Proceedings of the American Statistical Association
1985, Social Statistics Section, Pages 31-35

STATISTICAL INPUT TO WATER POLICY DECISIONS: AN IDAHO CASE STUDY

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Introduction

The ways in which statistics influence state policy decisions vary enormously. Relatively large systems of simultaneous equations are relied upon for economic forecasting. Qualitative response modeling is used to measure the demand for telephones in rural areas. Historical collection patterns are used to impute current year tax revenues. However, professionals trained to interpret statistics are more rare than the use of numbers to support a policy position. Flawed, but persuasive numerical analyses are still commonplace. Frequently, policy makers are confronted with problems for which inadequate data exists to make informed decisions. In fact, data base development often falls victim to fiscal restraint. In these situations, analysts are forced to judgmentally determine the effects of alternatives that potentially involve many millions of dollars. This paper discusses such an occurrence dealing with water rights in Idaho.

The Swan Falls problem

Water rights issues have caused heated legal battles throughout the West. The Swan Falls controversy originally dates back to the 1920's when Upper Snake River Valley citizens worried that downstream non-consumptive water rights could limit upstream economic development. A non-consumptive water right is one which utilizes instream flows or fully returns -its diversions, as opposed to diverting water for consumptive uses. Non-consumptive uses of water in Idaho include electricity generation, recreation, and support of aquatic wildlife. The Idaho Constitution was amended in 1928 to allow beneficial diversions of unappropriated streamflows except when the state chose to limit the use of water for hydropower purposes.

In the late 1940's and early 1950's, Idaho Power Company and the federal government wrangled over the right to build dams in Hells Canyon on the Oregon border. Idaho Power prevailed after agreeing to subordinate its water rights at the canyon dam sites to future upstream water demands. It was generally assumed that water rights at the electric company's other ten (upstream) hydropower plants were also subordinated by the Hells Canyon agreement.

By the 1970's, increased demand for electricity forced Idaho Power Company to consider alternate, more expensive sources of power generation. Irrigated acreage in the Snake River Plain increased from 2,500,000 in 1948 to 3,700,000 in 1978, much of it energy intensive highlift pumping for pressurized sprinklers. The irrigation expansion not only increased the demand for electricity, but also lowered return flows to the river by depleting the Snake River aquifer. Despite the fact that more generation capacity was needed, environmental concerns prevented a coal-fired electric power plant from being authorized (Costello and Kole, p.13).

Ratepayer concerns over the erosion of the company's low cost hydropower base finally led the power company to file suit to protect its water rights at the Swan Falls dam -- a structure with a pre-1928 right that was located upriver from Hells Canyon. The Idaho Supreme Court ruled in 1982 that the company's water rights at Swan Falls were not subordinated to later irrigation development by the Hells Canyon License. At that point in time, the Snake River system in Idaho became legally over-appropriated. The water rights of over 7,500 irrigators were in doubt, and a moratorium had been placed on further irrigation development. Several intense legislative battles ensued. On one hand, upstream developers sought complete subordination of the electric company's water rights, while the opposition sought compensation for lost hydropower and a halt in further water development. As it turned out, neither side could prevail in a political solution.

Potential Economic Effects

Perhaps the greatest source of uncertainty in all of the debates surrounding the Swan Falls problem was the question of how the economy of the river basin would be impacted by any emerging decision. Using the

State Water Plan's legal average daily minimum of 3,300 cubic feet per second (cfs) at Swan Falls as a constraint, estimates of the additional acreage that could be developed ranged from 195,000 to 1,500,000 (see Hamilton and Lyman pp. 18-22). Due to increased pumping requirements Hamilton and Lyman (p. 46) estimated that Idaho power could face a potential impact of 642 million kilowatt hours under the 195,000 acre development scenario. In addition to uncertainty as to the value of the dollar value of the increased agricultural output in Idaho, confusion also reigned over the degree of secondary impacts that would ripple through the economy under this scenario. It was apparent that the Swan Falls controversy involved hundreds of millions of dollars and would have a major impact on Idaho's economic development, even though an appropriate forecasting methodology was not identified.

Minimum Streamflow Negotiations

Given the importance of the issues at stake, the legislative stalemates in 1983 and 1984, and the costs of litigation, a negotiated settlement had appeal to all concerned, but its likelihood seemed slim. In July of 1984, the Governor offered to meet again with Idaho power's representative and the Attorney General to see what room existed for compromise. The Governor indicated a willingness to adjust the legal minimum streamflow as a means for striking a balance between instream and consumptive uses.

The minimum streamflow near Swan Falls had been set at 3,300 cfs. Idaho power was willing to subordinate this right to existing irrigators. The first issue was to establish what streamflow, given current water development, would result under the worst drought conditions on record. This streamflow would represent the highest water level Idaho power would l likely obtain in court.

To determine a low flow condition, three hydrologists were selected to represent the negotiating parties. These individuals used 5l years of historic monthly river low flow data, adjusted to reflect 1980 diversionary conditions in the state's hydrologic model. They agreed that under current development, the minimum monthly flow at Swan Falls would be 5,600 cfs in the driest year. This monthly figure was adjusted by the maximum measured range between daily and monthly low flows, 1,100 cfs, to obtain a minimum average daily stream flow of 4,500 cfs.

Since the legal minimum flow at Swan Falls was 3,300 cfs, the negotiators agreed to establish a new protectable water right of 3,900 cfs in the summer, mid-way between the existing "legal minimum" and "actual minimum" flows. Thus, 600 cfs was estimated to be available for further appropriations during the growing season. A higher winter flow of 5,600 cfs was arrived at by projecting the impact of an addition 600 cfs of consumption on existing winter flow conditions. This will permit Idaho Power to continue generating electricity for off-system sales and exchanges with winter peaking utilities.

Protecting the Minimum Streamflow

Even with a minimum streamflow consensus, all parties, especially Idaho power, felt the state lacked the means to enforce any stream level. Many of the earliest water rights are over a century old and were created simply by making beneficial use of the water. These "constitutional method" water rights were never recorded or are inadequately described. Many have changed over the years. To know how much more water can be used, existing rights must be identified, prioritized, and quantified as to place of diversion, period of use, type of use, and amount of water used. This is accomplished through a legal process known as an adjudication.

A general adjudication of the Snake River Basin thus became a central part of the Swan Falls Agreement. Surface water and groundwater rights are included, as well as all Federal reserved rights which are currently unquantified. It will be one of the largest single river adjudications ever conducted in the United States, taking at least ten years to complete and involving over 100,000 water rights. Based on observations from two previous Idaho river adjudications, total costs are projected to reach $28 million.

In addition to the adjudication, the State also agreed to increase its hydrologic data bases. One hundred new monitoring wells will be used to measure total monthly aquifer recharge of the river. For purposes of surface water monitoring, more than 20 new gages need to be installed at points above Swan Falls (Snake River Technical Advisory Committee, Appendix B). Total data collection costs are estimated at $400,000 per year (Costello and Kole, p. 15).

Cost Sharing Formula

Fiscal austerity prevented the state from paying the adjudication cost from the General Fund. A committee composed of the various types of water users was established by the Governor to determine an equitable way to share the cost of a general adjudication. Data was collected from the Department of Water

Resources on the number of water rights of each type, aggregate maximum water diversion, and actual water consumption. Estimates of total water rights and use were extrapolated from records based on the ratio of recorded rights to final rights revealed in past adjudications (1.74). Alternate fee schedules that would raise $19 million were presented to the committee. Interest earnings on the unused balance will provide the remaining $9 million.

Of course, no interest group was satisfied with the level of their fee, but a consensus gradually emerged that roughly one-third of the adjudication cost should be borne by irrigators, one-third by hydropower generation, and one-third by all other users. The committee selected a fee per cfs of water diverted for all uses except irrigation. There, a flat fee of $1.00 per irrigated acre reflected the relatively constant consumptive use of any type of irrigation.

The final adjudication fees approved by the Legislature appear in Table 1. The caveats in that table demonstrate the potential error inherent in the revenue estimates, yet the state will be under great pressure to complete the adjudication with revenues generated from these fees. The committee's consensus building effort was successful in that the Legislature made only one change before approving the adjudication package. (The hydropower fee was changed from a charge per volume of water to a charge per kilowatt of generating capacity.)

Public Participation

After the principals signed the accord in October of 1984, much work remained before it could be incorporated into Idaho's laws. Decisions of this magnitude require extensive public participation to educate individuals and interest groups about what is being proposed and to offer them an opportunity to voice their concerns. Ratification by the state Legislature is the ultimate test of whether these concerns have been met. For the Swan Falls Agreement, the democratic process offered additional inferences that the compromise and the numerical assumptions behind it passed the qualitative analysis of a wide range of people.

Information meetings were held in six different communities across the Snake River Basin. At these meetings, each point in the agreement was discussed, as well as the procedures utilized to estimate the minimum streamflows, the public interest criteria that would judge new development, and the adjudication cost sharing formula. During and after these meetings, a coalition of groups including the Water Users Association, the Farm Bureau Federation, the Association of Idaho Cities, and Idaho Power emerged. The testimony provided by this coalition in the hearings of five legislative committees proved instrumental. The equity of this landmark compromise was validated both by support of divergent interest groups and by the fact that the 12 pieces of legislation embodying the agreement all passed by majorities exceeding eighty percent.

Conclusion

The Swan Falls Agreement represents a classic scenario encountered frequently by policy analysts --the resolution of important conflicts without the luxury of adequate data bases with which to conduct quantitative analyses. Increased water usage and years of debate heightened interest in the issue of hydropower water rights, but the more the problem was investigated, the more apparent it became that additional information was needed. With respect to the physical environment, more data are needed to understand the movements of water through the streambeds and the aquifer of the Snake River Basin. Only then will hydrologists be able to quantify in detail the interactions between precipitation, different types of water diversion and consumption, return flows through the aquifer, and river flows.

With respect to the economic environment, even more uncertainty exists. The amount of new acreage developed for irrigation is impacted by economic conditions, farmers' perceptions of future crop prices, energy costs and the like. New water developments must now pass certain public interest criteria under the terms of the Swan Falls settlement, so the debate is likely to shift to the measurement of economic benefits and costs, along with the hydrologic effects, of each development proposal. Improved data bases should support larger hydrologic models, which can provide better answers about the effects of a given withdrawal on water levels and the water rights of others. This will allow a water market to emerge to transfer water rights to higher valued uses.

The Governor, the Attorney General, and the Chief Executive Officer of Idaho Power signed the Swan Falls Agreement in October of 1984. The Legislature ratified the agreement in March of 1985. While the lack of data presented problems in arriving at an agreement, the negotiators and policy makers recognized that additional information would be helpful. As a result, the six-point agreement calls for the state to

conduct a general adjudication of water rights and to fund technical studies to increase hydrologic knowledge of the Snake River Basin. The estimated 600 cfs of water held in trust by the State will not be totally reallocated to future applicants until data insufficiencies are remedied. The acquisition of the expanded information bases will thus lead to a new era in Idaho water resource management. A comprehensive record of system water rights will enable better protection of those rights, just as more accurate statistics on water flows will permit more efficient usage of Idaho's limited waters.

References

Costello, P.D. and P.J. Kole. "Commentary on Swan Falls Resolution." **Western Natural Resources Litigation Digest** (Commentary Section), Summer 1985.

Hamilton, J.R. and R.A. Lyman. “An Investigation into the Economic Impacts of Subordinating the Swan Falls Hydroelectric Water Right to Upstream Irrigation." Idaho Water and Energy Resources Research Institute, Moscow, Idaho, December 1983.

Snake River Technical Advisory Committee. "Needed Water Resources Programs in the Snake River Basin." Idaho Water and Energy Resources Research Institute, Moscow, Idaho, November 1983.

TABLE 1
ADJUDICATION COST SHARING
For Snake River Above Lewiston

ADJUDICATION COST	$27,369,000
(Discounted at 10% to July 1, 1986, or beginning of second year)	19,035,000
CLAIM FEES	
$50 per claim X 61,694 water rights	$ 3,084,700
$25 per claim X 52,332 domestic & stockwatering rights	1,308,300
VARIABLE WATER USE FEES*	
Irrigation: $1.00 per acre X 3,700,000 acres	$ 3,700,000
Hydropower:	
$3.50 /KW X 1,628,332 KW Private or Municipal	$ 5,699,200**
$3.50 /KW X 560,650 KW USBR or COE	1,962,300***
Aquaculture: $10 per CFS X 13,631 CFS water rights	136,300
Municipal: $100 per CFS X 1,161 CFS water rights	116,100
Industrial: $100 per CFS X 6,493 CFS water rights	649,300
Miscellaneous: filing fee only 0	
Public: $100 per CFS X 20,315.6 CFS water rights	2,261,600****
	$18,917,800
STATE SEED MONEY	1,000,000
TOTAL ANTICIPATED REVENUE	$19,917,800

*Claimants are allowed to spread variable water use fees exceeding $1,000 over as many as five annual payments with 10% interest accruing on the unpaid balance. Monies in the Adjudication Account would be invested by the Treasurer, with interest accruing to the Account.

**Additional fees may later be collected as proposed power projects and undeveloped permits perfect their water rights by proving beneficial use. Some $693,000 would be collected if Lucky Peak, Arrowrock, Idaho Falls permit, and all projects holding power sales contracts with Idaho Power Company were completed before the IDWR completes its adjudication report.

***This revenue is based upon the KW nameplate ratings of the federal facilities. Federal agencies may not agree to these claim fees.

****$2,131,300 of this is a state obligation. This figure includes $230,000 for raising the minimum flow at Murphy gauge from 3,300 CFS to 4,600 CFS in the winter. It does not include a $1,300,000 fee that would result from setting a new minimum flow of 13, 000 CFS at Lime Point.

CAUTIONS:

1) Water use numbers may be overestimated due to double counting, thus lowering revenues. The amount of water use on unrecorded rights is unknown.
2) The number of actual water rights is similarly unknown.
3) If all parties are not assessed within one year, revenues will be lower.
4) Both cost and revenue figures will change if the boundaries of the adjudication are changed.