

POLICY TOWARD FLOOD PLAIN MANAGEMENT

By

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Have there been more conflicts in water resources planning over flood control than with other aspects of water resources? I don't know. But, I think we'd all agree that there have been many, and the challenge is to learn what we can from them.

Losses from flooding range from \$100 million per year on the low side to over one billion dollars per year. Spending to avoid flood losses has approximated \$500 million per year over the last half a dozen years. These are sizable allocations of the national welfare on the one hand and the national budget on the other.

I doubt that conflict is over whether or not such losses should be avoided. The issue is more how to avoid them and who is to bear what burdens and what gains. At another level, conflict is over representation in the planning process and the resulting weighting of the interests involved.

### A Review of Some of the Points of Conflict Sets the Stage

Let's start with the traditional federal project -- a mix of channel work and one or more dams. The idealized problem is to manipulate the configuration of the channel and manipulate the distribution of flows through that channel in such a way as to optimize the net social value between all costs and all benefits. Of course, this assumes that incremental costs can indeed be compared with incremental benefits to determine which changes in project scale and mix add to the net social value.

According to some of my engineering friends, we still lack a good analytical mechanism for relating the parameters of dam design to channel configuration in an optimization context, even when we consider only

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those costs and benefits that can be put in terms of money. But for this paper that is a separate issue. The choice of how to solve the problem is even more fundamental than that.

An investment such as a dike protects existing houses and stores in the flood plain and one might well ask "Should they be rewarded for being flood stupid?" Houses and stores behind a dike are only really justified in the long run sense if the difference in social return from locating on the flood plain behind the dike as opposed to locating out of the flood plain is large enough to make the effort worthwhile. Such location differentials have not been the basis for our evaluation of many of our structures. Instead we have used damages averted to match against the direct costs. The result is that we have had a pretty clear policy in the past of rewarding those who are "flood stupid." And what else can you do once the houses and stores are there?

But a dike may also protect undeveloped land in many of our projects. The result is a windfall capital gain to a landowner that can range from \$1,000 to \$100,000 per acre in urban areas, less in areas without urban growth potential. Now the protection of undeveloped land and the windfall gain that results has with it a somewhat higher likelihood that the local cost-sharing will be higher. Nonetheless the degree of subsidy or income transfer to the property owner is substantial. Luckily we are now more likely to use location differentials as the basis of benefits. This is a step toward better identification of who in addition to the tax payer is involved in the income transfer.

Note that if the owner of extensively used land has been denied more intensive use because of flood plain zoning he is in an ironic position if structural protection is provided. He and/or his local government are apt to be held for higher cost-sharing than if development had taken place. This would seem to represent a penalty for being "flood wise" instead of "flood stupid." And the larger point is that we have to evaluate our policy toward flood plain management in the broadest context of the equity and motivational effects.

The construction of a dam, particularly a large one, often directs our attention to the process of acquiring the land to be flooded, acquiring flowage easements, etc. New legislation in the 1970 session of Congress, introduced as S-1 by Senator Edmund Muskie, goes a long way towards reforming the federal approach toward compensation. For all federal projects and federally-aided projects the principle will be to make those who are affected whole again. This is in contrast to a previous principle, quite unevenly applied from agency to agency and project to project, which was to compensate only on the change in capital values before and after the taking. There seems little doubt that if more equitable, humane and uniform procedures are developed for compensation, conflict from this source should be reduced.

But what about consequential damages? Examples of these are the business lost by surrounding service firms because a number of customer farms have been inundated. Closely related to this is the effect on the indebted school district that has had half its tax base move into public hands and perhaps half of its school children moved elsewhere. We sometimes figure such costs into the justification for our project. We

almost always work into that justification the consequential losses of the floods that we are attempting to prevent. These stem from such things as the loss of limiting inputs that are cut off as a result of floods, e.g. cotton for the cotton gin. Another type is the effect of idleness of associated activities during the period of repairs following a flood. And of course the effects of floods on the demand for goods and services causes some consequential losses.

On some occasions, particularly those where a public agency can act as spokesman for the loss involved, consequential damages have been recognized in the measures included in a new project. But by and large the approach towards obtaining consent and agreement for the project in the face of consequential damages has been to sweeten the blow on the community by stressing the multiple purposes at the reservoir. For example, recreation is often pointed to as producing secondary effects within the community that will compensate for the consequential damages that the project itself will create.

Shouldn't we consider ways of introducing more flexibility into the planning process for compensatory investments? Just as a fish hatchery is sometimes included to compensate for a loss of a part of a fishery by a dam, we should more systematically consider payments that should be made as part of the project to not only replace facilities that were directly destroyed but also those that were indirectly affected. And in many cases this may mean, not putting things back just the way they were, but rather deciding what the potential for the community may be and making investments of a compensatory kind in the light of future realities. Economic Development Administration type districts and the kinds of investments which the EDA can make are one kind of action that might help. It should be made easier to replace the lost fishery, for example, with something quite different if that has greater value.

We have some history that needs to be studied in the use of direct payments to those who bear consequential damages. New York City under arrangements established by the New York Legislature has compensated people in a wide variety of circumstances. This history needs further study. It may identify approaches to be avoided and guidelines to what is needed. Anyone affected indirectly by a New York City reservoir could make a claim for income lost as a result of the project -- apparently regardless of the success he had had or could reasonably be expected to have in adjusting to that effect. But since these were strictly single purpose projects there was little about the projects that produced mitigating effects. Further, at that time and place, there may have been little else being done by government in general that could be counted on to have an offsetting effect.

Conflict over environmental values as they are affected by flood control projects, as well as other means of managing the flood plain, has taken on new significance in recent years. If we think of the environment in its broadest sense, as being that set of relationships which an individual has with his surrounding world, we can of course include everything under this heading.

The economist has suggested one means of delineating the territory. Environmental values become those effects of an activity which are not

normally taken into account by those who are making decisions. In other words, if the owner of the flood plain were dealing directly with the construction engineer to provide works for flood protection and neither cared about fishing nor were concerned about those who did fish, they would presumably make the decision about the protection works without considering the effect on fish. Another way economists define environmental values are those that we all share where one user's enjoyment of the resource need not diminish the usefulness of that resource for someone else. A variation of the last definition notes that the price paid, if any, by the user does not fully reflect the social or opportunity cost of the use of the resource.

Obviously, social process-oriented definitions of environmental values makes it difficult to classify them in physical or biological terms. This in turn makes them difficult to handle in planning.

Definitions and classifications of various sorts are helpful in thinking about environmental problems. But the conflict over environmental values seems to revolve around whose environmental values are to prevail and what environmental values are to be considered. Indeed, in practice we seem to have relied on conflict to identify environmental values for the planning process.

Fish and wildlife values have a fairly well established bargaining position in the water resources planning process. With respect to mitigation and enhancement values it is quite clear who pays and whose responsibility it is to determine that indeed losses or enhancement are going to occur. This is certainly less true for many of the other areas.

The need for general guidelines seems quite apparent. Some who are quite concerned that the state of our knowledge about how to study and value the environment and the position of these values in the political process is such that to try to make definitive statements about their relative scarcity, to try to set priorities, can only work to the disadvantage of the fragile values that are involved. But whatever the reason, general plans for the protection and enhancement of the kinds of environmental values over which there currently is conflict do not seem to be produced in any detail or sophistication, except as they are related to water resources planning and development. Perhaps this is quite reasonable. Water is, after all, such a pervasive element in many environmental concerns.

Our experience with fish and wildlife values may indicate some of the difficulties. Where compensatory mitigation features are included in a project it is not always clear that the funds are utilized to maximize what the agreed-upon dollar amount could actually buy in terms of the values at issue. The emphasis is on doing something at or very near the project site, and cost-effectiveness tests considering unrelated opportunities elsewhere are rare.

It is not unreasonable to put some emphasis on penalizing the project at hand for the losses that may result, but this is still no excuse for failing to make maximum beneficial use of that amount to transfer funds.

What would happen if the planning process produced more general developmental plans for fish and wildlife, or whatever environmental values are at issue, than they do now. In spite of the fact that water is such a pervasive element in many environmental values the agencies which are charged with the protection and enhancement of those values do not look upon the water resources planning process as a means of expanding budget and program authority. If changes were made to encourage a program building approach to planning on the part of these agencies, it would seem they would be in a stronger position to use the process to the advantage of the values which they seek to enhance and protect. Would shifting the environmental agencies to more of a project approach help? How much will current steps to shift the management of planning to the Water Resources Council help? Will added review arrangements and evaluation principles and practices help? These all should help place the fish and wildlife, water quality and other environmental agencies into the status of full-fledged water development agencies.

Many esthetic, ecological, and cultural values are just beginning to be formalized in the planning process. Controversy creates perception of some of these values, both on the part of planners and the public. Indeed controversy may create the values themselves. This makes them no less real. A good hot fight over the use of a natural area for a reservoir, calls the values of that unique area to the attention of many people, many who might never have heard of the area before. The mind boggles at the thought of including benefits created by controversy in the benefit-cost equation for a project, but I think it's difficult to deny that this process really works.

Asking you to think about how controversy can create values highlights the planners' burden in their consideration. When there is controversy and a decision is finally made in a political context of bargaining between mobilized active interest groups, where there has been an appeal to political authority, the planner's job is easier. Vexing perhaps, but easier. His difficult problem is where there is little strong representation and bargaining at the time that he must perform his task of identifying alternatives and marshalling the basis for choosing between them.

Direct values, the values held by those who use the resources for environmental purposes from direct contact at the current time, are simply not enough. Yet getting a handle on direct use values is hard enough. Running a project proposal up the flagpole to see who salutes can help stimulate some participation in the planning process but by no means can it be relied upon to bring out all of those who have a current direct value.

But the planner's problem does not stop there. Doesn't he also have a responsibility to consider the value of holding open options for the future? We protect undeveloped flood plain so that it is available for future use, we have an equal responsibility to consider the future of other affected environmental values. Closely related to this is the question of the vicarious users of environmental values. Just as there are those who gain considerable satisfaction from the fact that flood threats are reduced in areas that they never expect to live in or even visit, so there are also those who enjoy other environmental values because they're available for others to use.

Anyone who is familiar with the history of the Adirondack State Park in New York State will recognize the political importance of the vicarious users of the Adirondack Preserve. For years they have vigorously defended a provision in the State Constitution which insures that the Adirondack Preserve will be forever wild. Or at least those parts owned by the State will remain forever wild. Perhaps if those vicarious users were to indeed become direct users, and also gain some faith in the public administration of natural resources, they might consider more control for the private lands in the Adirondacks and more management for some of the public lands for environmental purposes.

Conflict over environmental values has one other lesson for us, and that is that it shows one way in which greater representation and participation in the planning process does come about.

Conflict over interests that are represented by upstream and downstream water users seems to be thought of by many persons in the water resources field as the classic form of conflict. Yet as I read the record conflicts over environmental values would seem to have been at least as disruptive and in some ways more instructive. Conflict between power production and other uses of water, conflict between recreation interests and others, conflict seems to be the order of the day. But conflict over environmental values seems to be handled less well than other forms. I would venture the hypothesis that the reason for this is not that these conflicts are any more or less real in physical, biological and economic terms. Rather it seems there is a structural difference between environmental values and other kinds of values that goes a long way towards explaining why conflicts over them are not as easily resolved, nor do we seem to find ways to make institutional adjustments that prevent conflicts over environment from arising.

An explanation might go something like this. Conflict is costly. It takes energy and resources, particularly political resources, that can be used for other things. When it arises there is a natural attempt to find ways to accommodate the conflicting interests, to find a middle road. Necessary in this process is some form of bargaining. This may be overt where the parties sit across the table and exchange project and program modifications for mutual support or at least for the absence of opposition. Or the bargaining may take place without the parties at issue even discussing the problem directly. In this case the decision-makers anticipate the reaction of the potential opposition and move to prevent a confrontation. Such strategies take many forms.

But effective bargaining probably depends upon, or at least is related to, particular characteristics on the part of the bargainers. It seems reasonable to expect that when the interests involved are immediate, represent a significant share of the incomes of the individuals, where the effects are tangible and easily recognized, then groups are easier to form and to keep effective and bargaining is made much easier. But when the concerns are diffused, when they're conjectural, in the future, spread over many people or show themselves in a number of forms not easily agreed to by all and not subject to easy identification of cause and effect, then the bargaining position of the groups at interest is far different. The ability to organize a group under this second set of conditions is markedly less. The total social values of the effects

involved may in a real sense be no less in the aggregate, but the costs of forming an effective bargaining group are simply very high.

But this is not to be interpreted as meaning that environmental values, which by their very nature seem to be in the second set of conditions, are not becoming better represented in the decision-making process. The Council on Environmental Quality is an example, at the federal level, of a significant recent advance in the bargaining position of groups interested in environmental values. That it is only a start should be recognized by the fact that the group now enjoys a staff of less than 50 professionals. And while the federal agencies are required to submit a reasonably strictly framed report on the environmental effects of anything they might do, it is clear that the sheer volume of reports will place a burden on this small staff. For example, the Corps of Engineers alone could generate in the neighborhood of 10,000 reports annually depending upon the definitions that are finally worked out for when a report is required, how the permits under the 1899 Refuse Act are to be required.

#### Conflicts Suggest New Strategies for Water Development

Let us look a little more closely at what the function of conflict might be. If we are as dedicated to growth and change as we sometimes say we are, then it would seem a shame to lose our taste for conflict. It is in part through conflict or the threat of it that new interests are represented in the decision-making process. And with change and growth it seems inevitable that new interests will arise and need a place in the decision-making process. It seems quite unlikely that we can expand the economy, redistribute income to those who are poor, either directly or by making them more productive, that we can do any of the great things that we want to do without changing the distribution of effects of what we do, and without changing our sense of values about those effects. In short, with economic growth, with new technology, with more population and crowding, are bound to come a restructuring of our arrangements for interest representation and participation.

Conflict can itself lead us to new innovations and new technology. For example, in the field of flood control, growing opposition to dams and other structural manipulations of streamflow is not going to reduce the incentive for action produced by flood losses and potentials for capital gain. Mechanisms to mobilize this incentive which provide relief with less threat of conflict, if not offset by other increases in decision-making costs, will have a better chance.

Note that the emphasis here is still on finding ways to reduce conflict, to accommodate conflict. Yet how do you tell when you have accommodated it enough? There's plenty of truth to the saying that you can't expect to make everybody happy. But how do you know when you've made enough people happy? The fact that there are no complaints at all is not the test. Yet some level of complaining is too much. I don't know how to define what is enough, but I am sure that there is some kind of a working coalition between the interests involved that is enough agreement. Without it, action is limited and there can be losses from inaction that can accumulate to become just as great as the losses that might have been precipitated by an action.



Also without some level of a broad working coalition I think it is legitimate to be suspicious of an assurance of social optima. Economists are fond of saying that the best of all possible worlds is where no change can be made to make someone better off without it making someone else worse off. And as some are also fond of noting this may be a fairly rare occurrence in the real world. Generally speaking when someone is made better off, someone else at least perceives that he is apt to be made worse off and should be compensated. It seems reasonable that if there is not at least some minimal level of agreement that adequate compensation has been made to the losers, then we cannot be assured of a social optima.

The conventional wisdom in public administration suggests that there are those who work for the public interest. It goes on to suggest there are ways in which government can be organized that increase the likelihood that the public interest will be expressed by bureaucrats and elected representatives. It may be cynical, but I don't know of anyone whose salary is paid by the public interest. Even the president can be elected by a minority. And while we are all altruistic and well-meaning in varying degrees, is this enough?

The public interest does exist. It is not simply the bargain that can be struck by a group of organized interests. Certainly the system, luckily, is structured to provide many opportunities for minority vetoes. It is the well organized minorities that get things done. They stop other minorities, too. But conflicting minorities are often forced to appeal to the general public for resolution of their conflict. More or less disinterested people are brought in to arbitrate. And they usually effect some form of compromise, some form of accommodation of the conflicting interests. Is it in this process that we are assured of working toward social optima?

At very least water interests and water agencies need broader coalitions. Budgets have been static, conflicts have been increasing. Yet by virtually every measure our needs for better water services are increasing more rapidly than they ever have before. We keep hearing that the cities are where the action is. And note that it is primarily the older more established programs whose budgets are static. Water resource development, as we have traditionally thought of it, is less important than it used to be, politically as well as economically. Profits and pleasures are more affected by other things now. Some of the organized interest groups are merging their formal organizations. This is a symptom not to be overlooked. But coalitions are paid for out of program content and features including constraints. This is just as true for agencies as it is for organized interests. For flood control, coalitions that link new interests to old suggest exploring the prospect of linking flood control to other values that people want and will support.

#### How Can We Link Flood Control to Other Values?

Those of us in the water resources fraternity have preached the gospel of multiple-purpose planning for many years. What seems to be called for is more vigorous exploration of that same familiar concept. Coalitions of new interests are apt to be stronger if what they choose

to do together produces more with the same resources. In other words, exploiting joint costs and avoiding sub-optimizing decision-making is still in order.

Have we exploited all the possibilities for environmental enhancement that can be linked to flood control? We have made a beginning toward expecting channel work that is more human habitat sensitive than we have done in the past. Looking at the attractive banks of the Colorado River flowing through Austin, or at parts of the Charles as it flows through Boston or parts of the Potomac flowing through Washington, one is reminded that a river need not be an eyesore in an urban area. But most of the opportunities for streamside renewal have been left unexploited. Improving the visual effect of a stream in an urban area should become a rallying point for flood control investments rather than an argument against them. Adjustments to a conventional flood control project that are simply grafted on to our usual approaches have worked except where they add significantly to the cost of the project. Cosmetics are not as productive of benefits as major restructuring of project content. But a number of projects have been developed which have found ways to incorporate flood damage avoidance with broader and more imaginative redevelopment of the urban scene. This is a trend to be encouraged.

Another opportunity for combining flood control with other environmental improvements would come from linking storm water runoff management with improving the interior drainage of cities. A major headache in most rapidly growing urbanizing areas is the provision of drainage in the face of the drastically changed hydrograph that results. In some cases our traditional flood control agencies and/or their respective Congressional committees have looked upon this as somebody else's problem. They have lost an opportunity for a broader coalition. Now it is increasingly recognized that this is not only a flood problem, but also a water quality problem. Our frustration with combined storm and sanitary sewers in older urban areas has been with the high cost involved in separating them. But more and more we are beginning to recognize that dissolved oxygen and bacteria are not the only pollution problems worth worrying about. Indeed suspended solids and nutrients can be even more of a threat to environmental values. Storm water is rich in these. Separation may not be worth it. The physical manipulations to manage the storm water from a flooding point of view should be closely akin to those needed to handle it from a quality point of view. Solving the two together should in many cases be more effective and perhaps even less costly than handling them separately.

The construction of flood control dikes around Texas City, Texas illustrates an opportunity for exploiting joint costs and forming new coalitions. Our older single-purpose policies prevented these from being realized. Indeed the engineers designing these dikes had to take considerable pains to maintain the status quo with respect to the interior drainage of the area and also with respect to the waste water collection and treatment system, such as it was. This was highlighted when a fish-kill was associated with the dike and blamed upon its builders -- the Corps of Engineers -- instead of the pipe that had carefully been placed through it in order to discharge the wastes at exactly the same point where they had always been discharged. The opportunity for designing and constructing an interior drainage system for the area as well as a

waste water collection and treatment system jointly with the flood control works may have been too ambitious a project for that time and place. The point is that in the future we cannot afford not to try.

As has been noted on a number of occasions the construction of a reservoir provides a pollution sink downstream from existing sources of discharge. In addition to the change in existing environmental values, if that reservoir is to be used for either water supply or recreation this fact is of significance. It should be increasingly reasonable and acceptable to use the construction of a reservoir as the focal point in a justification for a continuous review of upstream waste abatement. Protecting the investment in the reservoir should justify some aid in stimulating increased levels of waste treatment upstream.

### Mixed Strategies -- Flood Plain Management

Even if we do not leave the problem of managing the flood plain itself we can find ways to develop new mixed strategies which should help forge broader coalitions behind flood control work. There are three basic categories of action in managing the flood plain. The first of these has been discussed to some degree already, namely to change the characteristics of the flood. The second is to change the distribution of flood susceptible activities. And the third is of course to change the burden of the losses from flooding.

Changing the distribution of flood susceptible activities over the landscape is of course an old idea. It consists of moving out the old, keeping out the new, and floodproofing what's left. It has been shown that in many, if not most cases, only a mix of land use restriction and structural protection optimize conventional benefits and costs. Distinctions between the floodway and the flood margin based on frequency and damage levels are familiar concepts. Obviously land use restrictions have a very different distribution of gains and losses than structural approaches that manipulate the flood. Can they be reasonable complements to each other as long as they are so unequal in terms of ease of implementation?

The literature is replete with exhortations, but very few responses to the challenge of devising incentives, facilitation of local decision-making and compensation for those affected by land use restrictions. It is not simply a question of 1) more information, ie., identifying the zones and 2) writing the ordinances. Through compensation of lost opportunities and program development these approaches must be made more equally attractive with the existing structural approaches to both the local constituencies and the flood control agencies.

Prairie du Chien is one of several demonstration projects being developed by the U. S. Army Corps of Engineers that does not involve reliance on conventional structural approaches. In this case it was clear that no structural measures could be justified to protect the some 1,000 Prairie du Chien residents who live on a low-lying island and adjacent mainland areas flooded regularly by the Mississippi River. This project has the potential of developing new federal relocation policies.

Interestingly most of the people involved are either enthusiastic supporters of the concept or at least accept it. The Congressmen, the local officials and many others responded in this way as a result of a carefully developed participation program. Careful step-by-step exploration of the problems of implementation and liberal doses of imagination and hoped-for funding seem to have produced a successful nonstructural project. If the Congress approves, the city will develop a relocation area on higher ground with assistance from the project. Further the project will spend up to \$1.1 million to move some houses onto new foundations and to buy others for razing. Owners of the houses that will be taken down will be reimbursed to obtain equivalent new homes.

Prairie du Chien's flood plain will become a recreational area with a historic site and two marinas remaining on it. No more disaster relief or flood damage claims or demands for flood control works should stem from this community. Appropriate controls to zone the flood plain against further development are now required and have been since 1 January 1968 when a Wisconsin law was passed to that effect. Indeed, if a local community does not now zone a flood plain, the Wisconsin Natural Resources Department is empowered to write such an ordinance.

This type of approach with its solid program development characteristics and adequate attention to implementing details and compensation is what is needed. But for this to be a real alternative we have to be as equally willing to spend money to achieve it as we are to build dams and channel works. Once we have established that, then the existing rules to require a nonstructural plan and the demonstration that structures recommended are superior to feasible nonstructural approaches will take on some meaning.

Certainly there is a separation of the required powers between levels of government. This adds to the challenge to find ways to induce joint action. But it is no excuse for inaction. It is the essence of a federal system.

The third category of action that directly relates to flood losses is to redistribute the burden of those losses. Flood relief is of course a well-developed response to disaster. But we are looking to flood insurance to be used as a carrot to produce flood plain regulations. And in some cases it may be enough stimulus to provide a satisfactory result. By giving a subsidy for insurance on existing property -- 40¢ per hundred dollar valuation is the top charged for existing property -- we try to get flood wise restrictions put on undeveloped property. But I would expect most of the new development in prospect to be outside the boundaries of the municipalities with large established losses. If true this implies that inducing these jurisdictions to adopt restrictions on undeveloped property won't put the controls where they are needed.

As the flood insurance program currently operates through the Department of Housing and Urban Development, the higher the expected loss between properties, that is, within communities or between communities, the greater the subsidy. It is hard to see that the size of the subsidy in the current program is related to the difficulty of obtaining effective regulations.

The degree of subsidy for flood insurance on existing property may be quite high. Expected payouts of 11 to 1 are not unusual. In other words, for every dollar of premium paid, the property owner can expect to receive \$11 in compensation at the time of a flood loss.

This may seem high, but it is yet to be determined if this is higher than the existing subsidy that that same property owner could receive if the protection were provided him under the existing cost-sharing arrangements for structural approaches. Such a comparison would seem to be quite fruitful as indeed more than one community is faced with the problem of trying to choose between flood insurance and flood plain regulations on the one hand, or flood protection structures on the other hand.

The impact on new development also needs to be explored. Here there is no subsidy but other effects on incentives can be expected. The procedure identifies the degree of hazard and makes this information available on maps that are presumably translated into regulations that keep development off the riskiest portion of the flood plain. Development that does take place has the flood insurance available to it, but premiums are expected to cover the cost of payout. This should have an effect on the size of the capital gains that would be associated with the development of property in the flood plain. It would be interesting to see if communities that take the insurance option have growth rates that are below average for the areas around them.

#### Cost Sharing -- Pressure and Opportunity for Adjustment

A recent study (Marshall, 1970) has explored the economic logic behind the consequences of local bargaining power in water development projects. Local interests are in a position to bargain their support in exchange for modifications in project size and project features. The result is projects that over emphasize features with higher federal cost-sharing and pressing project size to approach the point where incremental gains in local benefits equal incremental increases in local costs. In the case of flood control this is complementary with the natural engineering interest in maximizing technical efficiency, avoiding politically apparent, if economically efficient failures, and the interest in reducing the threat to life and property not reflected in stage-damage curves. The result is projects that are larger than otherwise.

For many years there has been interest in reducing the federal share in the financial cost of flood control projects. Both efficiency and equity arguments have been used and there has been an expectation by some that environmental values would be better served with such a change. Further, mixed strategies of regulation and structures are expected to be easier to implement if the subsidy for structures were reduced. If the federal treasury will pay 50 to 100 percent of the costs of a structure and the costs of a nonstructural alternative are all borne locally, in our system of political processes, there is no contest.

In 1968 the Water Resources Council attempted to meet this dissatisfaction over cost-sharing rules. On March 19, 1968 it adopted a policy

statement that included the objectives first, to reduce the federal subsidy in the protection of uneconomic future use of the flood plain; and second, to require local beneficiaries to take into account structural project costs in some relation to the costs of alternative management measures available to them. Fairly modest changes were proposed; 25 percent local cost-sharing for existing development and 50 percent for future development whether "normal" or "induced." The problem of "hold outs" by minor beneficiaries was handled by limiting cost-sharing to only areas where a significant portion of the value of the property was involved. In exchange for complementary land use restrictions projects were to be given priority in construction scheduling and cost-sharing could be reduced to 15 percent for existing development and 35 percent for new development. Promise was held out for further reductions in cost-sharing if plans were for integrated systems of projects and for the stimulation of redevelopment areas. Collection costs were to be deductible from repayment. Also repayment could be stretched out to more closely match the timing of future development.

While these proposals were not adopted they represented a most interesting effort and hopefully a viable base from which to proceed. A number of questions were left unmet. For example, how were costs of relocation and floodproofing to be shared when they were substitutes for structural protection and when they were not? Should the capital gains foreclosed by land use restrictions be more explicitly recognized as a local cost?

At another level, do these proposals offer enough to obtain a coalition adequate to obtain their adoption? Communities who stand to gain from the status quo and the portions of the agencies whose program, prestige and self-image are threatened by such changes deserve more positive consideration. Future reviews of cost-sharing changes should be based upon further exploration of the requirements of mixed strategies. This holds out the promise of more local support to offset that lost by the changes. It also offers program expansion possibilities to the agencies in exchange for the reduced emphasis on structures. But perhaps more to the point such cost-sharing changes should be linked to broadened program responsibilities that link flood control to other environmental objectives.

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