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A THEORETICAL ANALYSIS OF MINUTE 242*

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In contrast to the other contributors to this symposium, I am not an expert on the Colorado River. I was asked to comment rather generally on the matter of international rivers from the point of view of an economist, and thereby perhaps to put the discussion of the Colorado salinity agreement in a somewhat widened context. To do this, it is helpful to have some sort of taxonomy of the types of situations characteristic of international watercourses.¹ Four types of situations seem to characterize most cases involving international watercourses.

First, the more or less pure "public goods" situations. These are instances in which all the riparian states have equal access to the watercourse and in which the use of one does not diminish the benefits to others. Examples might be navigation on a noncongested boundary stream or recreational use of an international river which does not diminish its quantity or quality.

The second situation is where development in an upstream country provides benefits in both the upstream and downstream countries. Examples are flow regulation for hydropower production in the upstream country which simultaneously makes the river-flow more even in the downstream country and therefore more valuable for uses such as hydropower production or diversion for irrigation.

The third type is the strict "common property" situation. This is where all the riparian countries have equal access to the watercourse but use of the watercourse by one diminishes its value for others. For example, use of a boundary body of water for irrigation or for waste disposal fits this category. Navigation on a congested waterway would be another instance.

Fourth, a "zero sum" situation may prevail where use of the water resource by an upstream country diminishes benefits to the downstream countries but where the downstream users cannot retaliate in

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1. The taxonomy I use is adapted from the somewhat more elaborate one presented by D. DeMarquand, Research Into the Management of International Rivers, February 15, 1974 (unpublished paper, University of British Columbia).

any direct way. This is the pure upstream-downstream conflict situation.

There are different national imperatives and motivations associated with these different kinds of situations. In the first type there is really no conflict and consequently no sort of international agreement is needed. In types two and three, there clearly are possibilities for mutual gains from some sort of an agreement.

For example, in the second situation the downstream country would be motivated to attempt to influence the upstream country to provide flow regulation even if the benefits in the upstream country could not suffice to cover the costs but the sum of the downstream and upstream benefits did. Alternatively, perhaps it would be motivated to bargain for an increase in the degree of flow regulation which the upstream country would otherwise provide for its own purposes.

In the third situation it is possible that the various riparian countries could each gain from agreeing to limit their use of the waterway. This does not of course mean that such agreements would necessarily be accomplished. When a large number of countries with different ideologies and cultural backgrounds are involved, agreement may be very difficult. For example, even though all of the riparian countries around the Baltic Sea are technically advanced, and the sea is clearly deteriorating because of excessive waste disposal, they have not been able to reach any sort of meaningful agreement. The situation in the Mediterranean would seem to be even more complex and perhaps even hopeless. Nevertheless, in situations two and three, possibility for mutual gain may be a powerful force in the direction of achieving agreement.

However, in the "zero sum situation," if one views the matter from a narrow economic point of view, there can be no basis for agreement unless the victim country compensates the damaging country for costs incurred to reduce the damage. If the damaging country acts in its own immediate economic self-interest, it will not be willing to reach any other sort of an agreement. Surely the salinity situation in the Colorado is of this "zero sum" type.

An interesting illustration of this type of situation, giving rise to the victim-pays result, is found in the case of the Rhine River. The Netherlands being at the terminus of that river stands in somewhat the same relation to the upstream coriparians as Mexico does to the United States on the Colorado. Indeed, the main water quality problem is the same one—salinity. The Dutch are experiencing increasing difficulty in using the Rhine River waters for both industrial and municipal purposes. Accordingly, in 1972, they agreed to pay the

French, who are the main source of salinity in the Rhine River, 35 percent of the costs of control to reduce the salinity of the river.

But, in the case of the Colorado, the United States has agreed to pay the entire cost of mitigating the situation. If the United States had been acting on the basis of a narrow interpretation of economic self-interest, it either would have done nothing or would have required Mexico to pay the costs of the mitigation. This, then, leads one to wonder what factors, other than magnitudes and distribution of strictly economic costs and benefits, could be important in a U.S. decision. Economic costs and benefits are, of course, always pertinent to the development of national decisions. But if they had been the only consideration, the situation never would have turned out the way it did.

It appears that in many cases negotiations about international rivers involve considerations which are in quite other arenas, and in many cases these "extraneous" considerations have been dominant. In other words, it is impossible to understand the outcome of such international negotiations simply by looking at the particular situation which is the apparent focus of the negotiations. A much wider view of the national and international considerations involved must be taken. Indeed, it may be that even the initiation of negotiations on an international river problem is more related to other considerations of national interest—and clearly the results often are. For example, Krutilla has shown that various considerations, including military strategic ones, caused the United States to agree to a treaty on the Columbia which was quite unfavorable to it economically.² Thus, matters such as trade concessions, military bases, and the desire to win allies in international politics may often be overriding considerations.

In addition, the image a country wishes to project to the outside world may sometimes be important. One might interpret the agreement of the Swiss, who are at the head of the Rhine River, to pay 5 percent of the costs of reducing salt discharges in France as being a result of this objective. A related consideration might be the attitude of a particular country toward international law. My own conjecture is that these latter considerations are not nearly so important as the more directly national self-interest-related ones mentioned earlier. As long as all interested parties have something of value to trade, the outcome of this kind of process may not be so arbitrary or irrational as it might at first seem. Indeed, as long as national self-interest is the primary motive force in international affairs, as I believe it is, this

2. J. Krutilla, *The Columbia River Treaty* (1967).

type of broad trading process seems to be the only one that can lead to international agreements, especially in the "zero sum" type of situation that characterizes the salinity problem of the Colorado River.

Indeed, such larger factors seem to have been very important in all the major Mexican-American water agreements which have been achieved. During the 1939 to 1944 negotiations over the Colorado and the Rio Grande, one factor which caused the United States to agree to an allocation of 1.5 million acre-feet per year of Colorado River water to Mexico, an amount far above historical usage in the Mexicali Valley, was its desire to cultivate friendly relations with other countries, especially neighboring countries, during the Second World War. In that case, however, the situation was more complex than the present one since agreements for both rivers were being negotiated simultaneously, and the United States did have a direct economic interest in reaching an agreement on the Rio Grande. This was so since most of the water in the lower Rio Grande (below Fort Quitman, Texas) originates from the Mexican tributaries.

The 1973 agreement also seems to have been a situation in which the United States was anxious to cultivate more favorable relations with Latin American countries and, more generally, to reduce international stresses in the world at large.

Even if the agreement was the result of national self-interest, and I think it must be interpreted to have been so, many people on both sides of the border, including myself, feel that a very unfortunate injustice may now have been corrected. Or if they are a little skeptical, also like myself, about whether the injustice actually has been corrected they are at least encouraged that it has been faced up to.

But, to an economist at least, it is very interesting to observe the means the United States has chosen for implementing the agreement. In this connection, I should like to call attention to an interesting paper prepared for the United Nations by Irving Fox and several coauthors in which are found a number of premises about international agreements on rivers.³ Premise No. 4 reads as follows: "Configuration of power and influence within a country may have an important bearing on the kind of program acceptable to it and upon how the planning and implementation of the program can be done effectively." Examples of such internal forces affecting the nature of agreements reached can be found in negotiations between the United

3. I. Fox, H. Gotzman, S. Smith, & U. Torti, *Administration of International Rivers* (presented at the United Nations Panel of Experts on Legal and Institutional Implications of International Water Resources Development, Vienna, Austria, December 9-14, 1968).

States and Canada both on the St. Lawrence and the Columbia. In both cases regional interests had a powerful influence on the specific nature of the agreements reached.

These forces internal to the country seem to be especially clear in the salinity agreement. The motivation of the basin states seems to have been a determination not to lose a single drop of water to Mexico no matter what it might cost the general taxpayer in the United States. Back-of-the-envelope calculations indicate that it would have been far cheaper to buy the necessary water rights to send pure water to the Mexicali Valley than to implement the means actually chosen—primarily the desalting plant. William Martin's paper in this symposium goes even further to assert that the problem could have been solved with no net cost to the United States whatsoever. Dean Mann's paper analyzes the politics of the situation which permits the states, or at least historically has permitted the western states, to shove most of the cost of water development on to the general tax burden of the U.S. taxpayer. What we have as a result is a wildly uneconomic approach to the problem of reducing salinity in the Mexicali Valley.⁴

The diplomatic language characteristic of international negotiations terms the agreement which was reached a "definitive and final solution" to the problem. There is, however, a little space between the diplomatic language and the realities of the situation. There are still, as several of the papers in this volume make clear, large disagreements within the United States concerning how the agreement is to be implemented, and action by Congress is required on a number of points. The difficulties of reaching agreement may be exacerbated if the wildly uneconomic nature of the solutions proposed becomes more generally known.

Furthermore, as Dregne's paper makes clear, further increases in salinity of the Colorado River are inevitable. This, no doubt, will in due course raise the issue of permitted absolute levels of salinity to be delivered to the Mexicans rather than the relative prescription found in the agreement. The latter, as a number of the papers point out, links the permitted deliveries of salt to what arrives at the Imperial Dam in the United States.

4. The extreme and, it seems to me, rather convoluted position of the basin states on not losing water to Mexico is exemplified by the assertion that the U.S. taxpayer should be responsible for replacing the 43,000 acre-feet of brine which will flow from the desalting plant directly to the Gulf of California because, it is argued, this involves an increase in water deliveries to Mexico. See M. Hulbert, Values and Choices in the Development of an Arid Land River Base (paper delivered before a meeting of the American Association for Advancement of Science, San Francisco, California, February 24-March 1, 1974).

Finally, if the means proposed in the agreement are adopted, the control of salinity for the Mexicali Valley will depend on the continued operation of a very expensive and somewhat experimental piece of machinery, namely, the large-scale desalting plant. This problem may well be exacerbated by the energy requirements of the facility which will occur in a region where there is already much disputation about the environmental effects of increasing electrical generation capacity.

In my opinion, the agreement cannot realistically be regarded as the final and definitive solution. But at least the issue has been joined, and we may hope that this will lead to careful consideration of the salinity management problem of the Lower Colorado as a whole, including both the acreages in the United States and in Mexico, and to some innovative thinking about what sort of institutional arrangements might be appropriate to a situation of this type. I am not very optimistic that this will happen, but at least the issue has been brought out of the darkness and into the daylight.