

Water and energy resource development in the Tongue River basin, southeastern Montana

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This dissertation explores water use, water availability, and energy development from the perspective of historical-cultural geography, physical geography, and resource management. Water has been the key to the settlement and economy of the Tongue River Basin and is the key to future development of the basin. Massive development of the basin's coal resources will alter the basin's hydrologic systems and traditional means of livelihood.

Water use in the historical period was first confined to available surface water. Ranches focused their operations on floodplains where water was used to irrigate hay and alfalfa. The construction of a locally owned irrigation district in the lower valley did much to stimulate economic development in the Miles City area. In the upper basin the irrigation systems developed on individual reaches were smaller because of the narrowness of the floodplain, meandering of the river, and distance to market. These systems have persisted to date without much refinement.

Cattle grazing in the uplands at first depended on numerous springs for water. The development of the windmill enabled ranches to utilize most of the basin for grazing and provided a dependable source of water during droughts. Later, electric pumps tapped deeper aquifers, allowing ranchers to graze livestock throughout the entire basin. Today, groundwater is a potential source of water for energy development.

The use of a water budget to quantify the basin's water resources provides an assessment of how much water is available for use and illustrates the human impact to date on the basin's hydrologic systems. More than 91% of the basin's precipitation either evaporates or transpires and only .6 percent of the total precipitation flows into the Yellowstone River Miles City. The remainder is consumed within the basin.

Development of the basin's vast energy resources is dependent upon several factors, among which are international politics, federal energy policy, national energy consumption habits, state policy, technological innovations, and the availability of water. Water supply is relatively scarce but projected levels of water demand are high. Several energy and water conflicts exist in the Tongue River Basin: Montana versus Wyoming, Montana versus the United State, federal agencies vs. federal agencies, Montana agencies versus Montana agencies, economic opportunity versus lifestyle preservation, agriculture versus energy, Indians versus non-Indians, developers versus preservationists, in-state conversion versus export only, and water conservation versus business as usual. In addition, much conflict results from the difficulties of implementing a new water rights system.

Water rights in the Tongue River Basin are in a state of uncertainty. Quantification of the basin's water rights is proceeding slowly and lawsuits initiated by Indians may delay adjudication of water rights for many years.

Energy development in the Tongue River Basin will have a significant impact on the basin's hydrologic social, and economic systems. Energy conversion projects threaten to dewater the river, seriously degrading water quality and endangering virtually all aquatic life. Industrial

development threatens the traditional values of basin residents and will alter the pastoral, rural landscapes. Coordinated planning to mollify the impact of mining is nonexistent. Energy development will initially stimulate a boom economy but ultimately the Tongue River Basin has the potential of becoming a national sacrifice area.