

Evaluating Economic Outcomes: Big Horn Adjudication and Water Use on the Wind River

Indian Reservation

Executive Summary

University of Wyoming

Katelyn Fisher

2024

Summer Undergraduate Research in Economics

Evaluation of Potential Economic Outcomes of the Big Horn Adjudication

Introduction

This paper aims to conduct a cost/benefit analysis of infrastructure investments for expanded use of legal water rights on the Wind River Reservation through the use of government, professional, as well as local knowledge on legal and agricultural issues in central Wyoming. This analysis requires an understanding of both the costs to build the necessary infrastructure for the Eastern Shoshone and Northern Arapaho tribes (to fully utilize their current legal water right of 344,706 acre-feet) and the economic implications of this increased water usage both on and off the on the Wind River Reservation.

Background

Water scarcity in the Western United States has led to controversy regarding management and allocation to human uses. The doctrine of prior appropriation has outlined standards for water allocation based upon the seniority of an established property right; this system is also commonly referred to as first in time, first in right¹. The Big Horn Adjudication is a legal proceeding that was filed in 1977 by the Wyoming Attorney General asking the court to determine the nature, extent, and relative priority of all persons holding water rights in water division number three, which encompasses the Wind River Indian Reservation. This lawsuit concluded in 2014 and changed the water right availability for the entire reservation due to the interpretation of the 1868 Second Treaty of Fort Bridger; 344,706 existing practicably irrigable acres were recognized as well as 263,132 acres granted for reserved future use given appropriate infrastructure implementation and development.

¹ View full project report for complete reference list.

Evaluation of Potential Economic Outcomes of the Big Horn Adjudication

A decade after this final decision, the agricultural and economic landscape of the reservation has seen little to no alteration. This lack of development has been identified due to the fact that approximately 60-70% of the existing water rights have yet to be used, stunting any opportunity for increased production and revenue for tribal members. The lack of availability of initial water rights highlights the need for an expansion of infrastructure cost/benefit analysis. To effectively address these challenges, a comprehensive analysis of the available data is essential. By employing data collection methods and analytical techniques, we can gain deeper insights into the underlying factors contributing to this stagnation and identify actionable strategies to optimize water resource utilization for economic growth.

Research & Findings

Initial Costs

The topic of water projects on the reservation is not unfamiliar; Senator John Barrasso addressed a lack of funding for water extraction systems, storage facilities, distribution networks, and maintenance and operational systems in 2014 in a Senate hearing. In this hearing “Irrigation Projects in Indian Country”, an official funding estimate of \$77.1 million to complete the first stage of the Wind River Irrigation Project was submitted. Adjusting this figure to the rate of inflation (34%) and considering the continued cost of deferred maintenance, a reasonable \$95 million was estimated as necessary in today’s dollars to complete the initial stages of the Wind River Irrigation Project, allowing for the establishment of irrigation districts and the beginning of economic reform for the Wind River reservation.

Land Conversion

Evaluation of Potential Economic Outcomes of the Big Horn Adjudication

Surveying completed near the end of the Big Horn Adjudication identified 1.5 million acres of rangeland on the reservation and 85,500 acres of appropriate land to satisfy the identified 209,372 acre-feet of water in the Big Horn Adjudication. This conversion would take place at approximately \$1,767 per acre as an initial investment. Once the irrigation systems are in place, economically self-sufficient irrigation districts would likely be established and enrollment fees would allow for funding of routine maintenance and continued operational costs such as water delivery.

Projected Profits

The Wind River Reservation is unique when it comes to identifying potential profits from water usage and delivery. The decision in the Big Horn Adjudication outlined that the identified water rights could only be used for agricultural purposes. Additionally, these rights were awarded with an 1868 appropriation date; making this water senior and first in time to nearly any other allocation in the Wind River Basin. These two factors, as well as the proximity of the reservation lands to existing rights allow for a simplified yield formula: $Y = \sum_{i=1}^1 P_i \cdot Y_i$.

Given an essential guarantee to water due to a senior appropriation date leads farmers in the region to pursue the highest value crop, alfalfa. Approximately 64,016 acres of alfalfa could be farmed every year if the existing 209,372 acre-feet of water was fully utilized. Gross income per acre of alfalfa is equal to \$693.27 and variable and fixed costs equal approximately \$312.10 per acre, leaving an estimated net income of \$381.17 per acre annually, given three seasonal harvests. These values would generate an estimated revenue of nearly \$24.4 million every year in crop production.

Land Value Alterations

Evaluation of Potential Economic Outcomes of the Big Horn Adjudication

Irrigated cropland in the region is valued at \$3,000/acre while non-irrigated cropland falls short at \$960/acre. This contrast is apparent in other cases; in Wyoming, the average cash rent for irrigated cropland was \$86.50 per acre, compared to just \$20.00 per acre for non-irrigated land. This value underscores how adding water rights to a parcel of land provides greater opportunity for both agricultural and real estate potential. Currently, the 209,372 acres that are not irrigated have an approximate value of \$385 million and if they were to become irrigated they could nearly double in value, equaling a total of \$628 million.

Analysis

The above findings and figures indicate that the Wind River Indian Reservation has the opportunity to reform its economic standing with proper financial backing and capital investment. The irrigation districts created by tribal members have the potential to be financially self-sustaining based upon the guideline that there needs to be at least 140 acres of irrigated land per mile of canal; the Wind River Indian Irrigation project projections far exceed this suggestion. Additionally, given that the estimated start-up cost of implementing infrastructure is approximately \$1700/acre, the increase in agricultural productivity has the potential to recover initial costs by the end of year six. Although a significant upfront cost and a project that is very multifaceted, the benefits of this endeavor have the potential to outweigh the costs with proper management and agricultural practices.

Conclusion

The impacts of this project and the potential for economic development extend far beyond agriculture in central Wyoming. The creation of irrigation districts and placing tens of thousands of acres into production provides opportunities for remediation by diversifying

Evaluation of Potential Economic Outcomes of the Big Horn Adjudication

tourism and other local industries. Job creation paired with economic stability can help advance the tribe's sovereignty and ability to become self-sufficient. Additionally, displaying a successful project at the intersection of economic and environmental challenges can impact the entire region.

Acknowledgments

This research was made possible through funding from the Rocky Mountain Power Foundation, whose support enabled me to conduct this study and further explore the intersection of economics and environmental systems. I sincerely appreciate their generosity in fostering undergraduate research opportunities.

I would also like to thank Dr. David Finnoff, Dr. Jacob Hochard, and Tyler Kjorstad for their time, guidance, input, and coordination throughout this project. Their expertise and support have been instrumental in shaping my research and analytical skills, as well as encouraging me to further pursue academic opportunities in economics.