BARD

FINAL REPORT

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**Problems and Prospects in the Political
Economy of Trans-Boundary Water Issues**

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(Cover Page)

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Abbreviations used in the report, in alphabetical order: n/a

Publications & Patents Summary (following page) - Attached

Summary of Cooperation (following page) - Attached

Budget: IS: \$ 52,900

US: \$103,800

Total: \$156,700

Section I. Overall Summary and Statistics

Publication Summary (Numbers)

	Joint IS/US authorship	US Authors only	Israeli Authors only	Total
Refereed (published, in press, accepted)		3	1	4
Submitted, in review, in preparation		2	1	3
Invited review papers				
Book chapters		11	5	16
Books (Edited)		1		1
Masters theses				
Ph.D. theses		1	1	2
Abstracts				
Not refereed (proceedings, reports, etc.)				

Patent Summary (numbers)

	Israeli inventor only	US inventor only	Joint IS/US inventors	Total
Submitted	n/a			
Issued (allowed)				
Licensed				

Cooperation Summary (numbers)

	From US to Israel	From Israel to US	Together, elsewhere	Total
Visits/Meetings	2	3		5
Sabbaticals		1		1
Postdoctorates		1		1

Cooperation: Our work is best described as complementary with respect to addressing water issues and synergistic in conceptual and theoretical advances. The conceptual work, in which the political-economy framework was developed for the area of water resources has been extended to analyses of sugar policy, dairy policy, international trade issues, food safety and other environmental issues. Part of this work is joint work between U.S. and Israeli scientists and part is independent.

Abstract

The objective of this research was to develop and apply a conceptual framework for evaluating the potential of trans-boundary bargaining with respect to water resource sharing. The research accomplished this objective by developing a framework for trans-boundary bargaining, identifying opportunities for application, and illustrating the potential benefits that can be gained thereby. Specifically, we have accomplished the following:

- Developed a framework to measure the potential for improving economic efficiency considering issues of political feasibility and sustainability that are crucial in trans-boundary cooperation.
- Used both cooperative and non-cooperative game theory to assess feasible coalitions among the parties involved and to model potential bargaining procedures.
- Identified empirically alternative schemes of cooperation that both improve upon the economic efficiency of present water usage and appease all of the cooperating parties.
- Estimated the potential short-run and long-run affects of water reallocation on the agricultural sector and used this information to understand potential strategies taken by the countries in bargaining processes.
- Performed case studies in Israeli-Jordanian relations, the relationship of Israel to the Palestinian Authority, and cooperation on the Chesapeake Bay.
- Published or have in process publication of a series of refereed journal articles.
- Published a book which first develops the theoretical framework, then presents research results relating to the case studies, and finally draws implications for water cooperation issues generally.

Background to the Topic

The increase in water scarcity and decline in water quality that has resulted from increased agricultural, industrial, and urban demands raises questions regarding profitability of the agricultural sector under its present structure. The lack of efficient management has been underscored recently by consecutive years of drought in Israel and increased needs to clean up the Chesapeake Bay. Since agriculture in the Middle East (Chesapeake Bay) is both the main water user (polluter) and the low-value user (polluter), a reallocation of water use (pollution rights) away from agriculture is likely with further industrial and urban growth. Furthermore, the trans-boundary nature of water resources in the case of the Middle East and the Chesapeake Bay contributes to increased conflicts over the use of the resources and therefore requires a political economic approach.

Major Conclusions, Solutions, Achievements and Implications

Using game theory tools, we critically identify obstacles to cooperation. We identify potential gains from coordination on trans-boundary water policies and projects. We identify the conditions under which partial (versus grand) coalitions dominate in solving water quality disputes among riparian countries. We identify conditions under which linking water issues to unrelated disputes achieves gains in trans-boundary negotiations. We show that gains are likely only when unrelated issues satisfy certain characteristics. We find conditions for efficient water markets under price-determined and quantity-determined markets. We find water recycling and adoption of new technologies such as desalination can be part of the solution for alleviating water shortages locally and regionally but that timing is likely to be different than anticipated. These results have been disseminated through a wide variety of publications and oral presentations as well as through interaction with policymakers in both countries.

Achievements

Significance of Main Scientific Achievements or Innovations

Reduced allocation of water to agriculture will induce costly structural change. Such reduced allocation to agriculture is often recommended as an approach for dealing with rising household and industrial demand. However, sectoral reallocations must be weighed against or be considered in the context of constraints imposed by non-market and/or non-efficiency objectives (such as food security, border security, settlement of arid regions, equity and industrial development). In addition, reallocation of water resources within jurisdictional boundaries by means of conservation, recycling, and inland desalination of brackish water may not be sufficient in the long run and/or economically efficient ways of meeting increasing domestic demands in the short run. The creation of water (or pollution) markets is widely propounded as a means of achieving economic efficiency in water resource allocation within jurisdictions. In Israel, this implies abandoning non-transferable water quotas. Establishment of international or interstate water (pollution) markets could potentially facilitate efficient trans-boundary reallocation. However, as experience in many forms of international trade has shown, markets are not likely to operate free of regulations and restrictions that reduce the efficiency of competition. Alternatively, we have analyzed outcomes that are likely to occur through negotiated settlements taking account of realistic barriers to competition.

Our various contributions offer a means for dealing with these issues. Our scientific contributions can be usefully categorized according to the following areas:

- Examination of water pricing and quota allocation for the agricultural sector (U.S. team).
- Economic analysis of adoption of water technologies such as water recycling and desalination (Israeli and U.S. teams).
- Economic analysis of efficient market mechanisms for water allocation by means of bargaining (Israeli team).
- Determination of optimal coalition size for trans-boundary water problems (U.S. team).
- Determination of conditions under which linking trans-boundary issues between riparian countries can be advantageous (U.S. team).

Our economic analysis investigates various feasible approaches to trans-boundary cooperation. Using game theory tools, the research critically points out the obstacles to cooperation but at the same time identifies potential gains from coordination of trans-boundary water policies and projects. Limitation and options of coalition formation in water basins that are shared by more than two political entities have been considered. A basic cooperative model

achieved than at present. For example, one project shows how some new approaches to bargaining might make possible cooperation between Israel and Jordan on projects that could increase water supply by 6-9%. Considering that the alternative might be desalination of water at a price of about \$1 per cubic meter, this could have an on-going benefit in the neighborhood of \$180 million per year if it truly resulted in implementation. Other parts of the analysis have derived approaches that could potentially provide considerable and commensurate additional benefits. In addition, as some of the analysis shows, benefits from water negotiation have synergistic effects with the overall peace process. If new approaches suggested for developing sustainable and politically feasible water agreements are successful, the payoff in non-monetary benefits for facilitating peace agreements may be even larger and harder to quantify. The stakes are not as high in the U.S. component of the research but the potential for enabling higher environmental standards for the Chesapeake Bay are large because of the significant use of that resource by a large riparian population.

Details of Cooperation

Cooperation has been extensive because Eyal Brill was able to spend the 1996-97 academic year at the University of Maryland as a post-doctoral student financed by BARD working under the direction of Richard Just. Subsequently, he was part of the Israeli team and worked under the direction of Professor Eithan Hochman during the 1997-98 academic year. Cooperation was also enhanced by the appointment of the Israeli team leader, Professor Eithan Hochman, as a Visiting Professor at the University of Maryland from October, 1996, through June, 1997. The resulting interaction led to rich discussions and collaboration.

During April 13-16, 1997, the U.S. team organized and hosted the Fifth Meeting of the International Water and Resource Economics Consortium, a conference entitled "Conflict and Cooperation on Trans-Boundary Water Resources." Several of the Israeli and U.S. research papers and results were presented at the conference and have been published as a book that grew out of the conference proceedings (see the list of publications).

Completion of some of the work was enabled by Netanyahu's stay in Israel in 1998-99. During that period, collaboration with Hochman yielded further discussions on future research and development of a research proposal on the economics of recycled water in Israel (as part of a larger interdisciplinary research team). Cooperation between Just and Hochman has also yielded further research on the U.S. sugar sector and Israeli dairy sector using the political-economic framework developed from this BARD project.

Section II. Body of the Report

Background, Scientific and Agricultural Relevance

The research identifies several core obstacles to and benefits from cooperation on trans-boundary water resources. Agriculture is the most immediate beneficiary of cooperation because the agricultural sector is most likely to be displaced as the low-value water user (polluter) when constraints cannot be eased in other ways. Our research first reviews the difficulties in the development of multinational cooperation with respect to water resources and then identifies more specifically the potential gains in regional cooperation under various conditions. The results are novel compared to most economic analysis by trying to account for the non-economic factors that have distorted water use and prices so far from what one would expect under free water market solutions. The methodologies, results, and implications are best discussed on a study-by-study basis.

Methodologies, Results, and Implications

Just and Netanyahu (1998a) consider past experience and potential in international water resource conflicts. They argue that, in recent years, significant discussion has focused on the scope and scale of management of international water resources. Some have advocated that, because countries' actions within a basin are interdependent, the management of a trans-boundary water basin should consider the basin as a unit and cooperation should include all riparian countries. However, in practice, multilateral agreements on management of trans-boundary water resources with participation of all riparian countries are rare. This paper identifies the sources of difficulties in forming international river basin agreements involving all riparian countries. Some countries may prefer a small blocking coalition that does not include all riparian countries. Moreover, coalitions can be formed, dissolved, and re-formed by various groups of countries within a basin. This raises the question of sensitivity and sustainability of agreements depending on size and membership of the coalition. In this context, it is shown that smaller incomplete coalitions may be preferred and more sustainable. The paper concludes by looking at past and present experience in the management of international water resources where cooperation is still limited in scope and scale. The implications of the paper are that a new concept of cooperative management is needed that is less ambitious than basin-wide management. This can lead to more success in formation and sustainability efforts because of practicality considerations.

At the regional level, the political economy of domestic water allocation in Israel and Jordan is investigated by Just et al. (1997c). The analysis, which began prior to the Israeli-Jordanian signing of the water agreement, can eventually be re-evaluated under the new agreement. This study argued that an assessment of the value of potential new water projects depends on the marginal value of water. Marginal valuation of water is complicated by the fact that water markets in most countries do not equate prices across users. Thus, valuation depends on who gets the water. The implied unequal marginal valuation of water by users suggests that current water allocation is inefficient from a standard economic perspective.

The empirical results compare the benefits from partial price equalization with the benefits of water augmenting projects. Results show that even partial domestic price equalization can be more valuable than additional water obtained by international cooperation if factors motivating water price differentials can be overcome. However, water projects may be instrumental in facilitating domestic price equalization because the sectoral costs of price equalization are reduced when the two measures are undertaken in conjunction. Another result is that when prices are partially equalized as a water project is undertaken, the value of the project is higher than otherwise because new water is used more efficiently. With this approach, new water projects become more valuable, which can potentially break existing coalitions behind current water pricing schemes to the extent that unequal prices are due to political power. Alternatively, to the extent that current pricing schemes are due to non-market considerations such as international security and the need for food self-sufficiency, new prospects for peace in the region may permit partial price equalization and, thus, increase the value of international water projects. This creates a synergy between international water cooperation and peace agreements. An understanding of the impact of international water projects on domestic water pricing policies can be gained by evaluating these predictions in the post-agreement era once widespread success is achieved.

As background work for potential water pricing reforms in Israel, Just, Netanyahu, Horowitz (1999) evaluate water pricing and water allocation in Israel. Marginal valuation of water is complicated because water authorities do not equate prices across users. Standard analyses imply that unequal valuation of water by users is inefficient and that economic efficiency can be improved by equating prices after accounting for transportation costs. Such inefficiencies are usually explained by the influence of political interest groups. This paper suggests alternatively that motivations such as food self-sufficiency, ideological settlement

objectives, equity, and long run infant industry investment considerations may take precedence over short run economic efficiency in Israeli water markets.

Additional issues concerning water policy reform that consider the privatization of a public utility firm and regulation of multi-source water usage are discussed by Brill et al. (1998b). Water problems are often complicated by the presence of both positive and negative externalities. This study deals with public utility firms that supply two intermediary inputs, one with a positive externality, and the other with a negative externality. Both inputs have an inter-temporal impact on the environment. It is proven that the trajectory path is unique, and of a saddle-point nature. An optimal trajectory is determined for inter-temporal regulation of a newly privatized public utility firm with taxes or pricing controls. Finally, the optimal tax policy is compared with a specific form of standard around the steady state. The paper examines how the comparison of benefits of optimal tax and standard policies differs depending on imperfect information about the coefficient of return. The main finding is that, under imperfect information, a special form of standard is superior (inferior) if the demand for water is elastic (inelastic).

International cooperation in water sharing with an application to Israel and Jordan is considered by Just et al. (1997a). This research focuses on two international water projects. The first requires bilateral cooperation between Israel and Jordan on the construction of two canals, a Yarmouk River-Kinneret canal and a Kinneret-Ghor canal. The second project is a dam between Syria and Jordan on the upper Yarmouk River. Water benefits from such projects are very one-sided by standard economic analysis based on competitive water price equalization, and are thus politically infeasible. Alternatively, Nash bargaining solutions are investigated for each of these international water cooperation problems. Nash bargaining imposes the reality that both parties insist on gains from cooperation. In general, the solutions are remarkably robust to changes in supply or demand but can still be quite different from market solutions. Results demonstrate that cooperation problems may be much different depending on which international investments are in place. The bargaining analysis also reveals how the difference in ex ante and ex post incentives may cause agreements to break down once investments are made unless they are structured appropriately.

Since Israel and Jordan have subsequently adopted a variation of the first project, it is now interesting to further investigate the conditions under which this agreement will remain

intact. That is, future work can build on ours by determining conditions under which the coalition can be sustained and conditions under which it may break down.

A paper by Netanyahu (1998) discusses conceptually the impact of uncertainty on the gains from bilateral water policy coordination. This paper assumes that there are two political entities that share a joint aquifer where each has conflicting domestic targets in relation to the uses of shared water. In addition, it is assumed that both entities plan their domestic and foreign water policies in a stochastic environment. Drawing on the findings in the macro-economic literature on policy coordination, and especially those that discuss policy coordination under uncertainty, it is inferred that, under certain conditions, political entities are likely to gain from coordinating trans-boundary water policies relative to uncoordinated action. This framework has relevance to the Israeli-Jordanian Agreement over the Arava Aquifer and to the Israeli-Palestinian shared Mountain Aquifer.

Bargaining over shared aquifers is discussed by Netanyahu, Just and Horowitz (1998b). This paper develops and applies a framework to evaluate the potential for cooperation in aquifer sharing, with an application to the Israeli-Palestinian Mountain Aquifer (MA). Based on potential gains from Israeli-Palestinian cooperation in management of the MA, a framework to analyze the process of negotiation and the factors that affect its outcome is suggested. A single stage cooperative game is offered as a tool to suggest and motivate possible agreements. Recognizing three distinct phases in water exploitation decisions expands the analysis. First, the two entities, possibly with the help of a third party, must design a contractual agreement for joint aquifer use. The outcome of this stage possibly depends on players' impatience and on the risk that unrelated political factors can cause negotiations to break down. The end of the first stage is marked by an agreement over use of the joint resource. If the agreement is advantageous to each player, they move to the second stage, which is the cooperation stage. In the third stage, sustainability of the agreement is questioned. Players may choose to deviate from the cooperative agreement. However, if a credible punishment is incorporated into the agreement in the first phase, then no defection occurs. To ensure that cooperation on water agreements will be sustained, the punishment must be robust to changes in governments, economic variables, political forces, and water availability.

Just, Netanyahu and Olson (1999) investigates the impact of uncertainty in the arrival date of improved backstop technologies on the rate of depletion of an exhaustible resource and the timing of decisions regarding the adoption of an existing backstop technology. The source of the uncertainty is not, as traditionally analyzed, the arrival date of a backstop technology that

releases the economy from a resource constraint. Instead, there is a known backstop technology but uncertainty over the arrival date of improved lower-cost technologies. The planner must choose between adopting the existing technology or waiting until an improved technology is developed. When there is a fixed cost of adoption, uncertainty over technological progress creates an incentive to delay investment in existing backstop technologies. At the same time, it can also create an incentive to utilize the resource more rapidly. This paper shows that in some circumstances the option value of waiting for improvements in technology may justify putting off what would otherwise be a sound economic investment, while in other circumstances the resource is depleted more rapidly and the current backstop is adopted sooner than it would be under certainty. This analysis has direct implications for the use of water resources and the adoption of desalination technologies. It also has implications for allocation of energy resources and for the adoption of alternatives such as fusion or solar power.

Just and Netanyahu (1999) emphasize the importance of game structures in linking trans-boundary games. A common approach in modeling trans-boundary negotiations is to apply game theory to single issues. Recent work has suggested that the complexity of international negotiations can be better modeled by linking independent games, i.e., linking unrelated issues in negotiations. Some recent studies have suggested that linking is a very likely source of gains. This research shows that gains are only possible in certain circumstances. For example, successful linking is possible when the linked issues have compensating asymmetry of similar magnitude. An important result of linked games is that such games produce a greater feasible set of choices relative to the aggregated isolated games, i.e., negotiating issues individually. In this paper, we demonstrate that achieving strict dominance of the linked game is not trivial and that results and implications depend critically on the structures of the isolated games.

The implications of these results are developed with reference to Israeli-Palestinian negotiations over water. Frustration has often been expressed in international circles with the pace of the peace process, and Israeli-Palestinian negotiations in particular, because the international community believes large gains are possible through full cooperation. Our results suggest that the problem may be that full cooperation does not lie on the preference frontier of the two parties when the following two circumstances combine: (1) payoffs are highly asymmetric due to structural differences in the economies and hydrological circumstances and (2) equity is a matter of critical concern in the negotiations. While linking with less than full cooperation may meet the needs of the two countries in these circumstances, which describes the

on-again-off-again nature of Israeli-Palestinian water negotiations, identifying the best issue to link to water is critical. We identify features of potential linked issues that will tend to success and greater payoffs.

Using a similar framework, Just and Netanyahu (1999) analyze the U.S.-Mexican relationship in the area of agricultural trade and environmental problems of food safety. Issues between countries with a common border can be complex and involve non-trade issues as well as trade issues. This paper considers bargaining motivations that may develop as countries adopt strategies on agricultural trade and imposition of environmental and safety standards. In addition, we consider how issues of illegal immigration or illicit drug trade, although typically considered largely independent of commercial trade, may become useful issues to address in tandem, i.e., to link to agricultural trade and environmental safety.

Additional potential regional cooperation is discussed by Brill et al. (1998a). This paper discusses trans-boundary water allocation between Israel and the Gaza Strip, exploring in particular the value of desalination, recycling and fresh water use for (i) farmers in the arid region of the Negev and (ii) Palestinians in Gaza. Israeli-Palestinian cooperation over integrated water management addresses multiple regional objectives. It captures the utilization of multiple water resources such as fresh, desalinated, and recycled water by multiple users in the agricultural, urban, and industrial sectors. Conveying water from its various sources to users depends on its spatial distribution. In order to address the problem, a conceptual model based primarily on the theory of optimal control is used to derive optimal solutions. Then, given the gain to both parties from a cooperative solution to the bargaining situation, the applicability of the optimal solution is tested using the framework of the Coase theorem.

Gisser and Hochman (2000) introduce a framework for the implementation of water markets that may overcome the obstacle of high transaction costs associated with water markets. At the national level, a quantity-determined market is suggested with given shares of the initial endowment while the aggregate water quantity is determined administratively by the central government. At the regional level, a price-determined market is introduced with a price announced by the policy maker. Each individual uses water according to his demand curve and pays (receives) a monetary fine (compensation) according to his share in the aggregate water right. The Israeli water economy is considered as an illustration. Interestingly, they find that optimal allocation results in a decrease of 13% in the aggregate amount of irrigated water. One should note that out of 1.4 billion cubic meters (annual Israeli water consumption), 13% is

almost twice the amount of water supplied by the Yarmouk River to the Jordan Basin (although both amounts are currently disputable between Israel and the Palestinian Authority).

Just, et al (1998) suggest that economists must consider the practical applicability of their analyses to problems of trans-boundary water problems. Mathematical tools and a specialized jargon complicate communication. In addition, policy makers often have interests dictated by political interests that are inconsistent with economists' objective concept of economic efficiency. Departures from competitive efficiency may be undertaken to meet legitimate social objectives of equity that cannot be reached by other means. Trans-boundary water problems where sovereignty, lack of infrastructure, or weak enforcement mechanisms cause market imperfections are examples. Economic analysis must be conditioned on realities of the policy process to find practical applicability. Perhaps individual economic analyses must serve selfish individual policy maker or agency goals to find usefulness by them. Debate among policy makers where each is informed according to their own selfish interests may reach informed policy choice. Alternatively, if each policy maker or agency rejects available economic analyses because the analyses try to serve comprehensive and objective criteria, then policy choice is economically uninformed

Potential Impact on Agriculture, Industry, the Environment, Policy, and Legislation

The game theoretic approach has been demonstrated by this research to shed light on trans-boundary water resource issues that were, until recently, largely neglected in the analysis of regional water management. The understanding of limitations in forming multi-political coalitions in river basins is an important domestic and international policy issue. Limited access to water resources that originate in multi-jurisdictional political conflicts has substantial implications for the ability of a region to develop economically. In regions where the agricultural sector consumes the bulk of the water and contributes the bulk of the toxic pollutants, cooperation over water management potentially has great value. If economists employ the correct tools, then they can represent the realistic requirement that all parties must share in the benefits of international cooperation. In this way, economic analysis can contribute usefully to the policy debate and to identification of workable solutions. This research has not only developed a number of studies where such results are demonstrated, it has developed methodology that can enhance the ability of economic analysis to contribute to solution of problems of cooperation among sovereigns where typical market analyses are likely inapplicable.

List of Publications

Books

R. E. Just and S. Netanyahu, Eds. 1998. *Conflict and Cooperation on Trans-Boundary Water Resources* Boston, Kluwer Academic Publishers, 432 pages.

Chapters in Books

Brill, E. and E. Hochman. 1996. "Allocation of Common Resources with Political Bargaining." In J.J. Pigram (ed.) *Security and Sustainability in a Mature Water Economy; A Global Perspective*. Center for Water Policy Research, Australia.

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Just, R.E. and S. Netanyahu. Forthcoming. "Environmental Problems, Immigration, and Trade," A. Schmitz, G.C. Rausser, and D. Zilberman, (eds.) in *Agricultural Globalization, Trade and the Environment* Boston, Kluwer Academic Publishers.

Netanyahu, S., R. E. Just, and J. K. Horowitz. 1988b. "Bargaining Over Shared Aquifers: The Case of Israel and the Palestinians." R.E. Just and S. Netanyahu, eds., *Conflict and Cooperation on Trans-Boundary Water Resources*, Kluwer Academic Publishers, Boston.

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Proceedings

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Chakravorty, U., E. Brill, and E. Hochman. "Allocation of Water among Agricultural and Urban Users in Israel." Paper presented at the International Water and Resource Economics Consortium Conference on Security and Sustainability in a Maturing Water

Economy: A Global Perspective, The University of Melbourne, Melbourne, Australia, Feb 11-12, 1996.

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Just, R.E., J.K. Horowitz, and S. Netanyahu. "The Political Economy of Domestic Water Allocation: The Cases of Israel and Jordan," paper presented at the Annual Meetings of the American Agricultural Economics Association session on Political Economy and Policy of Water Resources, Indianapolis, Indiana, Aug 6-9, 1995.

Just, R.E., J.K. Horowitz, and S. Netanyahu. "Game Theoretic Resolutions of Public Issues in Agriculture," invited paper presented at the Allied Social Science Association Annual Meetings in the American Agricultural Economics Association session on "Applications of Game Theory in Agricultural Economics," San Francisco, Jan 4-7, 1996.

Just, R.E., L. Olson, and S. Netanyahu. "Resource Depletion, Technological Uncertainty and Adoption of Improved Technology: The Case of Desalination," plenary invited paper in the International Water and Resource Economics Consortium Conference on Security and Sustainability in a Maturing Water Economy: A Global Perspective, The University of Melbourne, Melbourne, Australia, Feb 11-12, 1996.

Just, R.E. and S. Netanyahu. "International Water Resource Conflicts: Experience and Potential," invited paper presented at the Fifth International Water and Resource Economics Consortium Meetings entitled Conflict and Cooperation on Trans-Boundary Water Resources, Annapolis, Maryland, Apr 13-16, 1997

Just, R.E. and Sinaia Netanyahu "Environmental Problems, Immigration, and Trade," invited paper presented at the Agricultural Globalization, Trade and the Environment Conference, University of California, Berkeley, Mar 7-9, 1999.

Just, R.E. and S. Netanyahu. "Bargaining Over Shared Aquifers: The Case of Israel and the Palestinians," invited paper presented at the Conference on Water and Food Security in the Middle East sponsored by The Institute on Global Conflict and Cooperation, Cyprus, Apr 20-23, 1998.

Just, R.E. and Sinaia Netanyahu. "The Importance of Structure in Linking Transboundary Games," invited paper presented at the Sixth Conference of the International Water and Resource Economics Consortium entitled Water and Environmental Resource Management: Focus on Asia and the Pacific, Kona, Hawaii, June 29 - July 3, 1999.

Olson, L., R.E. Just, and S. Netanyahu. "Depletion of Natural Resources, Technological Uncertainty, and the Adoption of Technological Substitutes," Conference on Technological and Environmental Major Risks, CIRANO, Montreal, QC, Canada, November 13, 1998.

Netanyahu, S. and R.E. Just. "The Importance of Structure in Linking Transboundary Games," Conference on Forging Regional Cooperation in the Mediterranean Basin, Arles, France, May 27-28, 1999.

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