

CHAPTER 5 CONCLUSION

In the policy literature and the popular press, the issues of water and conflict are being raised together with increasing frequency. Geographic, international relations, and environmental security theories speculate on the linkages between geographic features, natural resources, spatial relationships, and war or acute conflict. This literature often stresses various indicators for conflict, including aridity and rapid population growth. Little quantitative or global-scale research exists, however to test these theories regarding the relationship of water to international conflict. Moreover current literature often lacks consideration of water cooperation or spatial variability.

My dissertation research addressed a series of overarching gaps in research on freshwater resources and international conflict by providing a quantitative, global scale exploration of the relationship between freshwater resources and conflict. In essence, we asked whether the existing theories and claims regarding water's relationship to conflict held true. We also incorporated a spatial perspective and considered the full spectrum of interactions, using precise definitions of conflict and cooperation. The specific purpose of my dissertation research was threefold:

- To identify historical indicators of international freshwater conflict and cooperation;
- To use these indicators to create a framework to identify and evaluate international river basins at potential risk for future freshwater conflict;
- To enhance understanding of the driving forces that may cause water to become a focus of conflict or cooperation.

To accomplish these goals required three main elements: creation of an event database documenting historical water relations, including a methodology for identifying and classifying events by their intensity of cooperation and conflict; construction of a geographic information system (GIS) of countries and international basins, both current and historical; and the collection or creation of indicator variables (biophysical, socioeconomic, and geopolitical) for testing of hypotheses about factors associated with water conflict. Each of these elements is described in detail in the preceding chapters.

International relations over shared freshwater resources were overwhelmingly cooperative. Although conflicts over water occurred, violent conflict was rare and far outweighed by the number of international water agreements. International cooperation over water resources covered a wide range of concerns, including quantity, quality, hydropower, and infrastructure development. Conflict, especially acute conflict, centered on issues of quantity and infrastructure (e.g., dams, reservoirs).

Many of the factors traditionally considered to be relevant indicators of international conflict, and of water conflict in particular, showed no statistically significant association with international water conflict or cooperation. Neither spatial proximity, climate, basin water stress, government type, relative power, dams, nor dependence on freshwater resources for agriculture or energy showed a significant association with conflict over international freshwater resources. Geographic theories relating proximity to conflict were unsupported by empirical evidence; quite the contrary, when considering co-riparian countries with adjacent territories. What comes to light in exploring such theoretical claims is that the issue over which the international conflict occurs is a key consideration in identifying relevant indicators. Indicators of territorial disputes differ, for example, from disputes over freshwater resources, which in turn differ from other resource issues such as oil. An environmental determinist approach that emphasizes physical aspects, such as climate and water availability, proved unsupported by the data.

The factors that did show a slight association with conflict over freshwater resources included high population density, low per capita GDP, and overall unfriendly relations between countries. None of these indicators, however, explained more than a small percentage of the variability in the data. The relevant indicators appear to be rapid or extreme changes in physical or institutional settings within a basin (e.g., the building of large dams or the internationalization of a basin) and the presence of institutional mechanisms that mitigate uncertainty, international freshwater treaties in particular.

Broadly defined, institutions and institutional infrastructure matter, perhaps because institutions provide a mechanism for mitigating or managing the uncertainty that theorists associate with a propensity towards international conflict. It would be worth exploring freshwater treaties and other institutional mechanisms in more detail, especially

the nature of articles regarding water quantity, quality and management, the opportunities for flexibility in the face of changing physical circumstances, and the evolution of water treaties over time. Institutions are also important because they reflect the ability of a country to understand and cope with stresses upon water resource systems. From the results of our analyses, we identified three categories of basins at risk:

- basins negotiating current conflicts – well known “hot spots”, where the potential for continued dispute is therefore considered likely.
- basins in which factors point to the potential for future conflict and in which up-coming development projects or other stresses upon the water system have raised protests among the riparians.
- basins in which factors point to the potential for future conflict, however there is no evidence of existing tensions in public policy or media fora.

When viewing all the categories together, what stands out is that the majority of basins at risk fall in southern Asia and central and southern Africa.

We also presented a framework for further evaluation of the potential for international water conflict in these basins. Our indicators are derived from a broad and highly variable set of data, which concern basins that show a high degree of individuality. Categorizing a basin as “at risk” does not presume to identify basins in which acute conflict *will* occur, but to point to basins worth more detailed investigation. Assessing basins at risk is as much art as science and requires a mix of quantitative and qualitative research approaches, in which particular attention should be paid to:

- the existence, strength and provisions of existing international water treaties or other relevant, basin-level institutional mechanisms;
- overall relations among the riparian countries;
- the likelihood and potential impact of large-scale water infrastructure projects;
- uncertainties associated with the basin’s water regime (i.e., climatic variability and institutional adaptability to extreme fluctuations in water availability);
- the presence of minority groups that might contribute to further internationalization of a basin; and,

- the quality of governance within the basin and conditions such as high population density and low per capita GDP that may hamper a government's ability to cope with change.

In the future, there will be international conflicts over water and it may be that such conflicts will increase given increasing populations or other possible stresses upon the resource. The question is how and at what level of intensity such conflicts will be dealt with by the parties concerned.

What we set out to do in the Basins at Risk project was an extensive undertaking involving the creation of multiple, linked spatial and tabular databases encompassing an array of disciplines, and the development of new data variables and accompanying methodologies. It now comes as no surprise as to why quantitative, global-scale evidence to support or disprove claims associating water with violent conflict had not been gathered before. In addition to the difficulty of the task, the quality and coverage of many of the data variables left something to be desired.

As with any project involving socio-economic and other data at global scales, the analyses are as much an art as a science. We did not expect to produce exact numbers but to provide a picture of the world, certainly in more detail than has heretofore been available, and to allow for relative comparisons at various spatial and temporal scales. And in these aspects, we succeeded.

It is hoped that the results of this research will provide a framework for policy makers interested in conflict or cooperation over water and regional stability. Concern about the potential for violent conflict over transboundary freshwater resources has been prevalent in academic literature and the popular press. Conflict over water is also of concern to national policy-makers, from both a perspective of intra-state and inter-state instability and conflict. We provide a framework that policy-makers and others concerned with international water resources may use to identify and evaluate basins at potential risk for future conflicts over water. In addition, the research provides an empirically based understanding of the driving forces that may cause water to become a focus of conflict or cooperation. This knowledge can contribute to the development of international management approaches and programs based on region- or basin-specific information and designed to mitigate the potential for international water conflict. An

enhanced understanding of the driving forces behind international water resource conflicts also may facilitate policy-makers' ability to contribute to the peaceful resolution of existing water conflicts.