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Water resources, institutions, & intrastate conflict

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A B S T R A C T

Although linkages between water scarcity and conflict have received a great deal of attention, both in qualitative case studies as well as quantitative studies, the relationship remains unclear since the literature has generally not considered the effectiveness of governance. We distinguish between direct effects and indirect effects linking water resource scarcity and conflict by systematically examining how intervening factors, such as political institutions, might influence the impact of water scarcity on the probability of conflict. We find support for our hypotheses postulating both direct and indirect relationships between water scarcity, governance, and conflict.

Introduction

> Reg: All right, but apart from the sanitation, medicine, education, wine, public order, irrigation, roads, the freshwater system and public health, what have the Romans ever done for us?
> Attendee: Brought peace?
>
> (Monty Python's Life of Brian)

Existing literature on environmental scarcity and conflict has led to mixed conclusions about whether scarce water resources are likely to generate violent conflict (De Soysa, 2002; Furlong & Gleditsch, 2003; Gleditsch, Owen, Furlong, & Lacina, 2004; Gleick, 1993; Hauge & Ellingsen, 1998; Hensel, Mitchell, & Sowers II, 2004; Homer-Dixon 1991, 1994, 1999; Lowi, 1995; Toset, Gleditsch, & Hegre, 2000; Wolf, 1995). Most studies have focused on proving or disproving that a direct, deterministic relationship exists between scarcity and conflict. Likewise, non-conflict studies scholars studying these issues often do not recognize important patterns in conflict onset and do not differentiate between conflicts of interest that might arise in conditions of environmental scarcity and the actual environmentally-driven onset of a violent conflict. We argue that political institutions and democratic governance can mitigate disputes and alleviate grievances. Thus, our article focuses on how political and institutional responses can mediate between resource scarcity and the risk of intrastate conflict.

The ability of governments to manage environmental grievances, and specifically water scarcity, is an important determinant of whether violent intrastate conflict will arise. For this analysis, we focus on water resource scarcity, although there are important distinctions between types of scarcity, or as Gleditsch (1998), notes, between simple scarcity and degradation. Likewise, sub-national level variation in scarcity and degradation and the specific decision-making influences at those levels are important, but beyond the scope of this analysis.

Effective governance can address problems of water supply, for example by improving storage, preservation, and water quality. Governance can also help ensure a fair and equitable distribution of water resource, as well as limiting total demand through efforts to promote better conservation and more efficient use. These factors all suggest that governance can play a crucial role in whether water scarcity is likely to give rise to violent conflict. Responsive governments may be better able to deal with problems like water scarcity, and thus avert discontent and civil strife caused by environmental factors.

The next section discusses the link between water scarcity and the probability of intrastate conflict. We present our argument and contribution in section *The mediating role of conflict potential*. In section *A model of environmental scarcity, governance, and conflict* we discuss our methodology and data, and in section *Empirical analysis* we discuss our empirical findings from the pooled data analysis of 98 countries from 1980 to 2001. The final section concludes.

Water scarcity and conflict potential

In the late 1980s, neo-Malthusian scholars began exploring environmental scarcity and conflict relationships, most arguing that natural resource scarcities, together with social inequalities,

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independently and directly increase the probability of conflict. Although Homer-Dixon (1999) and others (Schwartz, Deligiannis, & Homer-Dixon, 2000) discuss social variables such as ingenuity and adaptability as possible conflict-mitigating factors, they also emphasize the physical limits of such social variables. That is, most neo-Malthusians scholars circle back to deterministic links between environmental scarcity and conflict.

Gleditsch (1998) and others make the case that neo-Malthusian studies are overly complex and deterministic and highlight the absence of important political and economic variables in these analyses. Neo-Malthusian theorists have responded to critiques of determinism and complexity by pointing out the exogenous factor of environmental scarcity and thus the "automatic" response of conflict to such scarcity. While the neo-Malthusians make an important point in highlighting the complexity of ecosystems and human interactions (Matthew, 2000), a common neo-Malthusian assumption that conflict arises automatically out of scarcity is problematic. This automatism argument is problematic because it assumes that institutions are either irrelevant or minimally important, that adaptation possibilities are limited and determined at base by environmental context, and that politics does not matter as much as other factors. Some of these deterministic and pessimistic neo-Malthusian claims are not supported by recent micro-level studies (Horowitz, 2009; Turner, 2004).

Resource optimists or cornucopianists—exemplified by Simon (1996) and Lomborg (2001a, 2001b)—claim that scarcity is not the condition that actually applies to most natural resources (Urdal, 2005). Humans automatically adapt to resource scarcities, either by using market mechanisms which respond to scarcities or through purposeful technological innovation which drives adequate responses (Boserup & Schultz, 1990, Urdal, 2005).

The argument that innovation drives environmental improvement is also important in the literature on environmental Kuznets curves. Scholars claim that environmental degradation will display an inverted u-shaped relationship with economic development. Although economic growth in very poor countries at the outset will lead to greater environmental problems, such as water pollution, higher economic development beyond some threshold will yield decreasing degradation either through industrial and technological shifts, increasing concerns over environmental degradation once core material needs are satisfied, or more income to expend on anti-pollution efforts (Grossman & Krueger, 1994; Shafik & Bandopadhyay, 1992). Work focusing on water resource availability and Kuznets curves has considered outcomes such as water consumption (Goklany, 2002; Rock, 1998), improved irrigation efficiency (Bhattarai, 2004), and water withdrawals and virtual water (Katz, 1998). However, contrary to the cornucopianist expectations, this line of research does not consistently find support for the hypothesized inverted u-shaped relationship between income and water resource outcomes. For example, while Katz (1998) finds that water withdrawals exhibit a Kuznets curve – decreasing with increasing income after some level – he also shows that total water use does not confirm this relationship. Katz demonstrates that water footprints, which incorporate virtual water through imported goods and therefore all water consumption, do not exhibit Kuznets curves. The fact that there is not a one to one relationship between income and effective governance may account for some of these findings.

In addition to cornucopianist arguments about income and resource scarcity and the tests of these hypotheses, the resource abundance hypothesis posits that a plethora rather than the scarcity of natural resources increases the risk of violent conflict, although the resource abundance literature does not address water resources (Collier, 2000; Collier & Hoeffler, 1998; De Soysa, 2002; Le Billon, 2001; Urdal, 2005).

Conflict studies scholars have moved to a more systematic examination of the competing arguments about the impact of decreasing water resource availability primarily on the probability of interstate conflict (Collier & Hoeffler, 1998; Gleditsch, 1998; Gleditsch & Urdal, 2002; Hensel et al., 2004; Tir & Diehl, 2001; Vasquez, 1993). These studies have sought to identify whether or not patterns of relationships between nations sharing water resources exhibit the hypothesized neo-Malthusian relationship between conflict and increasing scarcity (Ackerman & Tir, 2003, Furlong & Gleditsch, 2003, Gleditsch et al., 2004, Hensel et al., 2004).

Hauge and Ellingsen (2001) find a positive and significant impact of freshwater availability on both intra- and interstate conflict, with more significant impacts on intrastate conflicts. However, their findings have not yet been replicated. Toset et al. (2000) find that countries with shared rivers have a slightly higher frequency of armed conflicts than those that do not share river basins. Hensel et al. (2004) argue that regional conflict management institutions develop more often and are more effective in resource abundant regions. Basing their work on the hypotheses of the neo-Malthusian approach by Critchley and Terriff (1993) and "Lateral Pressure Theory" proposed by Choucri and North (1975), Hensel et al. (2004) offer a hypothesized "indirect" relationship between water scarcity and peace through regional institutions and democracy, rather than just the direct relationship postulated by most other studies. Their results indicate that international institutions dealing with water scarcity can account for variation in interstate conflict and can reduce the probability of such conflict.

The systematic studies of water resource conflict have been important for shedding light on the role of institutions at the international level. The wide consensus in the literature is that water scarcity does not induce violent international conflicts; however, the literature pays little attention to the impact of water scarcity on the most common type of violent conflict, namely intrastate wars. While much of the systematic literature in search of general patterns uses the Homer-Dixon group's work as a starting point for proving that this relationship is not automatic, to our knowledge no quantitative work approaches the level of complexity of most neo-Malthusian arguments and models. Thus, much of the quantitative literature does not adequately reflect the complex relationships identified by the case study literature. As most conflicts tend to be at the intrastate level, the analysis of water resource conflict potential should be at the sub-state level, where environmental factors interact with domestic institutional structures.

The mediating role of domestic institutions

In order to better understand when and how conflicts over water resources occur, we look at the institutional capacity of states to adapt to environmental constraints and public dissatisfaction with increasing environmental constraints. Our argument that intrastate water resource conflicts are institutionally driven is based on a set of assumptions: regime type influences conflict potential, resource distribution, and perception of resource availability; intrastate conflict has an impact on institutional effectiveness; international spillover effects are possible in regionally resource-dependent countries; and conflict, political institutions and natural resources interrelate both directly and indirectly in an endogenous system.

Structural scarcity – the unequal distribution of resources – matters for the emergence of environmental conflict, as neo-Malthusians suggest, because it puts pressure both on natural ecosystems and social structures (e.g. Burton, 1990a, 1990b; Galtung, 1996; Lederer & Galtung, 1980). Nevertheless, since we assume that