

IMPACT OF WATER DEVELOPMENT FOR THE NAVAJOS

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The Navajo Indian Irrigation Project is a 110,630-acre development for the Navajo Indians. The lands to be irrigated are located on the mesa south of Farmington, New Mexico. The project has a diversion allocation of 508,000-acre feet from the San Juan River. It is anticipated that 360,000 to 400,000-acre feet of water will actually be delivered to the project lands.

The United States Congress has authorized 206-million dollars for the development of the Irrigation Project. Approximately 40-million dollars have been appropriated for the project development to date. The project is under the control of the Bureau of Indian Affairs, but construction is being supervised by the Bureau of Reclamation. The completed project will be under the ownership of the Navajo Tribe with no private ownership of the irrigated lands--either Navajo or non-Navajo.

Development Schedule

The idea of an irrigation project from the San Juan River evolved as part of a treaty with the Navajo Tribe in the late 19th century. As a part of the treaty, the United States Government promised to provide irrigated lands to the Navajos. Project planning, including survey work, has continued on an off-and on-basis since the signing of the treaty; but it was not until 1962 that Congress authorized the development. Construction began on a limited scale in 1964. The first water is expected to reach 10,000 acres of the project lands by 1975 or 1976. The scheduled completion date is 1986 to 1990, depending upon funding.

Site Factors

The soil on the project lands is predominately sandy to sandy loams. A large part of the land that is being brought in under irrigation has fairly shallow soil which makes it difficult to level the land for flood irrigation. The topography is generally rolling, and the elevation ranges from 5,500 feet to slightly over 6,000 feet. The region has a growing season of approximately 160 days on the average, but frequently ranges from 140 to 180 days. It is anticipated that the project will be mostly under sprinkler irrigation because of soil and topography conditions.

Navajo Economic Situation

It is estimated that 17,000 to 18,000 Navajos are presently unemployed. Underemployment is as much a problem on the reservation as unemployment. Because of small farms and ranches, most Navajos, particularly those engaged in agriculture, are underemployed. The average Navajo family annual income is about \$800. The average Navajo family size is 5.6 persons; hence, the annual income per capita on the reservation is very low.

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The primary purpose of the Irrigation Project is to create income and employment opportunities for the Navajo in his native land. There is a critical need for additional income and employment opportunities on the reservation. Most Navajos, with the exception of a few highly trained individuals, have not been successful in relocating off the reservation. They find it very difficult to get satisfactory employment in the cities and even more difficult to have a satisfactory social life.

Role of New Mexico State University in the Project Development

New Mexico State University is assisting the Irrigation Project development in at least two ways. The University has located a branch Experiment Station directly on the project lands. This station is testing crops that are likely to be grown on the project lands. The Agricultural Experiment Station has also jointly funded with the Four Corners Regional Commission a multi-disciplinary team approach to study the project and assist in its planning. The project team consists of agricultural economists, agronomists, horticulturists, and engineers.^{1/} The primary objectives of the study are: (1) make recommendations on crop and livestock enterprises that will likely be most profitable, (2) evaluate agricultural processing and service industries and make recommendations on those that appear most profitable, (3) make suggestions and recommendations on how the Irrigation Project should be organized, and (4) specify employment opportunities and the training and education needed to meet the employment opportunities.

Major Issues

There are several major issues pertaining to the project development that will have to be resolved. One of the big issues is whether the land should be divided into individual entrepreneurship-size farms, possibly ranging from 160 to as much as 1,200 acres, or should it be organized as a tribal enterprise farms or farms ranging in size from 10,000 acres to one large 110,000-acre farm. Another alternative would be a combination of tribal enterprise farms and individual entrepreneurship-size farms. The ultimate decision on how the project lands will be organized must be made by the Navajos themselves. It is a very difficult and important issue.

The authorized 206-million dollars provides funding to deliver water to the project lands. It does not, however, provide capital for sprinkler irrigation systems, land development, farm equipment and buildings, and for operating expenses. The sources of this substantial additional capital requirement is another important issue. The Navajos do not have the needed capital, nor do they appear to have the potential basis for borrowing it from commercial sources without government assistance.

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Other major issues are the educational and training requirements needed to make the project a success. The training and educational requirements, as well as the capital needs, are closely associated with the type of farm organizational structure selected. The educational and training requirements are substantially different for the tribal enterprise type of farm as compared with the individual entrepreneurship-size farms. One of the major deterrents to individual entrepreneurship farms is that there are relatively few Navajos who have the training and experience necessary to manage a commercial irrigated farm. A successful manager of a commercial farm is a highly skilled individual. It is anticipated that the level of management required will increase substantially for successful farming in the future.

Another factor to consider with the individual farm approach to project organization is that relatively few Navajos would get farms. A minimum size economic unit, given the types of crops that will likely be grown in the area, is likely to be about 320 acres. If the project were divided into 320-acre farms, there would be room for only 345 farms. Hence, as few as 345 Navajo families out of the estimated 23,000 families on the reservation would receive farms.

The tribal enterprise farm approach also has many inherent problems. Large farms are difficult to manage. There are relatively few farms in the world larger than 50,000 irrigated acres. Large farms, however, can be managed successfully and offer many opportunities, particularly from economies to be gained in purchasing, marketing, machinery efficiency, and integration into processing activities. It is also likely that capital would be easier to obtain under the tribal enterprise farm approach. The Navajo Tribe has had some experience in tribal enterprise activities having organized the tribal utilities and forest products' industries along these lines.

Potential Crops

The area is adaptable to a large number of crops. The research team concluded that the crops listed in Table 1, under the present production and marketing conditions, offer the most potential. A large number of other crops were considered but were eliminated for climatic, production costs, or market reasons.

Table 1. Budgeted crops

Field Crops	Vegetable Crops	Fruit Crops	Livestock Enterprises
Sugar beets	Asparagus	Apples	Dairy
Alfalfa hay (baled)	Beets		Warmup feedlot
Dry beans	Bell peppers		Finish feedlot
Soybeans	Cabbage		Swine
Grain sorghum	Carrots (fresh)		Laying hens
Corn silage	Carrots (processed)		
Winter barley	Cucumbers (processed)		
Winter wheat	Onions		
Irrigated pasture	Potatoes (fresh)		
Alfalfa seed	Snap beans		
	Sweet potatoes		

Potential Livestock Enterprises

The Navajo people have raised sheep and cattle for many years. Because of this experience and climatic and locational factors, it is reasonable to expect that many livestock enterprises will be associated with the project lands. If the project is developed along the individual farm entrepreneurship approach, the principal livestock enterprises will likely be cow-calf programs, sheep grazing, summer grazing of yearling beef animals, and possibly, swine production. If the project is developed along the enterprise farm approach, large scale livestock enterprises appear feasible. Among the most promising are dairy, backgrounding and finish beef feedlots, and large-scale egg production. Large-scale confinement and semi-confinement swine production operations might also prove profitable.

Under current cost and return figures developed by New Mexico State University, it is anticipated that if the project is developed along the individual farm approach, the cropping pattern and livestock produced or fed will likely be as shown in Table 2. It is predicted that the farms will be heavily committed to hay crops, cereals, feedgrains, and sugar beets. This assumes the project can get a sugar beet allotment. If a sugar beet allotment cannot be obtained, preliminary results indicate the land will be shifted to cereals and feedgrains. Markets and production seasons are the major limiting factors for fresh and processed vegetable production.

Table 2. Potential cropping pattern and livestock for individual farms

<u>Cropping Pattern</u>	<u>Percent of Acreage</u>
Cereals, feedgrains and sugar beets	35
Hay crops	50
Fresh vegetables	8
Processed vegetables	6
Seed crops	1

Livestock Enterprises

Cow-calf
Beef yearlings

If the project is developed under the concept of the enterprise farm approach, a slightly different cropping pattern is expected as shown in Table 3. It is anticipated that fresh market and processed vegetable acreage will be about the same as under individual farms. The big change will likely be an increase in feedgrains relative to hay and silage crops. It is anticipated that because of the advantages of integration opportunities and capital availability for large-scale units, the enterprise farm development would have considerably more livestock enterprises, particularly feedlots and large-scale egg operations. These operations would provide a substantial market for feedgrains.

Table 3. Potential cropping pattern and livestock enterprise farm

<u>Cropping Pattern</u>	<u>Percent of Acreage</u>
Cereals, feedgrains and sugar beets	51
Hay and silage crops	37
Fresh market vegetables	6
Processed vegetables	5
Seed crops	1
 <u>Livestock Enterprises</u>	
Laying hens	300,000 hens
Dairy	1,100 cows
Feedlot	60,000-head capacity
Backgrounding lot	30,000-head capacity
Cow-calf	Several thousand
Steers	Several thousand

Economic Impact

Because of the many unknowns as to how the project will be developed, it is difficult to estimate accurately the economic impact of the Irrigation Project. Coefficients indicating the relationship between off-farm income and employment relative to direct farm income are of questionable accuracy. Better estimates of income investment multipliers are also needed to measure the impact of the Irrigation Project development on the supply, processing and service industries in the general Four Corners Region. Allowing for uncertainties and using coefficients of questionable accuracy, the predicted number of jobs created if the project is developed on the basis of 320-acre farms is as follows:

<u>Employment</u>	<u>Number of Full-Time Jobs</u>
On-Farm Employment (Mostly operators and family labor)	400-500
Off-Farm Employment Directly Related Businesses	500-800
Impact on Other Industries and Services	1,800-2,300
Total	2,750-3,600

The number of jobs created if the project is developed on the basis of an enterprise farm approach is as follows:

	<u>Number of Full-Time Jobs</u>
Direct Enterprise	
December-March	500
April-May	1,100
June-August	2,100
September-November	1,400
Enterprise Service Industries	400-600
Impact on Other Industries and Services	1,800-2,300
Total	3,200-4,200

The estimated number of jobs created is likely to be larger for the tribal enterprise farm development approach. This is because more processing industries and livestock enterprises would be developed as an integrated part of the enterprise farm or farms. In general, the greater the degree a product is processed in a local region, the greater number of jobs will be created. This will be a very important consideration on the part of the Navajo people.

One of the primary difficulties of farm production and processing industries is the substantial variation in the number of jobs by seasons. It is anticipated that some of the seasonal peaks in the labor needs can be provided by students in the summer months and by homemakers who want to work only part of the year. Most livestock enterprises, as opposed to cropping activities, provide year-round employment. The addition of these enterprises to the development plan should assist, therefore, in balancing the employment requirements. The projected income generation and investment requirements for a typical 320-acre farm under the assumption of above average management are estimated in Table 4.

Table 4. Projected income per 320-acre farm under above-average management

Labor Income (Operator, Family, Hired)	\$4,000 to \$10,000
Returns to Management and Capital (Paying \$20 per rent to the tribe)	\$8,000 to \$20,000
Investment Capital in Machinery and Equipment	\$ 54,000
Investment Capital in Buildings, Farmstead, Fences	\$ 30,000
Operating Capital	\$ 40,000
Total Capital	\$134,000
Return to Operator's Labor and Management (Assuming 8 percent interest on 50 percent of investment capital and 100 percent of working capital)	\$4,000 to \$20,000
Income to the Tribe (Land Rent)	Slightly over Two Million Dollars

It is estimated that labor income will range from \$4,000 to \$10,000 per year. This includes income to the operator for his own labor, as well as family labor and hired labor. The returns will vary depending upon crops grown and livestock raised or fed. Those farms having a sizeable acreage of vegetable crops will have increased labor needs as compared with those producing primarily hay and grain crops. Returns to management and capital are estimated to range from \$8,000 to \$20,000 per year, using the assumption that the Navajos would pay \$20 an acre per year cash rent to the tribe for use of the land. The projected total capital requirements are estimated to be \$134,000 per farm. The capital would be needed for construction of farmsteads, purchasing irrigation equipment, machinery and farm implements, and for operating capital. If an eight percent interest charge were made on capital, and the working capital was 50 percent of the investment capital, it is anticipated that an above average operator would have anywhere from a \$4,000 to a \$20,000 return for his labor and management. Farmers with successful livestock enterprises and growing a sizeable acreage of vegetable crops will have the greatest net returns.

If the tribe were able to collect \$20 cash rent per acre for the use of the land, the total rental income should run slightly over two million dollars per year. Doubling the cash rent to \$40 per acre would add slightly over \$7,000 to the annual operating expenses. This would eliminate nearly all of the expected profit except from those farms with sizeable vegetable acreage. A summary of the expected investments and operating profits, assuming a 110,000-acre tribal enterprise farm, is presented in Table 5. Assuming the Navajo Tribe will be able to raise nearly 80-million dollars in investment and operating capital, and if they are able to develop or obtain superior management, the total operation should return a net operating profit of approximately 18-million dollars when it is totally developed. This return figure does not include any charges for capital. This net return figure is based on the assumption that the Navajos will use a cropping pattern and establish a livestock enterprise similar to that shown in Table 3. It is estimated a 41-million dollar investment in facilities and equipment and 38-million dollars in annual operating capital would be required. Assuming an interest charge of eight percent on one-half of the investment capital, and eight percent on the operating capital, the net income will be about 13-million dollars. If the public investment in the project is 206-million dollars, a 13-million dollar annual return amounts to nearly six-percent return on the public investment.

Table 5. Enterprise Farm Approach

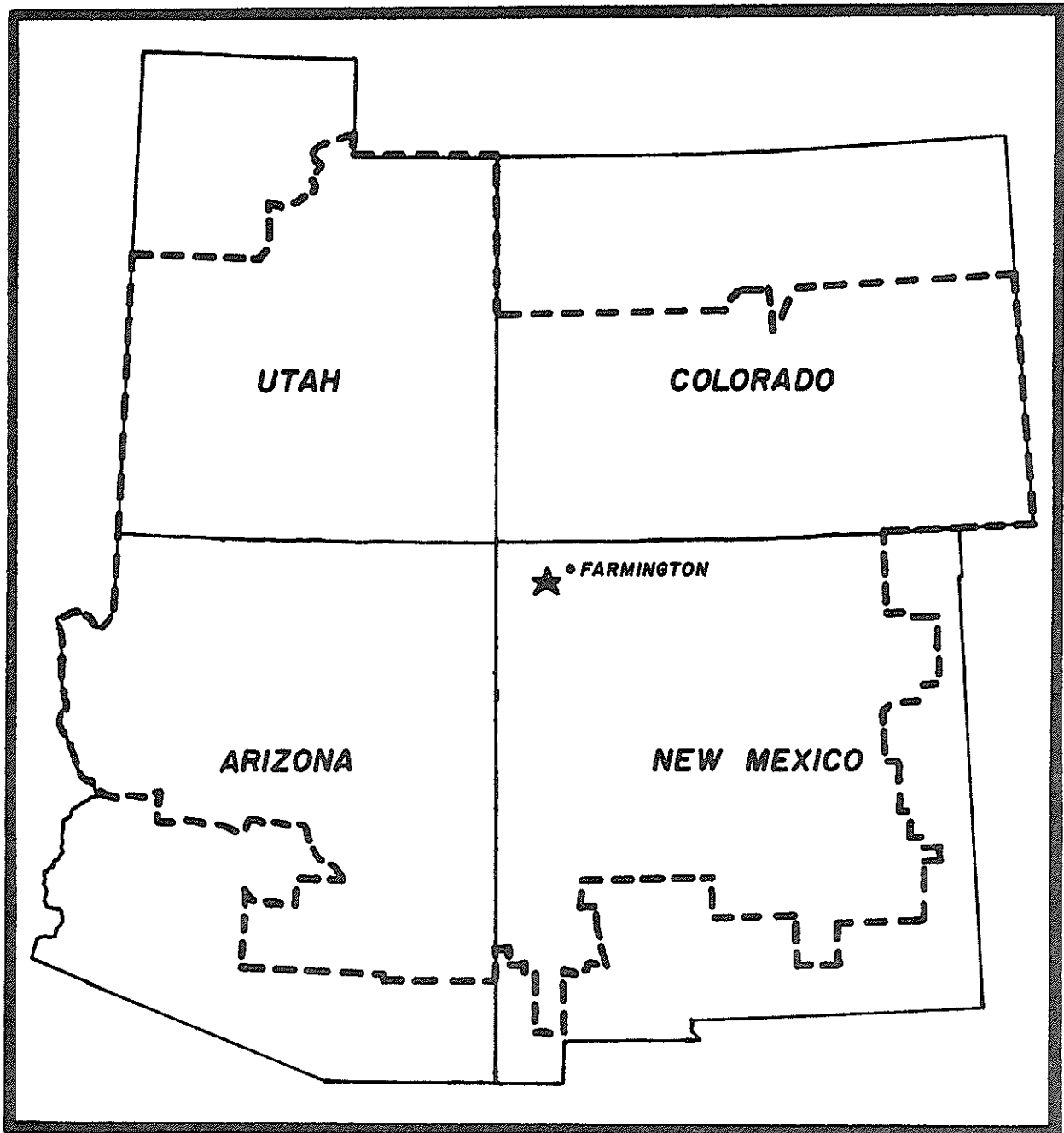
	Millions of Dollars	Percent
Expected Net Operating Profit	18	
Investment Capital	41	
Operating Capital	38	
Net Income (Less interest charge)	13	
Return to the Project (at 206 million)		
(Does not include any off-farm or secondary benefits)		6

Is the Project Worthwhile?

Many individuals have questioned the value of such a large undertaking. The past history of irrigation projects for Indians, and in particular the Navajos, has not been very encouraging. Most of these irrigation projects, however, were based on the concept of subsistence farming and not on the development of commercial agriculture. It is almost certain that the public investment will exceed 206-million dollars before the project is completed. These are direct appropriation funds and are not to be paid back. The value of the project should be measured by both the primary impact upon the Navajo Tribe as well as the secondary impact upon the general Four Corners Region. As indicated previously, the average Navajo family income is only \$800 per year. If the project provides employment for approximately 4,000 Navajo families, it could have the effect of removing these families from the poverty rolls. It is anticipated that at least 4,000 families would have an income exceeding \$5,000 resulting from the project. Without this type of development or similar developments on the reservation, these families might have to be supported through public welfare transfer payments. If a minimum income level for a family of five to six people is \$3,800, and the Navajo average is now \$800, a public outlay of nearly twelve million dollars per year would be required to support 4,000 Navajo families. The project, viewed in this light, makes sense from an economic and a social viewpoint. From a purely agricultural production standpoint, the project does not appear to be economically rational. The present agricultural situation is excess production for many products. By the time the project is completed, there will be an average public investment of nearly \$3,000 per acre of irrigated land. The land will not produce sufficient revenue to justify a \$3,000 investment per acre needed to develop new land. Viewed in the broader economic-social perspective, however, the investment appears much more rational.

The Irrigation Project is extremely important to the Navajo people. It is imperative that the University, as well as all other public agencies, assist the Navajos in making this a successful project.

NAVAJO INDIAN IRRIGATION PROJECT



- ★ PROJECT AREA
- == FOUR CORNERS ECONOMIC DEVELOPMENT REGION