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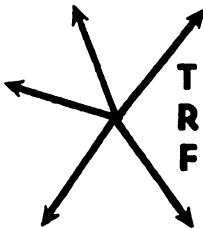
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TRANSPORTATION RESEARCH FORUM

Toward a Resolution of the Controversy Over Criteria for Water Resource Development

by John A. Creedy*

IN THE LONG RUN, a discount rate on water resource projects which is so high that it really does prevent essential water resource development will be corrected. But, as John Maynard Keynes once remarked, in the long run we are all dead.

Before that time arrives and before major crises are precipitated in water management, it would be helpful to build a bridge between those who fear that water resource development is being side-tracked and those who are seeking new and objective criteria for ordering the priorities of public investment.

We have no more water available to us on this continent today than was available to the Indians 5,000 years ago. We have introduced a vast population and a fast-growing and increasingly thirsty agricultural and industrial economy. Water cannot be created economically. There is too much of it in some places and at some times and not enough at other places and other times. Proper management of water is the essential under-pinning to the success of our way of life.

Little time is currently spent worrying about it because until very recently, a sensible program for water resource development has quietly and effectively anticipated the problems. In this one area, at least, we have achieved the kind of creative political and economic action which an educated, civilized society should achieve as a matter of routine.

Indeed, the water projects fit neatly into Adam Smith's concept of the proper functions of government. Smith, the father of so many streams of modern economic thought, believed government had three legitimate functions: defense of the realm, "exact administration of justice" and public works individuals would not undertake because they were unprofitable.

The programs have required the cooperation of diverse and often opposing interests, a willingness to compromise, concern for the effects of the program on the overall environment and, above all, sensible long range plans.

We have had the patience to wait more than 40 years for the development of the water resources in the Columbia basin in the Pacific Northwest, a program of vital interest to the exploding population of California in terms of the supply of electricity.

Efforts to manage the water resources of the Mississippi System, draining the vast area between the Rockies and the Alleghenies, began before the

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American Revolution. The program surely ranks with space exploration as one of the most imaginative engineering feats of man. It is far from completed, but it is on target as far as the needs of mid-America—accounting for better than half the nation—is concerned.

If we now mis-manage what has been well-managed in the past, the penalties are going to be severe for those who do the mis-managing. We may not have immediate solutions for the problems of the inner cities or the education crisis, or the drug problem, but water resource management we can do. If it turns out later that, in addition to all our other problems, we induce a national water crisis, there will be overwhelming anger. If the excuse offered when the taps run dry is: "we thought you would rather keep the money and buy booze with it than be taxed for investment in water resource development," a lot of people are going to find themselves summarily and deservedly removed from public office.

Before this ultimate unpleasantness occurs, it should be possible to come to grips with the issues much more effectively. As usual, the experts are in violent disagreement. As usual, there is more heat than light. As usual, much of the talk is at cross purposes.

The violent controversy has eroded the common ground for discussion and that is unacceptable.

At the heart of the problem is what must appear to most people as a completely reasonable statement from the Office of Management and Budget:

"The simple fact is that when the government, no less than a private citizen, makes an investment, the rate of return on that investment—the benefits and costs involved in it—should first be measured against those which could be derived from other investments of the same amount of money. The opportunity cost concept is but an expression of this situation. We cannot fairly compare the costs and benefits of two projects where the cost of capital for one is assumed to be different from the cost of capital at the same time and in the same amount for the other."

The OMB points out that there are more legitimate needs for public investment than there are resources to satisfy those needs. Hence it is logical that a priority system should be developed. One test which OMB feels has great promise, and the crucial test they would apply to water resource development, is to compare the rate of the return of a government investment with the rate of return which the same resources would have produced if they had been left in the private sector.

That may sound all right in principle, but how does it work out in practice? John Krutilla and Otto Eckstein, recognized experts in the field, suggested the number should be about 6 per cent. OMB experts believe it should be 10 per cent. But OMB concedes that 10 per cent would be too much of a shock to the water resources programs so, for political reasons, they propose a rate of 7 per cent. But OMB clearly believes it should be 10 per cent and, viewing the matter realistically, they will undoubtedly try to work it up to that level as soon as possible.

Under the law, the government cannot proceed with a water resource program if the benefits do not exceed the cost. Hence the cost of capital, the

discount rate, is crucial. In fact, if the rate is raised from the present 5% per cent to 7 per cent and eventually to 10 per cent, it is feared that most water resource projects would not meet the cost-benefit test.

North Dakota's Governor William L. Guy, past chairman of the National Governors' Conference committee on natural resources and environmental management, said that the information on the new discount rates "swept across this arid Upper Midwest like the crack of doom." Governor Guy was of the opinion that the use of a discount rate of 7 per cent or more would have the effect of stopping comprehensive water resource development in America.

Amon G. Carter, publisher of the *Fort Worth Star Telegram* said: "If these principles and standards are adopted, the orderly conservation, development and management of America's soil and water resources will come to a screeching halt—a halt that will produce delays and inaction that America cannot afford, America will soon wake up to some awesome and awful realities: severe water rationing; death and destruction from floods; inadequate water-oriented recreation facilities; dying rural areas and overcrowded cities; a faltering economy that once was bolstered by water resource development; unemployment brought on by curtailing construction programs that are bread and butter to millions of blue collar workers; stagnated river systems and a lack of versatility in our transportation systems because we halted the orderly growth of our inland waterway system."

Senator Robert Dole of Kansas was also critical. "By proposing an increase in the discount rate from 5% per cent to 7 per cent, these standards establish a bias in favor of projects returning relatively early benefits for costs incurred . . . my chief fear is that by becoming preoccupied with 'less capital intensive projects scaled mainly to meet near-term needs' the entire nation may some day be faced with water resource crisis of overwhelming proportion because no one looked far enough to see it coming."

Senator Henry Bellmon of Oklahoma echoed the same theme: "We simply cannot afford to wait until we are in the midst of a crisis before moving ahead with developing water supplies, transportation facilities, recreation of lands and other aspects of land and water development. We know a much larger population is on its way; we need to get ready for it—before it arrives."

Those supporting the new approach, however, have simply said that if it does stop water development, other things are more important. Resources should be applied to the problems of the inner cities, cure of the drug problem, improvement of education and the like. Others have said that water programs *should* be stopped because they interfere with their right to contemplate "the wonders of the affected rivers and streams and their ecosystems in their natural state."

Just to digress for a moment, I have personally never thought that there was a real conflict with the environmentalists over water resource development once the need for balanced and well-designed economic development is conceded. Mistakes may have been made in the past, but they certainly can be avoided in the future. There is more in proper water resource development for the naturalist, the outdoor sportsman, the camper, the fisherman and the conservationist than there is for almost any other segment of national life.

The common ground for discussion seems to be well and truly eroded. Where can one start?

Perhaps the best place to start is with the assumption that those who advocate such an apparently damaging approach to a useful and meaningful program are people of good will. Their problem is understandable. Budget resources are inadequate to satisfy all legitimate needs. Attempting to quantify and compare the benefits of different programs in such a situation is a useful and constructive discipline. The chances are good that if the answer in the end prevents a demonstrably sensible outcome, some fallacy or flaw has crept into the reasoning somewhere which can be revealed on analysis.

We start of course from the basic OMB position. There is a tremendous pressure on the budget process, limiting drastically the number of programs we can undertake when compared with the total suggested. OMB says: "... we have to be sure that within each given program the government's resources are used in the most productive way. When many clearly important programs are subject to tight funding limitations, we cannot rightly fund less productive programs in other areas."

All right, but productive compared to what standard? And the answer is: productive compared to the return that the same money would earn if it were not taken away in the form of taxes. This return has been determined to be 10 per cent.

But what is the basis for the 10 per cent figure? Is it as scientific as the OMB and its supporters would have us believe? It is not scientific at all. There is great controversy over the figure. And one of the reasons for the controversy is that what the concept requires is a figure to represent the rate of return in the private sector not only in the past and not only in the present or near future, but one which will provide accurate intelligence on the rate of return over a period of 50-75 years ahead. Some reputable economists believe it should be 6 per cent, others believe it should be much higher than 10 per cent. The very fact there is controversy and lack of agreement suggests that such a crucial figure should be used with great caution. OMB's answer may be that it has to start somewhere. Crude as it may be, this is all OMB has. If we wait for all the controversies to be settled, we'll never get an answer, they may answer.

But should OMB use the *wrong* number just because there isn't a better one? The effort to quantify, the discipline of meeting a standard are both constructive and helpful, but the numbers used, even if they were less vulnerable and fallible, should surely be used only as guidelines, as indications, not as immutable laws.

That is where part of the fallacy lies. Some things cannot be quantified, however useful quantification may be. For example, other social purposes exist besides pure economic productiveness. We have to have police, we have to have an army, navy and air force, we have to have other important services regardless of whether they meet a number standard or not.

Nor does the "either/or" approach seem appropriate. The concept that we must set up a priority list from 1 to 100 and only do those which provide the highest return is on its face an absurdity. The water resource projects would

probably have nothing to fear from such a rating system. It might mean, however, that all the water projects would be accelerated and none of the children educated. It is like asking, which do you want, food, clothing or shelter? It is obvious that we need to make progress on education, ending the drug menace, curing the problems of the inner city, defense, water resource development and many, many other essential needs. Numerical priority lists are useful, but not a substitute for judgment. All essential programs have to move forward. If they are not essential, we shouldn't do them at all.

As we look into this question further, opportunity cost at the 7 or 10 per cent discount rate becomes more and more questionable.

First of all, water resource development projects account for far less than 1 per cent of the Federal budget even when they are fully funded. So complete elimination of them would cause no movement of resources, no significant difference in public habits of investment and consumption such as would be the case, for example, if the defense budget were eliminated. Therefore it can't be said that we should cut back on the water projects in order to release resources for private use. The amount involved is too small to have any measurable effect.

When we say that the social cost of a public works project is equal to the foregone rate of return on private investments, the assumption underlying that statement is that the economy is fully employed. If it is under-employed, if men and machines are idle, clearly public investment at a very low discount rate which employs men and machines may well be highly useful and productive. So an opportunity cost approach with a uniform rate is wrong. The rate should be very different in an under-employed economy and the extent of the difference depends on how much under-employment there is. There cannot possibly be a fixed rule.

One also wonders about the concept that a dollar spent by the Federal government is a dollar that would otherwise be spent on something productive by the taxpayer. Clearly taxes are not the only source of government income. For one thing the government creates money every year by expanding the money supply.

Also of course the government borrows money from the private sector, so it isn't necessarily a one-to-one question, one dollar of public investment subtracted involuntarily from the private sector where it could be used to better purpose.

This question has interesting implications. Back in the Great Depression, the classical economists were called upon to explain how that fantastic economic disaster, which appeared to be so contrary to all economic theory, could possibly have occurred. They failed miserably, particularly on the question of public investment. In England, David Lloyd George urgently wanted to get started on public works in order to create employment. The British Treasury, reflecting world-wide orthodox economic opinion, advised against it, holding to the conclusion that state-supported schemes of capital development must "make a hole in the capital which is available for the purposes of the community." Others insisted, in a famous exchange, that the solution was to reduce wages since this would create vacancies and increase the demand for labor, a suggestion economists would hoot at today.

Both Republicans and Democrats have come a long way since the collapse of classical economic theory, but it is interesting that OMB seems to be holding to the idea that public investment makes a "hole" in capital. A doctrinaire insistence on a high discount rate is reminiscent of the high bank rate of the 1930's which discouraged new investment at the very time it was most needed. One wonders what OMB's approach would be to public works in a period of really serious economic distress. Would they insist on a high discount rate just as the Bank of England insisted on a disastrously high bank rate during the depression?

How can we test whether the 10 per cent figure is right? We know for example that it is perfectly possible to invest money in the private sector and make much more than 10 per cent—15, 20 and even 50 per cent in one year. But the 10 per cent figure is an attempt to strike an average for the private sector as a whole, all the profitable deals balanced off against the disappointing performance of horses at the race track and the corner groceries which failed.

The opportunity cost idea has been around a long time without serious challenge. How right Paul McCracken is when he said recently that "ultimately the world is governed by ideas." In the intervening years, the use of opportunity cost has found powerful supporters.

But what about the 10 per cent figure? The first thing that occurs to one is that the government can go out and borrow in the open market at between 5 and 6 per cent, or less. Unlike the situation in which the taxpayer surrenders his money in taxes involuntarily, loans to the government are completely voluntary—indeed the government interest rate is defined to be that rate which will attract investment from the private sector. It has been going up in the past 10 years but it still averages around 5 and 6 per cent. Why isn't the yield on long term Treasury borrowing a very strong indication of the actual opportunity cost of money for public works? No one forces anyone to lend to the government. In most cases, if the private investor knew of a better deal, he would presumably invest elsewhere, indeed, he is under a heavy obligation, if he is the trustee of funds, to get the best deal possible. Presumably, lending to the government is the best deal possible.

This is obviously a sensitive point with OMB because it is passed over very quickly in their papers. But it bears further examination. Why should a public works project be loaded with a 10 per cent rate when the government can get the money for half that—and plenty of it?

Until recently, the discount rate applied to public works programs was in fact based on the cost of 15-year Federal obligations. OMB now says that is not a proper calculation because one should take into account "not only the yield on Treasury obligations but also tax revenues foregone on returns to private borrowing displaced by Federal borrowing, commissions paid on sales of bonds, and administrative costs of borrowing. After the yield rate, the most significant of these is foregone tax revenues."

But this begs the question. Now we have suddenly switched sides of the street. We were seeking to determine what the *taxpayer* earns in the private sector. We cannot figure into that what the Government's expenses of bor-

rowing money are. All we want to know is how much does the taxpayer earn when he invests in government securities. That is a figure net of any government expense of borrowing.

And why bring in taxes foregone in this equation at all? In any discussion of saving or investment versus consumption, consumption is always foregone for savings. One foregoes consumption now in order to receive a stream of income or other benefits later on. The government makes an investment now in public works. Of course it foregoes taxes now which it might otherwise receive in anticipation of a benefit later, including taxes which may come from a more productive, wealthier economy made possible by the investment.

That's what public investment in public projects is all about. We set aside valuable property for parks. We forego not only the taxes which might otherwise be paid on the land if it were privately owned, but taxes on the businesses—lumbering, minerals and the rest—which might have been paid if the land had remained in private hands.

With water resource projects, there is a well-proven record that taxes foregone at the time the projects were built have been returned many times over in taxes from expanded economic activity stimulated by the projects.

Why, then, is there such a difference between the opportunity cost rate of 10 per cent advanced by OMB and the yield on Treasury money?

Assuming that the 10 per cent is properly calculated, and no one has added in the date by mistake or divided by his telephone number—which happens more often than one would expect in these marathon calculations—perhaps, on analysis, we may find that something has been overlooked.

Again we turn to the statement in the Federal Register justifying the higher discount rate. "The difference between the interest rate paid on Federal borrowings and the opportunity cost in the private sector is due in part to the fact that private rates of return must be sufficient to pay taxes on earnings of capital."

So the 10 per cent figure is before taxes. Is *that* right? A rate of return properly figured is net of all expenses. Surely the police force, the fire department, flood protection, an assured water supply, the "exact administration of justice" in case we want to sue someone and all the rest are expenses of doing business, of living in freedom, of the very "pursuit of happiness" which the country is supposed to be all about.

So if we are comparing a rate of return on government investment with what that money might earn in the private sector, it has to be net of all expenses—the *after* tax rate would appear to be the right one.

Adjusting the 10 per cent to an after tax basis would account for a great deal of the difference between the rate for money earned on government loans and the OMB's opportunity cost. Another sizeable part of the difference is accounted for by the risk premium attached to private investment. Loans to government, backed by the taxing power of the government, are virtually without risk. Investments in the private sector carry some risk. If one adjusts for risk, the difference may well be eliminated altogether. Thus,

why isn't opportunity cost best measured by the yield on long term Federal borrowing?

The proposed 10 per cent discount rate has drawn attention to the discounting process, a useful tool to bring all future streams of benefits and their income equivalent into a present time frame of value. A businessman uses such a tool to help him decide which of two different investments to make. A certain income of \$1 next year will only be worth 94 cents to him today, assuming a rate of interest of 6 per cent. An income of \$1 in the year 2,000 would be worth less than 20 cents today. An income of \$1, 50 years from now, would be worth about two cents today.

The usefulness of the discounting system of course depends in part on the certainty of the information on future streams of income. The errors are less, naturally, for the short term than for the long term.

An income stream of \$5 million a year for five years is not as good as an income stream of \$5 million for 10 years. The discounting process would demonstrate that. But out 20, 30 and 50 years, the information becomes more uncertain and gross errors become more possible.

If one doesn't know all prices, all alternative actions and their consequences with certainty and conditions are *not* constant through the period, then the answers can be faulty.

A good example of the kind of problem that arises in the analysis of future water resource benefits which makes such analysis, at best, very crude crystal ball gazing indeed is the story of the Grand Coulee Dam on the Columbia River. A cost-benefit analysis in the 1930's could not count at all the fact that in a very short time it would help win a war for the nation. The Grand Coulee is called the dam that won the war because of its contribution of electrical energy to the aluminum industry, the aircraft plants and the atomic energy plants in the Pacific Northwest.

The future is unknowable. But nevertheless through the discounting process we are making a judgment about the future. When we discount \$1 of income received 50 years from now, the tables give us a present value of two cents. In other words, we are saying that a benefit 50 years hence is worth little or nothing to us today.

Most of us may well be dead in 50 years, but the country will still be going. Are we saying that practically *no* consideration should be given to the needs of future generations? Should we add nothing to the real capital of the country for our grandchildren to enjoy? Surely we don't mean that, but a judgment relying slavishly on the discounting tables says precisely that.

And yet, of course, it is important to try to quantify benefits to the best of our ability. But we must be constantly aware of the limitations of the numbers available. This is not always easy in our society. There is a great tendency to rely blindly on numbers which, very often, are far from meaningful. There is faith somehow that by manipulating figures, some numerical conclusion can be reached which is a substitute for thinking and judgment.

Our number experts are now very sophisticated. They can quantify anything—the quality of the sunset, degrees of feminine attractiveness, the impact

of modern art. If asked, they'll devise a formula, make a survey and classify and compute anything. The classification may not be worth the paper it is written on, but if we insist on a number in our society, a number will be forthcoming.

The United States has the best and most reliable statistics in the world, but many of them are very crude indeed, accurate to only plus or minus 20 per cent. Because they are so crude and have so wide a margin for error, their use in policy making can be dangerous; the more so when they are used to measure the unknowable future.

Number manipulation is no substitute for thinking. The citizenry should be aware that arbitrary assumptions are frequently made to provide a number otherwise unobtainable. A simple change in an arbitrary assumption based on imperfect knowledge can turn a cost-benefit ratio from plus to minus. The discipline of developing the numbers is useful, but we must be constantly aware of the limitations of the numbers.

Over-reliance on numbers has blocked communication on such issues as user charges for the rivers. A budget number on the one hand has to be matched with a budget receipt on the other. Experts who propose matching those numbers never seem to ask why, in over 40 years, the Congress has not agreed to supply the matching number or whether, in fact, they have long ago made up in other ways for whatever inequities to the railroads which may have resulted.

If they did they would find that the benefits of federal investment in navigation are indeed very broadly spread throughout the economy, that vigorous competition has made certain that the economies of water transportation are passed on to the consumer, that any user charge would be passed along to those consumers directly as a waybill tax, that tax abatements to railroads probably more than compensate for any inequities that may result. But the common ground for discussion has been eroded on this question.

What then is the answer? One is reminded of G. K. Chesterton's comment about jury trials. How has our civilization decided who should rule on guilt or innocence? Mr. Chesterton writes:

"If it wishes for light on that awful matter, it asks men who know no more about law than I know . . . When it wants a library catalogued, or a solar system discovered, or any trifle of that kind, it uses up its specialists. But when it wishes anything done that is really serious, it collects 12 of the ordinary men standing about."

The well-informed ordinary citizen has an excellent track record on issues which are really serious. When I was growing up in North Carolina in the 1930's, the South was called the nation's economic problem No. 1. A number of federal programs were developed, aimed at making the region more prosperous. The programs used were equally available to any region of the country as they are today at any one time they may help one region more than another.

For the Pacific Northwest and the west coast, the more affluent east made available a variety of national resources with a view to helping economic development in the west. And so in other parts of the country.

It is a tribute to the reaction of the ordinary non-experts that they didn't require these programs to produce a net increase in affluence for the nation, though that was the end result. The thing that needed to be done as the problems arose in the different regions were done.

The informed voter makes the right judgment in serious matters. Left to himself, he can decide that he wants to be protected from floods, that he wants a lake for boating and fishing, that he wants low cost electricity from barged coal, that he wants the water to run out when he turns on the tap.

Opportunity cost at the effective yield of long term, low risk government securities calculated over a reasonable time period to smooth out peaks and valleys could well be used as part of the input in making these fateful decisions. When the economy is not in full employment, the discount rate should be low in order to help move the economy to full employment. Or it might be low, as some have suggested, for projects which help the environment, since that has important priority, but it should never be more than the long term government interest rate.

Alternatively it might be a mixture of opportunity cost at the long term rate of Government securities and a rate to indicate the "social time preference." This is intended to give the vote on these issues to unborn generations and not insist that all benefits be in the near term. It assumes that we should deliberately build the productive capacity of the nation so that it can be enjoyed by future generations.

Social time preference is a somewhat fancy way of saying that whatever is done, there is no substitute for sound human judgment. In the end what's needed is the capacity to make the decision that when we turn on the tap, water must come out.

Not every civilization has been able to do that.

To tie every decision to a number which appears on the face of it to be highly suspect, which even its defenders have to concede is open to serious challenge on the merits, and arbitrarily use it to determine whether such crucially important projects as water resource development are done or not as if God himself had carved the number in stone is entirely unacceptable.

The real challenge is how to apply informed, common sense judgment. The effort to quantify benefits has so far been useful, but it obviously falls short of being the total answer.

The OMB's problem remains. The nation's budget is insufficient to meet all legitimate requirements. How should OMB make its choices?

And this, it seems to me, is the fundamental question. Clearly what is proposed is inadequate. Something better is needed. But OMB's critics also have an obligation, it seems to me. They must address themselves to OMB's problem and try to supply an appropriate answer.

The question is a highly complex one. It cannot be answered in a paragraph. But it can be answered. The people best equipped to answer it are not the specialists. This is too serious a question for the specialists.

They have been helpful, but the end result of what they have done is not certainty, but uncertainty. As a result, we are losing that sense of confi-

dence which enabled Jefferson to make the decision to buy Louisiana, which launched us on a program to build the transcontinental railroads, which propelled us into the space age. Our thinking on water resource projects has become one-dimensional, able to accommodate only present economic returns not other urgent social needs and equally important needs in the long term future.

Oddly enough, in this field of water resources, the Dutch retain their certainty. They have no doubts about the need for a superport with an 80 to 100-foot channel. They studied it briefly and since 1967 have been digging it out. The rewards of economic expansion have crowded in upon them. They have reviewed the worth of balanced economic development. On the choice between poverty and affluence, they have made a judgment. Rich is better.

And yet, in this country, we remain uncertain about superports despite the fact that we know beyond a shadow of a doubt that our country, great and powerful as it is, cannot afford to pass up the technology of the super-tanker and the huge new bulk carriers without serious damage to its energy needs, its steel and other essential industries. Other water resource investments are being delayed—dangerously delayed—while uncertainty continues.

It is therefore urgent to resolve our uncertainty. Fresh, positive ideas are needed—and soon. The controversy is one that reasonable men should be able to resolve.

