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The Bureau of Reclamation as a Bad Public Good

Peter J. Hill

Wheaton College and PERC

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I. Introduction

Throughout the nineteenth century the federal government was involved in many resource questions in the West because it was the primary owner of the land. This land ownership came through the Louisiana Purchase of 1802, the Texas annexation in 1845, the Oregon treaty in 1846, and the Mexican Cession of 1848. Throughout most of the century, however, the federal presence was decreasing because of the continued effort to dispose of government owned lands. Prior to 1862 there were numerous ways that settlers could purchase land and, starting with the Homestead Act of 1862, a series of measures provided land to those who would establish residence and farm on the frontier.

The role of the federal government in the West has changed dramatically in the twentieth century, however, and it has become a major player in resource questions. Part of the change was because much of the land was never privatized and the government assumed responsibility for managing the federal landholdings. Another major contributing factor was the efforts of the federal government to subsidize irrigation and hydro-electric power projects. In 1902 the Reclamation Act was passed and it was a major turning point in the political landscape of the west. In the words of Marc Reisner (1993, 111) “the passage of the Reclamation Act of 1902 was such a sharp left turn in the course of American politics that historians still gather and argue over why it passed.”

One of the major reasons for the passage of the Reclamation Act was the numerous public goods arguments that were made to justify federal involvement in the provision of irrigation water. Of course there were also more self-interested rent seeking arguments, arguments I shall take up after the consideration of the public goods nature of reclamation.

By 1900 there were approximately 7.5 million irrigated acres in the 17 western states with almost all of the irrigation carried out by private efforts¹ (Wahl 1989, Table 1.2). Evidently that was not sufficient in the minds of many, because throughout the latter part of the century there were numerous efforts to get the federal government involved in reclamation projects.

II. Reclamation as a Public Good

At first glance it would seem that the irrigation of land is purely a private good. It increases agricultural productivity, allowing owners of land to capture greater returns and increase their incomes, but the delivery of irrigation water is neither non-rivalrous nor non-excludable, the two conditions for a public good. The early promoters of subsidized irrigation recognized that fact, but were quite willing to make arguments about the high transaction costs of charging for the benefits of federal reclamation projects.

The first public meeting to lobby for some sort of public support of irrigation came in 1873 in Denver, where delegates from half a dozen states and territories met to make their case for collective action on behalf of irrigation (Worster 1985, 93). In 1878 a second convention met, also in Denver, but most of the emphasis was on state rather than federal involvement in irrigation (Worster 1985, 94). These congresses were followed by sporadic meetings of irrigation supporters throughout the 1880s. At these meetings various groups organized to lobby both the

¹ Irrigation districts, which are local governmental entities with taxing power, were first authorized by the Wright Act in 1887 in California, but almost no districts were formed until after 1900.

state legislatures and the federal government to provide financial aid for irrigation. In 1891 William Ellsworth Smythe came upon the scene. He, along with Elwood Mead, a Wyoming irrigation engineer, and Francis E. Warren, a U.S. senator from Wyoming, joined forces to pressure for federal involvement and irrigation become a substantial national issue (Pisani 1992, 266-270). Smythe was a tireless promoter of irrigation and started the publication *Irrigation Age* in 1890. The first National Irrigation Congress was held in Salt Lake City in 1891, largely through the efforts of Smythe, Mead, and Warren, and was followed by congresses in 1894 in Denver, in 1895 in Albuquerque, 1896 in Phoenix, 1897 in Lincoln, Nebraska, and in 1898 in Cheyenne, Wyoming.

Both at the various irrigation congresses and in the publication *Irrigation Age* numerous arguments were made about the substantial public goods elements of damming rivers and providing irrigation water. The federal government had been involved in river and harbor improvements throughout the nineteenth century and after the Civil War the amount of expenditures for those projects increased rapidly (Pisani 1992, 274). However, the West had been left out of most of the river and harbor improvements and congressional representatives from the West wanted to extend the federal involvement to the western states.

One of the primary public good arguments was the necessity of federal efforts to control flooding. The case for federal flood control was strengthened when, in 1891, the Imperial Valley in California flooded after the Colorado River changed its course (Wahl 1989, 20). Senator Warren was able to secure a reservoir survey in 1896 that he hoped would provide more support for federal flood control. At his request, Captain Hiram Martin Chittenden of the Army Corps of Engineers was chosen to head the survey (Pisani 1992, 276). Chittenden visited many areas in

the West to examine potential reservoir sites and also met with many of the leaders of the reclamation movement.

In some ways Chittenden's report to Congress in December of 1897 was a disappointment to those who wanted to use flood control as an argument for federal involvement. He said that dams on the upper Missouri would provide little benefit for flood control in the lower Mississippi basin and that reclamation activity would have to have a different justification. He did suggest, however, that the national government construct reservoirs in Wyoming and in Colorado to control local flooding and to provide irrigation water. He believed federal construction of dams was necessary because "[r]eservoir construction in arid regions of the West is an indispensable condition to the highest development of that section." And "it can properly be carried out only through public agencies. Private enterprise can never accomplish the work successfully" (quoted in Pisani 1992, 278). He also argued that water from government reservoirs should be free to the public since river and harbor improvements were provided without charge.

Senator Warren continued to be one of the primary exponents of federal involvement, making a wide range of arguments about the public goods nature of such activity. He said that storage reservoirs on Missouri River tributaries would prevent floods, encourage mining and milling, aid in the reclamation of arid lands, and would improve navigation in dry years (Pisani 1992, 275). He also said that "the presence and use of this additional water would, according to accepted theories, greatly increase rainfall in those high, dry regions, thus reproducing and increasing itself" (Congressional Record 1896).

In 1901 Francis G. Newlands from Nevada introduced the first significant legislation providing for government construction of irrigation (Wahl 1989, 19). During the congressional

debate Frederick Newell, the chief hydrologist for the U.S. Geological Survey who later became the first director of the Reclamation Service, testified that there would be substantial spillover effects from irrigation in the West. He argued that if 1 million acres were to receive surface water, another 2 million acres would be able to be irrigated because of increases in ground water availability and from seepage that would occur through irrigation canals and reservoirs (Wahl 1989, 19-20). Since it would be difficult to know exactly which private irrigator had contributed to the increase in irrigation capability this became a part of the argument for federal subsidies in providing water.

The final substantial public goods argument for federal support of irrigation was the belief that economic growth in the West would be enhanced by irrigation and that many of the effects of such growth could not be captured by individual investors (Reisner 1993, 81). Along with this general increase in wealth, irrigation would provide many opportunities for relatively poor people to have access to land and this would decrease social unrest. The safety valve thesis is an important part of the nineteenth century political debate, and was used repeatedly by those arguing for federal subsidies for irrigation. Senator Thomas Patterson from Colorado said that the Newlands legislation would be “a great pacificator” since people who were struggling economically would go west to find an irrigated farm rather than “meeting for the purpose of concocting trouble” (quoted in Worster 1985, 167). Congressman Wesley Jones from Washington made a similar argument, positing that putting people on small farms was conducive to social order since when people worked as wage laborers, the result was “anarchy and anarchist disorder and revolution” (quoted in Worster 1985, 167).

The 1901 Newlands bill failed to pass but by that point the Geological Survey had examined 147 reservoir sites and prepared estimates for specific reclamation projects at each of

those sites (Golze 1961, 23). Therefore, although the legislation failed, the national mood was changing. Two of the national political parties, the Republicans and the Silver Republicans, included support for a national irrigation program in their platforms (Worster 1985, 160). In January of 1902 another reclamation bill was introduced and Theodore Roosevelt, who became president with the assassination of President McKinley in the fall of 1901, provided his support for legislation. The act passed with hardly any debate in the Senate, although there was opposition in the house with 146 voting in favor of the law and 55 against it (Worster 1985, 161).

Supposedly the legislation required for full repayment of the cost of irrigation projects by those receiving irrigation water. National funding for the reclamation project was to come from the sale of public lands in the 16 western states with arid land (Gates 1968, 655). However, since the receipts from the sale of public lands had previously gone into the federal treasury, this meant that taxpayers were subsidizing the projects.

The above discussion summarizes the public good arguments made on behalf of federal involvement in irrigation projects. Despite the many and repeated arguments that federal involvement was necessary to provide for the various public good aspects of reservoirs and irrigation, it was clear from the very beginning that there were substantial rent-seeking forces at work.

The railroads were some of the major contributors to efforts to secure federal subsidies for water. They expected to gain because of the increased value of the land they had acquired through grants from the federal government and because of increased use of the railroad to transport settlers to the West and agricultural products from the area. In either of these instances, it would seem that providing irrigation water in order to increase returns was a purely private

good and the railroads' desire for a subsidy was an effort to force the taxpaying public to make investments that those railroads were unwilling to carry out.

In 1899 George Maxwell and Elwood Mead, two of the early promoters of irrigation, met with the officials of the Northern Pacific, the Great Northern, the Santa Fe, the Southern Pacific and the Union Pacific railroads. The railroads agreed to provide Maxwell a subsidy of \$30,000 to lobby congress and to mount a publicity campaign for irrigation legislation. They continued this subsidy for six years, even after the passage of the Reclamation Act, because they wanted to also secure land swaps that would enable them to consolidate their holdings. Such swaps made irrigation projects more profitable for them and also increased their revenue from leasing land to ranchers.

Other enthusiasts for irrigation used the annual national irrigation congresses to lobby for federal involvement and most of those attending those congresses were individuals who stood to profit from federal support of irrigation. Some were large landholders and others were members of Congress who expected to receive political benefits from the construction of irrigation projects in their states. "Every Senator still wanted a project in his state; every Congressman wanted one in his district; they didn't care whether they made economic sense or not" (Reisner 1993, 116).

Several members of Congress saw the Reclamation Act as a pure transfer from the taxpayers to a special interest group. Representative Hepburn from Iowa said,

The proposition involved in this bill is the most insolent and impotent attempt at larceny that I have ever seen embodied in a legislative proposition.

These gentlemen do what? They ask us ... to give away an empire in order that their private property may be made valuable ... and I insist now, as I have before,

that this is a thinly veneered and thinly disguised attempt to make the Government from its general fund, pay for this great work - great in extent, great in expenditure, but not great in results . . . Certainly, there can be no return to the general government (Congressional Record 1902, 6742,6762).

Nevertheless, despite the rather obvious rent-seeking attempts by those lobbying for federal subsidies, the legislation passed and reclamation by the federal government became an ongoing fact of life.

III. Assessing the Return to Reclamation Projects

Many of the public good arguments for federal involvement in reclamation activity suggested that benefits would flow to the nation as a whole. Nevertheless, it was clear that political forces representing the West were influential in securing passage of the reclamation legislation. The Senate Committee on Irrigation and Reclamation of Arid Lands was responsible for the hearings about the act. Previous reclamation legislation had failed and it is noteworthy that in 1895 only two of the eight members of the committee were members west of Colorado. The size and make-up of the committee changed over time and by 1902 nine of the thirteen members of the committee were from west of Colorado (Mayhew and Gardner 1994, 73).

The provisions of the act also expressed political reality in that, in order to secure support from all of the western states, the legislation required that 51 percent of the revenue from public land sales in each state had to be spent within that state (Pisani 2002, 60). There were several problems with this requirement, the first the fact that there was little relationship between the revenues generated by state and the location of the most efficient projects. This requirement “seriously compromised the ability of government engineers to select projects objectively”

(Pisani 2002, 60). Immediate political considerations also meant that it was difficult to use any measure of economic efficiency in the selection of projects.

The Reclamation Act was passed in June of 1902, which meant that it was just a few months prior to the fall elections. The Republican Party saw an immediate political advantage to having a wide number of projects in as many states as possible. In July of 1902 Secretary of the Interior, Ethan A. Hitchcock, told President Roosevelt, in response to Roosevelt's pressure, that he had met with the directors of the Reclamation Service and impressed upon them the importance of the politics of reclamation (Pisani 2002, 3). By making promises to deliver projects to key states, political advantage was secured. By 1907, the Bureau of Reclamation, which at that point was still located in the U.S. Geological Survey, had requested and received Congressional approval for 24 projects, with every state receiving at least one (Cuzan 1983, 34). Because of political necessity and the importance of getting projects established quickly in every state "most of the projects were begun in great haste with little attention paid to 'economics, climate, soil, production, transportation, and markets.'" (Cuzan 1983, 34).

The Bureau of Reclamation also made sure that there was little competition from private organizations such as commercial companies or mutual ditch organizations or from small scale government entities in the form of irrigation districts. Immediately after the passage of the Reclamation Act the federal government withdrew 40 million acres from entry by homesteaders, which meant that the land could not be privatized. Included in those 40 million acres were the prime reservoir sites and the public land adjoining streams.² Thus the Bureau of Reclamation did not have to worry about any private entities bidding against it for irrigation projects and it had garnered a de facto monopoly on much of the new irrigation development in the West.

² Eventually much of the 40 million acres was opened to homesteading, but the reservoir sites continued to be reserved for federal projects.

The Bureau of Reclamation moved rapidly in other ways to become a source of rents and rent-seeking. The original enabling legislation stated that “charges shall be determined with a view of returning to the reclamation fund the estimated cost of construction of the project” (quoted in Wahl 1989, 28). A relatively straightforward interpretation of this provision would have required that payments include the interest charges on the original construction costs incurred by the Bureau. However, the Bureau chose to ignore that provision and to interpret the repayment obligations as simply the amount of the original charges. The repayment period was ten years in the original legislation, but that was extended to 20 years in 1914 and to 40 years in 1926 (Wahl 1989, Table 2-1).

Rucker and Fishback (1983, Table 2-1) estimate that with a discount rate of three percent, a ten year repayment period and no grace period the interest subsidy was approximately fifteen percent of the total costs of the projects. However, since later projects entailed a 40 year repayment period with a ten year grace period the interest subsidy was 57 percent with a three percent discount rate and 91 percent with a discount rate of ten percent. Wahl (1989, Table 2-1) finds a subsidy between 36 percent and 92 percent of the total cost once the 40 year repayment period was enacted in 1939.³ In interpreting the subsidy estimates it is important to recognize that these estimates only include the cost of the infrastructure and the repayment of those costs by water users. No opportunity cost of the water is included. In correctly calculating the subsidy, one would have to include the difference between the price the user paid for water and its market value.⁴

³ Wahl uses the federal borrowing rate for each date as his discount rate, which gives him slightly different estimates than Rucker and Fishback.

⁴ For instance, it is estimated that the Central Utah project costs taxpayers \$300 per acre-foot, produces crops worth \$30 per acre foot, and the farmer pays \$3 per acre foot (Anderson and Snyder 1997, 49). In terms of the subsidy calculations reported above, Rucker and Fishback and Wahl are estimating the degree to which the \$3 covers the original cost of the project plus interest. See the discussion on page 13 of this paper on the issue of whether one

Other actions by the Bureau and by the United States Congress made funding easier and also increased the subsidy. In 1910 Congress added \$20 million to the Reclamation Fund to supplement the money from land sales. In 1921, 1922, and 1923 Congress passed legislative deferrals of repayment obligations because of economic hardship in agriculture. In 1924 similar legislation was passed that provided for deferrals through 1927 (Wahl 1989, 29). In the 1920s the Secretary of Interior was allowed to vary repayment obligations on the basis of the productive potential of land and, in numerous cases, part of the land that previously had been part of the original project was declared unproductive and any repayment obligations from that land were nullified. Unlike with a private development, the charges on the unproductive land were simply forgiven and were not added to the repayment obligations of the remaining land (Wahl 1989, 29-32).

During the Great Depression there were even more forgiveness or deferral laws passed. In 1932, all construction repayment charges on all reclamation projects were suspended for a year and in 1933 and 1934 similar charges were deferred. In 1935 deferral again was passed and fifty percent of the charges were deferred in 1936. Because of the repeated deferrals some irrigation users paid no charges from 1921 through mid-1936 (Wahl 1989, 32). These repeated deferrals had varied impacts upon projects and the interest rate subsidy reported earlier does not include these deferrals.

Because many of the projects did not meet a standard benefit-cost test and because agricultural prices had fallen during the Depression, in 1937 Congress created the Repayment Commission which resulted in the Reclamation Project Act of 1939 (Golze 1952, 30). This act instituted a ten-year initial deferral after a project was completed before payments were required

should calculate the subsidy as the difference between the price paid by the farmer and the market value of water in agriculture or the market value of water in all uses.

and also allowed payments to be reduced through estimated “ability to pay” calculations (Wahl 1989, 33).

The Bureau of Reclamation, in its early years, made some estimates of benefit-cost ratios, and since the 1950s has been required to do so. Because of a desire to maintain and increase its size the Bureau of Reclamation has a strong incentive to underestimate costs and overestimate benefits. This tendency is exacerbated by the fact that benefit and cost estimates by the Bureau are not reevaluated once a project has been completed. Since most projects change in size and location, and since no further analysis is made, there is no accountability in terms of the accuracy of Bureau benefit-cost calculations (Mayhew and Gardner 1994, 79).

Also, the Reclamation Service was able to adopt its own methodology for calculating benefits and costs, which surely led to overestimates of the benefits and underestimates of the costs (Mayhew and Gardner 1994, 77). For instance, in most of the Bureau projects the total value of the irrigated crops was counted as a benefit to justify the cost of irrigation development. Sounder analysis would only count as a benefit the net increase in crops because of irrigation water. (Mayhew and Gardner 1994, 81). The Bureau estimates that 84 percent of its reclamation expenditures from 1902 to 1980 will be repaid (Wahl 1989, 42). However, those figures include no interest charges and numerous other errors are made in calculating costs and benefits.

Several scholars have calculated the benefit-cost ratios for reclamation projects and their findings indicate that a majority do not meet standard benefit-costs tests. Wahl (1989, 42) recalculates the overall repayment record for the 1902-1980 period and finds that only 10 to 14 percent of the costs will ever be repaid. A detailed analysis of eighteen projects conducted in 1978 found that eleven of those eighteen had costs greater than benefits (Wahl 1989, Table 2-3).

Therefore, the Bureau of Reclamation was engaged in more than simply transferring resources from one group to another; it was also engaged in actual waste.

In discussing waste is also necessary, as in the subsidy estimates, to revisit the benefit and cost calculations from an opportunity cost perspective. The benefit-cost calculations are usually made on the basis of the water being used in agriculture. But what about the fact that the water probably has an even higher value outside of agriculture? In 2005 water transferred from agriculture to urban uses sold for approximately \$10,000 for an annual flow of an acre foot (Brewer, et al, Figure 1). The same method of calculating the value, as measured by sales, of water in agriculture gives a figure of \$2000.⁵ If one uses these or similar figures to calculate the subsidy to farmers then that subsidy becomes enormous. However, in most cases farmers who receive Bureau of Reclamation water do not have the right to resell it (Bretsen and Hill, 2008). Therefore it may be more appropriate to calculate the subsidy to farmers as the difference between the marginal value of water to them and the price they pay. If one uses this approach, then the difference between the value of the water in agriculture and the value in alternative uses is a deadweight loss to the economy, not a subsidy to farmers. However one approaches the issue, the waste is enormous since much of the water in Bureau of Reclamation projects is going to a low valued use.

But what of the general public good arguments with reference to reclamation activity? From the very beginning the prevention of flooding was seen as a public goods justification for building dams. As discussed earlier, Captain Hiram Martin Chittenden reported after his survey in 1897 that most feasible dams would be on the upper Missouri and would provide little flood relief for any of the lower Mississippi basin. Also, it appears that the early building of dams and

⁵ The annual return for an acre foot of water in agriculture varies between \$20 and \$100. However, the \$2000 figure is the discounted present value of an acre foot of water over time (Brewer et al, 92)

irrigation facilities was driven much more by political considerations rather than by attempts to secure public benefits through flood control. Nevertheless, some of the later dams such as the Boulder Dam on the Colorado River, completed in 1935 (renamed Hoover Dam in 1947), and Fort Peck Dam on the upper Missouri, completed in 1940, may have had flood control benefits.

However, public sentiment has shifted in the last several decades and major dams are now considered an ecological disaster rather than a public benefit (Grossman 2002,). Dams alter the natural course of rivers and regulate seasonal flooding, now thought to be an important part of ecological balance (American Rivers 2007). Dams on the Missouri River have costs greater than benefits and “in the long run, the Missouri will have its way” (Schneiders 1999, 9). The Yellowstone, which is presently undammed, is seen as generating substantial public benefits in contrast to the Missouri, which is dammed at several places before it reaches the Mississippi. Assuming that the arguments about the ecological integrity of areas downstream from dams are correct, it is interesting that many of the major obstacles to free flowing rivers have come about because of the massive projects of the Bureau of Reclamation. The Bureau, supposedly a provider of public goods, has become, in the minds of many, a provider of a large scale public bad. The major dams, which are the target of most of the anti-dam movement, have required both federal subsidies and the substantial use of the power of eminent domain in order to be built.

The argument that the delivery of water to farms in the West would result in increased ground water flows and therefore would lead to in substantial water availability is no longer thought to be scientifically credible and is no longer made.⁶ There are some seepages from major canals that nearby residents can take advantage of but, by and large, the farmers within an

⁶ In fact, evidence for the effect of irrigation on ground water tends to run the other way; massive diversions of water from rivers have decreased available ground water supplies in some areas.

irrigation project capture almost all of the benefits from irrigation water. Likewise, irrigation in the West has not changed the overall climate for the better; neither increased forestation nor increased rainfall has followed irrigation.

It is harder to assess the arguments that there are public good aspects to economic growth and the provision of job opportunities. However, many investments generate a return above cost and the fact that growth occurs because of those investments is not an argument for the public good nature of growth nor for subsidies of investments that produce that growth. Nevertheless, advocates for reclamation continue to make unsubstantiated claims about the benefits of federal reclamation activity. In 1961 Alfred Rudolf Golze (37), in his comprehensive study of reclamation in the United States, said:

The economics of reclamation can be condensed to, Is reclamation good for the United States? The answer is “yes.”

Yes, because the West needs reclamation. It needs reclamation because its mushrooming population would otherwise have to import quantities of food at high prices from the Midwest and East. It needs reclamation because otherwise 24,500,000 acres would still be an unproductive desert. It needs reclamation because the family-farm program has given 100,000 families a secure living on fertile land once worth a few dollars an acre as desert. It needs reclamation because surplus power is important to its industry, and power revenues help repay the cost of its irrigation works. It needs reclamation because the West and the United States collect hundreds of millions of dollars in taxes from the farms and cities which have sprouted and matured from the once-barren soil of the Western States. The whole United States needs reclamation because the country likes its

specialized crops and enjoys steaks from cattle born on the Western range. Last but not least, the country needs reclamation because benefits from the purchasing power of the Western Reclamation Projects reach every state in the Union.”

Golze’s arguments for reclamation show no recognition of opportunity costs or alternative returns on investments of funds that are spent for subsidized reclamation. Furthermore, farming has not been an economic activity that has warranted greater investment. Pisani (2002, 129) reports that in 1925 one-sixth of all government farms were vacant. Some were vacant because they had been abandoned and others had never been occupied. The plan to create a whole class of land-owning yeoman farmers was also not successful; tenants cultivated one-third of federal irrigation project acres by the end of the 1920s (Pisani 2002, 277).

The opportunity to create people of character through avoidance of wage labor in the cities also did not seem to be realized. In 1930, Frederick H. Newell, a prominent engineer with the Reclamation Service, recanted his earlier belief that reclamation was an important part of progressive era politics that would shape human behavior for the better. After observing 28 years of reclamation activity he argued that federal reclamation had eroded “the higher ideals of citizenship” (quoted in Pisani 2002, 277). He also believed that federal reclamation, rather than improving character had undermined self-reliance, had created a debtor class and had robbed farmers of discipline, energy and independence (Pisani 2002, 29).

Donald Pisani, the pre-eminent water historian in the United States, argues that federal reclamation “did not restore the family farm; it did not put ‘surplus man on surplus lands;’ it did not make the West’s population less migratory; it did not reduce land speculation; and it did not create a more virtuous society” (Pisani 2002, 292).

IV. The Central Arizona Project – A Case Study of a Bad Public Good

Arizona has long had a reputation as one of the most arid states in the United States. It is true that much of the state is desert, and summertime temperatures in Phoenix and Arizona often exceed 110 degrees. Nevertheless, there are substantial groundwater sources and several water storage projects have provided adequate water for a flourishing agriculture in the state (Fuller 1997, 102). However, from 1920 to 1960 the state's population doubled twice (Reisner 1993, 260) and that combined with several million acres planted with irrigated crops created an ongoing concern that Arizona would soon run out of water.

Since the Colorado River carries enormous amounts of water, and because it loops through northern Arizona, politicians have long thought it would make for good political capital to divert a portion of the river to agriculture and municipal uses in the southern part of the state. In 1922 the Colorado River Compact, the U.S.'s first interstate water agreement, divided the Colorado River water among the states. It allocated 7.5 million acre feet to the lower Colorado basin, which includes Arizona, California, and Nevada. In 1928 Congress authorized the building of Boulder Dam. In the process Congress divided the lower basin water among the three states, with Arizona receiving 2.8 million acre feet (Fuller 1997, 103). The concept of transporting Colorado River water across the state was proposed at that time, but was deemed economically unjustifiable, with even the Bureau of Reclamation arguing that such a massive project was a "mad man's dream" (Welsh 1985).

In 1944 the first legislation proposing a massive diverting of water to central Arizona, the Central Arizona Project, was introduced in the U.S. Congress. The bill was defeated, but this was only the beginning of several decades of political wrangling over the idea. The case for diversion was strengthened in 1963 when the Supreme Court ruled that the 2.8 million acre feet allocated

to the state in 1928 was valid and other water diversions in the state would not be counted against its allocation from the Colorado (Reisner 1993, 261).

By the 1960s most of the major rivers in the west had been dammed and the Bureau of Reclamation was having difficulty finding new projects to justify an ever larger budget. The Bureau officials also realized that allowing Colorado River water to continue to flow to California would give them few opportunities for new spending, since the water was flowing downhill and it was difficult to find additional ways to facilitate that process. The Central Arizona Project was an engineer's dream since it would require lifting water almost 3000 feet and delivering it over 300 miles through newly constructed aqueducts (Wahl 1989, 223). Of course this also involved massive expenditures of 5.0 billion dollars, but the Bureau was not interested in reasonable benefit cost analysis and "refused to believe any expert who told it what it didn't want to hear" (Reisner 1993, 263).

In order to replace water that had been flowing to California the original plan provided for massive diversions of water from northern to southern California and also proposed damming the Colorado just before and after the Grand Canyon. However, the environmental movement was strong enough by the 1960s that most of the project became politically unfeasible. That political pressure didn't stop the effort to divert water to Arizona and the Bureau of Reclamation was order to provide justification for the CAP and ancillary dams. Dan Dreyfus was the Bureau of Reclamation official in charge of providing benefit-cost estimates and he said "I had to fly all the way out to Denver and jerk around the benefit-cost numbers to make the thing look sound" (quoted in Reisner 1993, 292).

In 1968, after years of logrolling and political infighting, Congress passed the Colorado River Basin Project Act (Wahl 1989, 222) which authorized the main features of the Central

Arizona Project. Water would be pumped up 1,200 feet from Lake Havasu to the Granite Reef Aqueduct which would carry in 190 miles to the Phoenix area. Another aqueduct would carry it 58 miles to additional agricultural areas. Then the water would be lifted another 1700 feet and would flow 60 miles to Tucson and the San Xavier River Reservation south of Tucson (Wahl 1989, 223).

The primary justification for the CAP was to keep Arizona's farm lands from returning to desert, although the cities of Phoenix and Tucson would also receive some of the water.

Electricity was to be generated in the process, and one of the arguments was that selling the electric power would help pay for cost of delivering subsidized water to agriculture. However, the Second Law of Thermodynamics makes such calculations suspect; for every hundred units of energy used to lift water only seventy can be recovered through falling water.

By 1993 CAP was declared complete by the Secretary of Interior and water was flowing to agricultural and municipal users (Fuller 1997, 104). Of course massive rents were created through the construction process and the provision of subsidized water and those rents were hotly competed for. Public good arguments were seldom made in the arguments over CAP other than the very general one that maintaining Arizona irrigated agriculture was in the interest of the U.S. economy.

Holland and Moore (2003) have estimated the benefits and costs of the CAP and, using reasonable projections of food prices and water availability from other sources, find that, even if one wanted to maintain agriculture production in Arizona, the project was built 86 years too soon. Furthermore, if one calculates the net social return from the Central Arizona Project, it would have been better to never have built at all. Like most previous Bureau of Reclamation projects, the CAP was a massive waste of resources.

V. Conclusion

Despite the numerous public goods arguments for national involvement in the provision of irrigation water and other reclamation services, it appears that the Bureau of Reclamation succeeded in producing a bad public good. The cost to the taxpayers has been enormous and the ongoing federal involvement in water policy has served to justify other government subsidy programs, most of which also probably fall in the category of bad public goods. Once again, public good arguments have been made to justify government investments that have reduced economic efficiency and resulted in economic waste. Those arguments still carry weight, however. At the time of this writing the House Republicans have just joined the Democrats in voting to override President Bush's veto of legislation funding 900 water projects. In the words of Senate Minority Whip Trent Lott (R-Miss.) "I believe that this bill is in the best interests of the country. I know it's very beneficial to my state" (Chicago Tribune 2007). Bad public goods never die.

References

- Anderson, Terry L. and Pamela Snyder. 1997. **Water Markets: Priming the Invisible Pump**. Washington, D.C.: The CATO Institute.
- American Rivers 2007. "Ten Ways Dams Damage Rivers," at http://americanrivers.org/site/PageServer?pagename=AMR_content_a9ae, visited November 6, 2007.
- Bretsen, Stephen N. and Peter J. Hill, 2008. "Water Marketing as a Tragedy of the Anticommons," unpublished manuscript.
- Brewer, Jedidiah, Robert Glennon, Alan Ker, and Gary Libecap. 2008. "2006 Presidential Address: Water Markets in the West: Prices, Trading, and Contractual Forms," **Economic Inquiry** 46, no. 2, April 2008, 91-112.
- Chicago Tribune 2007. November 9, "Congress Deals Bush First Veto Override," Section 1, p. 4.
- Congressional Record. 1896. United States Congress, 54th Congress, 1st Session, Senate, May 12, p. 5115.
- Cuzan, Alfred G. 1982. "Appropriators versus Expropriators: The Political Economy of Water in the West." In Terry L. Anderson, ed., **Water Rights: Scarce Resource Allocation, Bureaucracy, and the Environment**. San Francisco: Pacific Institute for Public Policy Research.
- Fuller, Jeffrey R. 1997, "Interstate Marketing of Central Arizona Project Water: Law, Economics, and Politics." in Terry L. Anderson and Peter J. Hill, eds. **Water Marketing-The Next Generation**. Lanham, Md: Rowman and Littlefield.
- Golze', Alfred Rudolf. 1961. **Reclamation in the United States**. Caldwell, Idaho: The Canton Printers.
- Grossman, Elizabeth. 2002. **Watershed: The Undamming of America**. New York: Counterpoint.
- Holland, Stephen P. and Michael R. Moore. 2003. "Cadillac Desert Revisited: Property Rights, Public Policy, and Water-Resource Depletion." **Journal of Environmental Economics and Management**. 46: 131-155.
- Mayhew, Steward and B. Delworth Gardner. 1994. "The Political Economy of Early Federal Reclamation in the West." in Terry L. Anderson and Peter J. Hill, eds. **The Political Economy of the American West**. Lanham, MD: Rowman and Littlefield.

- Pisani, Donald J. 1992. **To Reclaim a Divided West: Water, Law, and Public Policy, 1848-1902.** Albuquerque: University of New Mexico Press.
- Pisani, Donald J. 2002. **Water and American government: The Reclamation Bureau, National Water Policy, and the West, 1902-1935.** Berkeley: University of California Press.
- Reisner, Marc. 1993. **Cadillac Desert.** New York: Penguin Books.
- Rucker, Randall R. and Price V. Fishback. 1983. "The Federal Reclamation Program: An Analysis of Rent-Seeking Behavior." in Terry L. Anderson, ed. **Water Rights: Scarce Resource Allocation, Bureaucracy, and The Environment.** San Francisco: Pacific Institute for Public Policy Research.
- Schneiders, Robert Kelley. 1999. **Unruly River: Two Centuries of Change Along the Missouri.** University Press of Kansas.
- Wahl, Richard W. 1989. **Market for Federal Water: Subsidies, Property Rights, and the Bureau of Reclamation.** Washington, D.C.: Resources for the Future.
- Welsh, Frank. 1985. **How To Create a Water Crisis.** Boulder, Co: Johnson Publishing Company.
- Wooster, Donald. 1985. **Rivers of Empire.** New York: Oxford University Press.