ENVIRONMENTAL IMPACT OF THE OKLAHOMA EAST-WEST WATER CONVEYANCE SYSTEM

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The conveyance system, as outlined by the United States Department of Interior, Bureau of Reclamation report (1) and envisioned by water developers, consists of a reservoir system throughout Oklahoma whereby surplus water retained in eastern Oklahoma would be transported to semi-arid regions further west. The system's 117 reservoirs would be interconnected by concrete-lined canals for most of its 1,968-mile length. Eighty-nine pumping plants would be required to lift the water to the higher elevations at the usage area. From southeastern Oklahoma, 3,700 cubic feet a second (cfs) would be carried to Lakes Dibble and Union in central Oklahoma and be distributed from there to the southwestern region. From the northeast, 2,710 cfs would flow through a canal passing north of Edmond out to the northwestern and panhandle regions. These two interconnected canals would have a capacity greater than the combined flow of the Red River, with an average discharge through Denison Dam of 4,783 cfs (2), and the Illinois River, with an average discharge of 837 cfs (3). The proposed projects would allow the westward transport of two major rivers.

Oklahoma's water needs, listed in descending order of requirements, are agricultural, municipal, manufacturing, and electrical generation usages. The described project is in a preliminary planning stage, but it has become synonymous with progress in the minds of many. It is supported by the Oklahoma Water Users Association and the Oklahoma Water Resources Board. Commitment by the latter agency in such an early stage of planning precludes intensive research into alternate and perhaps better methods of meeting water needs. The rapid depletion of ground water in the Oklahoma and Texas Panhandle lends urgency to adoption of some solution. Proponents of the conveyance system emphasize that all needs of eastern Oklahoma would be met, that only surplus water would be transported. As described, the system is an irreversible commitment to water resource development with irreversible environmental impacts.

PREDICTABLE AND POSSIBLE ENVIRONMENTAL EFFECTS

Irrigation acreage

The plan estimates that, in 2070, a total of 1,448,000 additional acres could be irrigated by using transported water. This estimate does not reflect acreage lost in bottomlands removed from agricultural usage by inundation with reservoirs. The Boggy River valley in southeastern Oklahoma would lose 52,740 acres to the Boswell Dam, 3% of the total state acreage to be developed. Simple arithmetic reveals that the acreage inundated by the 117 reservoirs would exceed the acreage that could be brought into production by the project. Productivity and fertility of bottomland soils is many times that of upland soils. The productivity of the land irrigated by this plan would never equal that of the land inundated. Agricultural usage would not be able to bear the total cost of the system. Municipal and industrial usages can more readily absorb the costs of transport and would have to use portions of the water (4).

Salt accumulation

Gradual loss of humus and salt accumulation in irrigated soils are inevitable. Despite continuing research, no real solution for this problem is known. Irrigation of the semi-arid portions of western Oklahoma and Texas can only be considered as short-term. Productive bottomlands, on the other hand, are perpetuating systems which, with care, can sustain productivity on a long-term basis.

Electrical consumption

The conveyance system will require 20 billion kilowatt hours (KWH), more electricity than Oklahoma used in 1970 (5). At 6 mills per KWH, 120 million dollars would be spent annually, and even this fig-

ure reflects only part of the annual cost. Electrical power generation, whether accomplished by nuclear power plant, conversion of fossil fuels, or hydroelectric generation, always involves pollution. Any environmental degradation from manufacturing electricity for the system must be subtracted from the benefits, if a true cost-benefit ratio is to be obtained.

Waste pollution

With the current increase in feedlot operations waste pollution would pose a problem. Water of the quality transported would be rather expensive to serve as a waste dilutant. Stream degradation of local channels would affect downstream usages. Both of the Canadian Rivers and the Cimarron River are present water sources for central Oklahoma. Development farther west must not be at the expense of the presently developed water resources of central Oklahoma. Industrial usage of water is predicted to increase; the effluent waste problems thus created would have to be controlled to maintain present stream quality of non-transported water drainage systems.

Water quality

In the western portion of the state the water quality is lower than that of eastern rivers. The purpose of the conveyance system is not just to supply water, but to supply water of a high quality not available locally. The proposed contribution (1050 cfs) from Lake Eufaula into the canal system reflects inadequate consideration of lake ecology and its influence on water quality. Portions of this lake are anaerobic during summer. The U. S. Corps of Engineers has experimented with aeration to increase water quality (6). Lake Eufaula can only progress towards more eutrophic conditions with age, particularly since it is a holding basin for rivers carrying nutrient wastes from the Oklahoma City Metropolitan area. Analysis of the Canadian River near Whitefield, downstream from the lake, shows the chloride and dissolved solids content occasionally exceeds that of drinking water standards (7). Inclusion of a large percentage of this water into the conveyance system would complicate maintenance of the high quality desired for the system, and would shorten its life. The high evaporation of holding basins in the western half of the state would concentrate those salts present, leading to further quality deterioration. Predicting water quality in reservoirs is hazardous. The Bureau of Reclamation's Foss Reservoir on the Washita River has filled with unexpectedly poor quality water during low rainfall years (8), a simple case of great expectations and reality not coinciding.

Water loss from evaporation

An inevitable consequence of the tremendous surface area created by the system and the low humidity prevalent in the high plains would be immense water loss due to evaporation. The estimated loss from the proposed system, including all 117 reservoirs, is placed at 1.6 million acre-feet per year, more than the discharge of Mountain Fork River, 934,690 acre-feet per year, at Eagletown, Oklahoma.

Downstream environmental impact

The system would result in water loss to downstream flow outside state boundaries. Municipal and industrial usages could be expected to consume approximately 20%, with the remainder being available for recycling. Agricultural irrigation is consumptive; only small excess flows ever return to stream channels. All multipurpose reservoir projects include flood control in the lower basin as a benefit. Adverse downstream consequences, such as loss of delta land from insufficient flow of the Mississippi River (9), can only be mentioned. A reduced flow in the Mississippi would affect the nutrient concentrations in the Gulf coastal water near the mouth of that river. This change would introduce a limiting factor to the photosynthetic activity of algae, the basis of the oceanic food chain. Many members of the estuarian ecosystem have life cycles geared to spring dilutions of their saline habitat. Some plants and animals would be eliminated due to inability to complete their life cycles. These consequences would be similar to those of the Nile River's Aswan Dam on the Mediterranean Sea. Essentially all aquatic ecosystems and many terrestrial ones of the central Great Plains would be affected by the completed project. The total disregard of adverse consequences outside the state's boundary cannot be tolerated—especially when federal tax dollars would build the project.

Preservation of natural ecosystems

The proposed Tahlequah Dam on the upper portion of the Illinois River, now a State Scenic River, would have contributed 525 cfs to the east-west system. The Eldon Reservoir on the Barren Fork, another preserved stream, would have contributed to the 470 cfs yield of Lake Tenkiller. The controversial Lukfata project on the Glover would contribute 350 cfs. Commitment of these rivers to preservation will require lowering the capacity of the proposed east-west system or modifying the already developed Grand (Neosho) River system. Whether for scenic value, preservation of unique wildlife, or agricultural purposes, the east-west water conveyance system requires an irreversible total commitment of stream beds and bottomlands, which would eventually fill with sediment and, hence, destroy the system itself.

Water rights

The rights of eastern Oklahoma are supposed to be protected by the assumption that only surplus water would be transported. Water rights disputes can be expected, for the potential usage of eastern Oklahoma is underestimated in the report. For instance, the projected water need, other than for agricultural usages, by McCurtain County in 2070 is 11.5 million gallons a day. Now, 98 years prior to this date, McCurtain County usage is more than 200% of this value. The Owens Valley fight with Los Angeles is a good example of the consequences of committing water from one area for the development of another (10). A recent United States Supreme Court ruling, favoring Arizona over California in the 50-year Colorado River squabble, sets a precedent for protection of local water users. Water usage in the eastern part of the state is underestimated. The commitment of an apparent surplus would eventually act as a limiting growth factor in some portions of eastern Oklahoma.

Water development and populations

Oklahoma's past growth has occurred in areas not necessarily abundantly endowed with water. In certain portions of eastern Oklahoma, where extensive water sources are present, populations have declined or barely maintained themselves at a time when overall state population has increased. Water is only one of many factors influencing location and growth of municipalities and industries. Large cities require extensive development of water resources, which in turn allows more urban growth in an unending cycle. Soon problems of transportation, overcrowding, violence and crime, with developing slum areas and central city decay, require vast transfusions of urban renewal. We suggest that one of the easiest ways to control city size at an optimum level would be through curtailment of water transportation systems. We wish to present the hypothesis that when an ecological perspective is used, it is more economical for large water users to go to the water source, rather than to promote transference over long distances. Wise and judicious use of water, coupled with ecological planning in land use, would allow natural environmental factors to limit large populations from environments that could not sustain them. This would also encourage non-waste usage and promote recycling.

Philosophy of arid land use

The growth of Los Angeles, Phoenix, and other cities could not have occurred without massive water transfers. However, the environmental impact of these transfers has never been considered in determining the cost-benefit ratio of the water conveyance systems involved. The United States is confronted with problems of overcrowding, pollution, exhaustion of natural resources, and other ecosystem imbalances. The proposed conveyance system symbolizes the "exploitation now" philosophy which prevailed during pioneer days. The fragile systems of arid lands can yield benefits to man over long-term usage, but they must be used in a manner compatible with the ecology of these areas. Abuse brings disaster. The dust bowl of the 1930's is a perfect example of exploitive practices coupled with ignorance of land conservation leading to disaster. Even now, the exploitive nature of man is rapidly using ground water in this very same area at a rate much greater than recharge. The term "rescue operation" has been used for the proposed east-west water conveyance line. The Oklahoma water plan implies usage of water for Oklahomans only. The comparable Texas plan for supplying the Texas panhandle shows a canal traveling from the Oklahoma-Texas border in the Roger Mills County region to Amarillo, Texas. The Texas plan and the Oklahoma plan are both sponsored by the same fed-

eral agency. The possibility of using eastern Oklahoma water in the Texas panhandle is being considered by federal authorities. Most large water planning is done by basins rather than political units. The discrepancy in the two plans reflects the current desire of Oklahomans to retain "their" water within the state's boundaries.

SUMMARY

The proposed Oklahoma east-west water conveyance system is a project requiring an irreversible commitment of most of Oklahoma's waterways to the short-term benefits of the system. It is an option which, if chosen, will close many doors to other kinds of water resource development. The choice of this plan over recycling, desalinization of surface waters, adoption of no-waste usage, and other alternatives not requiring this type of permanent and expensive commitment must be carefully made. The impact of this system would be felt in the rapid depletion of soil humus in irrigated arid lands, inundation of productive bottomlands, changing of the natural biotic communities of most of Oklahoma's waterways, reduced flow in the Mississippi River and alteration of the Gulf ecosystem.

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