemingly fluent regional cooperation seems to prevent actual discussion about negative transboundary impacts at the local level.

This finding relates to James C. Scott's idea on state simplifications.[56] The trade-offs between livelihood sources look different when viewed from the state rather than the local level. Calculations based on abstract forms of knowledge and information render livelihood issues of farmers and fishers living around the Tonle Sap into estimations of general productivity and profitability, ignoring political and moral dimensions of the trade-offs. The trade-offs are usually made on issues that many locals could not consider calculable or comparable. Thus, a common characteristic for all three cases is found to be related to unequal power structures and mechanisms of marginalization within and between the different scales.

Conclusion: the importance of the governance context

The three case studies indicate how diverse and multidimensional water-related tensions and conflicts are in the context of the Tonle Sap. It becomes obvious that water-related conflicts are rarely solely about water and its scarcity (or abundance), but that access to and control over water and related resources are actually often more dominant reasons for water-related conflicts.

Water-related conflicts cannot thus be linked to increased resource scarcity alone, but also – and perhaps mainly – to unequal distribution of water and related resources. Consequently, we see that the discussion on water conflicts should focus much more on the mechanisms of allocation of water and related resources as well as on formal and informal power structures shaping these mechanisms. In addition, different valuations attached to the resources as well as the political and historical context where they prevail have a strong influence on tensions over resource use. Consequently, water-related conflicts should always be examined in a broader context, with special attention to existing power structures both at local and higher – national and regional – levels. These findings reinforce many other studies on conflict and natural resources.[57]

Notes

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Water-related conflicts cannot be linked to increased resource scarcity alone, but also – and perhaps mainly – to unequal distribution of water and related resources.

1. See, e.g., Ohlsson (1999); Haftendorn (2000); Postel and Wolf (2001); Watkins and Berntell (2006).

2. For instance, Shiva (2002).

3. It has been suggested that Cambodia has one of the highest natural resource availability per capita in Asia (Kurien, *et al*., 2006; World Bank, 2004), but there seems not to be a proper study on this.

4. World Bank (2006a).

5. This decline is partly due to natural disasters, i.e., drought and high floods during the past few years. See NIS (2004). In these statistics the agricultural sector includes also fishing and forestry.

6. Le Billon (2007).

7. Öjendal and Sedara (2006). It is important to note that the sociopolitical structures usually considered as obstacles for democracy, such as patron-client relations and authoritarianism, are not as static as is often thought.

8. Although the estimated poverty incidence in Cambodia fell from 47 percent to 35 percent from 1994 to 2004, per capita consumption among the poorest fifth of the population rose by only 8 percent, compared to 45 percent among the richest fifth. The Gini coefficient (measuring inequality in the income distribution) grew from 0.35 in 1994 to 0.40 in 2004. Poverty sunk much faster in urban than in rural areas, and the inequalities grew particularly in rural areas (World Bank, 2006b).

9. World Bank (2004, 2006a).

10. Le Billon (2000, 2007); Tarr (2003).

11. World Bank (2006b, p. 131).

12. There naturally are a variety of practical norms when implementing these policies. For example, decentralization and its importance might be differently interpreted by different groups. The on-going decentralization process would probably not have taken place if it had not been interpreted by the ruling party as a new source of means to gain popularity and legitimacy. Thus decentralization has actually not been "participatory revolution," but merely "power politics as usual" (Öjendal and Sedara, 2006).

13. Keskinen (2006).

14. Bonheur (2001).

15. Lamberts (2006).

16. However, as noted by Lamberts (2006), there is currently very little information available on the actual ecosystem productivity of the Tonle Sap, and the available data is particularly ambiguous on fisheries.

17. See Galtung (1969); Farmer (1997). According to Galtung (1969, p. 168), structural violence refers to the mechanisms of exclusion and inequality and poverty that constrain the physical and mental capacities of the poor and denies them a decent life. Galtung sees violence consisting of factors that "cause people's actual physical and mental realizations to be below their potential realizations."

18. Exclusory mechanisms are partly based on ethnicity; in particular, Cambodia's Vietnamese minority is regularly deprived of basic rights such as land ownership. They are also often excluded from official statistics and enumerations, and it is therefore impossible to give their exact number. However, they are particularly numerous in the floating villages of the Tonle Sap, and it has been estimated that at least 14 percent of the population (around 12,000 people) in those villages would be ethnic Vietnamese (Keskinen, 2003).

19. Bryant and Bailey (1997).

20. For example, Peluso and Watts (2001).

21. In addition to the potential transboundary impacts discussed in this section, other kinds of transboundary impacts occur in the Mekong basin. For instance, Cambodia has suffered from Vietnam's water development in different ways. The Vietnamese flood protection structures along the Cambodian border (built to reduce flood damages on the Vietnamese side) have resulted in increased flooding in Cambodia (Bown, 2003). Also, the Mekong's tributaries in the Vietnamese Central Highlands have been a site for increased irrigation abstractions, deforestation, and dam construction that have had adverse effects on the Cambodian side. Perhaps the best-known case is the construction of Yali Falls Dam that has caused loss of river-bank agricultural areas, increased erosion, and losses for fisheries on the Cambodian side of the Se San River (Baird and Mean, 2005).

22. Kummu, *et al*. (2007); Evans, *et al*. (2004).

23. Evans, *et al*. (2004) estimate that between 1973 and 1997 the flooded forest cover in the Tonle Sap area has reduced over 50 percent. See Evans, *et al*. (2004); Degen, *et al*. (2000). The conversion of flooded forests into agricultural land has also induced conflicts between farmers and fishers. While fishers (including fishing lot owners) want to preserve the flooded forest to sustain Tonle Sap's high fish production, farmers – some of whom seem to be shifting from fishing to farming due to reduced fish catch – want to convert the forest areas to agricultural land.

24. Kummu, *et al*. (2007).

25. Kummu (2007) estimates that a 30 cm increase in Tonle Sap's dry-season water level would permanently submerge up to one third of the remaining flooded forest area.

26. Although the Tonle Sap area's population is concentrated on the upper fringes of the flood plain, an estimated over 140,000 people live in the actual flood plains, i.e., in the area that is submerged practically every year (area between 0m and 8m above sea level). See Keskinen (2006).

27. The Mekong River Commission (MRC) focuses on water management, but only four of the six downstream countries are members (Laos, Thailand, Cambodia, and Vietnam; but not China and Burma/Myanmar). The GMS Program has all six Mekong countries as it members and it focuses on economic and infrastructure development, but some environmental and water issues are also on its agenda.

28. Despite the MRC's commonly agreed rules of equitable utilization of the Mekong's waters, local livelihoods are still in various ways threatened by water development in the basin. This paradox can be understood partly through the state-centerd structure of the regional organizations. As noted by Fox and Sneddon (2004) for example, the MRC as an inter-governmental organization seems to dismiss that the river is a host of complex socioecological dynamics, and instead sees it simplistically as a watercourse where water is allocated in equal quantities among the countries.

29. In 2003 Cambodian prime minister Hun Sen said in a speech that "... the upstream countries' projects in the Mekong River, namely the continued dam constructions and commercial navigation plan, have become a major concern for the downstream countries including Cambodia," and he was particularly concerned about the negative impacts to the Tonle Sap (Cambodia New Vision, 2003). Two years later, just before heading to the Second GMS Summit in China, Hun Sen was quoted saying that he believes hydropower dams built by upstream countries will pose "no problems" to Cambodia, and he criticized that people who are claiming otherwise just want to undermine the unity among the riparian countries (People's Daily Online, 2005). At the same time China's economic assistance to Cambodia has increased remarkably (Keskinen, *et al*., 2007).

30. Keskinen, *et al*. (2007).

31. See, e.g., Pryor (2007).

32. World Bank (2006b).

33. Land title remains unclear in most areas of Cambodia.

34. National roads surrounding the flood plains as well as many smaller rural roads have during the past years been improved remarkably.

35. For example, Evans, *et al*. (2005) note that at least 15-20 dams/embankments for dry-season rice cultivation have been built in the 91.5 km^2 study area in Kampong Thom since 2003. These structures capture receding flood waters, are long (typically extending 0.5-2 km), and can each irrigate hundreds of hectares.

36. For example, in Kampong Thom province, an interviewed provincial officer estimated that up to half of the private irrigation areas in the province would be illegally built.

37. Field surveys were carried out in fall 2006 by Mira Käkönen, together with Yim Sambo, Suong Leakhena, and Marko Keskinen, in three different locations around the Tonle Sap Lake, adjacent to the surveys of the so-called Built Structures Project.

38. Findings from our field surveys indicate that, e.g., in Battambang province the development of approximately 6,450 hectares of land bought/leased by CityMart company is at a standstill due the strong opposition of local farmers and NGOs who criticize that the project acquired the land areas illegally.

39. Our field surveys indicate that, e.g., in Kampong Thom the provincial departments of agriculture and fishery are addressing the problems related to private irrigation structures and are demanding removal of some of the new structures.

40. The ministries involved include, e.g., the Ministry of Water Resources and Meteorology and the Ministry of Agriculture, Forestry, and Fisheries. While the latter seems to prefer more diversified and smaller-scale agricultural development, the former is keener to plan and build large-scale irrigation schemes and has been more active in promoting private land concession around the lake.

41. As pointed out by Ratner, *et al*. (2004), the confusion and even institutional rivalries over the formal division of authority in natural resource management is quite common in the case of wetlands due to its ambiguous nature.

42. Sithirith and Grundy-Warr (2007); Navy, *et al*. (2006); McKenney and Tola (2002).

43. Ratner (2006); Salayo, *et al*. (2006).

44. Salayo, *et al*. (2006) and Sithirith and Grundy-Warr (2007) recognize five different kinds of fishing-related conflicts in Tonle Sap, including, e.g., those between fishers and other users of aquatic resources (e.g., lowland farmers) as well as with "outsiders" migrating seasonally to the lake and its flood plain to fish. We focus here only on conflict among fishers and also leave out ethnic aspects (particularly with ethnic Vietnamese) that include some serious tensions as well.

45. Actually a lessee, but the term "lot owner" is much more commonly used, reflecting the dominance of the lessee over the fishing lot area.

46. In addition, there have been conflicts between fishing lot owners and farmers over water use rights, related mainly to diverting and storing flood waters, and consequently fish (Degen, *et al*., 2000).

47. For more information on this topic, see, e.g., Resurreccion (2006); Sina (2003); Bonheur (2002); NGO Forum (2000); Degen, *et al*. (2000).

48. McKenney and Tola (2002); Bonheur (2002); Ratner (2006).

49. However, only a part of the released fishing lots is currently under community management, with the rest being so-called open access fishing areas (McKenney and Tola, 2002). As noted by Degen, *et al*. (2000), the notion of open access is erroneous as a majority of these areas are actually under informal ownership and management arrangements, often imposed by lot owners and powerful local elite and excluding the poorer subsistence fishers. It would thus be perhaps better to refer, e.g., to the concept of common pool resources instead of open access resources (cf., Ostrom, 1990).

50. For innovative analysis on formal and informal power structures in Tonle Sap's community fisheries, and particularly on the challenges of women's participation in it, see Resurreccion (2006).

51. Even after fisheries reform, half of the private fishing lots continue their operation and apply significantly larger scale – and often illegal – fishing methods compared to the methods allowed for subsistence fishing. In the Tonle Sap Area 53.4 percent of the lot areas prior to 2001 are still under private fishing lot system. In Battambang and Kampong Chnang provinces – where many of the most productive fishing areas are located – this figure is over 70 percent (McKenney and Tola, 2002). Consequently, an additional disincentive for participation in community fisheries is that the fisheries' production in several new community fishing areas is fairly low.

52. Tam (2006).

53. This conclusion should not be interpreted simply as a lack of capacity for collective action in Cambodian communities. Spontaneous local activities and initiatives challenging authoritarian structures have followed from decentralization in Cambodia, also in the management of natural resources (Middleton and Tola, 2007). The challenge is that the community fisheries reform was initiated in a top-down manner and the responsibility does not therefore actually lie at the local level. The new local community fisheries can work meaningfully only if they are truly supported by a broader governance context that values equitable resource allocation. Fishers in our surveys often expressed frustration with the lack of attention and support from higher level authorities and with the reluctance of authorities to properly control private lots as well as the actions of local fisher elites in community fishing areas.

54. Cf. Upreti (2001).

55. More general discussion on current water policies in the Mekong region and their mismatches with local realities can be found, e.g., in Molle (2005).

56. Scott (1998).

57. See, e.g., Bryant and Bailey (1997); Peluso and Watts (2001); Upreti (2001).

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How trade affects international interactions

Solomon W. Polachek

A viable peace is one that comes about naturally and persists without the need for outside intervention. Baron de Montesquieu's made this statement in 1748:

> Peace is the natural effect of trade. Two nations who traffic with each other become reciprocally dependent: for if one has the interests in buying, the other has the interest in selling and thus their union is founded on the mutual necessities.

A least since then a number of economists and political scientists have maintained that trade among nations leads to peace. That logic is as follows: if a target country, the recipient of conflict, retaliates by cutting its trade ties with the instigator, then a portion of the cost of conflict born by the instigator is the lost gains from trade. Conflict is more costly the higher these gains from trade losses. This article summarizes some of the empirical work testing this proposition.

Motivation

Any one country cooperates and conflicts with other countries, and both at the same time. For example, during the Cold War the United States and the USSR exhibited great amounts of hostility toward each other, yet these same countries had extremely cooperative relations with other countries such as Canada (for the U.S.) and the Eastern Block (for the USSR). In 2005, Cuban – U.S. relations were poor but U.S. – Canadian relations were highly cooperative. At the same time, Canada had excellent relations with the United States as well as good relations with Cuba. Tables 1 and 2 utilize the Cooperation and Peace Data Bank (COPDAB) and the World Events Interaction Survey (WEIS) events data to illustrate. Both tables contain indices of cooperation from an actor country (column) to a target country (row). A positive number reflects cooperation while a negative number reflects conflict. Thus, Egypt (Table 1) exhibits strong hostility to Israel yet cooperation toward Russia (1948-1973) and cooperation with Canada, China, and Russia (Table 2) but hostility toward Israel from 1966 to 1991. By the same token, in both data sets the United States exhibits strong cooperation toward the United Kingdom while exhibiting conflict toward Russia. From these patterns we learn that the important question regarding understanding international conflict is why a nation can have good relations with some countries, yet poor or hostile relations with others, both at the same time. Clearly, looking at the attributes of only one country in isolation would not provide a full answer. Instead, one must look at both the actor and target countries. This is precisely the strategy of the conflict-trade literature. (A formal conflict-trade model is given in the Appendix.)

Table 1: Net cooperation from actor country to target country (COPDAB data, 1948-1973)

			Actor		
Target	*China*	*Egypt*	*U.K.*	*U.S.*	*Russia*
Canada	0.37	0.03	0.68	1.12	0.22
China		0.64	-0.56	-2.4	-0.93
Egypt	0.85		-3.07	0.63	2.77
U.K.	-0.13	-3.07		3.73	-2.54
U.S.	-4.74	0.53	3.04		-7.14
Russia	-2.33	2.77	-2.86	-4.76	
W. Germany	0.22	0.27	1.42	2.59	-1.13
E. Germany	0.24	0.39	-0.25	-0.54	1.28
Israel	-0.21	-23.17	-0.16	2.16	-1.08
Japan	0.80	0.17	0.34	1.75	0.47

Note: Each cell represents an index of actor to target cooperation measured as the intensity-weighted number of cooperative events minus the intensity-weighted number of conflictive events. *Source*: Computed by the author using COPDAB data.

Testing the conflict-trade model

Current studies employ regression analysis to test the model using dyadic (bilateral) data. The common specification relates dyadic trade to dyadic conflict, holding constant a set of exogenous factors defining aspects of the level of development for each actor and target country. A number of papers measure conflict using either war or militarized dispute data.[1] However, war data are difficult to use because wars are relatively rare and as such students must span many years to get enough war observations for statistical analysis. Also, concomitant data on trade and other variables generally are not available for such long time periods. Other studies use militarized dispute data (MIDs). MIDs comprise information on disputes less severe than war.[2] While more plentiful, MIDs omit minor disagreements as well as measures of cooperation between nations. Most of my work uses events data, which is less restrictive. Events data have the advantage of measuring bilateral political interactions more generally. They include both cooperation and conflict over a wide range of intensity levels. Further, these data allow a sufficient number of observations to study

Table 2: Net cooperation from actor country to target country (WEIS data, 1966-1991)

	Actor								
Target	*CAN*	*CHN*	*EGY*	*GER*	*ISR*	*JPN*	*UK*	*US*	*RUS*
Canada		2.57	3.42	1.63	1.48	2.03	1.61	1.63	-0.12
China	2.65		2.32	2.08	1.50	1.40	0.47	0.89	-1.08
Egypt	3.92	3.62		2.45	-2.68	2.07	2.27	1.42	2.22
Germ.	2.44	0.56	0.85		0.49	2.00	1.51	1.64	0.01
Israel	0.56	-1.03	-2.87	1.39		-0.02	-0.01	0.74	-1.76
Japan	2.59	0.34	0.26	1.62	0.09		1.65	1.28	0.47
U.K.	1.94	-0.27	0.09	2.00	-0.60	2.23		1.45	-0.79
U.S.	1.09	-0.83	0.31	0.71	0.40	1.06	1.16		-0.63
Russia	0.32	-1.42	1.03	0.29	-0.89	0.34	-0.61	-0.19	

Note: Each cell represents an index (rounded) of actor to target cooperation measured as the intensity weighted number of cooperative events minus the intensity weighted number of conflictive events. *Source*: Computed by the author using WEIS data.

Table 3: Impact of trade on conflict

Model	*Adjustment for country attributes*	*Independent variable*	*Intercept*	*Coefficient*	*Elasticity*
1	no	X	-1.324	-0.0028	0.192
			[13.7]	[13.3]	
2	no	X	-1.334	-0.0027	0.185
			[13.8]	[12.8]	
3	yes	M	-0.098	-0.0023	0.152
			[0.1]	[9.8]	
4	yes	M	-0.112	-0.0023	0.152
			[0.1]	[9.9]	

Note: Model refers to the following regressions: (1) conflict = a + b X; (2) conflict = a + b; (3) conflict = a + b X + c (actor and target attributes); (4) conflict = a + b M + c (actor and target attributes). The elasticity is the percentage change in conflict give a one percent increase in X or M. *Source*: Polachek (1980).

shorter, contemporary time periods in detail.

The dyadic trade variable is usually measured by the trade volume between two countries in millions of current U.S. dollars. Empirical studies look at a country's imports and/or exports from/to particular countries. Political scientists define trade *dependence* to be the amount of bilateral trade as a proportion of a country's GDP. Trade *share* they define as the proportional dyadic trade relative to a country's total trade. Another measure sometimes used is trade *openness*, which is a country's total trade with all countries as a proportion to GDP. The empirical findings that use trade ratios are difficult to interpret because one does not know whether a negative coefficient for a trade share variable arises because of a negative relationship between the numerator (dyadic trade) and the dependent variable (conflict) or a positive relationship between the denominator GDP and the dependent variable. Thus I prefer to use bilateral trade alone as an independent variable with GDP as a separate control variable.

Included also are a number of other variables that serve as controls so as to hold these aspects of the dyad relationship constant. Economists often take account of factors affecting economic development. These include country population, geographical expanse, the percentage of GNP originating in industry, highway vehicles per capita, secondary school enrollments, university enrollments, GNP, electrical production, and measures of economic growth. Political scientists often include a country's power and polity. These entail such variables as a country's power, measured as the Correlates of War (COW) composite index of national capabilities (CINC) score,[3] joint democracy based on the Gurr Polity Survey, political dissimilarity between dyads, again based on the Gurr Polity Survey, and contiguity of the countries in the dyad.

My work uses the following empirical specification:

$$(1) \qquad \mathrm{NETF}_{ij} = a_0 + a_1 x_{ij} + a_2 A_i + a_3 A_j + e$$

$$(2) \qquad \mathrm{NETF}_{ij} = b_0 + b_1 m_{ij} + b_2 A_i + b_3 A_j + e$$

where NETF is a measure of net conflict,[4] x_{ij} and m_{ij} are exports and imports, and A is a vector of country attributes for each actor and target country. As an example, I present estimates of (13) and (14) from prior research computed using COPDAB data from 1948-1973. Negative coefficients for a_1 and b_1 imply that countries with greater trade dependencies engage in less net conflict (Table 3). They indicate that a doubling of trade would cause a 15-19 percent decline in conflict (the elasticity measure).[5] Here I survey past results and present some new evidence.

In addition to the above, I have tried numerous other specifications to test

Table 4: The conflict-trade relationship

Variables	COPBAD (1948-1978)	WEIS (1966-1992)	VAR (1990-2000)
Trade	-0.0050***	-0.0002***	-0.0010***
ITO membership	-6.8168***	-5.4763***	-0.7956***
Constant	32.7436***	2.3303	-0.8909**
Observations	76,705	15,702	36,434
R-squared	0.0044	0.0068	0.3247
Probability > F	0.0000	0.0000	0.0000

Note: The dependent variable is net conflict. Each regression also adjusts for political scientists' measures of each country's power, joint democracy, political dissimilarity, and contiguity. ITO represents membership in an international trade organization (GATT prior to 1995; WTO after 1995). *** denotes $p < 0.01$, ** denotes $p < 0.05$, * denotes $p < 0.10$.

robustness. These include using various events data. My original work used COPDAB, but I have replicated these original results using the World Event Interaction Survey (WEIS) as well as newer machine-readable Virtual Resources Associates (VRA) data based on Reuters wire service reports.[6]

Table 4 illustrates the consistency of the inverse conflict-trade relationship across the three data sets. The trade coefficient is negative, although because of rising trade levels, generally becomes smaller in value in more recent data. The ITO coefficient, designating the impact of membership in an international trade organization (GATT pre-1995; WTO post-1995), is also negative.

Causality

One criticism of the conflict-trade model concerns causality, i.e., whether trade diminishes conflict or whether conflict diminishes trade. Of course, the theory predicts causality to go in both directions. Beginning with Pollins, a slew of studies examined how conflict affects trade. These include major works by Mansfield and Gowa. Pollins concludes his study by arguing that "nations adjust trade ties to satisfy security."[7] Anderton looks at particular cases.[8] He finds World War I dramatically decreased trade between Germany and the U.K., as well as between Germany and Italy, and between Germany and the U.S. Also, he finds that World War II dramatically decreased trade between the U.S. and Germany, the U.S. and Japan, the U.K. and Germany, and Australia and Japan. Finally he found that the U.S. Revolutionary War decreased trade between the U.K. and U.S., and that other wars did the same, including the China-India war 1962 which led to a decrease in China-India trade; the France-Egypt war 1956 which led to a decrease in French-Indian trade, and the 1959-1979 El Salvador-Honduras war which also led to a decrease in trade. In contrast, Barbieri and Levy find weaker effects but appear to examine fewer countries using nominal rather than real trade values.[9]

In my initial work, I adopted a 2SLS model to get at the simultaneous relationship between trade and conflict. Here the inverse conflict-trade elasticity more than doubled from the 0.15 to 0.19 measures of Table 3 to about 0.35. In later work I estimated 3SLS models.[10] In one equation, I assumed that conflict affects trade, while in the other I assumed trade affects conflict. The approach, however, is limited because of the inherent difficulty in choosing exogenous variables to identify each equation. I used defense expenditure to identify conflict and cooperation, and development-type variables such as highway vehicles per capita, secondary school enrollments, and electrical production to identify trade. I found that a 10 percent increase in trade led to a 39 percent decrease in conflict, but that a 10 percent increase in conflict had insignificant effects on trade. Later, Reuveny, and Reuveny and Kang fit a simultaneous equations model separately for ten dyads and found conflict and cooperation to be significant determinants of trade, and trade to be a significant determinant of conflict and cooperation.[11] However, the signs of the effects varied by dyad. Here too, the strength of the particular relationships depended crucially on the exogenous variables.

Because there is little theory determining the most appropriate exogenous variables, Gasiorowski and I applied time–series causality tests as an alternative.[12] Time-series data enables one to compute Granger-type causality tests. Increases in explanatory power induced by lagged trade values in a regression of conflict as a function of trade indicates causality running from trade to conflict. By the same token, one can specify the reverse to determine whether past conflict "causes" current trade. Table 5 contains probability values for Granger F-tests of the null hypothesis that trade does not cause conflict (column 2). Column 3 contains probability values that conflict does not cause trade. Low probability values (i.e., less than 0.05) indicate rejection of the hypothesis, while high values indicate no causality. The data reject the null hypothesis that lagged values of trade did not significantly affect present conflict for the first six lag periods. The data only reject the hypothesis that lagged conflict does not affect present trade in periods 4 through 6. These results are consistent with trade affecting political interactions. Reuveny and Kang extend this work by examining Granger-causality for 16 dyads.[13] Using COPDAB and WEIS quarterly data from 1960 to the early 1990s to measure conflict and IMF data for trade, they show that causality generally runs in both directions. However, the strength of causality differs by the particular dyad. In subsequent work, they take this issue a step further by disaggregating trade according to commodity group.[14] Trade data from the United Nations are used to divide total trade into ten commodity groups. Conflict

Table 5: Probability values for the Granger-causality test, 1967-1978

Lag periods	Trade causes net conflict [a]	Net conflict causes trade [b]
1	0.0009	0.1046
2	0.0018	0.3165
3	0.0004	0.1394
4	0.0054	0.0110
5	0.0071	0.0201
6	0.0126	0.0240
7	0.0874	0.0661
8	0.0515	0.0604
9	0.1917	0.1486
10	0.2739	0.2300

a Gives the probability values for the hypothesis that trade does not cause conflict; *b* tests the converse hypothesis that conflict does not cause trade. Low probability values (e.g., < 0.05) indicate that the hypothesis is rejected; high values indicates acceptance. Lag periods indicate the number of quarters over which Granger-causality is tested. *Source*: Gasiorowski and Polachek (1982).

tends to Granger-cause trade in metals, petroleum, manufacturers, and high technology. Trade causes conflict in food, live animals, beverages, and consumer goods.

Case studies

Often it is instructive to examine particular cases. For the purposes of this article, I look at two dyads: the U.S.-Soviet Union between 1967 and 1979 and the U.S.-China between 1948 and 1973. U.S.-Soviet relations are important because of their volatility during this time period. Détente which took place in the late 1960s and early 1970s caused U.S.-Soviet hostilities to ease, so an analysis of this time period is important. When one plots a time series – with a trade measure consisting of imports and exports in real quarterly dollars on the vertical axis, and a conflict measure, the intensity-weighted sum of the aggregated quarterly conflictive events from COPDAB, on the horizontal axis – then trends are in accord with prediction.[15] Trade tends to rise especially in the late 1960s and throughout the 1970s until 1976, and conflict is falling pretty steadily throughout the period until 1976. It is interesting to note that conflict rises from 1976 to 1977 just when trade appears to fall. One can also plot these time-series results in a cross-section framework. With U.S. to USSR conflict on the horizontal axis and a measure of U.S. trade on the vertical axis, it turns out that conflict is relatively small in years with relatively high trade, but larger in years with relatively low trade. (In addition, the relationship appears to be hyperbolic rather than linear.)

Trade with China (imports and exports) has increased from about $7.6 billion in 1985 to $57 billion in 2007. Thus investigating whether Chinese-U.S. relations conform to the conflict-trade model might be worthwhile. COPDAB provides data on Chinese-U.S. interactions from 1948-1978. We utilize the same conflict measure adopted in Table 2. Figure 1 plots this measure of conflict (i.e., net conflict, or the number of conflictive events minus the number of cooperative events) directed from the U.S. to China against U.S. exports to China for the years 1948 to1978. This yields a similar inverse relationship as was seen for the U.S.-Soviet conflict-trade relationship. Figure 2 is a plot of China's directed conflict toward the U.S. Again there is an inverse, and probably hyperbolic relationship. High levels of trade are associated with very small levels of conflict, while low levels of trade tend to yield higher conflict.

EUGene (the Expected Utility Generation and Data Management Program) is a computer software package designed by political scientists for the construction of annual data sets to be used in quantitative international relations studies. One can use the program to generate conflict data between country pairs. Given the limited time range for COPDAB, I downloaded China-U.S. conflict data for the period 1860-1993 and merged that with trade data available for 1870-1913, 1920-1938, and 1975-1992. Figure 3 contains these data. Again, there is an inverse relationship between trade and conflict.

Anomalies

Not all countries exhibit an inverse conflict-trade relationship. Although the preponderance of evidence yields an inverse relationship between conflict and trade, a significant number of dyads exhibit a positive instead of a negative sign. As mentioned, part of the problem is in the measurement of trade. Rather than use trade, a number of studies use trade *share* which is defined as a country's bilateral trade with another relative to its total trade with all other countries. Other studies use trade *dependence* which measures trade relative to a country's GNP. The empirical findings that use these variables are difficult to interpret. Take the case of trade share. A negative correlation between bilateral trade and conflict would yield a negative coefficient. However, because total trade is in the denominator, an inverse relationship between total trade and conflict would generate a positive coefficient. Indeed the overall coefficient tends toward zero if both dyadic and total trade are inversely related to conflict. The same can be said for trade dependence in which GNP is in the denominator. For this reason it makes sense simply to use bilateral trade as the independent variable and adjust for each country's other attributes, including GNP and total trade, separately as exogenous variables.

To see how the trade conflict-relationship can vary across dyads one can run regressions for each dyad separately. This allows for dyad-specific conflict-trade coefficients. Elsewhere I produce visual evidence of the conflict-trade relation between the United States and 115 countries for 1948-1978.[16] Each line (or curve) represents the best choice between a linear and hyperbolic bivariate fit (based on R^2) between U.S. conflict and trade with each of the 115 countries (Figure 4). Not all conflict-trade curves are negatively sloped. While most dyads show an inverse

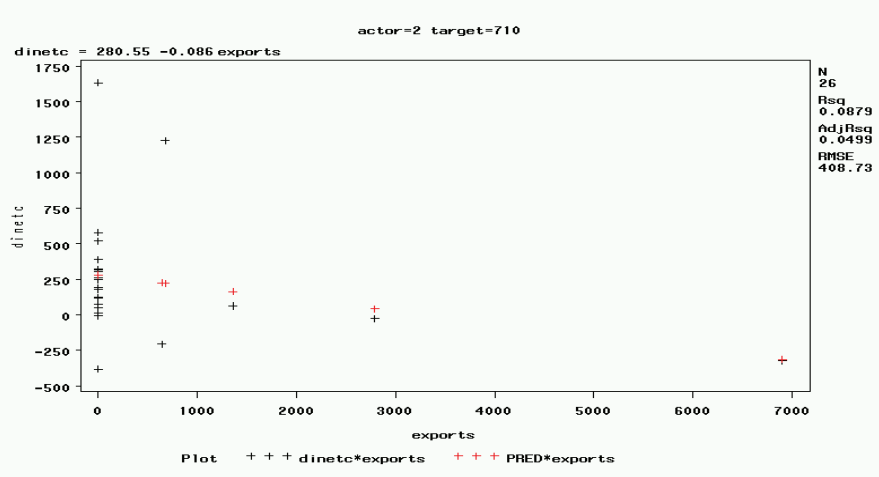

Figure 1: Conflict and trade between the United States and China, 1948-1978

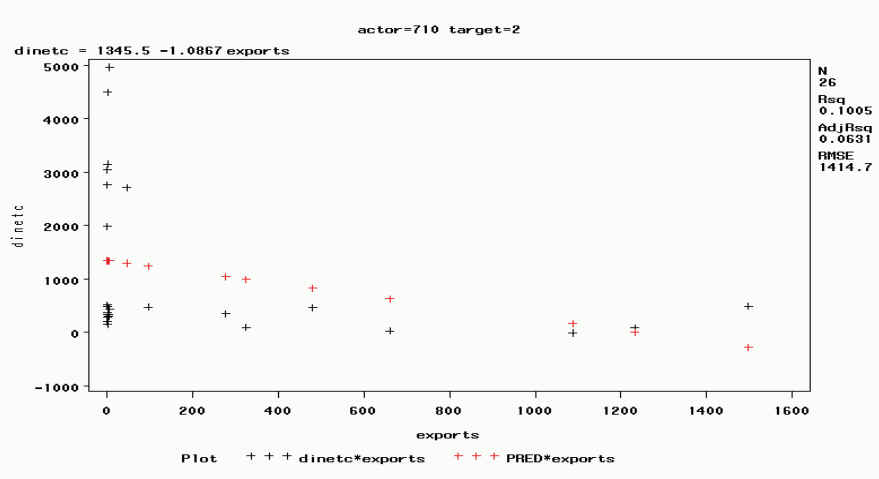

Figure 2: Conflict and trade between China and the United States, 1948-1978

relationship between conflict and trade, a significant number exhibit a positive sign. That there are significant variations in the sign of the conflict-trade relationship is not surprising. By and large, empirical testing has not been carried out in accord with theory. In the next section, I explain why, and offer some suggestions on where the field should go form here.

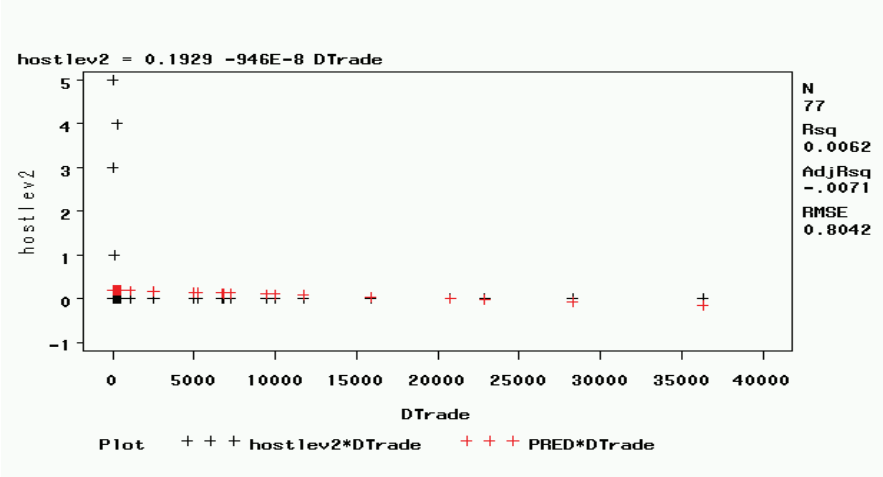

Figure 3: Militarized dispute and trade between China and the United States, 1860-1993

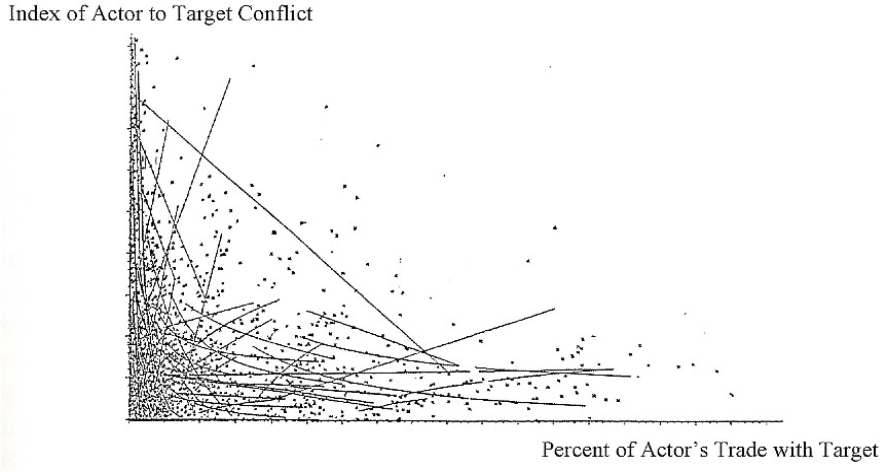

Figure 4: Conflict-trade relation between the United States and all other countries. Each curve depicts the fitted (linear or hyperbolic) conflict-trade relation between the United States (as actor) and each target country; the dots depict raw data. *Source*: Polachek (2002).

Extending the basic conflict-trade model: suggestions for future research

The conflict-trade model argues that conflict between two nations reduces their trade

with each other. The opportunity costs associated with these potential gains from trade losses are enough to induce trading partners to cooperate rather than fight. Whereas there are now numerous empirical studies testing this proposition, virtually all empirical studies concentrate on *trade levels* but neglect employing *gains from trade* measures to test the hypothesis. Those studies, mentioned previously, that use trade share or trade dependence also do not measure gains from trade directly. Although it is correct that trade levels and trade gains are proportional when each country has identical import demand and export supply curves; however, since countries differ dramatically from each other, it is not clear one can make the assumption that import demand and export supply curves are identical across countries. Thus it is not obvious that the theory is adequately tested. Further empirical work is needed.

As far as I know only one set of studies attempts to get at trade gains rather than simply trade, but here too further work is necessary.[17] To incorporate these gains from trade measures, Polachek and McDonald augment the basic conflict-trade equation (1) by incorporating import demand elasticities.[18] As such, they rewrite (1) as

$$(3) \qquad z_{ij} = \alpha_0 + \alpha_1 g_{ij} + \alpha_2 A_i + \alpha_3 A_j + \varepsilon_{ij}$$

where g_{ij} represent trade gains arising from actor i's trade with j. While gains from trade g_{ij} are not directly observable, they are however proportional to the sum of imports and exports and inversely related to their respective import demand and export supply elasticities. So because trade gains are related to levels of trade as well as to each country's import and export demand and supply, they incorporate elasticity measures. But because there are no export supply price elasticities readily available, even on the aggregate level, they concentrate on augmenting the conflict-trade model with demand elasticities obtained from the empirical international trade literature.[19] To incorporate these elasticities, the empirical specification is further modified as follows:

$$(4) \qquad zij = \alpha_0 + \alpha_1 m_{ij} + \alpha_2 x_{ij} + \alpha_3 \varepsilon_{mij} + \alpha_4 A_i + \alpha_5 T_j + \varepsilon_{ij}$$

where m_{ij} and x_{ij} represent dyadic imports and exports, and ε_{mij} represents country i's import demand elasticity from country j, and A and T depict actor and target attributes.

Regression results for the Marquez elasticity-augmented conflict-trade model using country trade and attribute data for 1973 to maintain time-period compatibility with the 1970-1984 Marquez-elasticities are given in Table 6. They show conflict to be inversely related to trade, but interestingly the magnitude is far stronger than in past estimates. A doubling of imports leads to a 50 percent conflict reduction. Similarly, a doubling of exports leads to a 30 percent decline in conflict. Recall that previous estimates, reported in Table 2, yield about a 15-19 percent reduction in conflict. Also note that to enhance the gains from trade argument, the difference in actor-target gross national product (GNP) is used as an exogenous proxy for differences in factor endowment. If actor and target GNP differences imply differences in actor-target factor endowment, then larger differences should raise the gains from trade and diminish conflict. Here the regression result (-0.056) is also consistent with the conflict-trade hypothesis.

Table 6: The conflict-trade relation

Variable	*Mean*[1]	*Coefficient*[2]	*Elasticity*[3]
Constant	-50.49		
	(3.12)		
Dyadic trade elasticity	0.83	37.62	0.47
	(.04)	(2.63)	
Exports (billions US$)	4.13	-4.49	0.28
	(0.67)	(4.47)	
Imports (billions US$)	4.02	-8.21	0.50
	(0.67)	(-6.86)	
GNP (actor)	232.8	0.0178	
	(26.1)	(0.46)	
GNP (actor) - GNP (target)	3.93	-0.056	0.003
	(39.0)	(2.20)	
Net conflict	-66.63		
	(9.66)		

R^2 =0.35; n = 178

[1] Standard error of mean in parentheses; [2] t-values in parentheses; [3] computed at mean values. The dependent variable is net-conflict computed from COPDAB. *Source*: Polachek and McDonald (1992).

Most interesting is the result of the import demand elasticity coefficient. Here, as mentioned above, theory predicts a positive relation between the import demand elasticity and conflict. Indeed this positive relation is observed. The 37.62 coefficient implies that a 10 percent more inelastic demand is associated with a 4.7 percent lower level of conflict. What is significant is that incorporating import demand elasticities not only yields the predicted sign, but strengthens previous findings regarding trade's effects on conflict as well.

Future explorations

I see expanding the conflict-trade model in at least two directions. On the theoretical

side, the distribution of actual and expected gains from trade should be introduced more explicitly. Part of the theory claims that countries cooperate more and fight less to protect gains from trade. But how these gains from trade are distributed between countries must matter. If the trade process results in an asymmetric division of gains, will the degree of cooperation also be asymmetric? Will one side have a greater stake in protecting trade? If so, how does this asymmetry manifest itself in determining conflict and cooperation?

On the empirical side, the field definitely needs to measure gains from trade better. We need measures of the present value of trade gains for each commodity country *i* trades with country *j* compared to the gains from trade that would be achieved from country *i* trading with the next best alternative. In a sense, this type of trade gain is subsumed in specific commodity import and export demand and supply functions. But we do not have estimates for these functions either.

Getting these measures right might require more sophisticated analysis using better data. But I think it is possible. For example, the U.N. keeps records of commodity-by-commodity trade flows along with price data. I believe using these bilateral commodity-by-commodity trade and price data along with appropriate cooperation and conflict measures is the prescription needed to definitively assess the conflict-trade model.

Notes

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1. Studies using a historical perspective include Richardson (1960); Rummel (1979); Gilpin (1977); and Ripsman and Blanchard (1996/1997).

2. See Sayrs (1990); McMillan (1997); Reuveny (1999); Barbieri (2002); Schneider, *et al*. (2003); Mansfield and Pollins (2003); and Mansfield (2004) for surveys of the literature.

3. See Correlates of War Project National Material Capabilities Data Documentation Version 3.0, Last update: May 2005.

4. It is what I have called "net conflict" which is the number of conflictive events minus the number of cooperative events from an actor to a target in a specific year using the Cooperation and Peace Data Bank (COPDAB) for 1948-1973. I have also used severity-weighted net conflict measures and have obtained comparable results.

5. See Polachek (1980) for more details.

6. See Polachek and Xiang (2006).

7. Pollins (1989a; 1989b); Mansfield (1994); Gowa (1994).

8. Anderton (2003).

9. Barbieri and Levy (2003).

10. Polachek (1992).

11. Reuveny (2001); Reuveny and Kang (2003).

12. Gasiorowski and Polachek (1982).

13. Reuveny and Kang (1996).

14. Reuveny and Kang (1998).

15. Relative conflict measures are not needed in time-series analysis because the selectivity issues occur in each nation's reporting but not in one nation's reporting over time.

16. Polachek (2002).

17. Polachek (1992); Polachek and McDonald (1992).

18. Polachek and McDonald (1992).

19. Marquez (1988; 1990); Hooper, *et al*. (1998).

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Appendix: Conflict and trade – a formal model

Describe an actor country's production possibility frontier as the convex set $\{q\}$ containing all possible output vectors q_i such that $\{q_i\} = \bigcup_i q_i$ for all commodities $i = 1, ..., n$. Next, define the welfare function $W(C, Z)$ for the country's decisionmaker to be based on the preferences of the entire population. This function depicts the welfare levels associated with each possible consumption basket $C = (c_1, c_2, ..., c_m)$, but is also dependent on another variable, $Z = (z_1, z_2, ..., z_k)$, representing conflict which can be construed as capturing (or at least moving politically in a direction giving the impression of seeking) to confiscate resources of any of k target countries. The welfare function is assumed quasi-concave such that $W(c, z) > 0$, $W_c > 0$ but that $W_{CC} < 0$. No assumptions are necessary for the effect of z on welfare levels, since for now we assume z to be constant and not part of the maximization process. The simplest bilateral trade model assumes potential trade at a constant price ratio $m = p_{c_1} / p_{c_2}$. This yields equilibrium c^* so that the gains emanating from both specialization and

trade are the difference in utility between autarky and trade.

Suppose, for example, that through quotas, embargoes, blockades, or a change in the terms of trade, conflict implies a diminution of trade. Then the implicit cost of conflict is the lost gains from trade associated with decreased trade. The greater the welfare loss, the greater the costs of conflict and the smaller the incentive for conflict, independent of the country's innate preference for peace.

To see how these potential welfare losses lead to greater cooperation and less conflict, one can introduce more structure. Domestic consumption c of commodity i equals domestic production of q_i plus imports minus m_i exports x_i. As such,

$$(1)\quad c_i = q_i + m_i - x_i$$

$$(2)\quad m_i = \sum_{j=1}^{k} m_{ij}$$

$$(3)\quad x_i = \sum_{j=1}^{k} x_{ij}$$

where j indexes import and export partners, with k being the number of countries. As such, an actor's welfare function is

$$(4)\quad W = W(C,Z) = W([q_i + \sum_{j=1}^{k} m_{ij} - \sum_{j=1}^{k} x_{ij}],[z_j])$$

where the bracketed terms are the commodity and conflict vectors just defined. Including C within the welfare function is obvious. Trade is the value of exports minus the value of imports. If no balance of payments problems exist then

$$(5)\quad \sum_{i}^{m}\sum_{j}^{k} x_{ij} p_{x_{ij}} - \sum_{i}^{m}\sum_{j}^{k} m_{ij} p_{m_{ij}} = 0$$

where the first price term depicts unit export prices charged to country j for commodity i and the second price term is the unit import price charged by country j for commodity i. Import and export prices are determined in the international market, but assume they contain at least a component that is dependent on bilateral conflict. Thus

$$(6)\quad p_{x_{ij}} = f(z_j)$$

and

$$(7)\quad p_{m_{ij}} = g(z_j)$$

such that hostility raises the price that must be paid for imports and lowers the prices at which exports can be sold

$$(8)\quad p'_{x_{ij}} = \frac{\delta p_{x_{ij}}}{\delta z_j} = f'(z_j) < 0$$

$$(9)\quad p'_{m_{ij}} = \frac{\delta p_{m_{ij}}}{\delta z_j} = g'(z_j) > 0\,.$$

If conflict such as through embargoes or boycotts leads to the complete cessation of trade then $f' = -\infty$ and $g' = \infty$, although, as will be indicated, the net welfare loss associated with foregone trade need not be great if alternative trade avenues exist.

Given this structure as well as predetermined trade, rational behavior on the part of a country's decisionmakers implies choosing optimal levels of Z that maximize welfare level (4) subject to (1) to (3) and (5) to (9). This implies maximizing the following Lagrangian

$$(10)\quad \begin{aligned} &Max\, W = W(C,Z) = W([q_i + \sum_{j=1}^{k} m_{ij} - \sum_{j=1}^{k} x_{ij}],[z_j]) \\ &+ \lambda(\sum_i \sum_j x_{ij} p_{x_{ij}}(z_j) - \sum_i \sum_j m_{ij} p_{m_{ij}}(z_j)) \end{aligned}\,.$$

First order optimality conditions for optimal conflict requires

$$(11)\quad \frac{\delta W}{\delta z_j} = \lambda(\sum_i x_{ij} \frac{\delta p_{x_{ij}}(z_j)}{\delta z_j} - \sum_i m_{ij} \frac{\delta p_{m_{ij}}(z_j)}{\delta z_j}) = 0$$

$$(12)\quad \frac{\delta W}{\delta \lambda} = \sum_i \sum_j x_{ij} p_{x_{ij}}(z_j) - \sum_i \sum_j m_{ij} p_{m_{ij}}(z_j) = 0$$

Equation (12) is merely the balance of payments constraint. Equation (11) describes the mechanism by which a country decides on the amount of belligerence. Since the bracketed term is the implicit price of receiving less money for exports while at the same time having to pay more for imports, it represents the net cost associated with extra hostility (MC). In equilibrium, this cost of hostility must just balance the welfare benefit of added hostility ($\delta W/\delta z_j$) so that the intersection of the ($\delta W/\delta z_j$) curve and the MC curve depicts equilibrium conflict/cooperation. The MC increases as imports and/or exports rise. Thus, the greater an actor country's level of trade with a target, the smaller the amount of actor-to-target conflict.

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Transnational threats and security in the Americas: patterns, contradictions, and more

Enrique S. Pumar

"Man knows himself only in history, never through introspections."
Wilhelm Dilthey

For students of Latin America, the pattern and historical development of belligerent conflicts in the region is a puzzle worthy of much attention and inquiry. Unlike other developing regions, Latin American has experienced its share of domestic conflicts – revolutions, protest, coups, civil unrests – but fewer interstate conflicts than any other developing region for much of the twentieth century. Moreover, some areas of Latin America seem more prone to domestic upheavals than others. Only in very few instances have domestic issues spilled over into state wars between or among neighboring countries. In the handful of cases when regional issues have instigated disputes, these have been resolved diplomatically without much fanfare.

In addition, political developments in Latin America defy social science research on peace and conflict resolution. The correlation between democracy and peace throughout the region has been spotty at best. The ABC nations – Argentina, Brazil, and Chile – have experienced their share of internal political instability, military authoritarianism, and, like much of the region, a façade of democracy despite their relative potent economies and cultural cosmopolitanism, but no interstate wars. Costa Rica, the only sustainable democracy since 1948, has no armed forces and therefore no commitment or desire to fight any of its neighbors. In countries with a similar political history, such as Venezuela and Colombia, social and transborder tensions have never resulted in war despite the occasional cantankerous public rhetoric. The absence of interstate wars is also evident among other nations with dissimilar political development throughout the hemisphere, regardless of the nature of their polity.

In terms of the correlation between economic development and the prevalence of belligerency, the outcome throughout Latin America is not much different. According to the 2005 *Human Development Report*, Argentina, Chile, Uruguay, Costa Rica, Cuba, and Mexico top the region in human development indicators. Yet all these nations, with the exception of Costa Rica, suffered from civil strife but not dyadic conflicts in the past five decades. Moreover, the wide development gap between these nations and the rest of the region does not appear to have significant bearing on the propensity to spark conflicts. The per capita GDP difference between traditional rivals Argentina, ranked 34th in the Human Development Index (HDI) in 2005, and Brazil, ranked 63th, is about $5,000. Chile's per capita GDP, the second-highest in the region, comes in at about $2,000 less than Argentina's. But Haiti and Guatemala, with the lowest HDIs in the region, had a combined 2005 per capita GDP that amounted to half of Argentina's.[1] Despite this skewed development distribution and tensions along their borders, all these nations had one or another form of domestic political instability but no dyadic conflicts. More significantly, their domestic strife has not led to war with neighbors.

This article examines recent political and economic developments in Latin America and lays out a framework of analysis that might explain the paradoxical manifestation of conflicts in the region, namely, that while Latin America has experienced its share of intrastate violence, the region is one of the most peaceful in the developing world in terms of interstate violence. The principal aim is to explain the relative interstate peace in Latin America for most of the twentieth century. Unlike other developing regions, the region witnessed just two cases when Latin nations have fought each other since the Chaco War of 1932.[2] Neither conflict lasted more than a year and neither escalated into an all-out regional conflict. Following a within-case comparative approach,[3] I suggest that interstate peace in Latin America parallels the explosion of transnational relations, especially pertaining to transnational security-related issues, throughout the region. I propose, therefore, that transnationalism has fostered interstate peace in the region through three specific mechanisms often neglected in the peace literature. First, transnational relations require policy coordination regimes where nations, even those who perceive themselves as rivals or adversaries, cooperate. Second, nations engaged in transnationalism quickly realize the spillover effects of transborder problems; consequently, actors become aware that to solve one contentious issue they must collaborate on an array of other broader issues as well.[4] Issue-linkage makes political coordination and collaboration not only possible but also indispensable among even rival nations. Third, the perception of transnational threats creates a common enemy that prioritizes the formation of coordinating conjunctions to handle such threats. The perception of a shared menacing threat prioritizes the desire for confederation among nations because, as Thomas Hobbes unequivocally notes, all men have a desire for preservation and sovereignty that connotes the tacit expectation that if men cannot defend themselves, rulers will defend citizens.[5]

In particular, I argue that the rise of transnational, multidimensional threats diverts attention from other points of contention governing interstate relations and gears decisionmakers to the imminent task of devising mechanisms to prevent or control the dangers posed by non-state actors. In all, these three dimensions of the transnational process sustain the basis for a security regime that has been embedded in the political culture of the region for years but was later institutionalized through various conventions with the outbreak of the Cold War. Hence, hemispheric diplomatic norms reward regional cooperation and nonbelligerent resolutions of disputes.

I proceed in three stages. First, I review micro and macro perspectives of the peace studies literature to show how major individualist paradigms come short of explaining

the relative peace that reigns in Latin America during the postwar years. I then argue that recent middle-range explanations for interstate peace do not fare well when confronted with the evidence from Latin America. This is particularly the case with the arguments associated with the "democratic peace" and "peace through trade" perspectives discussed in a recent paper by Polachek and Seiglie.[6] The purpose of this discussion is not to test theories or their specific applicability per se but rather to argue that these two positions in particular seem to explain a number of domestic crises but not the peculiar absence of external crises throughout the region. Finally, in the third part of the paper, I propose a framework of analysis that incorporates the effects of transnationalism. Not only has the transnational dimension of peace in Latin America been neglected by contending positions in this literature but also, following this approach, I hope to add new twists to the peace and transnational relations debate in Latin American studies. Actors operate in a social context that gives meaning to their actions.

Micro and macro peace studies and Latin America

In recent decades, the literature on peace and conflict resolution has turned from the individual to the macro and more recently to the meso level of analysis.[7] Influenced by Freudian developments in psychology and by the rise of totalitarianism in Europe during the interwar period, the micro level first attributed the nature of conflict to innate aggressive behavior, especially the desire to monopolize and maintain power among leaders with autocratic, dogmatic, and narcissistic personalities. World leaders such as Nasser manifest a propensity for violence as a means to achieve their status and political ambitions. Anthropologists soon followed, emphasizing the role of culture in determining belligerence.[8] The parable of the tribe argument, for instance, envisions the struggle for power as an inevitable outcome in the course of civilization development. Once culture rewards power and aggressive individual instincts, the social environment fuels a disposition for violent drives. Critics soon dismissed these claims on a number of grounds. One essential criticism of the psychological and cultural positions is the failure to differentiate when aggressive behavior leads to war and when it does not. For if wars result from human aggressiveness and culture alone, would not most societies always be in some sort of Hobbesian state of nature?

Another turn in the psychological movement was popularized during the 1960s when international-relations scholars produced multiple studies on such instrumental questions as the nature of perception, misperception, belief systems, and the operational code of chief policymakers. One pointed insight from this literature is the assertion that cognition is a mediating mechanism between environmental stimuli and individual action. Ideologies and belief systems, for instance, were conceived as filters to interpret social tensions and determine whether specific tenuous conditions merit belligerent action.[9] What this means for peace studies is certain: misperceptions could escalate interstate conflicts into wars even in situations where aggression is not merited. This behavioralist movement is too burgeoning to discuss in detail here; it suffices to say that through methodological rigor, proponents of the psychological perspective managed to draw attention to the risks associated with actors' social construction of reality – a topic not always well conceived by proponents of voluntary persuasions. A more profound methodological challenge, of course, is to assess the validity of misperception in light of the self-reporting and interpretative mechanisms usually associated with this body of literature.

A third approach to peace studies emphasizes evolutionary strategic interactions among actors and the calculations behind the desire to go to war or avoid wars altogether. Game theory, the most popular trend from this approach, assumes that decisionmakers are capable of making calculated decisions and that these actors are also utility maximizers.[10] Game theorists often assert that cooperation is possible when players forfeit the highest payoff in strategic interactions or when interactions among players with limited rationality occur in incremental rounds of the game. In the latter case, landscape theory proposes that social learning resulting from incremental interactions reduces ambiguities and uncertainties and decreases negotiating costs and the utility of side payments under uncertain payoff structures to induce players to cooperate.[11]

Finally, a radically different approach to war and peace derives from the effects of the macro-structural configurations of world politics on state actors. This holistic approach popularized by Waltz, Gilpin, and Modelski among others, asserts that the anarchic nature of international relations fosters conditions under which bouts of war might emerge among states.[12] According to these scholars, the constellation of power among superpowers as well as their hegemonic capability determines the extent to which peace is possible. Under conditions of anarchy, when a global power is declining, or in multipolar situations, the likelihood of interstate wars seems higher than under other conditions.

Despite the parsimonious insights from both the micro and macro perspectives, these do not seem to have much relevance in understanding the long peace that has reigned in Latin America since the 1932 Chaco War. For one, all of these perspectives assume that threats come from other states with easily definable territorial borders, standing armies, and distinguishable national symbols. In Latin America, as I argue below, for much of the twentieth century the perceived threat derives from transnational non-state actors, such as insurgencies, terrorists, and drug traffickers, that engaged in protracted struggles markedly different in nature and character from the conventional wars these theories attempt to explain. More significantly, Latin nations do not have the same capabilities as industrial nations; consequently, the payoff structure of military calculations is substantially narrower. And when miscalculations take place, these are not as consequential as when superpowers misjudge a potential adversary's intentions. This may be one of the most important reasons that misperceptions rarely lead to war and the culture of power in the region is channeled to cross-national issues and actors.

In fact, many would argue that one of the implications of the relative economic dependency of developing nations is that this situation constrains the weighting of choices and sovereignty of the state among developing nations and thus reduces incumbent options available to decisionmakers.[13] Latin American nations also have to contend with the interests of the United States, their most important benefactor, to avoid and contain any dyadic conflicts that may impair regional development and investment efforts as well as good governance schemes. U.S. national security priorities call for a hemisphere free of interstate conflicts that might entangle American armed forces defending the southern flank of the United States, leaving the military vulnerable elsewhere in the world. Finally, counterinsurgency programs launched by the United States since the 1960s devised numerous mechanisms to promote interstate military cooperation against domestic threats. In fact, the evidence from Latin America demonstrates how the disproportionate allocation of resources to handle transnational threats reduces the provability of dyadic compulsions. As the president of Colombia has unequivocally stated to explain the need for *Plan Colombia*:

> The traffic in illicit drugs is clearly a transnational and complex threat, destructive to all our societies, with enormous consequences for those who consume this poison, and enormous effects from the violence and corruption fed by the immense revenues the drug trade generates. The solution will never come from finger-pointing by either producer or consumer countries. Our own national efforts will not be enough unless they are part of a truly international alliance against illegal drugs.[14]

Middle-range theorizing

A more promising approach for understanding Latin America's long peace derives from the "democratic peace" and the "peace through trade" perspectives. Since all nation-states engage in trade and, regardless of their security capabilities or position in the hierarchical structure of global politics, have a chance at democratic politics, in principle these two meso-level paradigms exhibit potential explanatory powers to decipher the nature of peace among developing nations. Moreover, it is usually the case with democracies that trade and peace occur concurrently at specific historical conjunctures; therefore it is easy to associate a correlation among these three distinct processes.

According to a prominent scholar, the democratic peace perspective rests on four *sine qua non* assumptions.[15] First, since the political elite in democratically organized political systems are under certain restraints, namely with regard to transparency and popular accountability, democracies tend to be more peaceful than other forms of political organizations. Second, in part because of the reasons just stated, democracies are less likely to initially use lethal force against other democracies. Furthermore, the relatively peaceful nature of democracies is a political question rather than one caused exclusively by economic conditions or geographical location. And third, democracies are more likely to wage wars toward autocratically governed states than toward other democracies. All-in-all, according to this line of reasoning, *polyarchies* are more peaceful than any other form of political organization.

In Latin America, the evidence supporting the democratic peace thesis is mixed at best since both democracies and nondemocratic state actors rarely fight each other; of the two cases of interstate conflicts since the 1930s, one involved two democracies (the Peruvian-Ecuadorian territorial disputes), the other a pair of nondemocratic regimes (the El Salvador-Honduras 1969 conflict). More significantly, the waves of military coups through Latin America between 1964 and the mid-1980s did not alter the pattern of regional peace. The return of competitive politics since the late 1980s has also been accompanied by regional peace but there is no evidence to suggest that democracy was the cause. Besides the 1995 border skirmish between Ecuador and Peru, two countries governed by popularly elected leaders at the time, none of the other twenty-one interstate disputes occurring during the decade of the 1990s resulted in an outbreak of war regardless of the political nature of the regimes or the degrees of democratic manifestations. Likewise, only one dispute, the 1969 "soccer war" between Honduras and El Salvador, resulted in a brief war during the prior three decades, when Latin America witnessed a breakdown of one democracy after another.[16]

Perhaps one reason for this wavering evidence lies in the nature of democracies that we witness throughout Latin America. In the region, almost all democracies, particularly early ones, are organized around very strong presidential systems where the executive branch enjoys relative autonomy. For instance, it has been suggested that the rare number of electoral primaries facilitates *presidentialism* throughout the region since the process of candidate nomination is less competitive than it otherwise could be.[17] The dwindling popularity of these presidential-style regimes seems to have two effects for peace. First, in Latin America we observe unanticipated situations where domestic insurgencies emerge under democratic rule, as has been the case in recently in Mexico, Colombia, and Peru, and even earlier in Uruguay. This means that when these nations allocated resources to combat domestic upheavals and transnational threats, this decision also raised the cost of fighting one another, thus deterring possible confrontations. A more feasible possibility might be that the relative autonomy of elected leaders may undermine their own capacity to rally enough support to fight an external war. Hence, when democracies do not fight throughout Latin America, they do so for reasons other than those suggested by the democratic peace literature. Latin nations do not fight each other as often as other developing countries because of the precarious state of democracy in the region, a situation that promotes a great deal of popular discontent and mobilization, as witnessed in Mexico today. An added consideration is that both democracies and authoritarian regimes have to devote a tremendous amount of their political capital to

promote national development and alleviate the political pressures mounting from the persistent income inequality throughout the region. In this context, interstate wars are perceived as undermining development efforts or supporting generations of unpopular political elites and therefore as contributing to the likelihood of a more explosive domestic situation, resulting not just in civil wars but in some 147 military coups between 1900 and 2000. In fact, after a rigorous analysis of state performance and popular disenchantment, one scholar concludes that "the premature dismissal of elected presidents was due in substantial part to the region's lackluster economic performance."[18] Therefore, both democracies and authoritarians have incentives to avoid wars at all cost in Latin America.

Liberal social scientists consider that the relative prosperity and interdependence brought about by trade constitute a second explanation to sustainable peace. Proponents of this argument claim that the benefits of trade raise the cost of fighting. As Polachek and Seiglie correctly point out, the "peace through trade" hypothesis was popularized by Keynes's critique of the terms of the Treaty of Versailles during the interwar period.[19] Following Keynes, many social scientists have argued that trade density among nations increases the motivation of state actors to cooperate since the benefits of trade have a spillover effect into other issues. The end result is that trading partners find themselves in a situation of "complex interdependence" that encourages diplomatic solutions to bilateral disputes – witness the case of U.S.-Mexican bilateral relations.[20]

In contrast, I would argue that the evidence supporting the "peace through trade" argument is hazy with respect to Latin America. The main shortcomings of this approach are insufficient covariation and inversed causal direction. Concerning the latter, in order to argue that trade causes peace in the region we must first demonstrate that there is a change in the pattern of trade variability preceding periods of peace. In the Latin American case this level of testing presents a problem because the density of bilateral trade among nations is currently low and has remained so for much of the last four decades. Most Latin nations diversify their dependencies by trading with Europe, the United States, and lately increasingly with the Far East before they trade with each other. This is true even with nations signatory to any of the regional trading regimes. According to data from USAID, in 2005 the value of total Brazilian exports to the United States amounted to $11 million more than to MERCOSUR, the Southern Cone Common Market to which Brazil is one of the signatories.[21] Moreover, the degree of causality between trade and peace is weak. As has been persuasively argued, in any robust causal relation variables must follow a causal direction that clearly demonstrates that the causal variable (in this case trade) precedes the dependent variable (peace).[22] But as I and others have argued, in Latin America, this direction is inversed.[23] Moreover, since peaceful conditions seem to be a constant feature, the trade volume alone cannot explain them. In addition, as the Brazilian data persuasively shows, the pattern of trade between Latin nations and extra-hemispheric partners is always more robust than with neighboring countries. In short, the peace through trade argument in Latin America is spurious.

In the next section of this article, I argue that another variable – one that might sustain the relative peace experienced by Latin nations during the postwar years – is transnationalism. The perception of transnational threats encourages policy coordination efforts against common enemies and reduces misperceptions among potential adversaries; thus even countries considered traditional rivals face no other alternative than to cooperate. This was the case, for instance, among Brazil, Argentina, and Uruguay, countries with variable political systems, contentious issues, and low trade density among them, but where peace reigns. The conspicuous absence of war is also evident in such traditional adversaries as Mexico and Guatemala or Argentina and Chile. I argue that during the latter part of the twentieth century, there has been a explosion of three major sequential and overlapping transnational threats in Latin America: insurgencies, drug trafficking, and crime.

Transnationalism and dyadic peace

Before I discuss how transnationalism and peace are correlated, I briefly assess the extent to which these transnational processes present a threat to the hemisphere's regional security. It is important to note that there have been two fundamental shifts in the nature of the political perils in Latin America during recent decades. During the Cold War, the United States and Latin America institutionalized the principles embodied in the Monroe Doctrine when they agreed to sign the Rio Treaty. Thereafter, the deterrence brought about by this and other accords coupled with the spillover social effects of the Cuban revolution fostered an environment in which Latin American elites, particularly the military, perceived their role as primarily guardian of domestic political order. Castro's effort to divert international menace from his revolutions by promising to support revolutionary guerrillas through the continent fueled the perception that the main danger undermining the political climate necessary to push economic development came not from other neighboring military establishments but rather from insurgencies. These fears triggered comprehensive covert counterinsurgency programs, such as Operation Condor, which involved joint military forces from throughout Latin America and the United States.[24]

One of the consequences of the rise of bipolarity for Latin America was a departure from the traditional role of armed forces throughout the region. In almost every country, the military was transformed overnight from a force to guard the territorial integrity of the nation-state against external adversaries to one of carrying out social demobilization decrees to preserve the function of the state as an arena of elite interest intermediation. This first major mission shift is important for the preservation of peace in the region because it connotes that the training, arms procurements, and the strategic framework of the military was retooled to meet a different adversary, one that was domestically rooted.[25] Coincidentally, the shifting involvement also entailed the emergence of multiple inter-American institutions with

the intrinsic purpose of promoting the perception of a collective domestic threat and the socialization of military officers from the hemisphere.

One such institution, the Washington-based Inter-American Defense Board, coordinates military training and oversight in the Americas.[26] Lately, the infusion of drug trafficking activities, organized crime, and gang violence, among other transnational perils, seem to have produced a second transformation in the mission of hemispheric institutions, as well as in the minds of military planners in this Organization of American States (OAS) agency after the downfall of communism and the resulting peace accords in Central America. A content analysis of the recommendations and discussion topics in each of the six naval conferences sponsored by the Inter-American Defense Board between 1990 and 2000 reveals an overwhelming concern with the threats posed by illicit transnational activities and resolution after resolution committing navy forces to coordination and cooperation schemes to combat this rising threat.[27] This finding is also corroborated by an examination of the curriculum for the 2005-2006 class, hosted by the Board. Modules in crisis management, peace and diplomacy, assessment of transnational threats, and conflict resolution dominate much of the teaching. In short, after 1948, several mechanisms and institutions were developed to sustain the inter-military collaboration regime in Latin America.[28] At the same time, these institutions buttressed a perception that the real threat to democracy and social well-being emanates from the proliferation of non-state transnational actors.

The recognition that transnational violence poses a major threat to the hemisphere's security was officially articulated in a 2003 OAS security conference held in Mexico City, where the various elements of nontraditional security threats were framed as "the human security paradigm." In this and subsequent meetings officials proposed a comprehensive new collaborative framework among military establishments and between police personnel and civil society to mitigate these illicit activities. At the 2003 OAS meeting, the intergovernmental Committee on Hemisphere Security was institutionalized to assess the functions of hemispheric collective security instruments for the peaceful settlement of disputes as well as new security mechanisms necessary to bear nontraditional transnational security threats.[29] Just a year later, the ministers of defense convened in Quito, Ecuador, at the Sixth Conference of Ministers of Defense of the Americas. Among other resolutions, the defense ministers agreed to strengthen existing ties among inter-American security conventions, increase the interoperability of the region's armed and public security forces, collaborate in training, share information, and intensify intergovernmental exchange and coordination.[30]

The list of declaration, conventions, and public statements in support of the menacing threats from the new transnationalism is endless.[31] The point is that the evidence supports the assertion that at the end of the Cold War, the failure of neoliberalist policies to meet rising expectations throughout the region and bridge the income gap between rich and poor seems to have contributed to the proliferation of multiple informal activities, which are perceived as the most urgent threat to national security by officials throughout the hemisphere.[32] This imminent shift of perception and conceptualization of national security is sustaining the long peace in the hemisphere today, for it has reframed national security to prioritize transnational activities. The emergence of new nontraditional threats poses a common enemy to the state and diverts attention from interstate conflicts. In addition, these activities, by their very nature, require collaboration across nations at multiple levels. Today, Latin states recognize that they cannot tackle the issue of drug trafficking without examining migration and gang violence, and the magnitude and scope of these activities raises the cost of fighting a conventional war. Various hemispheric collaborative arrangements seem necessary to cope with the transnational and multidimensional aspects of violence in the region today. These regimes are also fostering confidence building measures which ultimately guarantee dyadic peace in the region.

After examining the evidence from the Latin American experience, the question remains as to why transnationalism has not produced similar effects elsewhere in the developing world. Here are few assertions. First, throughout the developing world, and to some extent even in Europe, transnational relations involve an element of ethnic conflicts and claims simply not seen in Latin America. Ethnic claims usually end in violence because they involve a historical tradition of oppression that undermines trust among ethnic groups and exacerbates conditions of violence. Moreover, international organizations and institutions are simply not equipped to resolve interethnic conflicts. More often than not, the mission of these institutions has been to contain escalating interstate confrontations. The effective role that the Inter-American Defense Board is fostering to build confidence among Latin military officials would be severely impaired in Africa or the Middle East. Last, the historical presence of the United States in Latin America has no parallel in other developing regions. As I discussed earlier, the United States and its inter-American agencies and institutions have facilitated and supported the new role of the military in the region as guardians against transnational threats and violence. In short, with respect to war and peace, Latin America may present a deviant case.

Conclusion

This article shows how the shifting nature of transnational threats in the Americas contributes to sustaining the so-called long peace in the region. After scrutinizing various contending peace perspectives, it demonstrates how the effects of transnational threats changed security priorities in the hemisphere. The multidimensional scope of transnational illicit activities has fostered state cooperation as a result of the numerous collaborative arrangements, exchange of communication, and policy coordination developed by the institutions, and conventions devised to mitigate the effects of transnational threats. The effect of this Inter-American security

regime is paradoxical. While Latin America has experienced its share of revolutions, insurgencies, and domestic violence, the region continues to be one of the most peaceful in the developing world.

Notes

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1. UNDP (2005, Table 1).

2. These two cases are the territorial disputes between Peru and Ecuador leading to clashes in 1941, 1981, and 1995, and the "soccer war" between El Salvador and Honduras. I do not include the Malvinas war because it engaged Argentina with Great Britain, an outside country.

3. The within-case comparative approach is a take-off from Juan Linz' seminal work, "Within Nation Differences and Comparisons: The Eight Spains" (Linz and de Miguel, 1966). Within-case comparisons examine variations among the different components of a case-study. With regards to this article, I apply the method to compare different trends within the Latin American case.

4. Hass (1980).

5. Hobbes (1931, pp. 75-77).

6. Polachek and Seiglie (2007). Also see the articles by Polachek and by Pantsios in this issue of the journal as well as that by Bhattacharya and Thomakos.

7. For a comprehensive review of conflict and peace studies, see Cashman (1993).

8. Schmookler (1984, particularly pp. 161-167).

9. Holsti (1987).

10. Schelling (1984).

11. Axelrod (1977).

12. Waltz (1979); Gilpin (1981); Modelski (1987).

13. See, e.g., Katznelson and Prewitt (1979).

14. Colombia (1999).

15. Russett (1993, p. 11).

16. See the empirical data from Martin (2006) and Mares (2000).

17. Carey (2003, p. 18).

18. Smith (2005, p. 332).

19. Polachek and Seiglie (2007).

20. Keohane and Nye (2000, pp. 718-731).

21. USAID (2007).

22. Stinchcombe (1968, pp. 32-35).

23. See Pumar (1990); Shafer (1988); Martin (2006); Mares (2000); Bailey and Dammert (2005). Many pundits involved in implementing development strategies argue that security was a necessary precursor of trade and development. Their point is that trade and development have a destabilizing effect on states already weak, thus necessitating security arrangements (see, e.g., Shafer, 1988, pp. 80-82).

24. McSherry (2005).

25. For a study of insurgencies and counterinsurgency policies in Latin America, see Kohl and Litt (1974).

26. In the welcome letter of the Circle of Friends, a support organization for spouses of military officers sponsored by the Inter-American Defense Board, the role of this group is described to be "a place to share your ideas and cultural traditions. We are here to provide support, information, and above all long-lasting ties of friendship." In addition, the web site of the Board describes the mission of this institution to be "an international committee of nationally appointed defense officials, who develop collaborative approaches on common defense and security issues facing the Americas." See http://www.jid.org/index.php?lang=en.

27. See IADB.

28. One such illustration of inter-military security collaboration can be found in Operation Condor (see McSherry, 2005).

29. OAS (2003).

30. U.S. Department of State (2004).

31. According to the latest annual report from the U.N. Office on Drug and Crime, the murder rate in the Caribbean is the highest in the world. Moreover, the crime rate is tied to the volume of drug trafficking throughout the region. Finally, the report concludes, the elevated crime rate is undermining growth, threatening human welfare, and impeding social development (UNODC, 2007). In the rest of Latin America, according to an Inter-American Development Bank report, violent crime cost an alarming 14.2 percent of GDP in 1999 (*International Herald Tribute*, 2006).

32. Bailey and Dammert (2005).

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Trade, openness, and domestic conflict: an empirical investigation for Latin America

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Conflict over resources and output is an important topic of economic and socio-political research. In an attempt to devise credible mitigation mechanisms, the World Bank project on the Economics of Civil War, Crime, and Violence is one of many examples of ongoing research that analyze occurrence and duration of conflict.[1] One of the most important results arising from this research is that increased trade openness may have conflict-mitigating effects.[2] But over-reliance on primary commodity exports, some studies suggest, can lead to more conflict.[3] (This so-called "natural resource curse" appears especially pronounced for Africa.[4]) It is also established that underlying sociopolitical and institutional structures play significant roles in starting and sustaining conflicts.[5] The literature on domestic and international conflict focuses on either all countries in the world, or only on the African continent.[6] Because continents and regions differ in various sociopolitical and economic aspects, as well as with respect to other factors that underlie conflict, it stands to reason to carry out additional region-specific studies. Accordingly, we analyze domestic conflict in Latin America (for the 1973-1995 time period).

Latin America has witnessed a significant drop in domestic conflict since the mid-1980s. As this coincided with a general tendency of opening up its domestic markets to world trade, it is plausible that trade and openness may have helped to mitigate conflict. Nevertheless, while for some Latin American countries trade liberalization resulted in reductions in the relative prices of agricultural goods (i.e., below autarky prices), which in turn might be expected to stimulate economic activity and help mitigate conflict,[7] in other countries agricultural prices rose above international levels, and this might be expected to foster conflict for the opposite reason (as has been observed in Africa, for instance).

Based on this sort of reasoning, on which we elaborate later on, we empirically explore the links among trade, openness, and domestic conflict in Latin America.[8] By making use of data on conflict deaths that arose in clashes between government and rebel forces, we focus on two important questions. First, how do variations in trade openness affect the likelihood of starting a domestic conflict or elevate a low-intensity conflict to a high-intensity conflict? Second, once initiated, how do variations in openness affect the duration of conflict? *Conflict onset* and *conflict duration* are the key variables to be explained. The underlying idea is that, through various channels, trade and trade openness may affect incentives and opportunities to engage in conflict, just as it can affect participants' ability to sustain conflict.

To address these issues, we rely on a theoretical model proposed by Garfinkel, Skaperdas, and Syropoulos that centers on the role of primary goods in the economy.[9] In brief, the argument is that the primary goods sector, i.e., agriculture in Latin America, (i) is most likely to create conflict due to the high level of resources involved and due to the temptation to exert control over them, and (ii) is likely to exhibit a significant change in relative commodity prices as a result of trade liberalization. The extent of trade liberalization should influence, by moderating incentives and opportunities, whether conflicts are stimulated and sustained, or abetted. After controlling for a variety of confounding sociopolitical and economic factors, our empirical findings suggest that agricultural exports as a percentage of total exports play an important role for conflict *onset* (occurrence) and *duration* (sustenance) in Latin America. As in Africa, over-reliance on commodity exports is a conflict risk factor. This needs to be addressed in devising conflict resolution policies. Further, we find that while overall trade openness reduces the probability of domestic conflict onset, this does not play a role in conflict sustenance.

The economic argument

The framework of Garfinkel, Skaperdas, and Syropoulos focuses on domestic conflict over a tradable resource. They show that trade may reduce welfare if it leads to the intensification of conflict and loss of resources associated with conflict. In their study, they analyze two questions. First, whether more openness reduces conflict by making participants richer and more open to "deal making" and, second, whether greater openness induces more wasteful competition and conflict by making some resources and commodities more valuable. This can happen when trade openness influences the value of the resource, as openness affects the price of the tradable resource.

By way of illustration, consider the case of agricultural products. If agricultural products are generating more value (return) after being traded in the world market, domestic participants in that trade would like to invest more resources (in terms of inputs) for continuation of that trade. Domestic conflict can then arise if either the ownership of these resource for producing that tradable commodity is not well defined or if these resources are confined to a certain proportion of the population.

Our work adds to that of Garfinkel, Skaperdas, and Syropoulos in that it focuses on the value of a tradable commodity and the value of the (not necessarily tradable) resources to produce that commodity under openness. Overall welfare, in terms of the reduction in the number or intensity of conflict, increases if the return from commodity trade is higher than the "return" from any potential conflict arising from the ownership of resources to produce those commodities. Conversely, if the return from commodity trade is of such a magnitude that it becomes almost impossible to avert conflict over control of the strategic ownership of resources to produce those commodities, then more openness may be a "curse" inasmuch as it enhances the number or intensity of domestic conflict. This reflects the "natural resource curse" idea mentioned earlier.

These points and our refinement cater to domestic conflict *onset*, which is the first question we address in this article, i.e., how do variations in trade openness affect the likelihood of starting a domestic conflict or elevate a low-intensity conflict to a high-intensity one?

To relate this to Latin America, consider conflict over land. To be specific, parties in conflict want to control land that provides them with opportunities to produce agricultural goods or extract natural resources that they can trade in the world market and generate income. This conflict over a resource has been played out time and again in Latin America, where land distribution is skewed.[10] When countries open up and start trading agricultural goods that use land as an input, the prices of these goods increase as compared to their autarkic (or no-trade) price. Consequently, stakes from conflict over higher-valued land increase once parties control and use that resource for future production of agricultural goods. Thus, the question that emerges for empirical investigation is whether increased trade openness (measured in terms of exports and imports of goods as a percentage of GDP) leads to an increase or decrease of overall conflict onset and intensity in Latin America.

Garfinkel, *et al*.'s framework is static; it sheds no light on conflict sustenance. However, looking at the previous example, and specifically for the case of Latin America, one question to follow logically is this: do changes in openness or variation in openness lead to domestic conflict sustenance? For example, if parties engaging in trade are always generating enough gains to outweigh the loss arising from potential conflict, would not they be interested in engaging in more trade and less conflict? Put differently, the probability that domestic conflict is going to be less (or more) than before again depends on the incremental benefits (or costs) being accrued over time. This is the second issue we pointed to before: once initiated, how do variations in openness affect the *duration* of conflict? Accordingly, we look empirically at the following question: what role does trade openness and other factors and tradable commodities (as a result of trade openness) play in explaining the probability that domestic conflict is going to be continued (or abetted) in the next period?

Data and methodology

In our study, the variable to be explained is "domestic conflict" for seventeen Latin American countries, collected from the Armed Conflict Dataset.[11] In this data set domestic conflict is defined as "internal conflict within a country between a government and one or more opposition groups, with no interference from other countries." Within this definition, there are four sub-categories: (1) no internal conflict; (2) internal minor armed conflict: at least 25 battle-related deaths per year and fewer than 1,000 battle-related deaths during the course of the conflict; (3) internal intermediate armed conflict: at least 25 battle-related deaths per year and an accumulated total of at least 1,000 deaths, but fewer than 1,000 per year; and (4) internal war: at least 1,000 battle-related deaths per year. The choice of time period, 1973 to 1995, is guided by data availability for some of the explanatory variables as well as by virtual nonoccurrence of internal conflicts in most of the sample countries before 1973 (except for Colombia and Guatemala). Some authors have argued that sustenance of civil war can also be attributed to the emergence of a large international arms market in the 1980s, and so our choice of time period addresses this issue as well.[12] Finally, our focus is on any internal conflict, not on civil war *per se*.

We use various measures of trade openness and trade variables as covariates or explanatory variables in our analysis. They include: (i) trade openness: the ratio of exports and imports as a percentage of gross domestic product (GDP); (ii) the proportion of agricultural exports in total exports; (iii) food, beverage, and tobacco exports as a percentage of trade; (iv) basic metal exports as a percentage of trade; (v) food and beverage imports as a percentage of trade; and (vi) fuel imports as a percentage of total trade. Data for all of these variables were collected from various issues of the Statistical Abstracts of Latin America.

As control variables, we use the countries' arable land area as a proportion of total land area (taken from World Development Indicators) and "landlock," the percent of land area beyond hundred kilometer of ice-free coast (taken from the web site of the Center for International Development at Harvard University). After controlling for various region-specific factors, the econometric part of our work employs three modeling techniques (ordinal regression, Markov switching, and proportional hazard models) to explain conflict onset/intensity and duration based on the trade and openness variables only. We check the robustness of our results by using additional explanatory and control variables, besides the trade and openness variables.[13]

Findings

Our overall results show, first, that increased trade openness reduces the chance of domestic conflict *onset* and that variation in trade openness therefore does affect the likelihood of commencement of domestic conflict and, second, that over-reliance on agricultural exports (a consequence of increased trade openness) plays the main role in conflict *sustenance*, highlighting that, once initiated, variations in openness affect the duration of conflict. Both findings remain robust in the presence of various sociopolitical, institutional, and economic controls. More specifically, we find:

- Over-reliance on agricultural exports as a proportion of total export generates a moderate to high conflict *onset* probability as well as a high conflict *sustenance* probability.
- Taking all the export variables together, and after controlling for region-specific factors, agricultural exports and basic metals exports as a proportion of total exports help to *sustain* domestic conflict. The use of arable land area, as a proportion of total land area, and the landlocked region as control variables, provides good intuition in explaining these results on domestic conflict. Latin

America is characterized by a high level of land and asset inequality. Keeping the high level of land inequality constant, possession and return from arable land becomes the point of contention and leads to conflict. This tallies with Garfinkel, *et al*.'s conjecture. With the domestic market opening up for trade, Latin American countries have a comparative advantage in the export of agricultural goods[14] and basic metals. As prices of these tradable goods increase, returns from resources used to produce these goods also go up. Consequently, appropriating these resources becomes beneficial for the parties engaged in production of those tradable goods. This process can initiate conflict or can elevate an existing conflict from a low-intensity to a high-intensity one.

- Our results support another of Garfinkel, *et al*.'s conjectures: if the international price of the contested resource is sufficiently higher than the no-trade, autarkic price, then more gains from trade will outweigh the costs of arming. The empirical results from food, beverage, and tobacco exports as a percentage of total exports show minimal conflict *onset* probabilities and low conflict *sustenance* probabilities over the years.
- We also find that in the presence of increased openness, high intensity domestic conflicts reduce to low intensity conflicts. This result is clearly important and remains robust when we control for underlying economic, sociopolitical, and institutional factors. The inter-temporal effects of openness on domestic conflict seem to be weak: we do not find any significant effect of openness toward conflict sustenance overtime.

All of our results provide suggestive evidence that trade openness and its associated measures do have a role to play in explaining variations in domestic conflict in the Latin American region between 1973 and 1995. A favorable policy mechanism for complete conflict mitigation should probably take our findings into account.

Concluding remarks

To explain domestic conflict in Latin America between 1973 and 1995, we rely on a plausible theory concerning the evolution of prices of trade variables. While the existing literature on domestic and international conflict pays much attention either to all of the world's countries, or only to the African region, we follow the suggestion of Sambanis for additional region-specific work.

Opening their domestic markets to participate more in world trade as from the mid-1980s, the data show that there was a significant drop in domestic conflict in the Latin American region. Therefore, it appears that trade can be beneficial in mitigating conflict. However, over-reliance on primary commodity exports may actually enhance domestic conflicts, as happened in African countries after they started interacting with world markets. Naturally, careful attention is needed to track down the reasons that may initiate, enhance, and prolong domestic conflict even after increased participation in the world market.

In our empirical analysis we use an indirect approach, taking the level of tradable goods' output and relate that with the prices or returns to the resources needed to produce those goods. The idea is that as a country opens up to world trade, the prices of exportables and importables change, depending on whether that country has a comparative advantage in some of the exportables being produced or comparative disadvantages from some of the importables being shipped into that country. There is strong evidence that Latin American countries have comparative advantage in agricultural goods exports. For some of the countries in the region, opening up to trade reduces the relative price of agricultural goods below that of no-trade price levels; this helps to mitigate conflict. Conversely, some of the countries in the sample show that agricultural goods prices go up beyond the international level, leading to an increase in conflict. After controlling for various sociopolitical and economic factors the literature already identified as explaining domestic conflict, we find that agricultural exports as a percentage of total exports play an important role for conflict occurrence in this region. Our results also suggest that overall trade openness reduces Latin American domestic conflict.

In our study, we go beyond Garfinkel, *et al*.'s static framework and also explore how trade and openness variables play a role in sustaining conflict overtime in the Latin American region within the selected time frame. Our analysis shows that only over-reliance on agricultural exports, and not trade openness *per se*, explains domestic conflict over time in the Latin American countries. Therefore we argue that even if overall trade openness is beneficial for abetting conflict, its role in conflict mitigation over an extended time period may be small. Instead, more focus needs to be put on the optimal, rather than maximal, reliance on agricultural exports for conflict mitigation.

Notes

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1. Sambanis (2004) has a comprehensive discussion regarding case study-based conflict and civil war analysis across the world.

2. See, e.g., Hegre (2002).

3. E.g., Collier and Hoeffler (2004).

4. See, e.g., Ross (2004).

5. See, among others, Collier and Hoeffler (1998); Sambanis (2004).

6. See, *inter alia*, Hegre (2002); Fearon and Laitin (2003); Collier and Hoeffler (2004).

7. On this point, see Garfinkel, Skaperdas, and Syropoulos (2005).

8. An exact definition of domestic conflict and the relevant data are provided in Gleditsch, Wallensteen, Eriksson, Sollenberg, and Strand (2002). Sample countries are Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela.

9. Garfinkel, Skaperdas, and Syropoulos (2005).

10. See Lipton, Eastwood and Kirsten (2002) who note that the land Gini coefficient in Latin American countries is 0.86 – the highest in the world.

11. Gleditsch, Wallensteen, Eriksson, Sollenberg, and Strand (2002).

12. See Collier, Hoeffler, and Soderbom (2004).

13. Additional controls are (i) land area, million square kilometers (source: Center for International Development, Harvard University); (ii) elevation, measured as mean elevation in hundreds of meters above sea level (same source); (iii) land inequality (Lipton, Eastwood, and Kirsten, 2002); and (iv) ethno-linguistic fractionalization (La Porta, *et al*., 1998). Additional explanatory variables apart from trade and trade openness variables include GDP growth per capita, rural population as a percentage of total population, rural population annual growth rate, infant mortality rate, and a sociopolitical index with weights on cabinet and constitutional changes, assassinations, guerrilla activities, revolutions, strikes, government crises, coups, party fractionalization, purges, and riots. After incorporating these additional controls, the overall findings remain essentially the same as those reported in the main text. Details are available from the corresponding author or at http://www.deakin.edu.au/buslaw/aef/publications/workingpapers/2006-02eco.pdf.

14. See Ocampo (2004) for an important discussion articulating this point and the related consequences. Also see Fraga (2004) for an informative perspective on Latin America.

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Trade and conflict: the dyad of Greece and Turkey

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This article discusses the relation between conflict and international trade. In particular it applies basic theoretical arguments and extensions of the so-called "liberal" approach to conflict and trade to the relation between Greece and Turkey. The purpose is to inform the policy debates that have dominated the public sphere in both countries in recent years regarding Greco-Turkish relations and Turkey's accession to the European Union.

"If our trade volume with Greece reaches US$5 billion, then our bilateral political problems with vanish." – K. Touzmen, Turkish Minister of State, 21 May 2006.

In 1980, Solomon Polachek – representing the so-called "liberal" school of thought regarding the conflict-trade relation – built a formal model to explain how trade may cause cooperation, reduce conflict, and advance peace.[1] In his model a state's overall consumption and "hostility" positively affect its utility, that is, nations are thought to have a "taste" for hostility.[2] A nation's terms of trade are expected to be negatively affected by hostility: export prices fall and import prices rise. Optimal hostility levels toward a trading partner are found as a nation (actor) maximizes its utility function for a given level of trade (i.e., trade affects conflict). The model's implications are relatively straightforward: the development of trade relations between two countries creates a form of mutual dependence which increases the cost of potential conflict (in the form of foregone benefits), thereby raising the incentive for choosing lower levels of hostility, or more cooperation and peaceful coexistence. Hence the model predicts that nations will be less prone to engage in conflict with trade partners. In contrast, "realists" – mainly political scientists rather than economists – argue that international trade causes conflict, or at best has mixed effects on it.[3] Trade is viewed as a zero-sum game, leading countries to compete over the securing of scarce resources; even if trade is a positive-sum game, conflict may result as trading partners fight over maximizing relative trade gains.[4]

Numerous empirical studies provide partial support for either of the conflicting hypotheses.[5] More research is needed to shed light on the conflict-trade relation, and the literature has identified a number of additional issues that need to be studied. These include the direction of causality in the presence of simultaneity bias (trade affects conflict but conflict affects trade); the appropriateness of the units (actors) of observation to account for differences in behavior and goals; the need to use disaggregated data to account for differences across different trading goods with varying strategic importance and elasticities; taking account of peculiarities in dyadic differences rather than assuming a common, universal relationship; and introducing dynamic elements.

A recent theoretical study offers a possible explanation for why increases in trade may nonetheless *not* necessarily lead to a reduction in conflict.[6] The explanation revolves around asymmetries in the increasing costs between the trading partners. Specifically, country A's probability of settling a trade dispute with B increases as its costs relative to B rise. But the asymmetric change (reduction) in the relative cost causes country B's probability of settling to diminish. Since the probability of a conflict is the product of the two countries' probability of not settling, it is quite possible for the overall probability of conflict settlement to fall even when joint costs (i.e., foregone trade benefits) rise.[7] Thus, higher conflict costs may not necessarily lead to less conflict. By providing a more general theory of the relation between conflict and trade, this model might reconcile the "liberal" and "realist" schools of thought: while conflict and trade are generally thought to be negatively related, a region might exist where rising costs with greater trade gains may raise conflict and reduce cooperation.

Conflict and trade: seven propositions

Polachek and other contributors to the "liberal" paradigm literature have derived a number of propositions regarding the conflict-trade relation.[8] This section reviews and explains them; the next applies them to Greece and Turkey.

The *first proposition* states that "the greater is an actor country's level of trade with a target, the smaller the amount of conflict that the actor will have with the target country."[9] If trade raises cooperation and lowers conflict then a basic policy implication would be to take the required steps and establish mutual trade dependencies aimed at the diminution of hostility. This basic conflict-trade paradigm has been extended to include third party effects, tariffs, foreign aid, contiguity, and country size.[10] Additional extensions look at the effect of a country's democratization, type of trade, and foreign direct investment (FDI).[11] By way of summary, the liberal paradigm finds that (i) democracies are less likely to fight and more likely to cooperate, (ii) trade in agriculture, fisheries, and energy is more cooperation-inducing than trade in minerals and manufactured goods, i.e, the type of trade matters, (iii) higher FDI raises cooperation and reduces conflict, (iv) larger countries have smaller incentives to trade and cooperate, (v) trade with a friend-of-a-friend or with an enemy-of-an-enemy decreases conflict, while trade with a friend-of-an-enemy or with an enemy-of-a-friend increases conflict, (vi) lower tariffs and higher foreign aid reduce conflict by raising trade gains, and (vii) trade among neighbors mitigates the natural proneness of neighbors to have disputes.

As regards *democratization*, the evidence is that democracies cooperate more than

autocracies do. The democratization effect is probably a proxy for trade (democracies tend to trade more than autocracies and hence engage in less conflict as they try to protect their trade gains), but whether a "democratic" conflict-deterrent effect is direct or indirect (through trade), democracies seldom seem to fight each other.[12] As to *type of trade*, the strategic nature of the traded product is expected to affect the conflict-trade relation: the more inelastic (price-insensitive) the import demand and the export supply functions for a given country, the larger are the corresponding expected trade losses, leading to a greater sensitivity of conflict to trade changes.[13] This is expressed in a *second proposition* of the conflict-trade paradigm: the more inelastic (elastic) an actor country's import and export demand and supply to a target country, the smaller (larger) will be the amount of conflict that the actor will have with the target country.[14] For example, import demand for energy and agricultural products is expected to be more inelastic than for consumer goods and manufactures, predicting a higher dampening effect of trade in such goods on conflict.[15]

With regard to *foreign direct investment*, the international movement of capital has acquired an increased importance in the past 10 to 15 years compared to the trade in goods and services. Multinational corporations have been playing an increasingly bigger role in international affairs, and countries are more receptive to foreign capital inflows and compete in attracting foreign funds. Standard economic theory predicts that FDI generates benefits to the parties involved and higher amounts of FDI would raise conflict costs, increasing the incentives for cooperation.[16] Evidence of a dampening effect of FDI on conflict has been found.[17]

In terms of *country-size effects*, smaller countries have greater incentives to trade[18] and hence cooperate as improving terms of trade increase an actor's country welfare more when trading with a larger country than with a smaller country. In a recent study, a theory of optimal country size is derived that balances the trade-off between achieving economies of scale and controlling managerial costs; it also predicts that larger countries have a greater tendency for self-sufficiency and less trade.[19] The relationship then between country-size and conflict can be summarized by a *third proposition* – the cost of conflict for an actor with a larger target country is greater than the cost of conflict with a smaller country – and a corollary: increased trade gains result in a greater reduction in conflict for a small actor trading with a larger target than for a large actor trading with a small target.[20]

As to *third-party effects*, a country will in general have numerous trading partners and hence the conflict-trade paradigm is affected by third-party relations. The relation between alliance conflict and dyadic trade has been studied in a model in which third-party, external costs in the presence of allies and foes are introduced.[21] The formal incorporation of third-party effects in the basic conflict-trade model leads to a *fourth proposition*: an actor country with improved terms of trade with a target country will decrease conflict with a third party if both the third party and the target are friends, or "a friend of a friend is a friend."[22] Put differently, the expectation is that more trade with a friend of a friend leads to more cooperation. Similarly, it can be shown that "a friend of a rival is a rival," "a rival of a rival is a friend," and "a rival of a friend is a rival."

Regarding *tariffs*, the standard analysis in international trade predicts that in general tariffs (import taxes) raise gross prices in the country that imposes the tariff and reduces net prices in the other country,[23] thereby lowering trade gains and cooperation. This leads to a *fifth proposition*: an actor's conflict toward a target decreases when the target decreases its import tariff. As an extension, tariff reduction by several countries toward an actor will increase the actor's gains from trade more than a tariff reduction by a single country.[24]

The conflict-trade paradigm finds that (i) democracies are less likely to fight and more likely to cooperate; (ii) trade in agriculture, fisheries, and energy is more cooperation-inducing than trade in minerals and manufactured goods, i.e, the type of trade matters; (iii) higher FDI raises cooperation and reduces conflict; (iv) larger countries have smaller incentives to trade and cooperate; (v) trade with a friend-of-a-friend or with an enemy-of-an-enemy decreases conflict, while trade with a friend-of-an-enemy or with an enemy-of-a-friend increases conflict; (vi) lower tariffs and higher foreign aid reduce conflict by raising trade gains; and (vii) trade among neighbors mitigates the natural proneness of neighbors to have disputes.

With respect to *foreign aid*, studies have looked into the effect of foreign aid on bilateral relations.[25] Within the conflict-trade model, foreign aid would take form of transfer payments that enable the recipient to purchase the donor's products and hence are beneficial to raising trade volumes and therefore cooperation. Direct and indirect effects on conflict are expressed in a *sixth proposition* – the reduced import prices brought about by the target's aid to the actor reduce the actor's conflict toward the target – and its corollary: if country A provides foreign aid to an actor, the actor decreases the amount of conflict toward country B when countries A and B are friends.[26]

Finally, *contiguity*. In classic Disney comic strips, Donald Duck was in near continuous conflict with his neighbor Jones: friction creates tension. Thus, analyses predict a dampening effect of distance on conflict: the greater the distance the lower the amount of conflict.[27] Conversely, distance has a dampening effect on trade: the greater the distance the lower the amount of trade due to higher trading costs.[28] There is no contradiction between these findings. The conflict-trade model expresses this in a *seventh proposition*: while the direct effect of contiguity increases conflict, the indirect effect of reducing trade costs tends to increase trade benefits and hence to mitigate the direct effects; contiguous countries would fight even more in the absence of trade. The corollary is that an actor country exhibits less conflict toward friends of neighboring countries.[29]

Greece and Turkey

Since the late 1990s, Greco-Turkish relations have entered a period of *rapprochement*. Official Greek policy has slowly shifted from outright suspicion to supporting Turkey's accession to the EU so long as Turkey meets fully the accession criteria. Greece acceded to and became a full member of the European Economic Community – the forerunner of the EU – in 1981. Turkey applied for full membership in 1988 and was given a date to start accession negotiations in June 2006. Despite a recent setback and partial freeze of negotiations in December 2006[30] over a dispute regarding Turkey's refusal to open its sea and airports to Cypriot traffic, Turkey still remains on track, albeit not on a strict time line, to negotiate and fulfill all EU criteria toward full membership. Turkey already enjoys Customs Union status with the EU, upgraded from Associate Union status in 1995.

Trade data[31]

Greece has a 53 percent trade-to-GDP ratio (2003-2005); the comparable figure for Turkey is 61percent. Both countries joined the World Trade Organization in 1995. For Greece's merchandise trade, manufacturing products make up the bulk of its exports (56 percent), followed by agricultural (24) and fuels and mining products (18). Imports are dominated by manufacturing (66), followed by fuels and mining (21), and agriculture (13). For Turkey, exports are heavily dominated by manufacturing products (81), followed by agriculture (11) and fuels and mining (6). Manufactures make up 67 percent of its imports, followed by fuels and mining (24) and agriculture (6).

The European Union is the major trade partner for both countries. Greece sends 53 percent of its total exports to the EU, followed by Bulgaria (5.8) – an EU country as of 1 January 1 2007 – Turkey (5.4), and the United States (5.2). Greece's imports from the EU make up 56 percent of its total imports, followed by the Russia (7.7), Saudi Arabia (4.1), and China (3.9). As to Turkey, it exports to the EU 55 percent of its total exports, followed by the United States (7.7), Russia (2.9), and Iraq (2.9). Turkey's imports from the EU amount to 46.6 percent of its total imports, followed by Russia (9.3), the United States (4.9), and China (4.6).

By the late 1980s, merchandise trade between Greece and Turkey was very limited: the ratio of Greek exports to Turkey to total Greek exports stood at only 1 percent, while the ratio of Greek imports from Turkey to total Greek imports was a minuscule 0.3 percent. (The combined ratio of Greek trade with Turkey to the total value of Greek trade was 0.7 percent.) But since 1990, the total value of trade between Greece and Turkey has increased from $223 million to $2.2 billion in 2006,[32] and 4.31 percent of total Greek exports now go to Turkey, while Turkish imports into Greece represent 2.24 percent of total Greek imports. Table 1 lists bilateral Greek-Turkish merchandise trade data for the period of 1996-2005.[33]

Table 1: Bilateral Greek-Turkish merchandise trade data, 1996-2005

Year	*GX ($)*	*GM ($)*	*(GX - GM) ($)*	*(GX + GM) ($)*
1996	284,958,914	236,463,911	48,495,003	521,422,825
1997	430,780,094	298,236,607	132,543,487	729,016,701
1998	319,751,386	370,038,895	- 50,287,509	689,790,281
1999	287,555,576	406,794,147	-119,238,571	694,349,723
2000	430,812,980	437,725,190	6,912,210	868,538,170
2001	266,253,783	476,095,465	-209,841,682	742,349,248
2002	312,462,301	590,381,620	-277,919,319	902,843,921
2003	427,743,333	920,400,913	-492,657,580	1,348,144,246
2004	594,350,617	1,171,203,001	-576,852,384	1,765,553,618
2005	720,679,499	1,122,108,994	-401,429,495	1,842,788,493

GX: Greek exports to Turkey; GM: Greek imports from Turkey; (GX - GM): Greek trade balance with Turkey; (GX + GM): total trade volume between Greece and Turkey.

Tourist ties have been growing as well: Greece occupies the eighth spot on the list of foreign tourists visiting Turkey. In 2004 Turkey welcomed a total of 480,000 Greek tourists, an increase of 23.3 percent when compared only with 2003, and the numbers grow continuously. Fewer Turkish tourists visited Greece, a number close to 25,000.

In addition to trade in goods and services, financial capital has also started to flow between the two countries. In 2004, 76 Greek companies invested in Turkey, with total invested capital amounting to $65 million, covering a wide spectrum of goods and services but with a notable preference in the Turkish banking sector, especially in 2006 to early 2007. There is less investment in the other direction, with only six Turkish companies operating in 2004 in Greece.[34]

Bilateral policy: predictions and implications

If one follows the propositions of the basic conflict-trade model outlined earlier, the mutual dependence between Greece and Turkey would be expected to grow as Turkey becomes more integrated into the EU, with lower tariffs and eventual economic unification leading to higher trade levels. According to the model's *first proposition* such an economic integration will raise the degree of mutual dependence and thus the cost of conflict. As compared to the alternative state of economic isolation, this creates an environment where peaceful coexistence between Greece and Turkey will not be the result of a "balance of terror," but the natural outcome of economic

cooperation and internalization of the cost of conflict through the creation of an economic unit. Further policy implications and conclusions flow from the other six propositions. Specifically, as regards *democratization*, Turkey is neither a typical Western state nor a fundamentalist Islamic state; secular and Islamic elements vie for political domination. A recent example, in April 2007, was the fierce opposition of secular forces in Turkey – as represented by the Army and the Constitutional Court – to Mr. Abdullah Gul, a member of the governing moderate Islamic party, accessing to the presidency.[35] It is paradoxical that while the governing moderate Islamic party has been following a European orientation, the custodians of the secular state are more nationalistic.[36] Since democracies appear to cooperate more than autocracies, the EU should continue to pressure Turkey on full democratization of its institutions (e.g., role of the Army in political affairs, human rights, minority rights, urban terrorism), as a fully democratic Turkey would be a greater guarantee for peace.[37]

With regard to the *type of trade*, Tables 2 and 3 record bilateral merchandise trade data by category.[38] Energy and farm products made up approximately half of Greece's exports to Turkey in 2005, while Turkish exports to Greece are more evenly distributed, with the bulk made up of semi-processed and manufactured products. While the importance of energy and farm products in Turkish imports from Greece would contribute to Turkey lessening hostility directed toward Greece, more research is needed in calculating import demand and export supply elasticities of particular commodities.

Until a few years ago, *foreign direct investment* (FDI) flows between the two countries were minimal. But as already pointed out, recently bold moves toward more Greek FDI in Turkey have been made: these include Eurobank's purchase of the Turkish bank Tekfenbank and the much-discussed buying of Finansbank by the National Bank of Greece, the latter constituting an investment of €4.5 billion. At the same time, there are Greek-Turkish joint ventures to do business abroad – e.g., AKTOR and ENKA to build a city in Oman in the amount of €12 billion – and the €100 million Aegean Greco-Turkish Bank, capitalized by Greek and Turkish funds (35 percent each), with the remainder coming from the United States. Bilateral interdependence will be further enhanced by the construction of a natural gas pipeline system that is to pass through Turkey and Greece.[39] As FDI and joint ventures continue to increase and the two economies become more financially integrated, interdependence will be enhanced and parties on both sides with mutual interests will pressure their respective governments to increase cooperation and solve bilateral problems amicably.

Another proposition regarded *country-size effects*. In 2005, Greek GDP amounted to $261 billion as compared to Turkey's $612 billion (both in current purchasing-power parity dollars), with Turkey's population reaching 72 million and Greece's 11 million. Since the cost of conflict for Greece with a larger country like Turkey would be greater than the cost of conflict with a smaller country, and since increased trade gains result in a greater reduction in conflict cost for a small actor trading with a larger target than for a large actor trading with a small target, Greece would have a greater incentive than Turkey to trade and cooperate. The opposite would apply for Turkey. Hence, the relative imbalance in conflict costs could be mitigated by Greece's support of Turkey's accessing to the EU. From Turkey's point of view, the EU as a unit would constitute a large target, raising Turkey's cost of conflict by raising its total trade gains. Greece's relative bargaining position would be improved if Turkey faced the EU rather than facing only Greece.

As to *third-party effects*, any bilateral analysis would be incomplete if it were to

Table 2: Greek exports to Turkey (2005), most valuable categories

Item description	*Value ($)*	*% of total*
Mineral fuels and oils	179,219,347	25
Cotton	172,495,184	24
Plastics and articles thereof	126,589,537	17
Machinery	24,906,285	3.5
Iron and steel	22,638,402	3
Aluminum and articles thereof	19,803,223	3
Raw hides and skins	14,943,409	2
Paper and paperboard	14,874,211	2
Wood and articles of wood	12,917,916	2
Oil seeds, misc. grain, etc.	12,724,232	2
Total exports	720,679,499	100

Table 3: Greek imports from Turkey (2005), most valuable categories

Item description	*Value ($)*	*% of total*
Iron and steel	140,736,511	12.5
Machinery	79,798,972	7
Electrical machinery, equipment	79,773,141	7
Articles of iron or steel	74,220,601	6.5
Vehicles	69,645,773	6
Apparel articles, not knit	64,065,998	6
Apparel articles, knit	41,509,263	3.5
Furniture and lamps	40,302,277	3.5
Plastics and articles thereof	39,140,323	3.5
Edible fruits and nuts	33,709,356	3
Total imports	1,122,108,994	100

neglect the role of Greece's membership in the EU. A Turkey with improved terms of trade with the rest of the EU will decrease conflict with Greece, given that Greece and the rest of the EU are friends (recall the dictum that "a friend of a friend is a friend"). Hence, as Turkey becomes fully integrated with the EU, conflict with Greece is expected to decrease. This "friendship effect" adds to the "country-size" effect, making it even more important for Greece to support Turkey's accession to the EU.

Regarding *tariffs*, Turkish conflict toward Greece is expected to decrease when Greece decreases its import tariffs and, as an extension, tariff reductions by several EU countries toward Turkey are expected to increase Turkey's gains from trade more than a tariff reduction by Greece alone. As the EU is a customs union, Turkey's full accession to the EU and elimination of all trade barriers will induce it toward cooperation and reduced conflict. Once more it follows that Greece should support Turkey's accession to and integration in the EU as the effect on cooperation would be greater as when compared to mere bilateral trade liberalization.

The conflict-trade model also speaks to *foreign aid effects*, i.e., EU transfer payments. Reduced import prices brought about by EU transfer payments to Turkey are expected to reduce Turkish conflict toward the EU. As an extension, as the EU provides foreign aid in the form of transfer payments to Turkey, Turkey will be expected to decrease the amount of conflict toward Greece, since the EU and Greece have friendly relations. Full accession to the EU would entitle Turkey to receiving larger transfer payments, and hence the incentives for cooperation with Greece will also increase.

Finally, with respect to *contiguity*, we would expect from the conflict-trade model that as neighboring countries Greece and Turkey would tend to exhibit more conflict with each other than if they were distant from each other. But the beneficial secondary effect of reduced trade costs due to contiguity would tend to raise trade benefits and hence mitigate any negative direct effects. In the absence of trade, Greece and Turkey would tend to exhibit even more conflict than they do. As an extension, Greece or Turkey would tend to exhibit less conflict toward each other's friends. Taking contiguity between Greece and Turkey as a given, which gives rise to the aforementioned territorial disputes between Greece and Turkey, higher levels of trade will tend to mitigate the "natural" tendency toward conflict and increase the chances for a "natural" peace between the two neighbors.

Conclusion

A major issue in the current public policy debate in Greece concerns bilateral relations with Turkey and Greece's stance with regards to Turkey's accession to the EU. To derive policy rules for how Greece should approach its bilateral relations with Turkey, this article uses not only the basic theoretical conclusions of the liberal conflict-trade model but also other factors that affect the degree of trade gains. Given the qualifications set out beforehand, and without claiming that bilateral relations are not affected by other considerations as well, the liberal conflict-trade paradigm and its extensions predict that Greece will continue to pursue a policy of *rapprochement* with Turkey conducive to increasing their bilateral trade and investment levels.

At the same time, Greece will continue to support Turkey's prospective move toward full accession to the EU under full compliance by the Turkish side to EU expectations and conditions, alongside with pressing Turkey to fully democratize its institutions. The political crisis which erupted in Turkey in spring 2007 on the occasion of the presidential vote between the governing moderate Islamic party and the military and judicial establishments, which see themselves as custodians of the secular state and which represent a significant portion of Turkish society, will test the democratic foundations of its political system and will send a signal to Europe about Turkey's ability to resolve political impasses by democratic means.

Rather than isolating Turkey, such an integratory approach would tend to internalize conflict cost for both countries as they participate in an integrated Europe. The "European effect" for Greece is quite significant, as a Turkey trading with the European Union (large target) is expected to reduce conflict by more when compared to a Turkey trading only with Greece (small target). Similarly, widespread tariff reductions, European aid programs, and third-party effects enhance further the European influence on minimizing conflict.

Notes

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1. See Polachek (1980). The school's intellectual debts date back to Adam Smith, Immanuel Kant, J.M. Keynes, J. Schumpeter, and G. Blainey. The quote in the text box is taken from Tsiordas (2006).

2. Those unfamiliar with economic modeling may perhaps better appreciate the point by likening a "taste" for hostility to supporters of one football team having a "taste" for disliking another team.

3. See, e.g., Ashley (1980); Sayrs (1989).

4. Grieco (1988); Mastanduno (1991); Gowa (1994).

5. For example, Polachek (1980; 1992; 1997); Oneal and Russett (1997); Mansfield (1994); Gasiorowski (1986); Vries (1990); Barbieri (1996); Morrow, *et al*. (1998).

6. Pantsios and Polachek (2002).

7. For example, if state A's probability of conflict settlement is 0.5 and B's is 0.5 as well, then the joint probability is 0.5 x 0.5 = 0.25. But if the benefits of more trade changes A's probability of settlement to, say, 0.8, this may induce B to "hold out" and lower its probability to, say, 0.2. Now the joint probability of settlement is 0.8 x 0.2 = 0.16.

8. These are captured in a recent major review piece by Polachek and Seiglie (2006), a working paper that has since been published as Polachek and Seiglie (2007).

9. Polachek and Seiglie (2006, p. 13).

10. Polachek, Robst, and Chang (1999).

11. Democratization: Polachek (1997); type of trade: Polachek (1980); Polachek and McDonald (1992); Reuveny and Kang (1996; 1998); foreign direct investment: Polachek, Seiglie, and Xiang (2005).

12. Polachek (1997). While some studies have found no support for the "democratic" deterrent effect on conflict (Weede, 1984; Vincent, 1987; Domke, 1988), Chan (1984) offered a methodological explanation to reconcile the conflicting findings based on dyadic rather than monadic-based statistical tests. He finds support for the expected democratic dividend on cooperation.

13. Polachek (1980).

14. Polachek and Sieglie (2006, p. 13).

15. Reuveny and Kang (1996, 1998).

16. Thompson (2003).

17. Polachek, Seigle, and Xiang (2005). The FDI elasticity of conflict has been estimated as -0.31: a one-unit increase of FDI is associated with a 0.31 unit reduction in conflict.

18. Ethier and Ray (1979).

19. Alesina and Spolaore (2003).

20. Polachek, Robst, and Chang (1999, pp. 415-416).

21. Feng (1994).

22. Polachek, Robst, and Chang (1999, p. 411).

23. Vousden (1990).

24. Polachek, Robst, and Chang (1999, p. 412).

25. See, e.g., Orr (1989/1990); Cashel-Cordo and Craig (1997).

26. Polachek, Robst, and Chang (1999, p. 413).

27. Barbieri (1996), Diehl (1985).

28. Gowa (1994).

29. Polachek, Robst, and Chang (1999, p. 414).

30. The freeze involved eight out of a total of thirty-five negotiating chapters. On 23 March 2007, the EU approved the partial resumption of the accession negotiations.

31. Data in this section are taken from The World Trade Organization's web site. See http://www.stat.wto.org/CountryProfiles [September 2006].

32. Greek export volume to Turkey: $950 million; Greek import volume from Turkey: $1.2 billion.

33. Source: Balkan Regional Center for Trade Promotion: www.balkantrade.org.

34. The bilateral trade, financial, and commercial data were taken from KEEM (Panhellenic Exporters Association Research Center), ELKE (Hellenic Center for Investment), and the web site of the Hellenic Ministry of Foreign Affairs at www.mfa.gr.

35. As those lines are written, Turkey has entered a period of political instability. Following the controversial decision of Turkey's Constitutional Court to annul the first round of voting for President by Parliament on ground of a need for a two-thirds quorum, Turkish Prime-Minister Recep Tayyip Erdogan called this decision a "bullet in the heart of democracy," asked for early parliamentary elections in the summer 2007, and initiated the process for a Constitutional Amendment to elect the President through popular vote. This followed the withdrawal of Mr. Abdullah Gul's candidacy after a failed second round of Parliamentary voting.

36. It must be added that while Turkey shares many Western democratic characteristics, it has a history of an active involvement of the military in state affairs: since the 1960s, the Army has ousted a total of four elected governments from office and continues to play an important role in Turkey's political system.

37. It will be interesting to see how the recent election of Nicolas Sarkozy to the presidency of France, who as a candidate opposed Turkey's accession to the European Union, will shape official policy of the EU toward Turkey.

38. Source: Balkan Regional Center for Trade Promotion: www.balkantrade.org .

39. Tsiordas (2006).

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Maintaining peace across ethnic lines: new lessons from the past

Saumitra Jha

In the year 1026, Mahmud of Ghazni led his cavalry down from the mountains of Afghanistan into the plains of India. His objective was the wealthy Hindu temple city of Somnath on the coast of Gujarat. Mahmud destroyed the temple and sacked the city, killing an untold number of the city's inhabitants. Ever since, Mahmud's raid on Somnath has been considered a pivotal event that polarized the Hindus and Muslims of India against one another.[1]

Yet little more than two centuries after the raid, the authorities of the re-built Somnath temple gave permission for a Muslim trader, Nur-ud-din Firuz of Hormuz, to found a mosque on temple lands. Hindu temple authorities actively encouraged Muslims to settle and trade near the temple, benefitting from the commercial taxes that Middle Eastern trade would bring.[2] This mixed settlement of Hindus and Muslims still exists, although the Middle Eastern trade has long diminished and local merchants sell fish, not frankincense.

In fact, throughout India, towns that traded to the Middle East in medieval times continue to show evidence of increased tolerance between Hindus and Muslims.[3] Because Hindus and Muslims in medieval ports had much to gain from exchange with one another, over the course of a millennium they developed a set of norms and organizations, or "institutions" that fostered between-group exchange.[4] Many of these institutions continue to exist today, two centuries after the decline of Muslim-dominated Indian Ocean trade with the rise of European involvement.[5] Instead of being repositories of Hindu-Muslim hatred, Somnath and other medieval port towns provide a long history of inter-ethnic tolerance that yield important lessons on how such hatreds may be overcome.

This article draws upon two studies, one empirical, one theoretical, to explore the lessons that medieval Indian Ocean trade provide for supporting ethnic tolerance in contemporary settings.[6] It begins by sketching a theoretical framework to understand the incentives of agents to trade and engage in violence in ethnically-mixed regions. The article then shows how the theory fits the particular case of trade in the medieval Indian Ocean. Finally, the article draws lessons from the theory and India's institutional legacy to understand why ethnic tolerance fails and how tolerance may be fostered in contemporary settings.

The determinants of ethnic tolerance

At least as far back as Montesquieu in the 18th century, it has been argued that trade encourages "civility" between individuals, as loss of that trade renders conflict more costly.[7] Yet looking at the repeated tension and violence between local populations and commercially-oriented ethnic minorities both throughout history and in many different settings around the world suggests a very different story. From the Jews in medieval Western Europe to the Chinese in modern Indonesia and South Asians in modern East Africa, commercially-oriented ethnic minorities have often been targets of violence and expropriation.[8] Why then did Muslim traders in medieval Indian ports enjoy an enduring environment of tolerance while many other commercial minorities did not? A theoretical model can shed light on this question and uncover broader strategies for supporting ethnic tolerance.[9] The model focuses on towns with two types of ethnic groups, "local" and "non-local," where non-local ethnic groups differ from local groups by having (slightly) better outside options. In the case of Muslim traders in medieval India, the non-local group enjoyed social and cultural ties to Arabia and the Middle East not enjoyed by the local Hindu population. These made it easier for Muslim traders to leave and go elsewhere than for local Hindus, for whom investments, information, and social ties were also concentrated locally.

Instead of being repositories of Hindu-Muslim hatred, Somnath and other medieval port towns provide a long history of inter-ethnic tolerance that yield important lessons on how such hatreds may be overcome.

In the basic model, in each period individuals can choose to leave town, choose to trade a good that they produce, and choose targets for violence. Violence is destructive but can be used to seize a victim's property or to deter or punish particular actions. The capacity for violence is unevenly distributed, so that "strong individuals" (e.g., rulers or mob bosses) find violence cheaper and thus more profitable. The focus is on finding strategies that support "peaceful coexistence" over time: no one prefers to leave or to engage in violence with a member of a different ethnic group.

The model reveals that three conditions need to be satisfied to maintain peaceful coexistence over time. First, there needs to be "complementarity" between ethnic groups, i.e., there are gains from exchange between them. Second, there needs to a high cost for either group to steal or duplicate the source of the others' complementarity. Third, there needs to be an effective mechanism to redistribute the gains from trade between groups.[10] It is useful to intuitively explain why these conditions are important for supporting peaceful coexistence.

The first condition for supporting peaceful coexistence is that there be complementarities, rather than competition, between groups. Consider the alternative case: members of different ethnic groups provide substitute goods or services that compete with each other. Then, a "strong" local (for whom violence is cheap) will have an incentive to target non-locals with ethnic violence. Violence against non-locals not only allows a strong local to seize their property but also to drive

The greater the inter-group complementarity, the more valuable the presence of non-locals and the lower the incentives for ethnic violence – so long as the source of the complementarity cannot be copied or expropriated and the trade gains are shared.

non-locals out and reduce competition. Weak non-local competitors are more attractive targets of violence than weak local competitors, as locals are harder to drive out of town: they essentially have nowhere else to go.[11] Thus societies where local and non-local ethnic groups compete are likely to exhibit greater ethnic violence.

In contrast, when ethnic groups provide complementary goods or services to one another, the incentive to attack non-locals diminishes. If non-locals leave as a response to violence, locals will face reduced supply and higher prices for goods that only non-locals can provide. The greater the inter-group complementarity, the more valuable the presence of non-locals and the lower the incentives for ethnic violence.

Complementarities between ethnic groups that live in close geographical proximity are difficult to maintain over time, however. If non-locals provide valuable services to locals then, over long time horizons, members of the local group will have incentives to replicate their production processes, or simply to violently seize the means of producing that complementary good. Thus a second condition for supporting peaceful coexistence over time is that the sources of ethnic complementarity be costly to replicate or expropriate.

Yet even this robust inter-group complementarity will not be sufficient for ensuring peaceful coexistence. When non-locals constitute a minority and provide a complementary good or service, the restricted supply of that service lead non-locals to enjoy high relative prices, and potentially even monopoly power. The resulting wealth inequalities between locals and non-locals lead to incentives by strong locals to target non-locals with violence to seize wealth and property. Thus a third condition to support peaceful coexistence is the need for an effective mechanism to redistribute the gains from trade.

Although a mechanism to redistribute the gains from trade from members of a non-local ethnic group to the local population is desirable for peaceful coexistence, it may fail to occur for two reasons. First, there is a public goods problem: the benefit of reduced incentives for ethnic violence is shared by all, but each individual would prefer that others pay. Thus there is a temptation for each individual to take advantage of others' contributions while reducing the amount they themselves provide. Thus redistributive transfers will be under-supplied in general. Second, what transfers do occur will be from rich non-locals to a particular set of locals: the strong (often incumbent political elites), as these have the lowest costs of engaging in violence. In fact, these transfers of protection money to rulers by non-local ethnic groups, sometimes called "ethnic cronyism," may actually provide perverse incentives for rulers to intermittently allow ethnic violence by poorer locals in order to extract greater transfers from non-local minorities. These sub-optimal outcomes can be improved upon by the introduction of explicit mechanisms to share the gains from trade with the broader local population.

An example: religious tolerance in medieval India

Medieval Muslim traders in Indian ports were fortunate to benefit from a natural means to share the gains from trade that allowed them to satisfy all three conditions without requiring the creation of an explicit redistribution mechanism.[12] First, Muslim traders provided complements to Hindu producers and financiers: access to the trade networks and markets of the Middle East. Second, because Muslim trade networks were coordinated along pilgrimage routes that were specific to Islam – such as the Hajj – they were largely closed to Hindus and could not be stolen or replicated. Third, Muslim traders benefitted from an inherent redistribution mechanism: Middle Eastern trade was relatively easy for any Muslim to access. With pilgrimage routes coordinating where and when trade would occur, Muslims did not require personal ties or information to enter into trade.[13] This ease of entry for Muslims meant that competing groups of both immigrants and converts became traders whenever Indian prices were high. Such entry increased competition within the non-local minority and improved prices for locals. This natural mechanism of redistribution thus reduced incentives for locals to attack Muslims to seize wealth.

Over ten centuries of trade, Hindus and Muslims in overseas trading ports developed sets of norms and organizations that bolstered these incentives so that peaceful coexistence could be maintained even with adverse changes, such as times of famine or scarcity.[14] It is these institutions that persisted even after Muslims lost their advantages in trade following increased European involvement, and facilitated a continued legacy of religious tolerance.[15] Although the institutions themselves differed among medieval ports, the underlying economic logic was fairly consistent and provide useful lessons for current policy aimed at peaceful coexistence. One set of institutions bolstered complementarities and opportunities for exchange between groups, while the other provided supplemental mechanisms to make explicit transfers of the gains from trade from non-locals to locals.

Complementarities and opportunities for between-group exchange were raised through a variety of means. First, medieval ports developed institutions to encourage different ethnic groups to specialize and punish the replication of others' complementarity. One example was that of "Kaala-paani" (literally "black water") – a community norm that punished Hindus who traded across the ocean with loss of caste and ostracism. Second, Hindus and Muslims in some ports developed joint guild organizations that jointly fostered overseas commerce and future complementary endeavors. Third, Hindus and Muslims developed norms that fostered increased between-group interaction in social as well as economic spheres that raised the

opportunities for future interactions. These included a norm of joint celebrations of religious and other festivals. A second set of institutions supported the mechanism of redistributing the gains from trade, both by encouraging Muslim immigration and conversion, but also through explicit transfers. Hindus were relatively more tolerant of conversion to Islam and the establishment of mosques in medieval ports than other Hindu-ruled towns.[16] Muslims, for their part, contributed taxes on commerce to Hindu temples, and in some cases explicitly endowed Hindu temples themselves.[17]

Maintaining tolerance in other settings

The logic underlying peaceful coexistence between Hindus and Muslims in medieval ports and the supporting institutions that emerged can be readily applied to other historical and contemporary settings where non-local and local ethnic groups coexist, both to understand why ethnic tolerance failed and how tolerance may be fostered. The model suggests that ethnic violence is likely to occur when ethnic groups compete, when the source of inter-ethnic complementarity is easy for one group to expropriate or replicate, or when no mechanism exists to redistribute the gains from trade.

Being impossible to violently expropriate, specialized skills do provide a better basis for inter-ethnic complementarity and tolerance than "hard" assets such as land, machines, or other forms of physical capital.

Competition between locals and immigrant groups for jobs has often been cited as a reason for ethnic tension.[18] The theory suggests that these tensions are most likely to arise in jobs that are unspecialized and require either few or generally-available skills or inputs, since these are the least costly to enter. Yet even non-local minorities who do not compete, but enjoy complementarities that stem from tangible assets, such as land, machines, or other forms of physical capital, will face violence. These assets can be seized by strong locals, as white farmers in Zimbabwe discovered in the late 20th century.

Being impossible to violently expropriate, specialized skills do provide a better basis for inter-ethnic complementarity and tolerance, but even these can be replicated in the longer term. Minorities that have specialized skills can become increasingly attractive targets of violence if locals become able to duplicate those skills. The forced expulsion of Jews from Spain at the end of the 15th century was precipitated in part by prior conversions, both forced and voluntary, of Jews to Christianity. These "new" Christians provided the administrative skills to Spanish rulers for which they previously depended on the better-educated Jewish population.[19] It is possible that the expansion of public education in Western Europe and the United States may also have had the unfortunate side-effect of raising the likelihood of violence against educated minority incumbents in skilled jobs by rendering them more replaceable by locals.

In contrast to physical and human capital, most ethnic trading networks are both difficult to steal – being intangible – and extremely costly to replicate. Because there are network externalities – the value of a trading network increases with the size of its membership – there will be high costs for any local to invest in a set of personal exchange relationships that would attain the scale necessary to compete with an ethnic trading network. Thus non-locals can use the privileged access to goods and services from ethnic ties elsewhere to provide the basis for sustained complementarity in mixed communities.

Like Muslim traders in medieval Indian ports, Sephardic Jews benefitted from valuable trading networks in the 15th and 16th centuries that rendered them welcome arrivals in Ottoman ports in the Mediterranean. With links to Spain and the Atlantic economy, their immigration was actively encouraged by local Ottoman authorities, and the city of Salonica in particular attracted a large number of Jewish refugees. A combination of permissive immigration and religious specialization resulted in a long history of peaceful ethnic coexistence.[20] For the next four centuries, Ottoman Salonica, sometimes referred to as the "Mother of Israel," maintained a remarkable degree of ethnic tolerance, with Jews specialized in commerce.[21]

While the trading networks of the Chinese in modern Indonesia and South Asians in modern East Africa also made them valuable to the local population, these groups lacked a general mechanism of redistribution. Chinese and South Asian ethnic trading networks, based upon personal and community ties, were closed to competitors, and thus relatively small minority groups were able to capture much of the gains from trade. This rendered these minorities increasingly attractive targets for ethnic violence and susceptible to expropriation by strong locals.[22]

One ethnic trading network, however, is remarkable in its relative success at maintaining peaceful and profitable coexistence with local populations in East Africa and elsewhere. The Nizari Ismailis, followers of the Aga Khan, have developed systematic mechanisms of explicit philanthropy that benefit the local population, including the provision of public goods, such as hospitals and schools, as well as organizations that explicitly match Ismailis and locals in joint business ventures.[23] These mechanisms also often include commitments not to engage in corrupt practices that foster "ethnic cronyism." Although the Ismaili case is unusual in its level of organization, it suggests that minority communities, acting on their own initiative, may benefit from organizing explicit transfers and public goods provision.

Conclusions

In medieval Indian ports, Hindus and Muslims developed institutions that continue to support ethnic tolerance today. These institutions provide insights into how policymakers can encourage peaceful coexistence across ethnic lines. To encourage tolerance, methods that have been employed in medieval ports include the encouragement of specialization within groups, the fostering of opportunities for

repeated interaction in both economic and non-economic spheres, and the creation of institutionalized mechanisms to allow the sharing of the gains from trade.

All of these approaches may yield dividends for ethnic tolerance today. Educational systems that allow minority individuals the choice of leveraging the advantages of their group to engage in broader exchange, rather than promoting homogenization of a town's human capital, may result in less competition and greater inter-group complementarity. An explicit and well-publicized system of transfers established by members of a minority community to the local population, in the form of earmarked taxes or endowed public goods, may be effective in improving between-group relations. Another mechanism that has enjoyed success in aligning incentives is to provide equity shares in trading ventures to the local population.[24] Organizations that match members of different communities with complementary skills in the creation of such jointly-held business ventures may combine the benefits of complementarity with transfer provision. Trading networks may have afforded minority groups an important source of comparative advantage that rendered them valuable neighbors. Long after the decline of Indian Ocean trade, it may be that we can apply some of their institutional learning to the fostering of inter-ethnic peace today.

Note

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1. Alberuni (1030); Thapar (2004).

2. Thapar (2004).

3. Jha (2007c).

4. Greif (2005).

5. Jha (2007c).

6. Jha (2007b; 2007c).

7. Hirschman (1977).

8. Benbassa and Rodrigue (2000); Chua (2003).

9. Jha (2007b).

10. Jha (2007b; 2007c).

11. For a different explanation for why ethnic violence is more likely to happen than class violence, see Esteban and Ray (2007).

12. Jha (2007c).

13. di Verthema (1503); Lombard (2000).

14. See Greif and Laitin (2004) for a general theory of institutional persistence.

15. Jha (2007c).

16. al Malibari (1528).

17. Bayly (1989); Thapar (2004); Jha (2007c).

18. Olzak (1992).

19. Benbassa and Rodrigue (2000).

20. Benbassa and Rodrigue (2000). A less attractive aspect of ethnic specialization in the Ottoman empire was that it was strictly enforced by the state.

21. Mazower (2005).

22. Landa (1994); Chua (2003).

23. Penrad (2000).

24. Jha (2007a).

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Deconstructing reconstruction: the overlooked challenges of military occupation

Christopher Coyne

In the post-Cold War period, the main threat to Western nations will not come from a national superpower, but rather, from weak, failed and conflict-torn states and rogue groups within those states. As Robert Rotberg notes, "the rise and fall of nation-states is not new, but in a modern era when national states constitute the building blocks of world order, the violent disintegration and palpable weakness of selected African, Asian, Oceanic, and Latin American states threaten the very foundation of that system."[1] The threats posed by these states are potentially formidable and cannot be ignored. In order to deal with the problems caused by weak, failed, and conflict-torn states, the United States has employed a number of overlapping strategies. These strategies have typically included some mix of delivering monetary and humanitarian aid, delivering military aid to certain groups or individuals, economic sanctions, and military occupation and reconstruction. My focus here is on the last of these strategies – the use of military occupiers to carry out reconstruction. With the ongoing struggles in Afghanistan and Iraq, as well as the threats posed by Iran and North Korea, the viability of military occupation and reconstruction as a means of generating fundamental change in weak, failed, and conflict-torn states is a central issue.

Reconstruction entails the use of military occupiers to establish peace while rebuilding, and in some cases building from scratch, both formal and informal institutions.[2] More specifically, the reconstruction process involves the restoration of physical infrastructure and facilities, minimal social services, and structural reform in the political, economic, social, and security sectors. The end goal is the establishment of liberal democratic institutions, or at least the foundations of such institutions.[3] The terms "reconstruction," "state building," "nation building," and "peacekeeping" are often used interchangeably. For my purpose, however, these terms capture overlapping but essentially different activities. When I use the term "reconstruction," I am referring to the process in its entirety, from the initial occupation through the exit of occupying forces, as well as the wide array of activities that occupiers undertake in the political, economic, and social arenas.

As the historical record indicates, the United States has not been overly successful in establishing liberal democratic institutions via military occupation in the post-Cold War period.[4] Efforts in Somalia and Haiti failed to create sustainable change toward the desired end. While occupiers have established some semblance of peace in Bosnia and Kosovo, both remain heavily dependent on outside support in terms of governing personnel, security, and monetary aid. Moreover, the final political status of Kosovo has yet to be determined, which constrains any movement toward a self-sustaining liberal democratic entity. While the final outcomes of the efforts in Afghanistan and Iraq remain to be seen, the difficulties associated with these occupations are well documented.

The issues of military occupation and reconstruction are particularly messy and difficult. There are a large number of relevant and interacting variables that contain a large variety of historical experiences, cultures, and geo-political mechanisms. Moreover, every occasion is highly unique which makes generalizations that much more difficult.

Recognizing these limitations, my goal is to explore two central, but often overlooked, issues that every occupation and reconstruction must face. I first focus on the "knowledge problem," which refers to the fact that policymakers, occupiers, and social scientists lack an understanding of how to establish the foundations of liberal democratic institutions where they do not already exist. I then turn to the "public choice problem," which focuses on the decisionmaking process. The political decisionmaking process within the country carrying out the occupation influences and shapes the nature of policies implemented during reconstruction efforts. Oftentimes, the incentives created by political institutions generate policies that run counter to the end goals of the broader reconstruction effort.

The knowledge problem

Policymakers, occupiers, and social scientists suffer from a fundamental knowledge problem when it comes to establishing liberal democratic institutions abroad. Stated differently, while there exists a firm understanding of what a successful reconstruction seeks to accomplish, much less is known about the appropriate steps to achieve this outcome. Most would agree that liberal democratic institutions are characterized by some mix of the rule of law, protection of individual, civil, and property rights, free and open elections, and the smooth transfer of power between elected officials. Despite general consensus on the end-goal, policymakers and occupiers have struggled to achieve success.

To further understand this knowledge problem, consider the ongoing debate in the social sciences regarding the conditions that are conducive to a liberal democratic order. Social scientists typically identify several key factors including experience with democracy, civil society, a minimal level of economic development, and the resulting middle class, ethnic and religious homogeneity, and some form of national identity as preconditions for liberal democracy.[5] However, there is no consensus regarding the nature, magnitude, and mix of the factors necessary for sustainable liberal democracy.

Further, recent experience seems to call these standard assumptions into question. As Larry Diamond has recently indicated, scholars have spent decades attempting to understand the factors that contribute to stable democracies. However, Diamond notes that the wave of new democracies that arose between 1974–1994, a period wherein

democracy spread to countries that lacked these conditions, "raised the prospect that democracy could emerge where the social scientists would least expect it."[6] On the one hand, this fact can be viewed as a positive since it indicates that all countries have some democratic potential. On the other hand, this realization highlights the limited knowledge of scholars regarding the factors and causes of sustainable liberal democracy.

This fundamental knowledge problem has not stopped policymakers from using military occupation and reconstruction as a tool to attempt to bring about political, social, and economic change in weak, failed, and conflict-torn states. It has also led to an overemphasis on "controllable variables" such as troop levels, leadership strategy and planning, monetary and humanitarian aid, the timing of elections, and the exit of occupiers. This narrow focus can be seen in recent studies by the RAND Corporation that attempt to compare a number of controllable variables across reconstruction efforts in the hope of formulating "lessons learned."[7] To be clear, it is not that these factors are unimportant, but rather to emphasize that a successful reconstruction is not simply a matter of exerting more effort. Instead, both controllable *and* uncontrollable variables (e.g., culture, belief systems, organizational forms, historical experiences, and other complementary institutions) are of the utmost importance.

Social scientists have long realized the importance of complementary informal institutions for the sustainability and functioning of formal liberal democratic institutions. For instance, Alexis de Tocqueville documented the importance of values and what he called the "art of association" for the nature of political, social, and economic institutions that existed in the United States.[8] Tocqueville noted that this art of association, and the resulting social networks, are not the result of government design, but instead are the result of the ingenuity of self-reliant, entrepreneurial actors. Similarly, the economist F.A. Hayek noted the importance of informal beliefs and dispositions, "which in more fortunate countries have made constitutions work which did not explicitly state all that they presupposed, or which did not even exist in written form."[9]

The importance of belief systems and norms is also captured in the more recent economic literature that focuses on the idea of institutional "path dependence."[10] This concept emphasizes that the way in which belief systems, rules, norms, and organizational forms developed in the past will constrain the feasible set of current and future choices. While these complementary institutions can change over time, social scientists and policymakers have a poor understanding of mechanisms that are effective in bringing about the desired changes.

In the context of reconstruction, the realization that historical experiences constrain the feasibility set in the present and future indicates that many weak, failed, and conflict-torn states may lack the prerequisites necessary for sustainable formal institutions. Further, policymakers and academics lack an understanding of how to change existing belief systems so that they may serve as a foundation for formal liberal democratic institutions. Where these complementary institutions are lacking, formal institutions imposed by occupiers will either be dysfunctional or fail to operate at all.[11]

The realization of the knowledge problem shifts the emphasis of reconstruction efforts from the overall level of "effort," typically measured by the level of controllable variables, to the importance of uncontrollable variables which are beyond the reach of policy, at least in the short-run. Ultimately, the effectiveness of controllable variables will be constrained by the belief systems, norms, rules, and organizational forms that evolved well before the military occupation and reconstruction effort. In other words, it is epistemologically impossible for occupiers to impose a set a set of formal institutions outside the existing context that has evolved over time.[12]

At its most fundamental level, reconstruction efforts entail the creation of a new set of rules that facilitate political, economic, and social interactions. The point being emphasized here is that these new rules will be binding only if context and customary practice dictates. The essence of the knowledge problem facing policymakers, occupiers, and social scientists is captured well by Douglass North when he notes, "We still do not know how to create polities that will put in place economic rules with correct incentives. We still have a very incomplete understanding of the complex institutional and technologically interdependent structure of political economies which is necessary to improving their performance."[13]

It is critical for policymakers to recognize the contrast between the *know what* and the *know how*. While the end-goal of reconstruction efforts is clear, the means to achieve that goal are not. Increasing monetary and humanitarian aid, increasing troop strength and military funding, and holding elections will not, in themselves, lead to success in reconstructing weak, failed, and conflict-torn states. Indigenous informal institutions cannot simply be discarded and our knowledge and understanding of how to change the trajectory of existing belief structures, ideas, values, etc., is severely lacking. Recognizing the limits of our knowledge regarding the reconstruction of countries along liberal democratic lines should not be seen as a negative. Instead, recognizing the limits of our knowledge is necessary to framing a realistic policy agenda and avoiding the errors of constructivism.

The public choice problem

The knowledge problem focuses on the inability of policymakers and occupiers to possess the relevant understanding of *how* to construct liberal democratic institutions where they do not already exist. The actual implementation of policies is yet another challenge that is often overlooked when considering the viability of occupation and reconstruction efforts. Even if we assume that policymakers and occupiers possessed the relevant information to bring about the necessary institutional changes, would effective policies actually be implemented in practice? In order to answer this

question, we need to consider the political decisionmaking process and the incentives facing those involved in that process. Public choice theory provides a means of doing so.

Public choice economics developed in the 1950s and evolved from the traditional field of public finance, which focuses on the study of government taxation and expenditure.[14] The core principle of public choice theory is the symmetry of behavioral assumptions in the private and public spheres. Economists typically assume that private individuals act in a purposive manner, seeking to better their situation given their goals and constraints. Public choice theory extends this same assumption to actors in the public sector. In other words, it is assumed that those acting in the public sector, like private actors, pursue their goals to the best of their ability. Note that this does not mean that private and public actors are not "other-regarding," but rather it implies that both sets of actors tend to identify and pursue their own wants over those of others.

The symmetry of assumptions advanced by public choice theorists has major implications for the study of the public sector. No longer can it be assumed that those acting in the public sector are benevolently acting in the "public interest." Instead, while public actors may have some concern for others, their main motivation is the pursuit of their own well-being and the furthering of their own goals. Starting from the core assumption of behavioral symmetry, public choice theorists use the tools of economics to analyze the political decisionmaking process. Given that the public sector plays a major role in reconstruction efforts, public choice theory can offer insight into the overall process.

The public choice model

The model of politics and democracy developed by public choice theorists frames policies as the outcome of the interactions of four key groups – private voters, publicly elected officials, bureaucrats, and special interest groups. It is assumed that private voters and interest groups seek to maximize their utility and wealth, elected officials seek some mix of maximum votes, fame, power, and income, and bureaucrats seek to maximize their budget and job security.

Each group in the model seeks something possessed by one of the other groups. For example, voters and special interests want beneficial policies from elected officials who in turn want voter's support. Likewise, bureaucrats seek to increase their budget which is influenced by elected officials while elected officials seek goods and services from bureaucrats for their constituents. The interaction of these groups influences the nature of a wide array of policies including those associated with occupation and reconstruction.

For instance, voters and interest groups will seek to influence the policies enacted by elected officials and will support reconstructions if they perceive those efforts as furthering their own goals. Likewise, bureaucrats will seek to influence reconstruction efforts to pursue their goals of budget maximization and job security. Due to the incentives created by political institutions, the political decisionmaking process will often produce policies which fail to align with the broader aims of reconstruction efforts. Briefly considering each of the four groups will further illustrate this point.

Elected officials

A central insight from public choice theory is that the decisions of elected politicians are often shortsighted in nature.[15] For those elected officials that are constrained by a term limit, the main focus is on obtaining the benefits during their time in office, even if these shorter-term benefits entail great costs that will be incurred in future periods. This is due to the fact that elected officials do not have to incur these costs if they occur after they have left office. In the context of reconstruction, elected officials will often consider the benefits and costs that accrue to them during their tenure, while neglecting those that occur after their tenure has ended. This can potentially produce ineffective policies that have long-lasting costs.

Elected officials face other perverse incentives as well. For instance, elected officials typically allocate resources to programs and activities that are readily observable to the average voter. This is precisely what one observes with attention being paid to the controllable variables in reconstruction – how much money and aid is delivered, how many building are constructed, the holding of elections, and an exit strategy. As discussed above, the effectiveness of these variables is directly constrained by complementary institutions which are beyond the control of elected officials. Nonetheless, these are easily measurable variables to signal "progress" to voters at home. The result is policies that have the potential to achieve visible and measurable outcomes instead of generating sustainable success.

Voters

In order to explain public opinion toward foreign interventions, social scientists have developed the "casualty hypothesis." In its simplest form, the casualty hypothesis indicates that there is an inverse relationship between the number of casualties and public support for the intervention.[16] Stated differently, this theory indicates that as the number of American deaths increases, support for the intervention decreases.[17] The political scientist John Mueller has applied the casualty hypothesis to a number of U.S. interventions, including the Korean and Vietnam wars, the intervention in Somalia, and the current intervention in Iraq, and it is his contention that the casualty hypothesis does in fact hold.[18]

The casualty hypothesis offers insight into what Niall Ferguson has called America's "attention deficit" toward foreign interventions.[19] It is Ferguson's contention that a main reason that past U.S. efforts at reconstruction have met with failure is that the United States has refused to occupy countries for a sufficient period

of time. The casualty hypothesis provides insight into why this is the case. When voters become dissatisfied with loss of U.S. troops, their support for the intervention shifts and elected officials feel pressure to respond accordingly.

Another important insight from public choice theory is that individual voters face an incentive to remain "rationally ignorant," meaning that they are largely uninformed of the specific choices and policies of political actors. The underlying logic is that each vote counts very little because it is unlikely that any one vote will influence the outcome of an election. Because there are positive costs associated with obtaining information regarding candidates and policies and the benefit of obtaining that information is small, given the lack of influence of a vote, voters typically remain uninformed of the particulars of policies. This logic explains why few voters know the specific details of candidates' voting records and the specifics of policies adopted. Instead, voters rely on general characteristics and outcomes – such as casualties as per the casualty hypothesis.

In the context of reconstruction, voters know in the broadest sense that a reconstruction effort is taking place but will fail to be informed regarding particulars of the effort – the allocation of resources, how long success may actually take, etc. Even if a longer term occupation may have significant benefits, individual voters will remain largely uninformed regarding the associated benefits and costs. As such, voters may demand policies from elected officials regarding reconstruction efforts that fail to align with the broader goals of reconstruction. In other words, there is no reason to believe that voters will demand the "best" policies given the goals of the reconstruction effort. This adds yet further insight into why we observe an American attention deficit disorder regarding occupations and why we should not expect the implementation of the best policies given the end goals.

Special interests

Whereas individual voters often lack the incentive to obtain detailed information, organized interests do have the incentive to obtain such information. Because of this, public choice theory emphasizes that special interest groups have major influence on the decisions of elected politicians and political outcomes in general. For example, the average U.S. voter is typically unaware of the amount and allocation of subsidies to the agriculture industry. However, those directly involved in the agriculture industry do have a direct interest in knowing the level of subsidies and how they are allocated. The reason this situation exists is that while the average voter garners little benefit from being informed regarding agricultural policy, the members of the agricultural industry receive significant benefits from such policies. As such, they have an incentive to be fully informed and to attempt to shape policy in their direction.

Due to the disconnect between uninformed voters and informed interest groups, the latter are able to influence political outcomes to concentrate the benefits of their lobbying expenses on the members of the group while dispersing the costs of the policies among uninformed voters.[20] In terms of the previous example, those in the agriculture industry stand to gain significant benefits from influencing political outcomes while dispersing the costs among the rest of the uninformed tax paying voters. The outcome is that one should not expect the political process to produce policies that benefit the "public interest." The logic of special interest group politics influences a wide array of political decisions including those related to reconstruction efforts.

The role of special interest groups is evident in the current reconstruction efforts in Afghanistan and Iraq, especially when one looks at the contractors that have received funds from the U.S. government. Much has been made about the political connections of Halliburton and its construction subsidiary, Kellog, Brown, and Root (KBR) which has received the largest total contract value to date in the Iraq reconstruction. These connections include both personal ties as well as significant monetary contributions that allowed Halliburton to influence the nature and magnitude of contracts in the post-war period.[21] The political connections held by the top contractors go beyond Halliburton. For instance, The Center for Public Integrity has analyzed the political ties of other top contractors including Parsons Corporation, Fluor Corporation, and The Bechtel Group, Inc.[22] The role that political connections and contributions play in securing reconstruction contracts is but one example of the role of interest groups in the broader reconstruction process. The important conclusion is that there is no reason to assume that the "best" provider of services will be chosen. Instead, many decisions associated with occupation and reconstruction will be based on political connections and pressures that may very well generate perverse outcomes given the goal of establishing the foundations of liberal democracy.

Bureaucrats

Bureaucrats hold non-elected positions in government. A wide variety of government agencies play a critical role in the reconstruction process. For example, the Department of State, Department of Commerce, Department of Defense, Army Corps of Engineers, Central Command, U.S. Agency for International Development, and Federal Business Opportunities, among other U.S. government agencies, are involved in the current reconstruction efforts in Iraq and Afghanistan. Because bureaucrats play a significant role in reconstruction efforts, it is important to consider the incentives they face.

Private markets and political institutions provide very different sets of incentives. Those acting in private markets are subject to market forces and act in an environment characterized by private property, prices, and profit and loss. Satisfying consumer wants generates a profit, while the failure to do so results in a loss. In contrast, public decisionmakers utilize the property of others (i.e., taxpayers), and are not subject to profit and loss like private businesses. Absent the profit motive, political criteria and pressures drive the allocation of resources in the public sector.

For instance, government agencies receive a budget from elected officials and attempt to influence legislators to increase their budget. As already discussed, legislators respond to the demands of voters and special interests, and the activities demanded by these groups are typically executed by government agencies and bureaus staffed and operated by bureaucrats. As such, the relationship between legislators and bureaucrats is central to political outcomes.

Within this context, bureaucrats from different agencies compete with one another to secure a part of the limited government budget available at any point in time. Resources are allocated based on relationships with legislators and the stated budgetary needs of the agency. The incentives faced by bureaucrats include signaling to legislators and voters that their services are needed in greater amounts than currently exist. Because of this, bureaucrats will not only exhaust their entire appropriated budget, but also continually seek increases in their budget in order to increase the size of their agency. In the absence of the profit and loss mechanism, agencies are not subject to fiscal discipline and have little incentive to save and be cost effective.[23]

In the context of reconstruction, one observes the incentives facing bureaucracies generating perverse outcomes. For instance, there is often conflict between the aims and goals of different agencies each seeking to maximize its power and budget. This occurs despite the fact that the agencies are supposed to be working toward a common goal in the broader reconstruction effort. For example, David Phillips notes that during prewar planning for Iraq, "relations between the Office of the Secretary of Defense (OSD) and the State Department became increasingly acrimonious. U.S officials vied for control over the Iraq policy."[24] Similarly, Larry Diamond, who participated in the early stages of the Iraqi reconstruction, indicates that, "A number of U.S. government agencies had a variety of visions of how political authority would be reestablished in Iraq ... In the bitter, relentless infighting among U.S. government agencies in advance of the war, none of these preferences clearly prevailed."[25]

Further, with little incentive to save and cut costs, one observes the misallocation and wasting of resources during reconstruction efforts. For example, one study of a $73 million program to construct Afghani schools and clinics found a lack of coordination, poor planning, and the inability of government agencies to even know the locations of certain projects.[26] Likewise, a recent audit of the reconstruction of Iraq showed millions of dollars of waste including $36.4 million of unaccounted funds and millions more spent on an Olympic-size swimming pool and unnecessary VIP trailers.[27] These are just a few examples of how the incentives facing bureaucrats will often generate perverse outcomes that run counter to the aims of reconstruction efforts.

Conclusion

I have considered two major challenges to any reconstruction effort. The first major challenge is the lack of knowledge of how to construct liberal democratic institutions where they do not already exist. The second major challenge is the political decisionmaking process and the fact that policymakers act within a set of institutions that tends to distort the policies driving the reconstruction process. Even if we assume that policymakers and occupiers possess the knowledge of how to construct liberal institutions, there is good reason to believe that the political process will distort the actual implementation of the policies and directives based on that knowledge. Previous analyses of occupation and reconstruction have typically overlooked these challenges. Both policymakers and social scientists must recognize these constraints since any successful reconstruction effort will require finding viable solutions.

Notes

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1. Rotberg (2004, p. 1).

2. Institutions can be understood as the formal and informal rules governing human behavior and their enforcement. This enforcement can occur through the internalization of certain norms of behavior, the social pressure exerted on the individual by the group, or the power of third party enforcers who can utilize force on violators of the rules. Institutions can be traditional values or codified laws. However, as binding constraints on human action, they govern human affairs for good or bad, and as they change, so will the course of political, economic, and social development.

3. For the important difference between democracy and liberal democracy, see Zakaria (2003).

4. See for instance Coyne (2007); Payne (2006).

5. See Diamond, Linz, and Lipset (1995).

6. Diamond (2005, pp. 19-20).

7. Dobbins, *et al*. (2003); Dobbins, *et al*. (2005).

8. Tocqueville (1835/1839).

9. Hayek (1979, pp. 107-108).

10. See North (1990, 2005).

11. Coyne (2005).

12. See Boettke (2001).

13. North (2005, p. 168).

14. For the classic text in public choice, see Buchanan and Tullock (1962). For more on the origins and development of public choice, see Buchanan (2003) and Tullock (1987).

15. Brennan and Buchanan (1985).

16. Luttwak (1994; 1995; 1996) has developed and offered a defense of the casualty hypothesis.

17. One could broaden the casualty hypothesis to include severe injuries as well.

18. Mueller (1973, p. 60; 1994, p. 77; 1996; 2005).

19. Ferguson (2004, pp. 293-295).

20. Olson (1982).

21. See Briody (2004).

22. See The Center for the Public Integrity, "Windfalls of War" project. Project web site: http://www.publicintegrity.org/wow/.

23. See Tullock (1965) for the classic economic analysis of bureaucracy.

24. Phillips (2005, p. 7).

25. Diamond (2005, pp. 28-29).

26. Stephens and Ottaway (2005).

27. SIGIR (2007).

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Some factors affecting independence movements: an overview

Rupayan Gupta

Conflict between occupiers and occupied has regularly occurred over the course of history when occupiers have infringed upon a community's rights to independence and self-determination. Historically, the list of independence movements in occupied or disputed territories is long. It includes the Indian Independence Movement, the Irish Nationalist Movement, the Israeli-Palestinian conflict, and the Kashmiri separatist conflict. One common factor seen on both sides of all such conflicts is the presence of leaders who act as primary motivators and decisionmakers. This article studies how differences in the nature and outcomes of conflict situations might be related to differences in the leadership element on both sides of a conflict. More specifically, this article discusses two questions. First, how is the nature of an independence movement affected by its leaders' opportunity costs and, second, how is the nature of an independence movement affected by the degree of aggressiveness shown by occupation leaders?

It will be seen that the opportunity cost of independence movement leaders and the aggressiveness of the occupiers affect the nature of a self-determination movement. Other factors are concurrently important as well. They include the characteristics of the population residing in the occupied region, the nature of punishment that is being meted out to protestors, and occupiers' costs of punishing protestors. In the following section, I describe the elements of an analytical model that may be used to understand how these factors affect an independence movement.

An economic view of independence movements

Decisionmaking processes of independence movement and occupation leaders can be captured in a two-stage game-theoretic model.[1] The game is played between two players, a leader of an independence movement and an occupier. Both attempt to maximize their payoffs (described later) by strategically choosing their actions. In the first stage of the game, the occupier chooses to deploy a certain level of armed force in the occupied region. In the second stage, after observing the level of this deployment of armed force, the independence movement leader chooses a certain level of insurgent activity (or insurgent effort).[2] The occupier deploys forces beforehand, of course expecting resistance and realizing that his forces need to be in place to deter and combat insurgents. The insurgents resist occupation, even after observing that an occupational force has been deployed to deter them.[3]

The players' actions affect their payoffs in various ways. First, their decisions determine the number of people in the occupied territory who participate in the independence movement. This is to be expected because people deciding to join an independence movement would take into account the level of deployment (and policing) by the occupier. It is assumed that a greater level of policing will discourage participation in the movement, other things remaining the same. The activity level of the movement leader affects the level of mass participation in the movement. More active leadership inspires more people to join, everything else remaining the same. How many people end up joining depends on the combined effect of the strategies of both the movement leader and the occupier.

Before proceeding, let me make an important observation whose implications will be fully apparent later on when the findings of the model are discussed. The strategies the occupier and movement leaders choose may be either *strategic complements* to or *strategic substitutes* for each other, and it will be seen later that whether they are complements or substitutes has important consequences. Game theorists denote players' strategies as complements if an enhanced level of action by one player brings about an enhanced level of action by the other. For strategic substitutability, an enhanced level of action by one player leads to a cutback in the action of the other.

Second, players' decisions lead to consequences for themselves. For example, a movement leader's insurgent activities would lead the occupier to punish her. The extent of the punishment depends not only on the level of insurgent activity chosen, but also on the level of deployment by the occupier. This is because normally a greater level of insurgency would carry a greater mandated punishment level, but the extent to which any punishment can be enforced depends on the level of force the occupier has at hand to enforce the punishment.

Third, punishing protestors is not costless for the occupier. The enforcement cost involved with punishing includes, but is not limited to, the cost of maintaining and provisioning an army. Additionally, significant costs of international sanctions and condemnation might accrue to the occupier. The role of such international pressure might significantly affect the actions of the occupier, as will be seen later. It is reasonable to assume that these costs would increase as the occupier inflicts increased punishment on protestors.

Finally, there is an opportunity cost (described below) for the movement leader. This opportunity cost increases as the leader becomes more active. Usually, economists use the concept of opportunity cost to measure the value of something that must be given up in order to get something else. In the present context, the term is used rather broadly. No doubt, a leader of an independence movement gives up many professional and financial opportunities which she could otherwise have received. The value of these foregone opportunities would

Result 1: If certain conditions are met then a movement leader with higher opportunity costs will be more active than one with lower opportunity costs. She will also be able to lead an independence movement with greater mass participation.

figure in her opportunity cost. However, in our particular context, I would like to extend the definition of opportunity cost to include other non-economic costs the leader might have, like psychological, moral, familial, and social costs. Given this broad definition of opportunity cost, it is not difficult to imagine that different leaders would have different opportunity costs. For example, in the case of the Indian independence struggle, the non-violent moral values of Gandhi and the social background of Nehru (hence their opportunity costs of leading the independence movement) were quite different from those of many other leaders of the Congress Party.[4]

This discussion suggests the following payoffs.

The movement leader's payoff

- is positively influenced by the number of people that participate in the independence movement;
- is negatively influenced by the opportunity cost she has to bear; and
- is negatively affected by the amount of punishment directly inflicted by the occupier.

The occupier's payoff

- is positively influenced by the number of people that he manages to discourage from participating in the independence movement; and
- is negatively influenced by the enforcement cost he has to bear in order to punish the protestors.

Through the strategic choice of their actions, players attempt to maximize their payoffs. While it is true that the framework discussed above does not capture the entire revolutionary process from beginning to end (culminating perhaps in the achievement of independence), it does capture a snapshot that is fairly descriptive of day-to-day decisionmaking processes of revolutionary leaders and occupiers. The following section discusses some results provided by the model.

How the movement leader's opportunity costs matter

The analytical framework described in the previous section provides interesting insights into how opportunity costs of a leader affect the nature of independence movements. In this section, I summarize two of these insights.

Result 1: If all five of the conditions enumerated below are met then a movement leader with higher opportunity costs will be more active than one with lower opportunity costs. She will also be able to lead an independence movement with greater mass participation by the citizens. The conditions are:[5]

- the enforcement costs of the occupier fall steeply if he cuts the punishment level of the protestors;
- a leader with higher opportunity cost is less willing to take advantage of any reductions that might be made in the size of the occupational force by the occupier, compared to a leader with lower opportunity costs;
- concessions by the occupier lead to greater activity by leaders, but the increase in activity is lower for leaders with high opportunity costs, compared to those with low ones;
- citizens begin joining the movement when the occupier reduces the level of his security forces and the leader becomes more active; and
- if the leader increases her activity in a climate where the occupier reduces his troops, the utility arising from the extra followers she wins to the movement outweighs the negative effect of the extra punishment she suffers by being more active.

This result carries interesting implications. It says that a leader like Gandhi, who has greater opportunity costs of leading the movement (perhaps due the moral framework under which he operates), will be able to lead a more successful movement than a leader with fewer such costs. However, for that to happen, the occupier's benefit of reducing his troop levels and allowing a leader like Gandhi greater freedom must also be very high (perhaps due to a lessening of pressure by the international community). Finally, if Gandhi decides to be more active, his utility from winning more converts to his cause must outweigh the increase in punishment he suffers as a result of this increase in his activity. Also note that in an environment where the occupier is reducing his enforcement level, it is easier for the movement leader to win converts to the cause of independence.

There are two main factors behind this result. First, the enforcement costs of the occupier decrease at a higher rate as compared to the rate at which converts are won to the cause of independence. That is, the occupier's benefit from his cost saving outweighs his loss due to the growth of the independence movement. Second, given the high opportunity costs of the leader, her behavior is also more moderate, compared to a leader with lower opportunity costs. Consideration of these factors makes it clear to the occupier that a troop reduction would save a lot on the enforcement cost front while the high opportunity-cost leader would not escalate the conflict too much. This leads to a reduction in the occupational force which the movement leader is able to take advantage of, increase her activities somewhat, and win converts to her cause.[6]

Result 2: If certain conditions are met then – as compared with a leader with lower opportunity costs – a movement leader with higher costs will only be able to lead an independence movement with reduced mass participation. But even to lead a comparatively small movement, the high cost leader will have to be more active than the low cost one.

This result suggests an important lesson for the international community that might have a role to play in the resolution of ongoing conflicts in occupied or disputed regions. The international community might want to make the costs of punishing moderate leaders (having high opportunity costs) very high for the occupying powers, perhaps through international sanctions. The role played by the enforcement costs of the occupier seems significant. But the moderate attitude of the movement leader is also important. Leaders of the Congress-led Indian independence movement, like Gandhi and Nehru, had great international stature, and the cost of punishing them harshly was very high for the British. Further, Gandhi had a moderate attitude, stemming from his moral values. He feared violence might result if the conflict got out of control. In fact, he cancelled the non-cooperation movement when it resulted in violence, even when it seemed to be succeeding against the British. The combination of the costs of the British in repressing Gandhi, along with Gandhi's moderate attitude, enabled him to lead a successful movement.[7] It must be stressed that both the enforcement cost factor and the moderation factor are important in reaching this particular outcome. As mentioned, the international community might have an important role to play in affecting the occupier's enforcement costs.

The second result portrays a very different situation, and it is interesting to note the factors that lead to these differences.

Result 2: If all four of the conditions listed below are met then – as compared with a leader with lower opportunity costs – a movement leader with higher costs will only be able to lead an independence movement with reduced mass participation. But even to lead a comparatively small movement, the high cost leader will have to be more active than the low cost one. The conditions are:

- a higher degree of enforcement by the occupier deters mass participation in the movement so much that the leader has to maintain a high level of activity in order to gain even a few followers;
- in a climate where the occupier is increasing the level of enforcement (troop levels), the only way for the leader to maintain the movement, even to some degree, is by being very active;
- the high opportunity cost movement leaders are themselves more reactive to increased force levels by the occupier, compared to low opportunity cost leaders; and
- ultimately, the occupier is able to discourage many people from joining the movement by increasing his forces. But some parts of the population remain susceptible to revolutionary propaganda even in face of this increase in force by the occupier (though the leader has to be very active to recruit them).

This movement is very different from the one described in Result 1. Here, the occupier realizes that converting the occupied territory into a garrison state will discourage many people from participating in the independence movement; he therefore adopts a stricter position. Under the circumstances, the movement leader has to raise her activity level a lot just to maintain the movement at a minimal level.

Why is there such a difference between the two results? Why does the occupier accommodate the high-cost leader in the first case, and not in the second? One difference might be the social background in which the independence movements operate, and the way in which citizens react to actions of occupiers and leaders. The model provides a significant clue in this regard. In the first case, it is seen that even when the occupier stands down his troops, the leader needs to increase her effort level in order to recruit more followers. But in the second case, if the occupier were to stand down (hypothetically), there would be an increase in the number of protestors, even if the movement leader were to cut back her effort level. The effort level of the leader and the troop cutback by the occupier are *strategic complements* in the first scenario. In they second scenario, they are *strategic substitutes*. This suggests a fundamental difference in the behavior of the citizens in the two cases. In the first, the citizens might be less prone to rebel against the occupier. In the second, they might be more prone to rebel, and would do so given the chance. Thus, the occupier has to guard against their rebellious nature by maintaining a large garrison. Only an increase in strictness would dissuade many people from joining the independence movement. One could hypothesize that the first scenario is likely to arise more in countries that have a long history of occupation, perhaps like the British colonies in the early twentieth century, where most citizens are used to the idea of being occupied. The general public in these nations would require a lot of exhortation by movement leaders to join nationalistic movements. In contrast, with newly occupied nations, where the sense of independence is still strong, rebellion might break out if there is not a high level of deterrence.

It is also interesting that in the second scenario, the occupier is even stricter when faced with a high opportunity cost leader than with a low opportunity cost leader. This is because the occupier realizes that in this case a high cost leader is quite reactive to increased strictness. In the real world, one might expect these

Result 3: If certain conditions are met then as compared with a pacifist occupier, an aggressive one will face an independence movement with greater activity by the leader, and with more mass support for her.

high opportunity cost leaders to be students and intellectuals (rather than career politicians), who under normal circumstances are not very prone to insurgent activities. One might expect this group to be driven by emotions to a great extent, and hence more reactive in the face of oppression (as opposed to career politicians). These leaders might lead low-key movements, using extreme measures to recruit support for their movement.[8, 9]

How the occupier's aggressiveness matters

In this section, I discuss how an occupier's relative aggressiveness or pacifism affects an independence movement. Historically, some leaders (or governments) in charge of occupying forces have displayed hawkish tendencies, while others have been dovish. For example, when compared to Labor governments, Likud governments in Israel usually adopt more hawkish postures in the Israel-Palestinian conflict. For the present purpose, one can think of a more aggressive occupier as one who, for the same amount of incendiary activity by protestors, inflicts a greater amount of punishment than a pacifist occupier.

Having a more aggressive occupier in control does not guarantee, *per se*, a low-key independence movement. In fact, under certain circumstances a more aggressive occupier faces a larger and more successful resistance than a pacifist occupier. Consider two additional results.

Result 3: If all four of the conditions listed below obtain then as compared with a pacifist occupier, an aggressive one will face an independence movement with greater activity by the leader, and with more mass support for her. The conditions are:

- the aggressive occupier saves substantially on enforcement costs by cutting back troop levels. In fact, given his proclivity for punishing more, these costs will be comparatively higher for a more aggressive occupier, other things remaining the same. So if cutbacks occur, his savings are substantial;
- when faced with a more aggressive occupier, the movement leader is more wary of increasing her activity level too much, other things being the same;
- concessions by an aggressive occupier lead to greater activity by the movement leader. But this increase in activity is lower than what the increase would be if the same concessions were made by a pacifist occupier; and
- if the movement leader increases her activity in a climate where the occupier reduces his troops, the utility arising from the extra followers she wins to the movement outweighs the negative effect of the extra punishment she suffers by being more active.

More aggressive occupiers, given their predisposition to be harsh, have higher enforcement costs. As mentioned, these costs may arise out of the high level of international pressure and sanctions that a hawkish occupier would face, e.g., due to his intolerance, as compared with a dovish occupier. This intolerance (and the high enforcement costs arising due to it) may make it impracticable for an aggressive occupier to maintain a garrison state. He needs to cut back forces to save on enforcement costs (this lends credibility that he will not be too harsh and wins him some respite from international sanctions, for example). The movement leader is able to use this cutback to raise the level of her activities and gather a mass following. But given the tough attitude of the occupier, the leader will not increase her activities beyond a certain point.

This result suggests that it might be possible for international sanctions to restrain a hawkish occupier. The international community can adopt a carrot and stick approach whereby too much aggressiveness by an occupier is punished and his concessions are rewarded. This will lead to concessions by the occupier. While these concessions will help the independence movement organize itself and be more active, the tough reputation of the occupier (and the fact that he actually does punish more than a pacifist) will prevent a huge revolutionary outburst.[10]

The next result presents a different outcome that might arise, under different circumstances, for an aggressive occupier being in control.

Result 4: If certain conditions are met then – as compared with a pacifist occupier – an aggressive one will face an independence movement with greater activity by the leader. However, in this case, there will be less mass support for the leader.

Result 4: If all four of the conditions listed below are met then – as compared with a pacifist occupier – an aggressive one will face an independence movement with greater activity by the leader. However, in this case, there will be less mass support for the leader. The conditions are:

- the enforcement costs should not be too high for the aggressive occupier. In this case, the aggressive occupier will raise his troop levels;
- when faced with a more aggressive occupier, the movement leader is more

reactive than she would be to a pacifist occupier, other things being the same;

- when the occupier increases troop levels, the only way for the movement leader to maintain the movement is by being very active; and
- ultimately, the occupier is able to discourage many people from joining the movement by increasing his forces. But some parts of the population remain susceptible to revolutionary propaganda even in face of this increase in force by the occupier (though the leader has to be very active to recruit them).

Here, it is not very costly for the occupier to increase the level of his troops, and he also realizes that converting the occupied territory into a garrison state will discourage many people from participating in the independence movement. Thus, he adopts a stricter policy, much more than a pacifist occupier would. This policy is completely in keeping with his natural aggressive nature. Under the circumstances, the movement leader has to raise her activity level a lot just to maintain the independence movement at a minimal level. In this case the leader also realizes that when facing a more aggressive foe, she must also be quick to respond to his aggressiveness in order to carry forward her movement.

For results 3 and 4, the effect of the occupier's aggressiveness has different outcomes for the independence movement. The main differences may stem from the way the public reacts to the players' strategies, the costs of enforcement for the occupier, and how reactive movement leaders are to an aggressive occupier versus a pacifist occupier. As far as the reactions of the citizens are concerned, in the first case (result 3) they might be less prone to rebel against the occupier. In the second case (result 4) they might be more likely to rebel. This conclusion is drawn because in the first case it is observed that the effort level of the leader and the troop cutback by the occupier are *strategic complements*, and in the second case they are *strategic substitutes*. In the second case, the occupier's strictness may be able to stop many people from joining the movement and his enforcement costs are also not too high. This may cause him to give full vent to his aggressiveness. The leader has to be very active to keep the movement alive.

Conclusion

This article is able to suggest some explanations as to why some independence movements are able to achieve mass participation by the citizenry while others are restricted to a much narrower support base. It also sheds light on how active leaders with different opportunity costs need to be to lead viable independence movements. The findings demonstrate that the outcomes are affected by the crucial interplay between personal characteristics of the leaders of the movement, the personal characteristics of the occupier, the proclivity of the citizens, and the cost structure of the players.

This article leaves at least two questions unanswered. First, it does not analyze which type of independence movement (among those characterized in the article) would be most successful in achieving the ultimate, long-run goal of independence. The game-theoretic model discussed here provides a short-term snapshot of an independence movement. More research is needed to establish whether the short-term recipe for success also leads to long-term success. Second, the model does not consider qualitative aspect of insurgent activity. One of the most important qualitative aspects of insurgent effort is whether it is violent or non-violent, and this element might greatly impact the nature of an independence movement. Further research might incorporate this qualitative aspect.

The results described here are theoretical in nature. Like other scholars, I have used game-theoretic models to seek answers to questions in the area of conflict. However, the ultimate reality check of these theoretical findings lies in their empirical validation. Future research should attempt to perform this validation.

Notes

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1. Game theory has been used by many researchers to study conflict situations. For examples, see Garfinkel and Skaperdas (1996); Grossman (1991); Hirshleifer (1989); Roemer (1985); and Skaperdas (1992).

2. Insurgent activity may include methods like propaganda, building of resistance networks, or even direct attacks on occupiers.

3. For a technical description and analysis of the model see Gupta (2006). Interested readers are welcome to contact me for a copy of this paper.

4. For instance, Gandhi called off the Non-Cooperation Movement (1920-22) when it got out of hand and led to violence. For him, the moral costs of bloodshed were too great. So he suspended the movement, even at the cost of the freedom struggle losing its momentum. In the case of Nehru, he belonged to the Anglicized upper classes. Schooled at Harrow, the famous British public school, and admitted to the Bar in London, he had strong social ties with the British elites. These ties were affected as

he became more involved in the freedom struggle.

5. These conditions do not depend on each other for their occurrence. This is also true of the conditions that will be stated for the other results that follow later in this article.

6. As low opportunity-cost movement leaders have a proclivity toward the escalation of their activities, the occupier would fear a natural escalation of the conflict while dealing with them. Thus, even with high enforcement costs, they might maintain a large occupational force rather than reducing troop levels and facing a huge escalation of conflict.

7. Scholars of Indian history might argue that the British were, in fact, quite severe with both Gandhi and Nehru, as evinced by the time they spent in jail. However, there seems to be a difference in the British treatment of leaders with lower stature. Leaders like Lokmanya Tilak, Lala Lajpat Rai, as well as leaders of the Bengal Revolutionary Movement (1907-1930) seem to have been much more harshly treated by the British. They were sentenced to longer prison terms in penal colonies (Tilak and some leaders of the Bengal Revolutionary Movement) or were subjected to stringent police action (Rai died from injuries sustained from police beatings). For accounts of the Indian independence movement see Harris (1991) and Sharma (2005).

8. Future research in this area might try to investigate the possibility of classifying real-world independence movements into the two categories outlined here.

9. There is a lingering question as to why large-scale successful movements led by leaders like Gandhi (who have high moral costs of protest) are less common historically than those led by more militant leaders. A recent paper by two behavioral economists suggests that when economic choices are strategic complements, a minority of "irrational" individuals may sway a majority of "rational" individuals and cause outcomes at odds with predictions of traditional models built on economists' rationality assumption (Camerer and Fehr, 2006). My (rational) model predicts that when occupier and movement leader follow complementary strategies, leaders like Gandhi would come forward to lead viable independence movements when faced by "rational" occupiers (who would be somewhat accommodating to such leaders, under certain circumstances). However, resorting to the logic of Camerer and Fehr, if high opportunity cost leaders like Gandhi were to face "irrational" rivals, who would be aggressive (and not accommodating, as predicted by the rational model), then they would be unable to lead viable movement, especially in the case of strategic complementarity. This line of thought might be worth exploring further and may enable us to ascribe a reason why independence movements along the lines of the Gandhian movement are historically rare.

10. Some similarity may be observed in this outcome and the unilateral withdrawal offer made in 2005 by the then Israeli prime minister Ariel Sharon, who was considered by many to be one of the toughest among all Israeli prime ministers.

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