Publications

TR-8

A Study of the Economic Impact of Water Impoundment Through the Development of a Comparative-Projection Model

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- Full Text

Using two established reservoir projects, an economic simulation model for reservoir development was constructed. The two comparative areas used for the model development are both reservoirs in central Texas and were constructed during approximately the same time period.

The simulation model divides reservoir development into three stages--Construction, Fill-Up and Post Fill-Up. For each of the stages economic

variables were chosen which reflected economic activity attributable to the reservoir. Inputs of construction money, operations and maintenance, recreation and investments were related to each respective stage and then used to determine the economic impact of the reservoir on the local area economy.

A synthetic index based on economic inputs other than those used for the model was developed utilizing a control area. The index served as guideline to the mathematical development of the model and as a measure of the predictive accuracy of the model.

A recreational survey was conducted at average recreational expenditures and develop the Post Fill-Up Stage of the model. Overall recreational attendance was projected, and to this figure experience ratios of the survey were applied.

After the simulation model was developed and applied to two established reservoir projects, it was utilized to generate prediction data for the primary study area. Checks were made on reliability of the data since the primary area is only in the second stage of development. The project data, the results, and recommendations of the study are published as Technical Report No. 8 of the Water Resources Institute, Texas A&M University. Copies of the report have been sent to all persons cooperating and furnishing data for the study.

Introduction

The purpose of the research reported here was twofold: (1) to develop a theoretical model which would predict with reasonable accuracy the economic impact of water impoundment on the surrounding areas, and (2) to show the practical application of the model by partially testing it on a single impoundment project.

The model to be developed was named a comparative-projection model because it was to compare a primary study project with two completed impoundment projects and generate prediction data for the primary study area. This approach assumed an economic relationship between the two completed projects and the proposed reservoir, but this assumption was considered tenable since the projects were closely located, similar in size, similar in preconstruction economies, and, with one exception, were similarly located to urban centers.

The primary study area selected to partially test the comparativeprojection model was the Somerville Dam and Reservoir; which, at the start of the research, was under construction. It has just recently started the deliberate impoundment of water. This project is located on the Yegua Creek and other small streams in central Texas. On the basis of data obtained from comparable water impoundments in central Texas -- namely, Lake Whitney and Lake Belton -- the economic impact of the Somerville Dam and Reservoir was to be predicted.

The approach used in developing the comparative-projection model was to follow a logical order. First, the theoretical model was to be described and related to economic variables of income, agricultural income, population density and urban proximity. The economic variables, considered characteristics of the economic system, were to be joined with the inputs to the model. Direct economic impact (e.g., payrolls from construction contracts) was not to be distinguished from indirect economic impact except by descriptive identification, because the multiplier effect on income is not measurable separately from the inflow of new economic activity. This phase of the model was then to be tested against the economic history of the two

comparable impoundments and to be adjusted for general economic activity. A comparable economic sub-region, also in central Texas but without an impoundment project, was to be used as a control area so that net differentials in economic activity could be attributable to water impoundment.

A synthetic index based on the variables, income, retail sales, postal receipts, and bank deposits, was to be used to identify differentials in economic activity. More important, the index was to serve as an accuracy test for the comparative-projection model throughout the history of the two completed projects, from inception to several years following reservoir completion.

After the model was developed, and tested on the two existing projects, data were to be collected on the Somerville Dam and Reservoir project. An economic comparison was to be made between the Sommerville project and the other two projects. The comparative-projection model was then to be applied to the Somerville project as a partial test of the prediction accuracy of the model, and the prediction data was to be adjusted for observable economic differences. The anticipated results were a reasonably accurate measuring and prediction model for economic impact, whose reliability would increase with future applications and adjustments.

Summary & Conclusions

A proposed dam and reservoir is most commonly met with mixed reactions from the communities most affected. Some citizens look upon the project favorably because the new facility will improve business or provide a recreational area to fish, ski, and relax. On the other hand, some people might be expected to object to the project because it will inundate acres of productive agricultural land and possibly move people from their homes and businesses. Both of these viewpoints are valid, but primary priority must be

given to the reservoir's total influence on the local population and economy. Specific benefits are realized for the overall area even at the expense of individuals. The reservoir provides social and economic benefits such as water conservation, flood control, water for irrigation purposes, hydro-electric power, and an additional recreational facility. And, the reservoir provides definite support to the local economy.

The support or stimulus to the local economy is noticed first in the construction phase of the dam. New jobs are created by the dam construction project. Filling these new jobs means employment or better employment for local manpower and movement of people to the project site from outside areas. Accompanying the new jobs will be new income poured into the local economy. If materials, supplies, etc., for construction are available locally, these will add income to the local area. These income increases will lead to an increase in business activity and a multiplier effect of the income assures further increases in income.

Business activity can be expected to be sustained at a higher level as the reservoir development project proceeds from the construction phase to the fill-up phase. Additional inputs of recreational and investment expenditures help sustain the economy at a higher level as construction dollars begin to diminish. Parallel with higher business activity is an increase in the value of land, because land use shifts from agricultural to residential or recreational purposes. Prices of near-lake land may increase as much as fifteen times pre-construction prices.

The economy will feel the filled reservoir's impact from vacationers, weekend campers, hunters, fishermen, and other area visitors. The presence of visiting recreators will support business activity and generate new money inflows from

investments. In turn, more jobs are created, more income generated, and new investment expenditures made.

The present study was undertaken to prove this general hypothesis of impact from water impoundment projects, to identify the detailed schedule of impact, and to develop a model which would predict economic impact with reasonable accuracy. An economic simulation model was developed to measure the impact of a water impoundment project on a local economy. Using two established reservoirs in central Texas, Lake Whitney and Lake Belton, the model was adjusted, tested, and readjusted. Measurement accuracy of the model was tested for net impact by comparing it with a synthetic index constructed as a parallel economic measure. The index removed normal economic growth and isolated economic growth attributable to a reservoir