



Chapter Two

The Tocks Island Dam Controversy*

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Tocks Island does not appear on most maps of New Jersey. Nor is the protracted controversy over whether to build a dam there likely to put Tocks on the map. There have been no real heroes or villains involved and no national monuments at stake. The size of the project, the number of people affected, the scale of effects, and the emotions generated by the Tocks Island Dam controversy are not nearly as dramatic as those relating to the Alaska pipeline, for example. But many of the same issues appear in microcosm, and the story is of interest for what it reveals about environmental decision making in the current climate of opinion. From the time that the dam was first proposed in 1962 until the Delaware River Basin Commission decision in 1975 to ask Congress not to appropriate funds for its construction, over 50 studies of the dam had been undertaken. A review of the thirteen-year history of the Tocks controversy may help shed light on the problems of reconciling competing values and interests and on the complexities of policy analysis.

I. THE SETTING

The controversy can be starkly rendered: should a dam be built to provide some flood control, increased water supply, electrical power, and a new recreation facility, at the expense of destroying the local communities, interfering with natural processes and scenic beauty, and possibly provoking ecological damage? From different perspectives, the central issue has been variously defined as a matter of preserving vs. destroying a natural environment; economic growth vs.

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no growth; recreation for the masses vs. maintenance of an elite preserve.

The parties to the decision have had to juggle a multiplicity of costs and benefits, both tangible and intangible. In some cases, of course, the interests of a politician's constituency may dictate a clear answer. It is not surprising, for example, to find a congressman from New York State opposed to the dam because of the costs to his farming constituency of measures to control or purify nutrient runoffs that could be expected to flow into the Tocks Island Lake. It is equally understandable that some New Jersey officials opposed the dam because the recreation facility would have entailed costs for New Jersey—for road building and a host of additional services—that would have benefited principally New York and Pennsylvania residents. Nor is it surprising to find the Corps of Engineers in favor of building the dam; building dams is, after all, what the Corps does.

But not all the political actors had ready-made positions available to them and the cast of characters involved to some degree in the Tocks dispute was quite large. It included the Delaware River Basin Commission (DRBC), the Army Corps of Engineers, the National Park Service, Congress (especially the Public Works and Appropriations Committees), the State Departments of Environmental Protection, the Federal Council of Environmental Quality, the Environmental Protection Agency, a variety of environmental and public interest groups (especially the Environmental Defense Fund and the Save the Delaware Coalition), industry (especially power companies, water supply companies, and members of the fishing, real estate, farming, and tourist industries), local residents, and a large number of state and local officials. Not all of these groups maintained a unitary position concerning the dam. The National Park Service, for example, housed both pro- and antidam factions, as did the New Jersey Department of Environmental Protection. In March 1974 the staff of the DRBC recommended that the dam be constructed. In August 1975, the DRBC Commissioners voted to have Congress deauthorize the project.

As studies of the costs and benefits of the dam proliferated, the desire to respect nature and preserve its diversity seemed to serve as the dominant force behind the analyses undertaken by groups opposed to the dam, while the values of efficiency, growth, and economic security underlay the analyses of dam proponents. The values of the latter group have a long tradition and a well established place in American society, while the values of the former have only recently begun to gain support. It is in part because of this divergence that an issue such as the Tocks project takes on

significance. For those who are trying to establish a new principle—in this case to make respect for nature an acceptable value—each occasion for decision takes on aspects of a crusade. Listen to the language used:

Concerned citizens all over the country are watching Tocks Island. The question here is no longer whether the old pork barrel brand of politics shall prevail. This is an issue of national magnitude, in which the little people who care will have their day. It marks the dawning of a new day, when the long-range effects on the environment must be measured, understood and evaluated before the shovel is turned, not after.¹

What is being conveyed here is that: (1) “politics as usual” can no longer be sustained; (2) we are “little people who care”—that is, we are ordinary citizens fighting against powerful and entrenched bureaucracies and interests; and (3) we are not irrational nature lovers, but are seeking to make certain that long range environmental considerations are given their due. Explicitly, this is a call for a turning point in environmental decision making. Implicitly, it is also a defense against the image of environmentalists as a small elitist group who care more about rivers and fish and trees than about the exigencies and realities of human life.

The crusading element is absent, by and large, in the literature on the other side of the Tocks controversy. It has behind it the full weight of economic efficiency and high technology. There is much appeal in the multipurpose project—a dam that can protect against floods, provide water and hydroelectric power, and serve as the basis for a new recreation area near several densely populated cities. Since the 1930s the rationale for building dams has been that they serve many purposes: they induce regional development, reduce poverty, and become part of a larger, coherent structure of regional river basin planning.

Perhaps less obvious, but equally potent, is the traditional American appeal of technology. The idea of a “technological fix” for solving social problems may have been articulated only fairly recently, but the practice has long been characteristic. In a country where labor was scarce, land and resources plentiful, and mobility and economic growth highly valued, technology was developed and used to a greater degree than elsewhere. It was only natural, when problems developed, to attempt to find technical solutions. Surely it is easier to change technology than it is to change men’s practices and institutions. Building a dam to provide water is easier than asking men to conserve water; building a dam to control floods is easier

than asking them to move away from the flood plains or, in Robert Socolow's intriguing proposal, to accept the risks involved.

Environmentalists and others are now challenging this pattern. They argue that social change, however difficult, is possible—that social decisions can ordinarily be reversed, whereas many technological decisions are essentially irreversible. The river cannot be undammed; its ecosystem cannot be restored to the status quo ante. Within this broader context lie a host of social and technical issues that no analysis can completely untangle, such as: What kind of regional development is desirable? Should government respond to the recreational desires and tastes of the people or, as seems implicit in Laurence Tribe's and Robert Dorfman's essays, attempt to uplift them? What will be the long range economic consequences of the decision not to build the dam?

In an ideal world, where decision makers were democratic philosopher-kings and analyses incorporated all the subtleties that Laurence Tribe describes as possible in principle, the road from analysis to decision would be a relatively smooth one. But in a world where models are imperfect, knowledge incomplete, the public interest undefined, and decision makers often parochial in the extreme, the bumpy road of pluralism and what Charles Lindblom has called "muddling through" may well be preferable (and are, in any event, unavoidable). In the Tocks case, one set of analyses undertaken by dam proponents—the Corps of Engineers and the Delaware River Basin Commission—was challenged by another set of analyses done by opposition environmental groups. In the end, a more "objective" analysis authorized by the Congress served the purpose of propelling a decision, even though its findings may not have been crucial to the decision.

II. HISTORY OF THE PROJECT

In 1955, residents along the Delaware River and its tributaries experienced the worst floods in the history of the basin. The loss of lives and massive damages led to a renewal of interest in the possibility of building a dam. The idea was not a new one. Indeed, 1740 has often been noted as the date of the first proposal to erect a dam on the Delaware, and in 1933 the Army Corps of Engineers had studied the feasibility of a dam at Tocks. Spurred by the floods, Congress in 1956 authorized the Corps to restudy the Delaware River Basin and appropriated \$2 million for the purpose. In December 1960 the Corps completed its Comprehensive Survey of the Water Resources of the Delaware Basin, which included the recommenda-

tion to build a dam on Tocks Island. This eleven-volume study, known as House Document 522 and released in 1961, has served as the principal basis of evaluation since that time, though numerous updates and changes have been made.

The affected states—New Jersey, New York, Pennsylvania, and Delaware—began to organize to deal with basin problems as early as 1939. In 1961, the Delaware River Basin Commission (DRBC) was created as an interstate agency whose five commissioners are the governors of these states and the United States Secretary of the Interior. In 1962, the DRBC adopted the plan devised by the Corps, and congressional authorization for the Tocks project was given in the Flood Control Act passed that year.

The earth and rock-fill dam to be built at Tocks Island, approximately five miles above the Delaware Water Gap, was to be 160 feet high and 3,000 feet long. It would flood 10,000 acres of land in addition to the 2,525 acres now covered by the existing stream; during temporary storage of flood waters, an additional 6,000 acres would be flooded. In 1962, the project was expected to cost an estimated \$98 million in direct federal funds. Changes in design and in construction requirements coupled with inflation brought the estimated cost up to \$400 million by 1975.

If flood control was the initial impetus for the Tocks project, nature soon provided a second purpose. During 1961–65, the area was struck by a severe drought, and maintenance of an adequate water supply took on considerable importance. The dam was to provide approximately 980 cubic feet of water per second. The original plan also included use of the dam to generate hydroelectric power. Congress subsequently authorized the construction of a pumped-storage facility at Tocks by private power companies, subject to approval by the DRBC and the Federal Power Commission. An estimated 70 megawatts of hydroelectric power would have been produced if there were no pumped storage plant, 1,300 megawatts if there were.

The fourth and final component of the Tocks project became one of the main elements in the controversy. This was the establishment of a recreation area at the Tocks site, using the lake created by the dam as a base. The lake was to run for 37 miles from Tocks Island to Port Jervis, New York, with a width of less than 3,000 feet through most of its length. The total recreation area would cover some 72,000 acres. In 1965, Congress authorized the Delaware Water Gap National Recreation Area (DWGNRA), to be run by the National Park Service. The language of that authorization tacitly assumed the existence of a dam; hence the Corps maintained that the dam and

recreation area were inseparable. The National Park Service argued that they were indeed separable and that a river based recreation plan could still be implemented if no dam were built.

When the Tocks project was first authorized, it appeared to have widespread appeal. The only significant opposition came from local residents who were to be displaced. Some 600 of them filed a class action suit against the project in 1965, but the case was dismissed on the ground that the government had not consented to being sued. In 1968, when the power companies proposed using Sunfish Pond, near Tocks Island, as the upper reservoir for the pumped-storage facility, public opposition resulted in a campaign to "Save Sunfish Pond." This pond is a glacial lake situated at the top of the Kittatinny Mountain Ridge and approachable via the Appalachian Trail. The DRBC succumbed to this pressure, and another site for the reservoir was chosen. Apart from this minor episode, environmental groups seemed favorably disposed toward the project, largely because they saw it as an alternative to the growing commercial development of the area. The dam and associated recreation area were perceived as a way to prevent the kind of unpleasant sprawl and destruction of natural beauty that had taken place in the nearby Pocono Mountains area.

It was only as further studies were undertaken and the secondary effects of the dam were exposed that environmental groups came to oppose the project. Opposition seemed to become effectively mobilized only in 1971, when the Corps issued its environmental impact statement. From that time onward, the opposition gained momentum as governors, senators, and congressmen turned against the project in an environmentally conscious climate. For many of the dam's opponents, the argument was turned around. Far from protecting the area against unwanted growth, the dam came to be seen as encouraging industrial and residential development by providing more water and power and bringing tourist and commercial development along with the recreation facility. Certainly the vision of a recreation site initially planned for 9.4 million visitors annually did little to discourage such fears. The adverse secondary effects of the project that generated concern included traffic and other congestion, waste disposal problems, the unpleasant effects of seasonal drawdowns, possible lake eutrophication, and damage to fisheries. The destruction of the last sizeable free-flowing river in the East, the disruption of local communities, the destruction of at least some life forms in the area, and the inundation of a picturesque and historic valley became important rallying cries.

Both the Corps and the National Park Service began buying land in the area in 1965. Land acquisition, preparatory planning, and various analytic efforts continued through the 1960s, even though funding cutbacks during the Vietnam War delayed the necessary appropriations. In 1970, Congress ordered construction of the dam to begin as soon as approval was granted by the Council on Environmental Quality (CEQ). The Corps issued its legislatively required Environmental Impact Statement in 1971, but the statement was met by criticism from the Council and by a demand for revisions.

By this time, various opposition groups had been mobilized and became vociferous. New Jersey had a new governor, William Cahill, who had not yet taken a stand on the dam. His approval was considered necessary even though the DRBC Commissioners had approved the dam earlier. At the end of 1972, Cahill announced his opposition to the dam until seven specified conditions were first met. Further environmental impact studies raised serious questions about eutrophication of the lake, and the project remained in limbo.

In an effort to force some resolution of the controversy, Congress appropriated \$1.5 million for a new study of the Tocks project in August 1974. These funds were to be used for "an impartial comprehensive analysis, including alternatives, and review of the project." The investigation was to be completed and "a final and definitive recommendation" was to be submitted to Congress by August 1975. Senator Clifford Case of New Jersey and others who were instrumental in arranging for the congressional appropriation had initially sought to fund a study that would deal exclusively with the question of eutrophication and related environmental issues. Various pressures operated against this approach, however. Budgetary constraints, for example, ruled out the possibility of a CEQ study, and jurisdictional politics within the Congress ruled out the possibility of an EPA study.

While the Congress was deliberating over who should do the study in the summer of 1974, the New Jersey Department of Environmental Protection acquired a new head, David Bardin, who was eager to see the DRBC undertake such a study. Bardin's office secured the cooperation of the Governor's office and in July, the DRBC Commissioners, prodded by New Jersey, unanimously adopted a resolution asking Congress for \$1.5 million for a study. In August, Congress appropriated the money, but allocated it to the Corps of Engineers. The DRBC was unable to receive the funds directly because under existing laws Congress cannot appropriate money for the DRBC unless the funds are matched by the four states involved.

Congress attempted to smooth over this difficulty by authorizing a study "under the direction of the Corps of Engineers and in cooperation with the Delaware River Basin Commission."

The proposed study became a subject of debate, nevertheless. Dam opponents expressed the fear that the results of the study would reflect the biases of its sponsor, the Corps of Engineers, irrespective of who received the contract to do the study. Because they effectively shortened the duration of the study, the inevitable delays in establishing the study's precise mandates and in assigning a contract for the work further fueled the fears and suspicions of dam opponents. Two prestigious research groups—the National Academy of Sciences and the Rand Corporation—declined to bid on the study because of the short time period allowed to complete it. In an attempt to ensure impartiality, Governor Brendan Byrne of New Jersey named a ten-member Citizens Advisory Board to monitor the progress of the study.

While some residents in the areas most directly affected by the dam preferred any resolution of the controversy to the prolonged uncertainty, others formed a new coalition in opposition to the dam. They were anxious that the local opposition to the dam be taken into account in the final decision; they were also concerned about what would happen to the thousands of acres of land already purchased by the government in the event of a decision against the dam. Their fear was that big private developers might buy the land that individuals could not now afford to purchase. Organized labor, on the other hand, expressed irritation with the congressional authorization of yet another study. They urged prompt construction of the dam in order to provide work for the unemployed.

The announcement of a new study thus became the occasion for increased lobbying by both supporters and opponents of the dam. At the same time, Governor Byrne indicated publicly that he was opposed to construction of the dam unless the study were to turn up some new "compelling reason" for it. Earlier, in May 1974, Malcolm Wilson, then governor of New York, indicated that he was opposed to the dam if New York would have to pay for the waste treatment facilities needed to prevent pollution of the Tocks Island Lake, or if New York's dairy and poultry industries were likely to be harmed by the project.

After some time, two New York City consulting firms were given the contract for the study: URS/Madigan-Praeger, and Conklin and Rossant. They released the separate sections of their report to the public as they were completed, and a series of public hearings was held to discuss the findings. The six-volume, 3,600-page, fifteen-

pound final report was duly produced and noted. The report assessed the costs of various alternatives, but took no position on whether the dam should be built. In essence, the consultants' study concluded that the various alternatives to the dam would be financially costlier, but less costly to the environment. The Corps of Engineers responded predictably by announcing that its analysis of the study showed that the dam should be built at once. Equally predictably, the environmentalists attacked each segment of the report as it appeared as biased.

When the DRBC Commissioners met in August 1975 to make a decision about the Tocks Island Dam, they apparently did not pay much attention to the consultants' study. Before the vote, Russell Train of the Environmental Protection Agency and Russell Peterson of the CEQ had urged a vote against the dam. In the final DRBC vote, which was to ask Congress not to appropriate funds for construction of the Tocks Island Dam, the Interior Department abstained and Delaware joined New Jersey and New York to outnumber Pennsylvania's lone favorable vote. Although there may have been some element of suspense before the vote was actually cast, most of the participants had made their positions known considerably earlier. New Jersey and New York had all but officially committed themselves in opposition to the dam. Governor Sherman Tribbitt of Delaware had announced in advance that he would join the majority in the DRBC, since Delaware was minimally affected by the Tocks decision. Governor Milton Shapp of Pennsylvania had long been one of the staunchest supporters of the dam. Although it voted to reject the dam, the DRBC approved the establishment of a national recreation area to be administered by the National Park Service around the free-flowing Delaware River. On this issue, both Pennsylvania and Delaware abstained, while the Interior Department joined New Jersey and New York in approval.

III. THE ISSUES

Cahill's Seven Conditions

Before examining the controversy in detail, a look at the seven conditions that former Governor Cahill of New Jersey felt should be met before he would approve construction of the Tocks Island Dam will help to pinpoint some of the issues. Two of these conditions related to zoning authority. They were (1) that New Jersey and Pennsylvania enact legislation authorizing state control of land use in the flood plains, and (2) that state and local units of government in New Jersey be given authority to control land use in the primary

impact area. These legislative changes were deemed by Cahill to be desirable in any event, although they would be more necessary if the dam were built.

A third condition was aimed at reducing congestion at the recreation site and minimizing the strain on the affected local communities. It stipulated that the recreation plan be scaled down to accommodate a maximum of four million visitors a year (rather than 9.5 million) and that adequate camping facilities be constructed in order to minimize commercial development. In a visit to the area before announcing his decision, the governor had met with a large number of local officials who were worried about their inability to cope with a large influx of visitors. Not only would they be plagued by inadequate facilities for fire and police protection, hospital and ambulance services, and solid waste disposal, but they would suffer loss of tax revenues because of federal acquisition of lands. Two other conditions were thus designed specifically to help reduce these problems: (1) the DRBC was to authorize the construction of a dispersed sewage plant system, and (2) the federal government was to consider payments to local units of government to compensate for loss of tax revenues as a result of federal acquisition of lands.

A sixth condition imposed by Governor Cahill was that the federal government provide substantial funding for the construction of new highways. This demand stemmed from the results of a study commissioned by the New Jersey Department of Transportation in 1969. The study, by Edwards and Kelcey,² assessed new transportation needs on the basis of the recreation area plans set forth by the Corps in House Document 522 and by the National Park Service in its 1966 "Master Plan," as well as on the basis of findings of an earlier study cosponsored by New Jersey and Pennsylvania on the expected impacts on the region surrounding Tocks.³

The Edwards-Kelcey study concluded that the required road network in New Jersey would cost an estimated \$680 million. A similar study commissioned by the Pennsylvania Department of Transportation concluded that an estimated \$40 million of road construction would be required on the Pennsylvania side. The magnitude of these sums—greater than the cost of the dam itself—and the potential impact that these roads would have on the local area became powerful arguments against the dam, and the failure of the Corps even to consider such important secondary effects served substantially to discredit their analysis.

The seventh condition—the demand that adequate control of nutrient runoffs be assured so as to prevent or diminish eutrophica-

tion of the lake—had broader significance than the first six, which can be construed as largely addressed to the parochial interests of New Jersey.

Eutrophication

The problem of potential eutrophication of the lake became one of the largest stumbling blocks to acceptance of the Tocks project. The principal objection voiced by the CEW to the Corps' Environmental Impact Statement was its inadequate treatment of this problem. As a result of CEQ prodding, the Corps commissioned a study of eutrophication. This study, the McCormick Report, concluded:

Even though the data are meagre . . . they suggest strongly that the proposed reservoir, in light of current conditions, will experience rapid eutrophication. Frequent algal blooms, aesthetically objectionable shoreline conditions, a low sports value of fisheries, and other symptoms of degradation of the aquatic environment can be expected.⁴

The report noted that the usual reservoir management techniques to retard eutrophication are most appropriate for water supply reservoirs and could not be employed in this case because the lake was to be used for recreation and hydroelectric power as well as water supply. Instead, it recommended sewage treatment to remove 98 percent of the phosphorous in the nutrient runoffs, a water quality monitoring network to provide baseline data and to assist in the formulation of control techniques, and the establishment of a comprehensive water quality control program for the Upper Delaware River Basin. "Such a program," the McCormick Report noted, "will require the cooperation of local, state, interstate, and federal governing bodies and their agencies."⁵ After noting the various recommendations of this study, the Corps' Environmental Impact Statement concluded that the problem of eutrophication is "subject to control" and that controls "can be implemented during the construction program and in advance of stream closure."⁶

Securing the cooperation of the governmental bodies involved was not a simple matter, however. In 1972, Russell Train, then chairman of the CEQ, sought assurances from the Governors of the affected states that they would cooperate to meet several sewage treatment requirements. He also requested assurance from New York's then Governor Nelson Rockefeller that the area above the reservoir that was not included in the regional waste treatment plan receive top

priority for federal and state funds for phosphate removal. Rockefeller indicated that he could not provide such assurances. Nor did the other Governors consent to Train's requests.

It is neither unusual nor surprising that statewide needs take priority over regional projects. Elected officials do not operate from a regional perspective.⁷ Since regional water problems are not a primary concern to the Governors, they must ask themselves questions of a different sort. Why should New Jersey Spend money to build roads that would benefit primarily New York and Pennsylvania residents? Why should New York spend money to control nutrient runoffs for a lake in New Jersey and Pennsylvania? The DRBC staff, on the other hand, is concerned with regional water management, and not with problems of land use, transportation, or recreation. Both they and the Corps of Engineers argued that since the Tocks project represented a large proportion of the overall Delaware River Basin Plan, elimination of that project would necessitate a rethinking of the whole plan and might jeopardize future water resources development in the region.

The multipurpose nature of the Tocks project complicated all the analysis and debate in much the same manner that treatment of the eutrophication problem in Tocks Island Lake was rendered more difficult by the multiple uses of that reservoir. Robert Socolow has suggested that insisting on multipurpose projects tends to discourage a search for new and imaginative solutions to problems. The central criticism directed against the Corps' analysis of the Tocks project has been its failure to examine single-purpose alternatives adequately: there are other means for generating power and providing water; there are nonstructural alternatives for flood control; and the park can be built without the lake. The position of the Corps has been that, taken together, all four benefits are best and most efficiently provided by the dam, and that other ways of fulfilling these needs would generate problems of their own.

The URS/Madigan-Praeger and Conklin and Rossant study (1975)—which did examine single-purpose alternatives—concluded that the lake would indeed be eutrophic. Efforts to control the pollution would be costly and might actually destroy the source of the pollution, the poultry industry in the upstate New York area. The study also supported the claim of the environmentalists that unsightly mudflats would develop around the periphery of the lake during annual summer releases of reservoir water. These mudflats would lead to erosion, which could in turn result in pouring sediment into the reservoir, thereby further increasing the pollution. Thus the

use of the lake as a source of water would greatly interfere with its recreational use.

Eutrophication was considered a more serious problem for the recreational use of the lake than for the water supply. The 1975 consultants' study found that the reservoir water could be treated and made safe for drinking. Therefore, for those like Governor Shapp whose principal interest in the dam lay in its water supply and flood control purposes, the eutrophication problem remained of minor concern. In a letter to the *New York Times* published on September 11, 1975—after the DRBC vote—Governor Shapp contended that “many Pennsylvania lakes are used for recreation and have a greater inflow of pollutants than that projected for the proposed Tocks Lake, yet there is no danger to the users.”

Recreation

In the Corps' cost-benefit analysis, the largest proportion of total benefits from the Tocks project was attributed to recreation—43.7 percent. This figure was derived by multiplying the estimated number of annual visitors by \$1.35 per recreation day and subtracting from this \$1.35 times the estimated number of annual visitors to the area in the absence of the project. The \$1.35 valuation was adopted from Senate guidelines; it is clearly an arbitrary figure, and probably something of an underestimation even in its own terms since the guidelines prohibit escalation to reflect cost of living increases. Nor does it take into account the aesthetic quality of the recreation site or the degree of crowding or privacy. The estimate of the number of visitors to be accommodated seemed almost as arbitrary. Citing a Senate mandate to develop the recreation potential to its “highest and best use,” the Corps estimated that 9.4 million people could be accommodated.

Little analysis was done to support this claim, and after first having adjusted it upward from 7 million, the Corps scaled the number down to 4 million in response to Governor Cahill's stipulation about maximum annual use. Project opponents were quick to point out, however, that the revision was accomplished simply by substituting the first stage of an originally planned two-stage project, which also called for building four sites instead of ten, so that the revised plan neither reduced the density at any site nor precluded eventual expansion. Another figure that was questioned was the number of current annual visitors to the area. The Corps used 183,000, but estimates range as high as 1.25 million, and a 1969 review of the project by the General Accounting Office which

pointed out this discrepancy helped to support suspicions that the Corps had seriously overestimated the benefits of the project as a whole.

What is the import of all these numbers? All parties to the dispute appear to agree that open space and recreational facilities are badly needed in the area. Tocks Island is approximately 50–75 miles from New York City, Philadelphia, and Newark. The question, then, becomes facilities of what kind, where, and for whom. The number of current visitors would seem to be a most inadequate basis for assessing potential recreation benefits since the very decision to build a dam would, as Laurence Tribe has pointed out, affect the preferences of nearby populations and hence change the demand on which the visitor-day estimates are based. Furthermore, the type of analysis used by the Corps naturally leads to building high density mass recreation facilities because the benefits increase in direct proportion to the number of users. This produces a “more is better” psychology that is not confined to the analysis alone, for once one announces the prospect of a recreation area designed to serve large numbers of people in the crowded Northeast, opponents have a difficult time proposing alternatives that would accommodate fewer people. They feel constrained to argue that their own schemes can satisfy almost as many people as could the dam.

The aim of the alternative plans is to reduce the crowding, noise, transportation, and other problems attendant upon densely populated beaches along the lake and to provide instead a “natural system plan” in which the free-flowing river and surrounding scenic lands would offer more dispersed recreational activities. Proponents of the alternative approach argue that crowded beaches would provide little respite from urban conditions. Furthermore:

Since the same recreational experience can be provided at any reservoir, lake, pond or pool closer to the cities, it is difficult to see how the expenditure of transportation resources can be justified for this purpose. . . . The land that would be flooded by the reservoir is the most usable in the Park. The long-distance bicycling, the camping, picnicking, hiking, canoeing, riding, fishing, etc. that could be provided on this land and river, and that would be precluded by the reservoir, can be denser in people per square mile without palpable crowding than can the boating (especially if it includes water-skiing) that would be provided by the reservoir's surface. The planned massive swimming beaches are dense, to be sure, but they are not appropriate to the Park in any case. Moderate swimming beaches, in keeping with the setting, would not require a reservoir. They could be provided in many places along quiet stretches of the river without severe disruption of the landscape. . . . A park without a reservoir, based primarily

on bicycling on the unflooded flatlands, and canoeing on the unflooded river, could be used much of the year. Thus a given yearly visitation could be achieved with less crowding in such a park. Among other advantages, spreading the load over the year would ease the transportation problem.⁸

This plan replaces images of Coney Island with images of a natural river and open countryside, available for multiple uses to large numbers of people. In the words of another proponent: "The native scene, complete with fishing on a flowing stream, canoeing over the river rapids, hiking past Sunfish Pond on the Appalachian Trail, deserves Federal sponsorship. Such a park would be less expensive than a dam and reservoir and of far more value to the public over a longer period of time."⁹ The problem is: which "public"? Would the people who flock to Coney Island or Sandy Hook be likely to come to the Delaware Water Gap to canoe and fish and hike? Also, given the distances involved and the absence of ready access by public transportation, is it likely that the facility would be used by the really poor people of New York, Philadelphia, and Newark?

Such questions have by and large been evaded. The Corps came close to facing the issue, though obliquely. In discussing the possibility of the DWGNRA without the dam, it argued that this alternative would not satisfy the recreation objective:

While there is a natural beauty inherent in a wild, free-flowing river, this development would nonetheless provide recreation opportunity for only a limited number of people. . . The paramount reason for this is that a large body of water such as Tocks Island Lake is a proven attraction in a recreational project of this type. Visitor affinity for water recreation generally runs two to one over land activities.¹⁰

For the environmentalists, turning a natural river into a beach by creating a lake and surrounding it with trucked-in sand has much the same flavor as replacing real trees with plastic ones, an enterprise that is much discussed in Laurence Tribe's essay for this volume. It represents a future in which the natural is replaced by the artificial, the esthetic minority is sacrificed to the culture of the masses, and the enduring and historical give way to expedient and transient concerns. Applying Tribe's argument in this context, large crowded beaches give rise to demands for more of the same as people's experiences shape their choices. If a "taste" for natural beauty is to be developed, people must be exposed to it. Hence, leave the river free-flowing, preserve the natural environment, and open up the surrounding countryside.

But there is another problem involved. True preservation of the

environment often requires the exclusion of people; a wilderness cannot remain a wilderness if it is subjected to any substantial human use. Currently, only 5 percent of the river shoreline in the project area is open to public access. Construction of the DWGNRA, even without the lake, would drastically alter this situation. There would be more people, noise, dirt, cars, roads, and the inevitable realities of commercial development. Proponents of the natural system plan have argued that all of these effects would be far more serious if the lake-based park were implemented. But the environment would be substantially altered under either plan.

Environmental groups have by no means been of one mind on the Tocks project. United in their opposition to the dam, they have differed on the issue of the DWGNRA and how large it should be. In recognition of what might be termed the "people problem," some have opposed any recreational facility in the area. Tawdry commercial development of the area is, of course, anathema to all, although the best means to prevent it do not seem clear. In an ironic postscript to an environmentalist victory, a man who had been instrumental in saving Sunfish Pond wrote a letter to a local newspaper in which he complained about the toll that people take on nature. He noted that, on a recent visit to the pond, he found the hitherto peaceful area strewn with litter and wracked with the noise of motorcycles. He wondered whether it had been worth "saving" the pond.

The Corps of Engineers has argued that without any intervention, farm lands are being turned into second homes, permanent homes, and recreation facilities. The conversion of land use to recreation purposes "has been accomplished by commercial developers with, in many cases, scant regard for environmental degradation."¹¹ Thus, "future developments within the project boundary would eventually eliminate a large portion of the present wildlife habitat and impair the natural character of the region. Presently there are no uniform standards effectively governing regional development."¹² But "this trend toward environmental degradation will be reversed with development of the project due to . . . attendant orderly development of the surrounding lands."¹³ Moreover, the Corps maintained, since the beaches would not constitute the whole of the recreation area, less densely populated land would be available for other recreational uses.

It is an interesting commentary on the ambiguous status of the value of economic growth today that Governor Cahill of New Jersey felt constrained not to oppose economic growth outright despite his personal predilections and the concerns of local officials, while the Corps of Engineers, traditionally a champion of growth, felt

constrained to adopt a somewhat muted tone. The Corps takes note of the fact that "pre-project commercial tax revenue will eventually double and employment opportunities increase. Through flood control 4,000 acres of land previously undeveloped or providing low economic return would be made available for economic development or for improved land uses."¹⁴ It goes on to say:

Many of the region's residents, particularly those in the low income areas, on the Pennsylvania fringe, will welcome better socio-economic conditions as an improvement. The provision of short-term services for visitors, such as daily and weekly sleeping accommodations and eating establishments, will stimulate the local economy and create jobs for many residents. Many permanent and seasonal residents will be distressed over the loss of the existing and predominantly rural and scattered commercial development pattern. Careful zoning controls and other local regulatory measures will be needed to prevent future commercial development serving the visiting public from occurring in areas outside the DWGNRA and the lake project, in a way that conflicts with sound regional land use plans.¹⁵

The Corps seems to be saying that although economic growth is good, it does have some unpleasant consequences, which can be controlled through appropriate regulations. In this instance, the Corps minimizes the difficulties of land use and zoning controls. Yet it continued to question the feasibility of such measures for providing nonstructural alternatives to flood control.

It is of interest that a majority of the residents in the local communities most directly affected by the project opposed construction of the dam. In referenda in two of the four affected counties (Monroe in Pennsylvania and Warren in New Jersey), voters opposed the dam by margins of three to two, but supported the establishment of the DWGNRA by two to one.

The 1975 consultants' study of the Tocks project noted the high current and future demand for recreational facilities in the region. It concluded that the New York area, for example, needs additional facilities for nearly two million more swimmers than can now be accommodated on an average summer Sunday. As alternatives to the Tocks facility, it proposed the expansion of the state parks and the construction of numerous swimming pools in parks closer to population centers. The consultants also suggested that the stretch of the Delaware that would have been dammed could be designated a part of the country's Wild and Scenic Rivers System to preserve it in its natural state. The DRBC voted to take advantage of the federal purchase of more than two-thirds of the 72,000 acres that had been proposed as a recreation area, and recommended the acquisition of

the remaining land for the establishment of a park. Governor Byrne has announced that plans are being drawn up to protect Warren and Sussex counties from the overdevelopment that might otherwise arise in the wake of the development of a national recreation area.

Flood Control

The Corps of Engineers had attributed 10.8 percent of the total benefits of the Tocks project to flood control. The proportion was small largely because the Delaware flood plain between Tocks and Trenton is sparsely populated. Yet the benefits as estimated by the Corps assumed largely uncontrolled growth and development on the flood plain, and were calculated on the basis of the damages that would be prevented on property that increased in value because of flood control. This ignored the possibility that zoning and insurance schemes might be adopted to retard growth on the flood plain. In fact, several communities have successfully adopted such measures, and a study by the Environmental Defense Fund found that since 1955, the population and the number of structures along the mainstem flood plain had either remained stable or decreased slightly. By contrast, development along the tributaries—which would not have been protected by the Tocks dam—had increased considerably.¹⁶

Opponents of the dam have often pointed out that the dramatic 1972 floods in Rapid City, South Dakota caused 235 deaths and much damage, despite the presence of a flood control dam fourteen miles away. The dam offered no protection because the rain fell in an area below the dam. Furthermore, they argue, the construction of a dam often sets in motion a vicious circle in which the protection afforded by the dam encourages further development along the flood plain and hence increases the damage potential. The increased damage potential in turn may generate pressures for further flood control structures. The argument of dam opponents is that because of the essential unpredictability of floods, a dam alone provides insufficient protection. It must be supplemented by zoning regulations, insurance plans, flood warning systems, and emergency relief provisions. Then, if such measures are implemented, and considering the environmentally undesirable consequences of the dam, one should reconsider whether the dam is necessary at all.

The Corps argues that in the absence of a dam, the land and properties downstream of Tocks would still be subject to flood damage and potential loss of lives. Insurance plans serve to redistribute the economic loss, not to do away with it. It is

unrealistic to expect effective flood-plain zoning because of the high degree of regional development and the multitude of political subdivisions. Furthermore, relocation of industrial structures would be extremely difficult.

Because of uncertainties in predicting the frequency and location of floods, similar difficulties arise in the design of both structural and nonstructural flood control devices. In any event, to afford maximum protection, a combination of both means of control is usually considered desirable. Although both sides to the dam argument accept this in principle, the Corps maintains that structural controls are of primary importance, while the Environmental Defense Fund, for example, contends that "reservoir construction should be considered only when it is clear that flood plain management measures are inadequate for the task."¹⁷ Essentially, the Corps is intent upon preventing floods, whereas the environmentalists are concerned with minimizing flood damages. Environmentalists appeal to the need for adapting to nature and refraining from building structures that cause environmental and ecological disturbance.

Until recently, federal funding priorities heavily favored structural means of flood control. This is beginning to change, however, perhaps due in part to the work of the President's Task Force on Federal Flood Control Policy. The Task Force found that despite the large sums of money devoted to flood control, losses due to flooding have continued to increase each year, largely as a result of increased development of the flood plains. Such findings, which point to the inaccuracies in flood prediction that render structural flood control measures inadequate, would seem to undercut the assumptions used in the Corps' cost-benefit analysis. In calculating the flood control benefits, the Corps had included the increased revenue to be derived from greater utilization of the land in the flood plains. The Task Force findings suggest that such land use is unwise and ultimately unproductive economically.

The 1975 consultants' study recommended flood-plain zoning as being considerably cheaper than the dam and producing "comparable" results. Flood-plain zoning could have the additional effect of reducing the growth of such cities as Trenton, Camden, Philadelphia, and Wilmington, by halting the riverside location of new manufacturing facilities, which have traditionally sought readily accessible water transportation. By contrast, the dam would have served to spur riverside development downstream. Many proponents of the Tocks Island Dam still contend that flood control protection will be inadequate without the dam. Governor Shapp, for example,

argues that Trenton and Easton, Pennsylvania could be "wiped out" in a flood. He further maintains that without more water, Philadelphia will not be able to retain its industry.

Water Supply and Power

Of the total benefits of the Tocks project as assessed by the Corps of Engineers, 33.8 percent are attributable to water supply, 11.7 percent to hydroelectric power. With water supply as with flood control, the alternatives proposed by the environmentalists entail social and economic changes. For in addition to suggesting different methods for increasing water supply, they contend that various means of reducing demand must also be implemented. Once again, the main concern is to break the cycle of ever-increasing technological interference with nature. In line with their desire to adapt to nature, environmentalists also argue that people can tolerate some fluctuations in water supply in order to avoid the environmental costs of constructing a dam to provide an assured and constant supply.

As enunciated by a study prepared for the Environmental Defense Fund, the basic argument was that demand must be reduced in any event, lest the Tocks Island Dam become inadequate to supply the ever-increasing demands. On the other hand, if programs to reduce demand do not succeed, there would be adequate time to construct the dam because the establishment of the DWGNRA preserves this option.¹⁸ Not all environmentalists share this position. Some maintain that a more careful study of water needs invalidates some of the assumptions made by the Corps and the DRBC. Once these assumptions are corrected and other sources of water supply are taken into account, they argue, the dam can be shown to be unnecessary.

The initial analysis of water supply and demand set forth by the Corps in House Document 522 has been superseded by an analysis done by the DRBC in 1971. According to DRBC estimates, the most significant increase in future demand for water will arise in connection with the installation of electric power plants that consume water for cooling. Second, there is a demand from the state of New Jersey to divert 300 million gallons of water per day (mgd) out of the basin to its heavily developed northeastern section. Finally, the Tocks Island Dam would satisfy the demand for minimum flow of 3,000 cubic feet of water per second (cfs) to be sustained at Trenton even under drought conditions. This amount of fresh water flow has long been considered necessary (it is one of Socolow's "golden numbers") to prevent salinity from exceeding a

tolerable level. The figure of 3,000 cfs at Trenton is also used as the basis for the pollution abatement program adopted by the DRBC. These three sources of demand have constituted the principal justification for building a dam for water supply. Projected water needs for municipal, industrial, and agricultural uses are insignificant by comparison.

Opponents of the dam have questioned the accuracy of these estimates. They note that, although the DRBC analysis relied on quite different analytic methods and sources of demand, the demands it projects for the next 50 years almost exactly matched the supply that the Corps of Engineers had initially estimated would be made available by the dam. Adding to the resulting suspicion is the fact that estimates of the need for cooling water have been based on studies done by the power companies. A consortium of eight utility companies operating in the Delaware Basin had projected a need for seventeen new power generating plants and nine expanded plants by 1986.¹⁹

The DRBC estimates for cooling water requirements assumed a somewhat less rapid growth. Nevertheless, the rate of increase involved would quickly consume much of the additional water provided by the dam. Environmentalists argue that such heavy use of water would be self-defeating and must be regulated. They contend that power plants should not use fresh water for cooling. The use of dry cooling towers and the siting of power plants either offshore or in brackish water lower in the estuary are suggested as alternatives, although offshore siting may produce problems of a different sort and dry cooling is expensive.

The diversion of 300 mgd of water to northeastern New Jersey is by no means a foregone conclusion. Although environmentalists have suggested means of providing this water without the dam, the status of New Jersey's request for this diversion remains uncertain. The request has only recently been made formal and the DRBC has not yet granted its permission. The number itself is of uncertain origin. One investigator traces it to a 1955 study that cited 300 mgd as the amount of water northeastern New Jersey would need by the year 2000 from all new sources. That study reported that the entire amount could be obtained from within the state if necessary, but recommended that one-third be taken from the Delaware.²⁰ The 1975 consultants' report made no firm estimate of what the demands for additional water would be. It did conclude that high-flow skimming could produce the 300 mgd for as little as 8¢ for each 1,000 gallons.

Environmentalists have proposed that a system of high-flow

skimming could be used to provide the necessary water. During periods of high stream flow the water would be pumped from the Delaware and stored offstream in an already existing reservoir, Round Valley. It has been estimated that this technique would provide enough water to satisfy New Jersey as well as maintaining the minimum 3,000 cfs flow at Trenton, and that the cost to New Jersey would be lower than its share of the Tocks Island Dam water supply costs.²¹ Environmentalists have also proposed that water supply could be increased by conjunctive use of high-flow skimming and ground water, or by the use of ground water from the Pine Barrens aquifer. The Corps has countered this suggestion by noting that although the environmental effects of a potential overuse of ground water are uncertain, ground surface subsidence and salt water intrusion have resulted in some regions of the country.

The need to maintain a 3,000 cfs flow at Trenton has also been questioned. It is alleged that there has been insufficient analysis to demonstrate that any such level is needed. Many environmentalists, however, are willing to accept this figure for purposes of debate, largely because existing capacities do not fall very far short of it. Their argument is quite straightforward:

The DRBC asserts in its Water Resources Program that as soon as the Beltzville dam on the Lehigh River is on-line, . . . it will be possible to guarantee a flow of at least 2700 cfs at Trenton. Moreover, a profile of the 25-year drought (low-flow conditions occurring on the average once in 25 years) determined by the Federal Water Pollution Control Administration shows that the flow during such a drought drops below 3000 cfs only for the single month of lowest flow (September) and then only to about 2700 cfs. Thus, with a flow assured which only drops below 3000 cfs (on a monthly average basis) perhaps once in 25 years and even then is deficient by no more than about 10%, an adequate baseline flow has been provided.²²

The added protection of 300 cfs that would be assured by the dam is viewed as a feeble justification for the project. The 1975 consultants' report found the likelihood of saline intrusion to be extremely small. It noted that if the peril should ever arise, however, an alternate water supply for Camden could be developed from ground water in the Pine Barrens and elsewhere and that Philadelphia's intake pipes could be relocated.

In addition to challenging the need for a dam to augment the water supply, environmentalists have proposed a number of measures to conserve water and restrict demand. These include altering the pricing and rate structures for water, repairing faulty plumbing,

recycling waste water for industrial purposes, alternative means of cooling for power purposes, and some changes in consumption habits. By virtue of a 1954 Supreme Court decision, New York City can take 800 mgd of water from the Delaware. It has been estimated that, if the city were to repair its leaks, at least 300 mgd could be released down the Delaware instead of being diverted—in other words, more than the amount that New Jersey would like to take.²³

In comparison with the debates surrounding the recreation, flood control, and water supply functions of the dam, power generation has been of minimal concern. Because alternative sources of power are clearly available, the issue has not been seen as salient by either the proponents or the opponents of the dam. The fact that the small conventional hydroelectric power facility would be constructed by the government while the pumped-storage plant would be built by the utility companies has drawn some attention to the long standing issue of whether power should be in public or private hands. For the rest, environmentalists have cited the usual alternatives—especially the use of gas turbines instead of pumped storage—while dam proponents have noted that these alternatives also have environmental costs.

The 1975 consultants' report concluded that the power companies need no additional capacity until the mid 1980s. Even then they may require peak capacity only briefly. By the early 1990s, such new technologies as battery storage fuel cells and compressed air could probably handle any growth in the demand for power.

IV. ENVIRONMENT, GROWTH, AND ANALYSIS

The issue of ecological damage never became a significant component of the Tocks controversy. Ecologists had expressed concern that changes in salinity caused by regulation of the river flow would lead to "simplification" of the environment of the Bay—that is, to a decrease in the number of species inhabiting the ecosystem. The consequence would be a reduction in diversity and possible impairment of the stability of the ecosystem. Environmentalists acknowledge that "at present, the full range of such consequences . . . cannot be spelled out in detail." Nevertheless, they argue, "one should be prepared to assume that such typical consequences of simplification could be among the environmental effects of further flow regulation and increased depletive use."²⁴

To the environmentalists, uncertainties about the precise effects dictate a stance of caution toward intervening with nature. But the position of some environmentalists goes beyond a concern

for the possible negative effects upon people of altering the natural environment. Their fundamental premise is that nature should be left unaltered unless and until it can be shown that interference is truly necessary. In effect, it is a plea to treat nature itself as something like an endangered species. Thus, in response to the environmental impact statement issued by the Corps, the New York Department of Environmental Conservation argued that "the loss of free-flowing stream listed as an adverse effect should be given much more weight. The real significance of this loss is the fact that this is the last major unimpounded stream in the East."²⁵

The Department also proposed that:

A more detailed discussion should be presented on the alternative of no action. This would require a projection of the future environmental setting if the project is not accomplished. A discussion should also be presented of the alternative(s), if any, investigated with environmental objectives as the sole purpose. . . . It should be noted that each generation is a trustee of the environment for succeeding generations and any proposal which would narrow the range of choices of future decision makers should be avoided.²⁶

In what may be an unprecedented statement, the Corps has seen fit to note that "the construction of the basic dam embankment although very massive does not preclude its alteration or removal. While truly a major undertaking, this change could be made for a compelling (and as yet unknown) future need."²⁷ Obviously this concession, unusual though it may be, offers a rather impractical suggestion. Dams are not temporary structures. The values of diversity and reversibility were simply not given weight in the analysis.

In the initial phases of the Tocks debate, the boundaries of analysis were too narrowly drawn, as the failure to consider such issues as access roads and eutrophication amply demonstrate. Many of the inadequacies of analysis are rooted in the real and perceived responsibilities of the institutional actors. As has been noted, neither the Corps nor the DRBC has responsibility for land use or transportation. Hence the ways in which construction of the dam would impinge on such matters were not given serious consideration in their analyses. Fragmentation of responsibility was also manifest with respect to problems directly related to the narrowly defined functions of the agencies. For example, the DRBC did not explore the possibility of using the aquifer in the Pine Barrens in southern New Jersey as a source of water supply for northern New Jersey

largely because the Pine Barrens water is outside the Delaware Basin. The agencies that do have jurisdiction—the United States Geological Survey, the New Jersey Bureau of Water Resource Planning, and the Corps of Engineers—did not attempt to coordinate their activities. As a result, the Geological Survey thought that the Bureau of Water Resource Planning was investigating the biological aspects of the use of the aquifer, while the Bureau thought the Geological Survey was doing so.

If fragmentation of responsibility has sometimes contributed to the poor quality of analysis, so has excessive coordination. The congressional directives that mandated uniform discount rates and the use of \$1.35 per visitor-day as the measure of recreation benefits introduced an unwarranted arbitrariness into the analysis. Both those figures might have been different had they been derived in the course of analysis of this particular project. One may wonder, for example, whether the number of visitors used by the Corps in its analysis might have been smaller if the guidelines had allowed the figure used to compute recreation benefits to reflect cost of living increases.

Whatever the difficulties involved in arranging for a satisfactory allocation of responsibilities, it would seem that, if the relatively intangible environmental values are to receive their due, they must become the responsibility of some institution or agency. This appears to have been taken care of, at least partially, through the mechanism of the Environmental Impact Statement. The requirement that this statement be carefully reviewed by affected parties and approved by the CEQ has put the brakes on undertakings that might have had apparently untoward environmental consequences. In the Tocks case, it may be recalled, potent environmental opposition was mobilized only in response to the Environmental Impact Statement itself. Although some have argued for far more direct and powerful means of incorporating environmental sensitivity in analyses and decision making, both the difficulties involved in doing so and the limited and tentative agreement on the importance of such values militate against much more rapid or dramatic changes.

NOTES

1. Michael Frome, "Preface," *The Tocks Island Dam: A Preliminary Review* (Philadelphia: Save the Delaware Coalition, 1973), p. x.
2. Edwards and Kelcey, *Approach Roads Study, Tocks Island Region, Part I*, April, 1969, Part II, March 1971.
3. Robert R. Nathan Associates, *Potential Impact of the DWGNRA on Its Surrounding Communities* (Washington, D.C., February 1966).

4. Jack McCormick and Associates, *An Appraisal of the Potential for Cultural Eutrophication of Tocks Island Lake* (Devon, Pa., September 1971), p. 92.

5. *Ibid.*, p. 96.

6. Department of the Army, Philadelphia District, Corps of Engineers, *Tocks Island Lake Environmental Impact Statement* (Philadelphia, October 1971), p. 4-4B.

7. In this connection, see Bruce Ackerman, Susan Rose Ackerman, James W. Sawyer Jr., and Dale W. Henderson, *The Uncertain Search for Environmental Quality* (New York: The Free Press, 1974).

8. F. W. Sinden, "Planning, Recreation and Transportation for the DWGNRA," in *The Tocks Island Dam: A Preliminary Review*, *op. cit.*, pp. 125-126.

9. Michael Frome, *op. cit.*, pp. ix-x.

10. *Tocks Island Lake Environmental Impact Statement*, *op. cit.*, pp. 5-3 - 5-3a.

11. *Ibid.*, p. 3-6.

12. *Ibid.*, p. 6-1.

13. *Ibid.*, p. 4-1.

14. *Ibid.*, p. 3.

15. *Ibid.*, p. 4-5.

16. Laurie Burt and Leo Eisel, *Flood Control and the Delaware River* (East Setauket, N.Y.: October 1973).

17. *Ibid.*, p. 119.

18. M. Disko Associates, *New Jersey Water Supply: Alternatives to Tocks Island Reservoir*, prepared for the Environmental Defense Fund (West Orange, N.J., October 1973).

19. Tibbetts, Abbott, McCarthy, Stratton, *Water Resources Study for Power Systems, Delaware River Basin*, March 1972.

20. See Frank W. Sinden, "Water Supply" in Harold A. Feiveson, Frank W. Sinden, and Robert H. Socolow, eds., *Boundaries of Analysis: An Inquiry into the Tocks Island Dam Controversy*, (Cambridge, Mass.: Ballinger, 1975).

21. See Smith Freeman, Edwin Mills, and David Kinsman, "Water Supply and the Tocks Island Dam," in *The Tocks Island Dam: A Preliminary Review*, *op. cit.*, pp. 4-17.

22. Freeman, Mills, and Kinsman, *op. cit.*, p. 10.

23. See Sinden, "Water Supply," *op. cit.*

24. Smith Freeman and Werner Schmid, "Depletive Use of Delaware River Water," in *The Tocks Island Dam: A Preliminary Review*, *op. cit.*, p. 20.

25. See *Tocks Island Lake Environmental Impact Statement*, *op. cit.*, p. L-6.

26. *Ibid.*, p. L-2.

27. *Ibid.*, p. 7-1.