



The impact of uncertainties on cooperation over transboundary water: The case of Israeli–Palestinian negotiations



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ABSTRACT

The effect of uncertainty on cooperation between the partners sharing the natural resources remains unknown. Uncertainty may strengthen cooperation between partners, as it is necessary to implement cooperative mitigation policies, however, it may also serve as a cause of friction between parties, as it may aggravate existing trust issues or power asymmetries. Given the potential for such contrary outcomes, we provide criteria to examine empirically how uncertainties in a transboundary setting seem to promote or impede cooperation. Taking Israeli–Palestinian Annapolis round and post-Annapolis negotiations as a case study, this work identifies the effect of uncertainties related to water on negotiation positions. Social and political uncertainties, which tend to be more associated with uncertainty regarding interpretation rather than a lack of information, play a much stronger role in water negotiations than do technical or physical uncertainties that often dominate in other resource issues. Many of the criteria used to assess the effect of uncertainty indicate that partners attempted to address uncertainties in an ostensibly cooperative manner, accepting negotiation venues and rules. However, confronting uncertainty stemming from interpretation of information often around social issues tends to result in additional uncertainties associated with delaying negotiations, spillover effects and power implications, each with negative implications in terms of cooperation. As such, mechanisms proposed to address these uncertainties also tend to be more disputed. The only type of mechanisms that did not appear to aggravate the effects of these uncertainties and perhaps the only that would be indicative of some type of cooperation, even if low level, are those that deal data and information exchange and research.

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1. Introduction

Water management inherently entails addressing uncertainty, given the stochastic nature of both supply and demand. Uncertainties affect both physical dimensions of water supply, such as precipitation patterns, as well as social aspects, including investment and technological development. A host of uncertainties also affect water demand, including economic growth, changes in preferences, and cross-elasticities for other goods. Climate change adds uncertainties to water forecasting, affecting a wide range of both supply and demand side factors, as well as the provision of ecosystem services (Raadgever and Mostert, 2005; Miller, 2008; Cooley et al., 2009; Raihani and Aitken, 2011). Uncertainties regarding policy responses to climate change are greater still than the physical uncertainties (Raadgever and Mostert, 2005). Such uncertainties can be aggravated by interactive effects and feedback loops in both the physical processes and the institutional responses. Such physical and policy uncertainties have inspired a

long literature calling for innovative and adaptive approaches to water management (e.g., Gleick, 1989; Boland, 1998; Milly et al., 2008; UNECE, 2009).

The variety of uncertainties and the challenges these pose are compounded in transboundary settings. Policymakers in transboundary settings deal with uncertainty regarding the preferences and behavior of riparian states and negotiating partners. These are exacerbated under conditions of conflict and mistrust between parties (Raadgever and Mostert, 2005; Miller, 2008; UNECE, 2009). As in other cases of international governance, relative to national or sub-national level management, transboundary water management is characterized by a lack of centralized decision-making, an increase in the number of both stakeholders and negotiating partners, increased possibilities for issue spillover, and the possibility of gamesmanship among parties. In light of such uncertainties, many have called for increased international cooperation and reliance on transboundary water agreements (e.g., UNECE, 2009). Others have claimed that uncertainties, especially those due to climate change, may pose challenges to existing agreements and other international water law, and entail their amendment (e.g., Goldman, 1990; Dellapenna, 1999).

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Few studies have examined how different uncertainties and the mechanisms prescribed to address them affect the propensity for promoting conflict or cooperation among riparians. Furthermore, little literature has focused on how the interaction between uncertainties impacts countries' ability to develop and implement cooperative water governance. This study seeks to address these gaps in the empirical literature. Taking the Israeli–Palestinian water negotiations as a case study, this work investigates the effect of different types of uncertainties and mechanisms designed to address them on the likelihood of implementing cooperative or non-cooperative policies for shared water resources.

The study proceeds as follows: the following section provides a review of the literature on the types of uncertainty and their hypothesized effects on cooperation and conflict over environmental and resource management, and briefly outlines various mechanisms used to address such uncertainties. Section 3 presents a description of the methodology of the current study. Section 4 presents a brief overview of the water resources of the case study area and briefly addresses how uncertainties have been addressed there. Section 5 presents the results of an analysis of a set of water negotiation protocols. Section 6 provides a discussion of these results, and Section 7 offers conclusions and suggestions for further research.

2. Literature review

2.1. Types of uncertainties and natural resource management

There are numerous types of uncertainties affecting water resource management and several alternative ways to categorize them. [Iida \(1993\)](#), for instance, distinguished between inherent variability in a stochastic system (e.g., annual precipitation) and incomplete knowledge of the system (e.g., the environmental impacts of a certain water supply technology). Incorporating policy issues, [Brugnach et al. \(2008\)](#) added “ambiguity,” i.e., uncertainty resulting from the possibility of different interpretations of events, rules, agreements, risks, study results, etc.

In order to effectively identify appropriate areas for policy intervention and assess the appropriateness of policy recommendations, one must also be specific about what the object of uncertainty is and what type of knowledge is at stake. [Brugnach et al. \(2008\)](#) specify three objects of uncertainty: the physical system, social system, and technical system. The physical system comprises issues like precipitation, water quality, etc.; the social system issues such as policy, demographics, institutions; and the technical system technology-related interventions to address water management, e.g., dams or irrigation equipment.

Understanding the types and object of uncertainties is potentially important in order to evaluate best policy responses. For instance, [Langsdale \(2008\)](#) noted that if uncertainties inherent in the system dominate, “the focus should shift away from reducing uncertainties and move onto clarifying and communicating what is known about the system and determining effective and robust responses.”

2.2. The effect of uncertainties on cooperation

Both the theory and empirical evidence regarding the impact of uncertainty on achieving cooperative regimes are mixed. [Young \(1994\)](#) claimed that uncertainty about the distribution of costs and benefits is likely to lead to cooperation over rules that are deemed fair, a theory supported by [Helm's \(1998\)](#) game-theoretic model. [Decuadra and Oliveira \(2008\)](#) argued that scientific uncertainty cannot only foster cooperation, but can also enhance treaty effectiveness, while [Ulph and Maddison \(1997\)](#) developed a game-theoretic

model and found that information may actually lead to non-cooperative equilibria with lower levels of aggregate utility.

However, several researchers have reached opposite conclusions, i.e., that uncertainty deters cooperation, especially over natural resources ([Koremenos et al., 2001](#)). [Cooper \(1989\)](#) concluded that “so long as costs [of cooperation] are positive and benefits uncertain, countries are unlikely to cooperate systematically” (p. 181). [Hine and Gifford \(1996\)](#) demonstrated that greater environmental uncertainty can lead to increased individual tendencies to pursue private interests rather than to act for the collective good. Such findings are in line with tragedy of the commons theories that predict that uncertainty about other actors' actions is likely to lead to non-cooperative behavior that fails to produce sustainable management of common pool resources ([Hardin, 1968](#); [Ostrom et al., 1994](#)). Even [Helm](#), in the same article cited earlier, found that model (or scientific) “uncertainty can be detrimental to the process of international environmental cooperation as well, because it enables countries to defect from cooperation on grounds of ‘not proven’” (p. 198).

In the realm of transboundary water, [Zeitoun and Miramuchi \(2008\)](#) posit that reducing uncertainty may represent a driver towards cooperation in transboundary water policy, but do not attempt to prove this. In line with [Young's](#) argument above, [Fischhendler \(2008a\)](#) found that ambiguity (i.e., uncertainty regarding interpretation of agreement specifications) was essential in getting parties involved in a conflict to overcome distrust and reach agreements on water sharing; yet, this uncertainty can become destructive during the implementation phase of the regime ([Fischhendler \(2008b\)](#)). [Fischhendler et al. \(2011\)](#) found that mistrust (uncertainty about riparians' future actions, can alter the benefit–cost ratio in favor of unilateral action over cooperation, especially in cases of conflictual political relations between riparians.

2.3. Mechanisms for addressing uncertainties

Given the potential for conflict over shared water resources, many sources have advocated cooperative international management regimes (e.g., [UNDP, 2006](#); [UNECE, 2009](#)). International agreements are designed to reduce political and physical uncertainties by establishing working rules of engagement and establishing protocols for interaction between parties. In their survey of 289 agreements signed since 1900, [Drieschova et al. \(2011\)](#) found that nearly two-thirds explicitly mention uncertainties, with the majority including multiple mechanisms for addressing them.¹

While transboundary agreements are cooperative acts designed to reduce uncertainties, they do not guarantee actual cooperation among parties ([Kliot et al., 2001](#)). Furthermore, they can create new uncertainties, especially in terms of interpretation by parties ([Drieschova et al., 2011](#)). In particular [Miller \(2008\)](#) noted that because “in many cases allocation rules and enforcement mechanisms are not clearly defined... [uncertainty due to] climate change could destabilize such agreements if it... causes a sharp drop in one or another country's perceived payoffs from continued cooperation” (p. 43). This has resulted in calls for adaptive management mechanisms to be incorporated into water management, especially transboundary water management ([Scholz and Stiffl, 2005](#); [UNECE, 2009](#); [Gupta et al., 2010](#)).

The call for adaptive governance to address uncertainty triggered the work of [Drieschova et al. \(2008\)](#), which investigated different governance mechanisms in international water agreements

¹ The term mechanism in this context is often used to describe both procedures and institutions (like conflict resolution processes or joint committees) with the aim of broadening communication, general rules and guidance, like those provided by international water law, and concrete and specific instruments like water allocation criteria (see [Drieschova et al., 2008](#)).

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