RIVER BASIN SIMULATION: AN INTERACTIVE ENGINEERING-ECONOMIC APPROACH TO OPERATIONAL POLICY EVALUATION*

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Traditionally man has used water for domestic needs, livestock, crop production and navigation; now he is also concerned with anesthetics, recreation, industrial production, waste disposal, power generation and aquatic ecological systems. He finds many of these uses incompatible and in conflict.

Florida is encountering similar conflicts and in many ways is typical of other humid eastern states. The situation is especially dramatic because of extreme oscillations in rainfall — torrential tropical storms to droughts lasting many months. Water management in Florida has been primarily for flood protection. More recently, the need for multi-purpose water management to increase usage benefits while decreasing potential damage from quantity extremes, has been recognized [21]. Legislation, the Florida Water Resources Act of 1972 [2] being foremost, has been enacted to create a governmental framework in which water problems can be addressed [9].

The Act grants five water management districts specific authority to regulate water use. These districts, among other responsibilities, must deal with water allocation among public and private users while protecting the public's broader interests. To foster efficient and equitable allocation, water management districts need accurate information on the impact of their policy decisions. River and reservoir management authorities in other southeastern states share similar responsibilities and problems. This paper suggests an interactive simulation approach to enhancing decision makers' understanding of the workings of the management system and policy impact.[1] This approach is addressed primarily to management of existing control facilities, but could be used to analyze operations of proposed systems. The decision framework in which policies are developed is considered first. Next, specific models making up the river basin model are discussed. Thirdly, use of the model is demonstrated by analyzing three management problems.

THE DECISION FRAMEWORK AND ROLE OF SIMULATION

The basic purpose of a public water management authority is to manage waters of a region so as "... to realize their full beneficial use ..." [2]. The decision-making responsibility to bring this about is generally assigned to a political group of representatives, "a governing board." The governing board is to gather pertinent information through its technical staff and to weigh, as best it can, consequences of various management policies and allocations. True effectiveness of a managed water resource system will depend largely on the governing board's ability to evaluate trade-offs associated with a given policy. It is in this evaluation that information generated with economic models can supplement other sources of information. The intent is not to prescribe optimal policy, but to elaborate on economic consequences associated with alternative policies. Questions to be answered are: to what activities and to whom do benefits and costs accrue, and what are total net benefits?

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[1] A linear programming model of the same river basin was developed by Reynolds and Conner [15, 16] to investigate broad water management policies.

The management situation considered in this paper is that of short run operational management. The assumption made by the water authority is that water users have made the decision to use water and have made investments based on an expected supply of water being available for their activity. The question the authority must now deal with is: on a day-to-day basis, how should water be managed to maximize net benefits to the region? The management performance indicators are, in this very short run situation, water levels in lakes. The ultimate indicator of management performance is net benefit levels.[2] The authority desires to have a policy specifying day-to-day management such that net benefits accruing to water users are as large as possible and are distributed in an acceptable pattern.

Since physical, economic and institutional factors are involved in management, information on each is needed as well as on their interactions. The simulation methodology discussed deals with the physical system and economic activities interactively, with institutional aspects entering as constraints. The methodology provides detail on spatial and temporal water supply and demand, which in turn allows specific evaluation of policies dealing with changes in water supply and demand.

Examples of policy areas of interest in the study area (the Kissimmee Basin) are water allocation among competing uses, operation of physical controls and provision of minimum stream flows. The water authority's technical staff can use simulation modeling to investigate several approaches in meeting a specific management objective associated with one of these policy areas. Information on changes in benefit levels occurring among the approaches is generated. Information on economic benefits along with information on other systems operating in the area not included in the modeling—for example, aquatic ecological systems—is used by the governing board in its final policy evaluation.

A RIVER BASIN MODEL

The Kissimmee River Basin — which is in the South Florida Water Management District[3] — is comprised of a number of lakes, streams, canals and control structures. The lakes are used extensively for recreation, and water for consumptive uses is removed under district authority. Flood control is an important consideration in operation of the system. Characteristics of the natural hydrology, existing water management facilities, water-using activities and institutions involved in surface water management were modeled.

Figure 1 illustrates the information flow occurring in the overall model. Each box represents a submodel used to calculate information about the water system and economic activities at regular intervals. With a policy alternative specified, the model basically works as follows: rainfall data enter the calculation on twelve-minute intervals, runoff is calculated on six-hour intervals, lake levels calculated on six-hour intervals, control operations performed on six-hour intervals and economic activity levels assessed on a daily interval. Water allocated to a particular economic activity on a specific day is based on water supply (in storage) and quantity demanded. Quantities allocated on previous days affect the water in storage as does operational management of the control system. The level of economic activities thus affects water available for use which, in turn, affects economic activities. The final outcome of an alternative policy simulation is the level of benefits, the Benefit States. These benefit data are calculated on an annual basis. Submodels making up the system are described next.[4]

Technical Models

The surface water management submodel is the first point at which management decisions can be made and water output affected (see Figure 1). Runoff from fourteen watersheds empties into seven lakes. Water flows southward through the lakes, control structures and canals, and ultimately into Lake Okeechobee which is a major water supply for south Florida (see references [8, 16] for more details on the system). This series of lakes, canals and structures is used integrally in management. By controlling lake levels with the nine control gates, water can be retained or released. When the system's capacity is exceeded, flooding occurs.

The hydrologic input into the management submodel is provided by rainfall information which is translated into watershed runoff values. A procedure using historic rain gauge records described by Sinha and Khanal [19] was used to estimate rainfall values

[2] Since construction of the water management facilities is complete, development costs are sunk costs and net benefits are those accuring to the water users. District operating costs are not considered.

[3] Previously, the district was the Central and Southern Florida Flood Control District.

[4] Complete mathematical representation of the models will not be presented in this paper due to their length. Economic activities models are described in somewhat more detail than are technical models. See cited references for complete models.

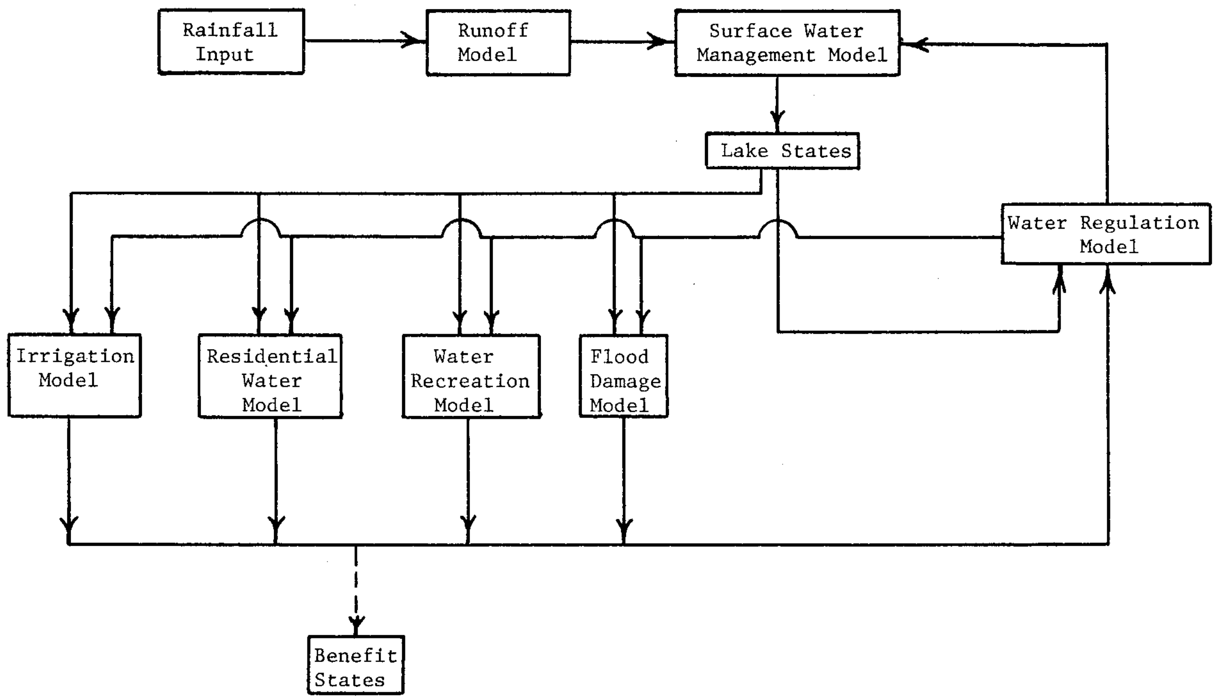

FIGURE 1. WATER MANAGEMENT INFORMATION FLOW DIAGRAM

over the individual watersheds at twelve-minute intervals.[5] Six-hour runoff values were obtained by inputting the rainfall values into a modified version of the Stanford watershed model [20].[6]

The major function of the management submodel is to determine lake levels at regular time intervals. The lake level at the end of a six-hour interval is a function of both water stored at the end of the previous time interval and net flow rate into or out of the lake during the interval of interest. Net flow rate during a six-hour interval for a specific lake is the sum of several flows. First, there is inflow from upstream lakes and outflow to downstream lakes. These flows are functions of control structure operations and canal capacity, and are calculated using a gradually varied flow technique [8, 13, 18]. Second, there is run-off from the surrounding watersheds with the runoff model being used to calculate these flows. Third, water is withdrawn for domestic use by municipalities and by farmers for irrigation. These consumptive flows are functions of the demand for water by these users and of the institutionally established allocation procedure.

With inflows and outflows for an interval calculated, volume of water in storage and lake levels can be determined [8]. These lake levels and water in storage values given at six-hour intervals are the lake states (Figure 1), and provide information about water available for allocation in the next time interval. The system is interactive in that the level of economic activities influences water in storage. For example, day-to-day removal of water from lakes for irrigation reduces water in storage; as water in storage is reduced below specified levels, farmers are allowed to use proportionally less water.

Economic Activities Models

Water for crop irrigation is removed from the lakes and canals by individual farmers under district authority. Quantity available for irrigation is a function of water in lake storage during a time interval (in this case, i is a day) and the allocation procedure used by the district (see footnote 12).

Crop yields possible with available irrigation water and rainfall are estimated in the model. Crop evapotranspiration is utilized in a production function, and variations in evapotranspiration cause varying crop yields. A modified form of the Blaney-

[5] A second source of rainfall data is also available. Khanal and Hamrick [7] have developed a stochastic model to synthesize rainfall data for the river basin.

[6] The runoff simulation submodel involves using mathematical relationships for determining four broad activities of the hydrologic cycle, (a) infiltration, (b) water losses due to evaporation, transpiration and deep groundwater percolation, (c) recovery of water into the streams from soil reservoir and overland flow and (d) routing water from the streams to the watershed outlet.

Criddle equation [14] was used to estimate potential evapotranspiration rates. Actual evapotranspiration is a function of soil moisture, and daily calculations of both are made. Functional relationships used to obtain the proportion of potential that gives the actual evapotranspiration in a given time interval were (see [3, 8]):

$$AET_i = ET_{p,i},\ SMCR \leq SMA_i$$

$$AET_i = PET\ (ET_{p,i}),\ SMPW < SMA_i < SMCR$$

$$AET_i = 0,\ SMA \leq SMPW$$

where

AET_i = actual evapotranspiration during day i
$ET_{p,i}$ = potential evapotranspiration during day i
PET = proportion of potential evapotranspiration actually occurring
SMA_i = soil moisture during day i
SMFC = soil moisture at field capacity
SMPW = soil moisture at permanent wilting point, and
SMCR = soil moisture at critical point.

The root zone moisture at the end of a time interval is:

$$SMA_i = SMA_{i-1} + WESI_i + WESR_i - AET_i$$

where

$WESI_i$ = water entering root zone from irrigation during day i, and
$WESR_i$ = water entering root zone from rainfall during day i.

The AET_i is accumulated through the entire growing season (the whole year) to obtain total evapotranspiration, ET_{total}. When only rainfall is available, accumulated evapotranspiration is ET_{rain}. The two (irrigated) crops considered were pasture and citrus.

Producer surplus is used to reflect benefits accruing to society as a result of irrigation water being available.[7] Only producers' surplus, PS, associated with irrigation water is an appropriate indication of benefits occurring due to the system's management. The producer surplus for effective water from rainfall is subtracted from the producer surplus for the total effective water.

That is:

$$PS = \int_0^{ET_{total}} p_{cy} \frac{\partial(CY)}{\partial(ET)}\, d(ET) - C_{iw}\,(ET_{total} - ET_{rain}) - \int_0^{ET_{rain}} p_{cy} \frac{\partial(CY)}{\partial(ET)}\, d(ET)$$

where

p_{cy} = price of the crop
C_{iw} = cost of irrigation water
CY = crop yields, and
ET = effective water.

Management of water in each lake causes the supply of irrigation water to vary so that actual evapotranspiration varies, thus causing yields to vary. Resulting producer surplus for each crop provides benefits due to irrigation water being available for each crop grown near each lake.

Water is removed from the lake system by municipalities for residential consumption, and a model is used to establish benefit levels for this use. Consumer surplus is used to reflect benefits accruing to residential users. These benefits are expressed by:

$$CSURP = \int_{p_w}^{p_u} q_a\,(p_a)\, dp_a + (p_w - p_a)\ GPD$$

where

CSUPR = consumer surplus for residential use of surface water
$q_a(p_a)$ = demand function for residential water
p_a = price consumers must actually pay for water
p_u = highest price consumers will pay for water
p_w = price consumers would be willing to pay for the actual quantity of surface water received, and
GPD = quantity of surface water actually received.

Again, availability of water for residential consumption is a function of water storage and the

[7] Use of producer and consumer surplus to indicate benefit levels associated with a policy follows the conceptual framework discussed thoroughly by Mishan [12].

allocation procedure. The amount of water authorized to be removed from a lake is some proportion (depending upon water availability) of the average quantity demanded. To obtain the maximum quantity of water demanded, an average consumer is assumed, and a residential water demand model suggested by Howe and Linaweaver [6] is used.[8] Specifically, this function is

$$q_a = 86.3\, v^{0.474}\, (w_s - 0.6r_s)^{0.626}\, p_a^{-0.405}$$

where

q_a = average quantity demanded for domestic purposes in gallons per dwelling unit per day

v = market value of the dwelling unit in thousands of dollars

$(w_s - 0.6r_s)$ = lawn irrigation water needs in inches of water, and

p_a = sum of water and sewage charges that vary with water use, evaluated at the block rate applicable to average domestic use in cents per thousand gallons.

Means for market value of the dwellings and lawn irrigation needs for the two cities in the basin were substituted into the equation. The actual quantity of water used by residents from each lake was determined daily and accumulated for the entire year. This total quantity was used to calculate total consumer surplus.

The lakes of the basin are used extensively for recreation, and usage level is influenced by water depth. This is true because the lakes are shallow; a few feet of fluctuation drastically affects boating. Benefits to recreational use of water were calculated as:

$$\int_{W_{\ell_0}}^{W_{\ell_0}} P_v \frac{\partial V}{\partial W_\ell}\, dW_\ell$$

where

P_v = value of a typical visit to a lake

V = number of visitors to a lake per day

W_ℓ = lake level

W_{ℓ_0} = average lake level during a time interval, and

W_{ℓ_m} = elevation of the lake's bottom.

Recreational use in the Kissimmee Basin was studied by Behar [1], and functional relationships which allow determination of the number of visitors as a function of lake level were developed from his work. The seven functions used are reported in Reynolds, *et al.* [16].

The value of a visit, P_v, was not readily attainable, because there was no market for recreational visits to Kissimmee Basin lakes. Gibbs and Conner [5] discuss components of outdoor recreation values for the Kissimmee Basin. Gibbs [4, 16] estimated a demand function for recreation by an individual on the lakes. Using this equation he found the consumer surplus for an individual's visit to a lake to be $59.91. Using this figure and the number of visits resulting from a particular lake during a given month, benefits accruing to the availability of water for recreation were found [8].

Lack of demand functions for flood protection made it impossible to use the surplus concept to determine benefits. Thus, market value for replacement of the damaged property was used. Lost net revenue to productive activities in flood-prone areas was not considered in this study. Flood damages resulting from lake water management policy were considered as negative benefits.

Flood damages can generally be viewed as a function of the lake level and activities at various elevations. In the case of agricultural crops, duration of the flood and time of year are also factors. Damage to crops increases with exposure to saturated soil conditions until finally the crop is killed. In addition, a crop is more susceptible to physiological damage during different growth stages.

Data on flood stage and damages were provided by the water management district.[9] Unfortunately, these data for agricultural crops were based on the assumption that the crops — and these included mature citrus groves — were completely killed and must be replaced. No information was available on the effect of temporary flooding during different seasons. To demonstrate the role of flood water management in the overall management operation, available data were used along with assumptions to derive flood damage functions. A hyperbolic paraboloid of the general form

$$CD = c(FD)\,(DOF)$$

where

CD = aggregate damages to a crop

FD = flood depth

[8] The quantity of water demanded for residential use is assumed to be relatively constant in the very short run because of fixed price schedules. Also, residential demand equations for south Florida have been estimated [10] and are being incorporated into the model.

[9] Data were gathered for the land uses existing in the study area during 1969.

DOF = duration of the flood, and

c = an empirical constant

was used to calculate agricultural damages on each lake [8, 16].

Urban property and rural structures are considered to be damaged immediately; duration of flooding was not a factor. Linear functions of flood stage were used to calculate structural damages for each lake. Specific functions for the Kissimmee Basin and their underlying assumptions are reported in detail by Kiker [8, 16].

Water Regulation Models

Alternative water regulation and allocation policies are specified by the district staff and enter the model as given functional relationships in the water regulation model (Figure 1). A given regulation affects temporal and spatial availability of water through the surface water management model, and affects the level of economic benefits through the economic activity models. Water availability in the various lakes during the year is influenced by the regulation schedules (generally referred to as rule curves) for the lakes (as well as consumptive use of water). The schedules specify desired lake levels for any given day (illustrated in Figure 2). Changes in the shape of the regulation schedules alter the water in storage and the flow rate through the lakes. Similarly, specific downstream water releases can be required from each lake and the system as a whole. These physical regulations affect the water in storage which in turn affects, in the short run, economic activities associated with the lakes.

Conditions under which water will be allocated to competing uses are also specified in the water use regulation model (Figure 1). Various procedures can be specified to allocate water among the consumptive uses. The form of allocation will have both economic efficiency and distributional impacts; these are reflected in the Benefit States component (Figure 1). Physical regulations and allocation policies are discussed more completely in the next section.[10]

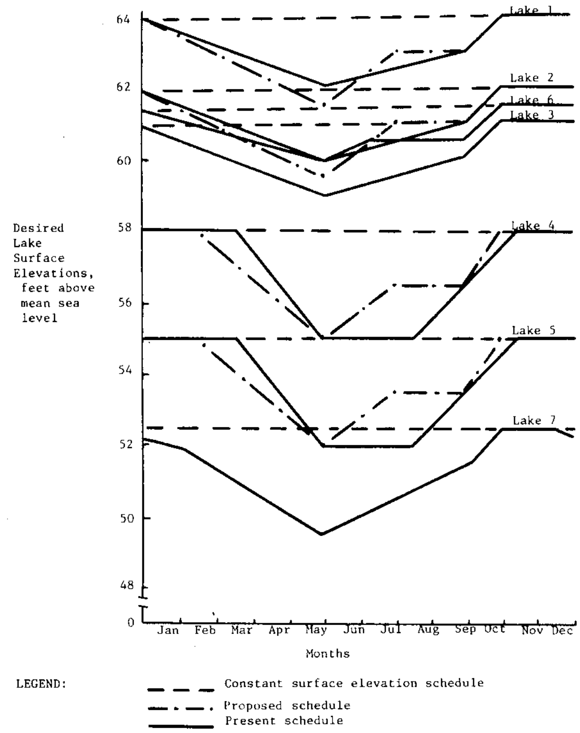

FIGURE 2. REGULATION SCHEDULES FOR LAKES IN THE KISSIMMEE RIVER BASIN

POLICY EVALUATION CAPABILITIES OF THE MODEL

Simulation models, by their very nature, allow easy modification of function specification. This flexibility allows a ready means of considering policy changes and the resulting effect on the overall management system. Such models could be used indiscriminantly with virtually any type of alteration being feasible.[11] Proposed changes must come from an understanding of the nature of water management and not a haphazard altering of variables and functions. Suggested policy changes to be evaluated with the simulation approach should come from the technical staff after thorough study of problems facing the people of the region and water management authority.

For any given policy the simulation model can be used to provide information on the flow through each structure, lake levels, flood damages, amount of irrigation water applied, evapotranspiration, soil moisture levels, crop yields, domestic consumption, recreation levels and benefits resulting from each use. These outputs can be aggregated, used to calculate

[10]A rigorous validation of all river basin simulation components was not possible. Thorough district records allowed complete validation of the hydrologic models. The models track actual hydrographs for the system sufficiently for use in policy considerations [17]. It was not possible to validate the economic activity models since there were no records on the changes in agricultural output, domestic water use and recreational activities with varying water availability for the entire region. The mathematical functions used were empirically determined and generally prescribed output levels which were within logical limits (see [8, 16] for more details). It was largely necessary to fall back on the approach suggested by Miller and Halter [11]: ". . . insight can be gained on the validity of the model by checking the logic of the model, by comparing computer results with historical data, and by assessing the model's predictive ability from a theoretical and/or common sense standpoint."

[11]Such indiscriminant use could also be inordinately expensive.

standard statistics or put into any form useful in staff and governing board evaluations.

Policy Evaluation Demonstrations

Three types of policy considerations follow; two deal with operational management of the control system and the third with allocation of water to consumptive users. Only a few of the economic indicators of performance are presented. The purpose is to give the reader a feel for the relative changes in benefit levels occurring when a change is made in certain parameters of formulations.

Each policy demonstration run was made using rainfall occurring over the basin during the period June 1, 1968 to May 31, 1971. The period had two years of normal rainfall, while the third was very dry and included the beginning of the worst drought in the recorded history of south Florida.[12]

Temporal and spatial water storage is controlled by regulating the gates at the lake outlets. The district specifies the lake level for a given day with the lake regulation schedule. When greater quantities of water are conserved, irrigation, residential use and recreation benefits are higher. But higher lake levels (and conserved water) increase the probability of flooding. So, when flood protection is a concern in lake water management, there are conflicting operational objectives. The stochastic nature of rainfall aggravates the situation and makes it difficult to identify a "reasonably balanced" policy. Three alternative sets of regulation schedules were considered and are illustrated in Figure 2. The "presently used" set was specified by the Corps of Engineers when the project was constructed. The second set, suggested by the district, consists of present schedules with four lakes modified. The third set consists of constant lake levels. The constant levels were suggested by the people living by the lakes.

Results of the three simulation runs are summarized in Table 1. There was little difference in annual benefits resulting from use of the "presently used" schedules and the district proposed schedules. Recreation benefits increased slightly while irrigation and domestic water benefits dropped slightly. Flood damages were identical. Net benefits dropped by less than one half percent. The simulation using the constant elevation schedule was different. Total annual net benefits increased by almost one half million dollars. Recreation, irrigation and residential water benefits all increased. But flood damages increased by $148,000 with almost all of this occurring on one lake. The water remained above

TABLE 1. ANNUAL AVERAGE DOLLAR BENEFITS AND DAMAGES RESULTING FROM THREE ALTERNATIVE REGULATION SCHEDULES

Regulation schedule	Recreation benefits	Irrigation benefits	Domestic water benefits	Flood damages	Net benefits
	Thousands of Dollars				
Presently used schedules	20,902	2,701	112	8	23,707
District Proposed schedules	20,949	2,630	111	8	23,682
Constant elevation schedules	21,277	2,782	120	156	24,023

flood level for 37 days [8]. Increased stored water available to consumptive users and recreationists caused a greater risk of flooding during the rainy summer months.

The second demonstration deals with water export to downstream interests. The Miami metropolitan region, agricultural producers and the Everglades National Park had requested that minimum flows be increased. Demonstration runs were made with minimum flow requirements of 0, 250 and 750 cubic feet per second (cfs). Results are given in Table 2.

Again, results showed significant distributional effects. Net benefits dropped with the increase in discharge required, but this was very small for the change from zero to 250 cfs. The increase from 250 to 750 cfs caused a decrease in net benefits of $665,000. The marginal value of meeting this higher

TABLE 2. ANNUAL AVERAGE BENEFITS AND DAMAGES RESULTING FROM MINIMUM FLOW REQUIREMENTS

Minimum flow rate in cfs	Recreation benefits	Irrigation benefits	Domestic consumption benefits	Flood damages	Net benefits
	Thousands of Dollars				
0	20,902	2,701	112	8	23,707
250	20,898	2,701	112	8	23,703
750	20,300	2,634	112	8	23,038,

[12]Hydrologic data for a longer time period which reflects greater variation would be desirable for an actual policy study being conducted by the water authority.

minimum flow is $1300 per cfs or approximately $2 per acre foot. Due to the manner in which the minimum release requirement was specified, the majority of the $665,000 decrease in benefits occurred on lake seven [8]. This highlights the equity problem that can arise when a policy approach is implemented. Other management approaches could spread the loss over the basin in a different way. Trade-offs again exist both between the basin and other areas, and within the basin.

The last policy demonstration deals with consumptive withdrawals from the lakes. The district has the responsibility of allocating surface water to consumptive users and also to protect the water resources in times of serious drought. Under the Water Resources Act, surface water to be used consumptively is to be controlled by withdrawal permits. To protect the lakes from undue lowering, the water allowed to be withdrawn is a function of lake level.[13]

Two sets of irrigation withdrawal functions were studied. One consisted of linear segmented functions which specify a proportion of irrigation demands to be met when the lake level is at a given elevation. These functions allow 100 percent of the demands to be met when the lake surface is at or above the elevation specified by the regulation schedule. When the lake is below this elevation, the percentage of demands which can be met drops off and reaches zero at certain elevations. The second set of functions allows an "all or nothing" allocation of irrigation water. One hundred percent of the irrigation demands are met until the lake level reaches a specific elevation, and below this, no withdrawals are allowed (see [8, 16] for more details).

Results presented in Table 3 show little difference between the two allocation approaches. The proportional withdrawal function provided $65,000 more irrigation benefits and $56,000 more recreation benefits than did the "all or nothing" function. The "all or nothing" approach, on the other hand, is administratively a much simpler allocation procedure to implement. When a lake goes below the acceptable level, irrigators cannot remove water. A visual inspection is all that is needed. The proportional approach would require metering and policing withdrawals. The district would have to weigh benefits to be obtained by water users against added administrative costs.

Demonstrations reported were made to illustrate the use of the models for several specific policy situations. In addition to having information on water shortages, floods, recreation levels and level of net benefits, there is information on shifting economic benefits and costs among groups.[14] For example, owners of shoreline property wanted the lakes held at constant levels for aesthetic reasons. Simulation of this policy showed net benefits higher, but owners of lake front property were flooded and incurred greater costs. Both the policy makers and property owners welcome this type of information.

TABLE 3. ANNUAL AVERAGE BENEFITS AND DAMAGES RESULTING FROM IRRIGATION WITHDRAWAL APPROACHES[a]

Allocation function	Recreation benefits	Irrigation benefits	Domestic consumption benefits	Flood damages	Net benefits
	------Thousands of Dollars------				
Proportional withdrawals	20,790	4,036	108	8	24,926
"All or nothing" withdrawals	20,734	3,971	108	8	24,805

[a]The crop acreages were higher in this demonstration than in the previous two. Thus, irrigation benefits are somewhat higher.

CONCLUSIONS

Policy makers are appointed representatives in matters concerning water. In doing this they need information on physical, technical and economic consequences of policy alternatives. Once broad policy guidelines have been formulated using an aggregate analysis, the reduced number of alternatives can be submitted to a river basin simulation model for further refinement. Engineering-economic simulation, because of its detailed approach, lends itself to refinement of operational policy. Technical consequences of alternatives are readily available to policy makers. Likewise, economic efficiency and distribution trade-offs are more easily understood.

Policy makers, in responsiveness to their clientele could involve the public in the shaping of policy. Interested groups, with aid from the technical staff, could interface with the model. Simulation of water allocation and management alternatives would help affected individuals better understand the workings and impacts of the system. The author is certain the

[13]Institutionally determined allocation procedures are in a state of flux [9] and the author is presently studying efficiency and distributional impacts of various procedures. The two discussed here are those suggested by engineers.

[14]Much of this information was not presented because of space limitations (see Kiker [8]).

residents of the Kissimmee River Basin would be interested in the results of the policy runs made with the model. Surely, they would like to make recommendations on how the water is to be managed.

One final point should be made. Results of simulation investigations and policy studies do not prescribe optimal policies for dealing with water management problems. The investigation provides answers to specific problems fed into the model, and the model consists only of quantified aspects of the management problem. Simulation results can provide insights and information to the decision makers concerning a specific policy. The final decision, as Miller and Halter [11] have pointed out, is theirs.

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