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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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APR 22 1975

The Honorable Gaylord Nelson
United States Senate

Dear Senator Nelson:

In response to your request of August 6, 1974, and subsequent discussions with your office, we reviewed the recreational benefits claimed for the Corps of Engineers' La Farge Lake reservoir and dam authorized by the Flood Control Act of 1962 (Public Law 87-874). We also gathered information on the alternative plan of constructing a dry dam --a structure designed to hold back water during flood periods rather than impound water continually--and inquired into the ability of two local communities to provide their share of non-Federal project costs.

We evaluated data supporting the recreation-use estimates shown in the Corps' September 1974 draft "Master Recreation Plan for Resource Management." We also interviewed officials of the Department of Natural Resources, Wisconsin; the Institute for Environmental Studies, University of Wisconsin; the communities of Soldiers Grove and Gays Mills, Wisconsin; Scientific Areas Preservation Council; and officials from the Corps of Engineers.

RECREATION BENEFITS

The Corps reported recreation benefits of $474,700 at July 1974, or 25 percent of the total benefits claimed for the project. The overall benefit-cost ratio was 1.2 to 1. Documentation to support the recreation benefits claimed was no longer available. During our review, the Corps' district office released its draft master recreation plan which increased the recreation-use estimates and most costs associated with the project. At our request the district prepared an analysis of the changes; the recreation benefits increased to about $724,000 and the benefit-cost ratio increased to 1.3 to 1.

After our review the district updated its economic analysis, taking into account additional costs and benefits for water quality improvements and projecting a greater number of recreation users at a higher unit value. As a result, recreation benefits were raised to about $994,000, although the overall benefit-cost ratio decreased to 1.14 to 1.

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The draft master recreation plan used a different methodology to estimate recreation use than the earlier study and expanded the zone of influence affecting visitor projections. No adjustments were made for anticipated poor water quality or the availability of other recreational opportunities in the surrounding area. Therefore, the number of visitors expected to use the lake may be overstated.

Since December 1974 the district has been reevaluating the present project plan and its alternatives. The district's reevaluations still are subject to review by higher authority; consequently, the benefit-cost ratio is subject to change again.

ALTERNATIVE PLAN--A DRY DAM

Although a dry dam could provide the necessary flood control for the Kickapoo Valley, the Corps did not select this method because it believed there would be adverse ecological and aesthetic effects and potential water resource benefits would not be realized. The Corps, however, has not prepared a formal assessment of the environmental effects of a dry dam.

Documentation specifically related to the dry dam benefit-cost ratio does not exist, but the ratio can be reconstructed, according to the Corps staff. Only limited consideration was given to a dry dam and there was no extensive planning for recreational use. Although a Corps appraisal showed that a dry dam would be possible using the structures already in place for the wet dam, there would be additional costs incurred because of delays and redesign work. In its current reevaluation of alternatives, the Corps is considering further the possibility of a dry dam.

FINANCIAL ABILITY OF LOCAL COMMUNITIES

Supplementary levee improvements for the downstream communities of Soldiers Grove and Gays Mills were included in the project authorization. The required local interest investment was estimated in fiscal year 1975 at $380,000 for Soldiers Grove and $260,000 for Gays Mills, plus annual costs of $3,500 for each community. On the basis of further study, the Corps believes that the amount of non-Federal costs may be about one-half the amount originally estimated, or $320,000. The Corps has no firm financial commitment from either community at this time. Officials of both villages said they would not be able to finance the improvements now or in the next several years.

The results of our review are discussed more fully in the enclosure. Although the matters presented in this report have been discussed with officials of the Corps of Engineers, as you requested we have not obtained comments from the Department of the Army.

We do not plan to distribute this report further unless you agree or publicly announce its contents.

Sincerely yours,

Comptroller General
of the United States

Enclosure

REVIEW OF RECREATION BENEFITS, DRY DAM ALTERNATIVE, AND OTHER MATTERS ON THE LAKE LA FARGE PROJECT

We reviewed matters relating to the planned construction of the Lake La Farge dam project on the Kickapoo River, near La Farge, Wisconsin, by the Army Corps of Engineers (Civil Functions). Our review included

--evaluating the annual recreation benefits claimed,

--gathering information on constructing a dry dam, instead of a wet dam, and

--obtaining views from officials of Soldiers Grove and Gays Mills, Wisconsin (two downstream communities that will be affected by the dam), on providing their non-Federal share of project costs.

PROJECT HISTORY

The La Farge dam and reservoir project was authorized under the Flood Control Act of 1962 (Public Law 87-874, Oct. 23, 1962) and was first described in House Document No. 557 (87th Cong., 2d sess.). Studies of the Kickapoo River and its flood tendencies were made as early as 1938.

According to Corps documents, the Kickapoo Valley floods almost every year, and in some years it floods twice--in the spring and in the growing season. The floods are characterized by their rapid rise, short duration, and rapid subsidence. Large floods have occurred in 1907, 1912, 1917, 1935, 1950, 1951, 1956, 1959, 1961, 1962, 1966, and 1973.

The project document of 1962 presented a plan to eliminate floods by constructing a dam above La Farge. The plan included a mutiple-purpose reservoir for flood control, recreation, and the enhancement of fish and wildlife and called for channel enlargements at downstream restrictive points and local flood control works at Soldiers Grove and Gays Mills.

As originally planned, the project would create a conservation pool of some 800 surface acres, which would require (through fee title or easements) the acquisition of about 4,000 acres of land. However, more detailed studies of the project, made after its authorization and discussions with State officials, led to a series of changes in the initial plan. The result of the study was to enlarge the water area to 1,780 surface acres, which would require the acquisition of more than 9,000 acres.

STATUS OF THE PROJECT

Funds for preconstruction planning for the total project were appropriated in fiscal year 1964; funds for "land acquisition only" were appropriated in fiscal year 1968 for acquiring land at the lake site; and funds for constructing the dam and reservoir were appropriated in fiscal year 1971.

The estimated cost for the entire project is $38.5 million, of which nearly $35.7 million is for the La Farge Lake unit. The balance is for channel improvements at Soldiers Grove and Gays Mills. These cost estimates do not include the additional cost of the recreational facilities that have been proposed by the Corps' St. Paul district office and the additional costs for water quality control recommended in a consultant's study.

The La Farge Lake unit is about 36 percent complete and is scheduled for completion by December 1978. The channel improvements are still being designed, and a completion date for this portion of the project has not been established. Most of the land for the lake unit has been acquired; however, the lake area has not been cleared of trees. Construction has not started for the main dam although certain preparatory portions have been completed, i.e., the inlet tower and outlet tunnel.

Nearly $14.8 million of the funds appropriated have been allocated to the project. The Corps has requested an additional $3 million for fiscal year 1976.

Currently a partnership team of Federal, State, and local agencies; private citizens; and professional groups has been established to evaluate the water quality of the proposed lake and develop a suitable management plan for the area. This effort was still underway at the time we completed our review.

PROJECT BENEFITS AND COSTS

Since authorization in 1962, the estimated annual benefits of the project have been increased from about $0.7 million to $1.9 million, and the relationship of the individual benefits has changed, as shown in the following table.

Estimates of Annual Benefits and Costs

	Initial estimate (July 1962)	Percent	Current estimate (July 1974) (note a)	Percent
	(000 omitted)		(000 omitted)	
Flood control	$570	82	$1,275	67
General recreation	113	16	475	25
Fish and wildlife	11	2	40	2
Area redevelopment (note b)	-	-	120	6
Total annual benefits	$694	100	$1,910	100
Total annual costs	$503		$1,625	
Benefit-cost ratio	1.4 to 1		1.2 to 1	

[a]The figures reported in the fiscal year 1976 official budget justification.

[b]Corps policy permits area redevelopment benefits to be included in project plans for information but precludes their use in determining a project's economic justification. Excluding these benefits from the Corps' current estimate would reduce the benefit-cost ratio to 1.1 to 1.

Federal water resource construction agencies develop and report benefit-cost ratios to the Congress to show the economic feasibility of proposed projects. The Congress seldom authorizes water resource projects unless the benefit-cost ratios exceed unity (estimated benefits exceed economic cost).

Water quality

The possibility of a water quality problem within the proposed reservoir was identified in a January 1965 study by the Department of Health, Education, and Welfare. The study noted that the present levels of nitrogen and phosphorus in the Kickapoo River were sufficient to permit algal blooms in a standing body of water, such as the proposed reservoir.

The Corps recognized this potential problem in the February 18, 1972, final environmental impact statement

which related several aspects that the Corps felt would improve the water quality, such as:

--The improved sewage treatment anticipated for several communities.

--The removal of 5,000 acres from agricultural production due to project acquisition.

--The continuing programs for soil conservation by the Department of Agriculture.

At that time, the Corps also recognized that little data was available on the quality of surface waters in the area, and it initiated a data collection program to determine the water quality of the lake.

In order to obtain the required data, the Corps subsequently contracted with the Institute of Environmental Studies, University of Wisconsin, in June 1973 for a detailed study and an independent assessment of the water quality. The study, completed in November 1974, concluded that the lake would have poor water quality because of the dissolved nitrogen and phosphorus content. This would tend to produce heavy algal blooms and thick plant growth in portions of the lake that would virtually make it useless for such recreational activities as swimming, canoeing, and boating.

In its review of the study, the Environmental Protection Agency agreed with the Institute on the predicted water quality. The Agency said the project, as proposed in the final environmental impact statement, was unacceptable from the standpoint of environmental quality and recommended that construction be delayed until all possible project alternatives are reevaluated or a specific program of water quality improvement is implemented.

In responding to the Agency the St. Paul district engineer stated that the Corps, together with State and Federal agencies, intended to improve the overall quality of the project. An intensive review of the Institute's report data, conclusions, and recommendations was being conducted. The district engineer stated that a joint partnership team was being estabished between selected agencies and individuals to work with the Corps in evaluating the Institute's report to develop a suitable management plan.

When we finished our field work, the joint reevaluation by the partnership team had not yet been completed.

Recreation benefits

Recreation benefits for water resource projects are computed by estimating annual recreation attendance during the life of the project and assigning a dollar value for each visit. Projected attendance is based on attendance at similar completed projects and projections of population growth. The dollar value of a recreation visit is based on implied willingness to pay. Recreation-day values range from $0.50 to $1.50 for general water recreation.

The current benefit-cost ratio includes recreation benefits valued at $474,700. This amount in itself represents a reduction from an earlier computation of $926,000, which the Corps recognized as incorrect because it used an improper unit of measure to determine design loads in the May 1967 "Preliminary Master Plan for Resource Development." Even though correction of this error reduced the annual recreation benefits, it did not reduce the benefit-cost ratio of the project below unity.

The $474,700 of recreation benefits claimed is not fully supported because the Corps' district office was unable to furnish supporting documentation for its 1967 projection of recreation attendance. District officials said the necessary documents had been disposed of and the data could not be reconstructed because the two people who made the original projection were no longer with the district.

However, in September 1974 the district released the draft of its final "Master Recreation Plan for Resource Management," which revised earlier recreation-use and attendance estimates, as well as the costs of constructing, installing, and maintaining the recreational facilities. The final plan, which shows increases in both attendance and cost of facilities, is being reviewed at the district and division levels. A district official said no major changes are expected to be made to the draft when the review is completed.

The district prepared the September 1974 estimate by projecting a per capita use-rate curve on the basis of actual rates at other Corps projects. Attendance was estimated at more than 524,000 visitors for the first year, increasing to a maximum 915,000 visitors in the year 2020.[1] On the basis of its preliminary 1967 plan, the Corps projected a maximum annual visitation of about 735,000 visitors.

[1]The Corps expresses visitors in terms of recreation days, which are standard units of use consisting of a visit by one individual to a recreation development or area for recreation purposes during any reasonable portion or all of a 24-hour period.

At our request, the district prepared a benefit-cost analysis to show the increased visitation projected in its September 1974 plan. The analysis showed that the recreation benefits would increase by almost $250,000 and that the benefit-cost ratio of the final master recreation plan would be 1.3 to 1.

After our review, we learned that the district had incorporated further revised estimates of recreational use in an updated benefit-cost analysis. The revision resulted in an additional increase to the projected attendance, estimated at this time to be 595,000 visitors the first year, increasing to a maximum of 1,016,000 visitors in the year 2020.

A summary of the updated benefit-cost analysis is shown below.

	February 1975 estimate	Percent
	(000 omitted)	
Flood control	$1,025	47
General recreation	994	45
Fish and wildlife	40	2
Area redevelopment	140	6
Total benefits	$2,199	100
Total costs	$1,926	
Benefit-cost ratio	1.14 to 1	

A district official said recreation benefits increased because of the revised visitor projections and because recreation use was raised from $1.00 to $1.25 a day.

Comparison of methods and data in preparing visitation estimates

We noted these differences in the preparation of estimates for visitors to La Farge.

--A newer methodology was used.

--The zone of influence was expanded, two new counties were included.

--No adjustments were made for marginal water quality or the availability of other recreational opportunities in the immediate area.

Newer methodology used

At the time the 1967 preliminary plan for recreation was formulated, there was no written guidance or standard procedure to follow for estimating the number of potential visitors to a reservoir. A district official said the method used for the plan was simple and primitive, compared to the approach used at the present time. Since the supporting documentation was not available, we were not able to evaluate the methodology used in the preliminary plan.

Technical Report No. 2, "Estimating Initial Reservoir Recreation Use," dated October 1969, provides guidance on estimating initial recreation use at prospective Corps reservoirs. The procedure uses the "most similar project" concept; estimations are based on existing reservoirs that are the most comparable in size, operation, and anticipated recreation-use characteristics to the prospective reservoir.

For the La Farge project the district used data from 10 reservoirs located in Texas, Oregon, California, Kansas, and Oklahoma. The Corps noted that none of these reservoirs were located in the upper Midwest and, therefore, it was not possible to relate them to La Farge directly. But by using data from 10 reservoirs, the district believed that the information would show the number of potential visitors at La Farge. Corps instructions state that the initial selection of similar projects should be on the basis of approximate size, in terms of the surface area of the average recreation pool. Lake La Farge plans called for a surface area of 1,780 acres. Of the 10 reservoirs used in its analysis, the district selected 3 with 600 acres or less, 3 with more than 2,400 acres, and 2 with more than 3,400 acres. The remaining two were the approximate size of La Farge.

District officials said the Corps' procedures require the similar project approach in estimating initial use and that the data selected for use in its analysis was the best information available. The Corps' procedures do indicate, however, that, when it is impossible to find a similar project or to adapt the data to a specific project, some other method may be used, provided that it is fully explained and documented to permit review by higher authority.

Expanded zone of influence

In the preliminary plan and recreation-use estimate, the district defined the zone of influence as the population within a 50-mile zone of the proposed reservoir that would contribute the potential visitation to the project. The zone of influence included 11 Wisconsin counties.

When the district prepared its final master plan, the zone of influence was enlarged and 13 counties were included. One of the two additional counties, Dane, was of special importance because population projections showed it had almost one-half the entire population in the 13-county area. Including two additional counties in the zone of influence increased the number of potential visitors by some 123,000 people, or nearly 21 percent, over the number of potential visitors from an 11-county area.

A district official explained that the zone of influence was altered from 50 to 75 miles because the Corps believed that a greater number of people would be attracted to La Farge to participate in the many varieties of recreational activities. Corps guidelines stated that the market area of the proposed project need not be a 50-mile radius and that it may be smaller or larger depending on the location of the major using population. The general criterion for selecting counties is to include those which have about one-half their population and/or land area within the tentative market area boundary. The district official also said recent evidence showed that people traveled as far as 150 miles to fish at one of its recreation sites. Overall, the district believes its visitation estimate to be conservative.

Adjustment factors to estimate not considered

Guidelines for estimating recreation use suggest that planners consider certain characteristics of a project area and make an adjustment, if necessary. For example, poor water quality, recreation alternatives available in the market area, and existing recreation use at the prospective project should be considered. The Corps made no adjustment for the above situations in its visitation and recreation-use estimates, although each would be applicable to La Farge.

To illustrate, information from the Department of Natural Resources showed that within 70 miles of La Farge there were four State parks with four lakes that had about 1.9 million visitors in 1973. Included in the above statistics is Wildcat Mountain State Park which is adjacent to the La Farge project and which had more than 108,000 visitors.

The water quality of the proposed reservoir is expected to be relatively poor, compared to other lakes in northern Wisconsin, because the Kickapoo River has a high concentration of dissolved nitrogen and phosphorus. A scum with a noxious odor will form when blue-green algal blooms and portions of the lake will be virtually unusable for some recreation activities, such as swimming, canoeing, and boating. It seems, however, that the water quality of Lake La Farge would be similar to other reservoirs in the area which are heavily used for recreation despite their eutrophic nature.

A district official said water quality was not considered in the recreation-use estimate, and it was assumed that the water would be suitable for water sports. This official said the Corps could not predict how water quality would affect recreational use.

Corps officials said these matters were considered in the final master plan to the extent that they were discussed in the narrative section. We were also told that the present recreational use of the project area is so slight that it would be offset by other uses, such as ice fishing and cross-country skiing, that were not fully considered or discussed in the final master plan. The Corps did state, however, that present use is an area of contention and should be considered further. In its February 1975 updating of the benefit-cost analysis, the Corps considered present recreational use and adjusted the recomputed benefits by about $17,000, reducing the total from $1,011,000 to $994,000.

We believe that it is appropriate for the Corps to estimate the recreational visitations by the newer methodology. It appears reasonable that the project could attract visitors from within a 75-mile range, and we believe the Corps is justified in using that as the zone of influence. However, the Corps has not adequately considered existing alternatives for water-oriented recreational opportunities or the effect poor water quality would have on the recreational visitation. As a result, the number of visitors expected to use the lake may have been overstated. These factors should be considered in the current reevaluation by making appropriate adjustments to the per capita use-rates that are applied to each of the counties within the zone of influence.

DRY DAM ALTERNATIVE

According to the February 1972 final environmental impact statement for Lake La Farge, a dry dam--a structure designed to hold back water during flood periods rather than impound water continually--could provide flood control for

the Kickapoo Valley. The benefit-cost ratio of a dry dam alternative would be approximately 1.1 to 1.

From discussions with district officials, we learned the benefit-cost ratio of a dry dam was determined by deleting recreation benefits and costs of the proposed wet dam and the ratio was not computed separately and on its own merits. Documentation related only to the dry dam ratio does not exist, but the ratio itself can be reconstructed without difficulty, according to the district staff.

Corps officials said only limited consideration was given to the dry dam alternative and there were no extensive plans for providing recreational facilities. Also the benefit-cost ratio was put in the environmental impact statement to satisfy the requirements of the National Environmental Policy Act.

Dry dam costs

A Corps appraisal showed that a dry dam would be technically feasible, using the present inlet tower and outlet tunnel. Converting to a dry dam, however, would increase the total project cost by about $10.7 million. It should be noted that this estimate represents the Corps' effort to assess the additional costs without intensive study, and it does not take into account any modifications to the structures planned or already in place. The major share of the additional cost, some $7.8 million, is the result of price escalation due to delays in completing the project.

Effects of a dry dam

According to the final environmental impact statement:

> "This alternative has not been selected for the Kickapoo Valley because of anticipated adverse ecological, aesthetic, and socio-economic impacts and because major potential water resource benefits related to public recreation and economy would not be considered."

A formal assessment of the environmental effects resulting from a dry dam has not been prepared, and the estimated cost of preparing one is $60,000. From discussions with Corps staff and other officials, we were told that the following could be expected.

--A dry dam would have a great fluctuation in water levels due to retaining and releasing the stored water. These filling and emptying actions would create mud flats behind the dam structure because of the high sediment load in the river.

--The length of time required to release water in a dry dam depends on the severity of the flood. Certain plants and trees cannot tolerate prolonged inundation and would not thrive with repeated flooding.

--All flood waters in a dry dam could not be released using the structures now in place because of the variance in the land, river bed, and conduit elevations. Consequently, there would be a marshy area of about 200 acres behind the dam.

--The water quality downstream from the dry dam would not be good and would not support the development of trout fishing, because of sediment stored in the basin from an earlier flood which would be flushed out with the following flood.

The Corps and some State officials believe that the environmental effects of a dry dam would be as damaging as those of a wet dam. Until a complete environmental assessment has been made, however, there is no way of knowing at this time what the environmental effects would be or how they would compare to a wet dam.

The joint partnership team will update and reevaluate all alternatives for the project. Among the alternatives to be considered is the dry dam, by itself or in combination with other alternatives. Work on the reevaluation was still in process when our review ended.

LOCAL COMMUNITIES' CAPABILITY TO SHARE PROJECT COSTS

Project authorization for the La Farge reservoir and dam project included supplementary levee improvements for Soldiers Grove and Gays Mills to provide further protection against local flood problems. This will protect areas within these communities against uncontrolled flows originating downstream from the La Farge reservoir, primarily from the West Fork of the Kickapoo River.

The fiscal year 1975 budget shows that the local interest investment in construction of the project is estimated at $640,000, broken down as follows:

	Soldiers Grove	Gays Mills	Total
Lands and damages	$142,000	$ 66,000	$208,000
Relocations	238,000	150,000	388,000
Ponding areas	-	44,000	44,000
Total	$380,000	$260,000	$640,000

The annual cost of maintenance, operation, and major replacement is $3,500 for local interests in each community.

The Corps has no firm financial commitment from either Soldiers Grove or Gays Mills. A Corps official said if either community could not contribute its share of the costs, the improvement projects at these locations would be delayed temporarily. We were told that a plan to exclude three bridge relocations from the original design was being considered and would reduce the non-Federal costs by about one-half the amount originally estimated, or about $320,000.

We learned from officials of Soldiers Grove and Gays Mills that neither community would be able to raise financing for the improvements considered necessary by the Corps. The officials said recent improvements in their towns' sewage disposal systems had been made, and this required some local cost sharing. An official of one of the villages said a total of $13,000 in property taxes was levied last year and added that the amount should speak for itself as far as his community's being able to finance the planned improvements.

Officials from the Office of the Chief of Engineers recognized that it was questionable whether the two communities could pay their share. They indicated that any local funds would probably have to come from the State rather than the communities. However, the Corps said it would not seek a cost-sharing agreement until the Design Memoranda for this aspect of the project has been completed.