Dams: Water and Power in the New West (Summer Conference, June 2-4) 1997

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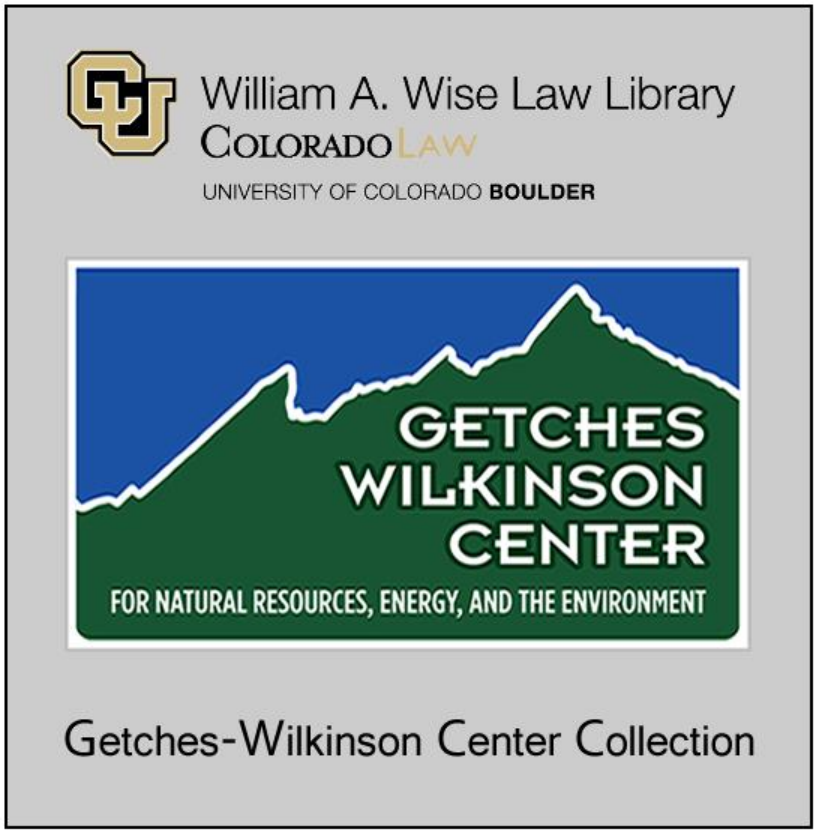

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DAMMING THE WEST: DEVELOPMENT OF WESTERN WATER RESOURCES

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I. Overview

The development of Western water resources may be viewed in the framework of public attitudes and actions with respect to dams as they reflect accepted concepts of feasible technologies, social benefits and costs, and responsible citizenry. It is impossible in a few minutes to examine all of the changes in these concepts as they may have been influential, but a few major ones are suggested, and these are presented as commanding attention in distinctive combinations in four time periods since 1900 and ending around 1990.

The suggested changes are subject to critical review, but it is believed that they may be at least partially correct, and that they direct attention to the types of concepts deserving thoughtful appraisal as the nation enters into a new period.

This review does not attempt to evaluate in detail the estimates of environmental costs and benefits because those are treated in the paper by Dan Luecke. Nor does it seek to specify changes in legal doctrine or legislation because they are the targets of other papers in this conference. The suggestions of significant factors over the past century may, however, help identify types of technologic, economic, and political factors that may play a role in shaping the years immediately ahead.

II. Spatial distribution of dams, circa 1990

The major features of the current distribution of dams in the West may be seen from two maps of the United States as a whole.

Figure I-1 shows the locations of structures impounding more than 100,000 acre feet of water. These account for roughly four-fifths of all water stored in reservoirs in the United States.

The remaining proportion of the total storage can be shown as Figure I-2, by the number of small

dams in each state per unit of area.

A further indicator of the location of dams is the figure to be presented by Dan Luecke showing the rough proportion of mean annual runoff that is stored at present.

Efforts to explain the evolution of individual and corporate and public agencies building these structures are numerous and detailed, and only a few factors can be noted here.

It should be remembered that dams in many areas are not to be regarded as discrete structures. They have meaning only as operated in conjunction with canals, aqueducts, diversions, and other structures, and serve their purpose in many areas only in conjunction with power generation and transport or irrigation facilities.

III. Single purpose - 1900 to 1928

With a few exceptions, the significant storage facilities on United States streams until 1928 were small and single purpose. They were preceded by simple diversion structures such as mill dams for flour and textile factory mechanical power, and were accompanied by canal and channel facilities, and other surface structures and wells to provide supplies to farms, households, and industrial plants. The prevailing federal interventions for water management were irrigation under the Reclamation Act of 1902; channel and levee installations for flood control; and channel improvements for navigation. While states exercised legal controls over water rights and some channel encroachments, the major developments were undertaken by individuals, corporations, and local governments for specified purposes of domestic water supply, waste disposal, irrigation, and curbing channel erosion.

Estimated costs were to be repaid by the direct beneficiaries, except that navigation costs were regarded as national responsibilities, and that flood control costs were divided among local levee districts and the federal government. In a few areas, state and local authorities had initiated flood

control activities, as with detention dams in the Miami Basin in Ohio or levee and channels in Dallas, Texas.

Exclusive of the national concern for navigation, the prevailing responsibility for water development rested with local units of management that dealt with discrete reaches of rivers.

The disastrous Mississippi flood of 1927 set in motion a broader and different approach to water planning. In the Flood Control Act of 1928, the Congress authorized heavier Federal contributions toward the cost of an enhanced system of flood control, sharing the costs with local agencies. The prevailing "levees only" approach to flood control was abandoned. Far more important, authorization was given, in accordance with House Document 308 of a War Department report, for a series of studies by the Corps of Engineers of general plans for all US river basins for multiple-purpose development including hydropower generation. Because of Bureau of Reclamation involvement, the Colorado Basin was excluded, but for the first time multi-use was to be examined, basin by basin, throughout the nation.

After this crucial decision, the speed of change in public policy was rapid and the diversity of types of resulting action expanded. It is impracticable to list all of the changes that followed over the next 70 years, but a few selected ones are presented to indicate some of the principal effects upon the current scene. These are not all-inclusive, but they serve to outline at least three periods preceding the present.

IV. The shaping of multiple-purpose planning, 1928-1950

The first of the "308" reports in 1933 deals with the Tennessee Basin and becomes the basis for the Tennessee Valley Authority, and stimulates widened Corps of Engineers and Bureau of Reclamation planning.

Unemployment and economic depression support Federal investments by the Public Works

Administration and Works Progress Administration in a wide variety of water projects in the 1930s.

The Soil Conservation Service is established in 1934.

The Mississippi Valley Committee in 1934 recommends wide investment in water projects, and the principal administrative outcome is the creation of the Rural Electric Administration to promote distribution of low-cost energy in needy communities.

The great drought inspires collaborative Federal land and water planning for *The Future of the Great Plains* in 1936.

Federal-state collaboration in joint preparation of priorities for data collection, surveys, and construction is initiated for every drainage basin in 1936 and 1938.

Following the floods of 1936 and 1938 the Federal government assumes 100% of the cost of flood control storage.

The first national advisory committee on water pollution is created and focuses on point sources.

World War II shifts national attention: the National Resources Planning Board is abolished, and the notion of creating other basin authorities on the TVA model is defeated.

After the War, attention begins to turn again to river basin planning, and to specification of policies that would promote comprehensive multiple-purpose development for each major drainage basin as outlined by the President's Water Resources Policy Commission in 1950. Examples of aspiring plans are those for the Colorado, Missouri, and Snake.

V. Multi-purpose construction and evaluation, 1950-1970s

Federal agencies press ahead with construction based on uniform criteria for benefit-cost analysis.

The Senate Select Committee in 1961 recognizes need for closer coordination through a national Water Resources Council , regional joint Federal-State boards, and state water resources research centers.

As studies of the experience with these early programs multiply, there are a series of efforts to improve the planning process through research in:

economic analysis, e.g., the Harvard Design of Water Resources Systems;
administrative efficiency; e.g., appraisals of Tennessee, Missouri, and Columbia Basin efforts;
environmental effects; e.g., implications of man-made lakes.

By the early 1970s, the Environmental Impact Assessment procedure is established: questions have been raised as to the relative merits of increasing energy generation versus energy demands management; and the range of engineering versus non-engineering measures in planning for the example of the Colorado Basin had been extended and specified.

The role of the wetlands in maintaining ecosystem health is recognized increasingly, and the natural values of floodplains proposed for intensive development and protection are examined by State and local agencies under the National Flood Insurance Act of 1968.

VI. Cautions and questions, 1970s - 1990s

By the late 1970s, as predicted by the President's Water Resources Policy Commission in 1950, almost all of the sites for large, cheap water storage are appropriated or built upon.

The roles of the recreation and urban sectors of the economy rise while the irrigation sector declines relatively.

Water transportation declines in national importance and with it the political significance of the once-powerful river and harbor lobby.

Non-government political action and educational groups concerned with environmental values are increasingly influential.

The Water Resources Council and river basins commissions are disbanded, and the interest of local citizen groups in "watershed management" expands, and bridges the long-time upstream-downstream gap.

Concerns for protection of environmental values grow in strength and public expression.

Questions are raised as to the efficacy of public involvement in power generation.

Non-point sources of water pollution are examined on a national scale for the first time.

Continued advances in technology make for lower per capital urban water use and lower irrigation use for unit of production, and for more effective means of avoiding and treating water-borne waste.

VII. Retrospect and prospect

Looking back at these major shifts in the demand for and use of dams, a few of the influential factors are especially noteworthy.

Changes in the technology of water storage and use contributed initially to the execution of

increasingly large storage structures and then to progressively smaller per capital demands for water use and waste dilution and power.

As the social and economic criteria are refined for valuing water and for valuating the segments of the environment that are changed by manipulation of water flow regimes, there are major changes in the public view of alternative classes of water management, such as in demand planning or in land use of dry or flooded areas.

Deepening scientific studies provide more understanding of the full consequences for ecosystems of changing the amount and regime of stream flow, and this supports more refined methods of evaluating both present and proposed new storage structures. This likewise nourishes changes in public support for storage. The notion of a wild river as something to be tamed changes in some sectors to the river as something to be restored.

The nature of the concerned public and political agencies alters accordingly, and so, for example, a constituency oriented around cheaper power rates may be replaced by local groups concerned with recreation and biodiversity.

A fascinating task for this conference is to examine how these and new emerging trends are shaping the character of Western dam development, alteration, operation, or replacement in the decades immediately ahead.