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# Interbasin Transfers of Water: Economic Issues and Impacts

Bruce R. Beattie

# *Interbasin Transfers of Water: Economic Issues and Impacts*

By
CHARLES W. HOWE AND K. WILLIAM EASTER
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Pp. 196 $6.96

This book is very much in the mold of other RFF issues in that a conceptual framework is presented, followed by appropriate empirical case studies developed in an attempt to give operational content to the conceptual framework. I find myself in a position similar to that of Irving Hock [3], who reviewed Ruttan's RFF sponsored work [5] for this *Journal, i.e.,* this book is a "noteworthy attempt to apply quantitative methods to [an important contemporary] problem in the use of natural resources." While I find myself in general agreement with the overall thrust of this book, there are a number of subplots and issues with which I must take exception or, at least, find a bit confusing.

This book is comprised of seven chapters. In the introductory chapter, Howe and Easter deal in general terms with the nature of the problem and give a good, concise description of several proposed and existing interbasin water transfers. The second chapter is devoted to the presentation of a conceptual framework for economic evaluation. This framework is developed in terms of necessary conditions for economically efficient interbasin transfers, including both direct and "secondary" [indirect] effects. In chapter 3, past empirical studies of direct and "secondary" benefits of water in irrigated agriculture in the West are reviewed. This chapter is very well done and should be helpful to those wishing a compact treatment of the results from some of the most frequently referred to studies. Chapters 4, 5, and 6 are devoted to the presentation of case studies which are variations on a hypothetical transfer from the Columbia River to the Imperial Valley of California via the Colorado River. The benefits (direct and indirect) of the hypothetical transfer are estimated, using an input-output framework (chapter 4); this is followed by a consideration of direct costs including costs of alternative water supply systems (chapter 5); and finally consideration is given to "secondary" costs in terms of the displacement of irrigated agriculture in other regions (chapter 6). The final chapter is a brief summary statement of the problem, results, conclusions, and further research needs identified by the study.

Given this brief look at the contents of the book, let us turn now

to some of the points of disagreement and uncertainty alluded to earlier. In developing their conceptual framework (chapter 2), the authors correctly point out, as have others [2, 5], the inadequacy of current planning approaches which by and large rely on the extrapolation of so-called "water requirements." They suggest "economic demand" as a preferable criteria and analytical approach for judging the need for interbasin transfer of water. As previously noted, the conceptual framework is developed around a statement of necessary conditions for economically efficient interbasin water transfers. Their first "necessary" condition states that ". . . the increment to net incomes in the importing and transit regions must exceed the loss of incomes in the exporting region and in other regions where activities are displaced by the costs of the physical transfer system . . . ," which seemingly says nothing more than that the total benefits (in an efficiency or "size of pie" context) must exceed the total cost. While I believe that such a benefit-cost formulation serves as an appropriate conceptual framework for efficiency analysis, I find it troublesome that the authors chose to state their case in terms of changes in net income. Although there are numerous practical incentives for thinking in terms of income (particularly when discussing indirect effects), it is not clear that such changes correspond to the change in net, present, real value of incremental output which McKean [4, pp. 144-145] argues is a superior efficiency criterion. The problem is that changes in net income not only reflect the above, but also mirror changes in product prices as well. It is, of course, appropriate to value the expected change in incremental output (including reductions expected elsewhere as well as increases projected in the area of water destination) using the new (expected) equilibrium set of prices. However, reductions in income will exceed the reduction in value of incremental output if it is anticipated that prices will fall. Certainly in elucidating the equity or income redistributive impacts of interbasin water transfer proposals, such changes (pecuniary externalities) are an important consideration. However, this is not so clear in the case of efficiency analysis (see McKean, pp. 136-143). This point is an important one, as Howe and Easter devote a full chapter to the empirical estimation of such so-called "secondary costs" (the displacement of agriculture in other regions due to a declining product price)[1] of interbasin water transfer. I should em-

1. I say "so-called" because, in my view, these costs (losses in agricultural income) are more appropriately classified as direct costs, just as the losses in the exporting region (benefits foregone) are classified by Howe and Easter as direct. Of course, there would be indirect ("secondary") losses in income due to loss in agricultural income in these other areas, but to place all of this under the label of "secondary" while classifying differently for the importing, exporting, and transit areas is inconsistent and confusing.

phasize that while I believe that the failure to distinguish between that part of change in regional income of other irrigated agricultural areas which can be legitimately counted in terms of economic efficiency and that which is purely an equity consideration, is a shortcoming of this book; the consideration given to effects in other regions represents one of its strengths because impact on other areas [in an equity sense] is clearly an important political dimension in the interbasin transfer decision-making matrix.

Howe and Easter's conceptual treatment of "secondary" [indirect] benefits, while on the brief side, is better than some of the literature on this subject. My concern here is not so much with what is said, but rather with what is left unsaid. Their argument is the familiar one that in the absence of unemployment, resource immobility, or excess capacity indirect benefits cannot legitimately be credited to national account due to offsetting indirect losses incurred elsewhere. This argument seems straightforward enough and is, indeed, espoused by many resource economists. However, if one logically extends this general equilibrium argument to direct effects as well, then it would appear that direct benefits generated by a new investment would also be offset by direct costs elsewhere, in which case we could forget the whole matter [1]. However, general equilibrium is never achieved and resources will always be *under*-employed in their existing employment if new, more lucrative opportunities are made available. This is true for indirect effects every bit as much as for direct effects. The difference in factor rent earned between the new employment and the old employment, represents a *legitimate* benefit be it direct or indirect! Legitimacy does *not* require, ". . . long-term, structural *un*employment . . ." as the authors suggest, although this condition clearly increases the potential for indirect benefits of a large magnitude and eases the estimation problems as losses elsewhere will be zero. The real problem is one of *legitimately estimating* net indirect effects and it may very well be that the associated empirical problems are sufficiently great that such effects should be ignored in the analysis of most interbasin water transfers when a case for *un*employment cannot be made.

Another point of disagreement involves Howe and Easter's statement that: "Since the demand function will always be downward sloping, the *existing price* can be taken as an *upper bound* on the direct benefits per unit of any *additional water* that might be made available." It is simply not true that the demand function will always be downward sloping. The demand function to which Howe and Easter refer is that of the demand for water as a factor of produc-

tion. As is pointed out in their mathematical appendix, the demand curve for water can be derived from the first order conditions for profit maximization. For their example case, a two factor Cobb-Douglas type production function, the demand function for water is given by

$$p_w = \left[ p \beta \alpha_0 \left( \frac{\alpha}{\beta p_k} \right)^{\alpha} \right]^{\frac{1}{1-\alpha}} \quad w^{\frac{\alpha+\beta-1}{1-\alpha}} \qquad \text{(Equation 2.13, p. 34)}$$

where

w = water

$p_w$ = price of water

$p_k$ = price of the other factor

p = price of the product and

$\alpha$ and $\beta$ = partial elasticities of production for w and k, respectively.

Only if the production function is one that exhibits decreasing returns to scale, will the demand function be downward sloping. If the production function exhibits constant returns to scale, $\alpha+\beta=1$, the demand curve will exhibit zero slope, in which case, the factor price will equal factor demand only by accident and the *existing price* can *not* be taken as an upper bound on the *direct benefits.* If production occurs in this case, the factor price must be *less than or equal* to factor demand. Of course, if the production function exhibits increasing returns to scale, $\alpha+\beta>1$, the demand curve will be positively sloped and the *existing price* bears no resemblance whatsoever to an *upper bound* on the direct benefits. It is interesting to note that 13 of 19 Cobb-Douglas type productivity functions fitted by Ruttan and his RFF sponsored study on the economic demand for irrigated acreage exhibited increasing returns to scale for his most completely specified model (all independent variables included) [pp. 102-108].

In view of these conceptual difficulties, this book should be read and interpreted cautiously. However, there is enough right about this book to make it a credible contribution to the literature on natural resource economics.

BRUCE R. BEATTIE†

†Assistant Professor of Agricultural Economics, University of Kentucky.