Technical and Physical Feasibility Fact Sheet
Alternative 11: Low-Water Crops

Acknowledgements: This fact sheet was written by Brian McDonald, Ph.D., private economic consultant, as part of the "Evaluation of Alternative Actions for Technical, Physical, Hydrological, Environmental, Economic, Social, Cultural, and Legal Feasibility and Water Quality Issues and Legal Overview" contracted to Daniel B. Stephens & Associates, Inc. The format and organization of the fact sheet and the definition of the alternative were developed by the Water Assembly.

1. Definition of Alternative

A-11: Develop markets for locally-grown produce, and low-water alternative crops.

2. Summary of the Alternative Analysis

In 2000 there were 41,494 irrigated acres in the Middle Rio Grande (MRG) planning region, with 21,200 acres in alfalfa and another 10,020 acres in pasture. Almost 60 percent of the alfalfa and pasture acreage was located in Valencia County. Other forage crops included corn (2,196 acres) and other hay (2,100 acres). Fruit crops included fruit orchards (600 acres), grapes (600 acres), and melons (25 acres). Vegetable crops included chile (980 acres), miscellaneous vegetables (1,510 acres), and dry beans (11 acres) (USDA, 2001) (Table 11-1).

Alfalfa is a water-intensive crop, using 28.20 inches annual consumptive use of water per acre in the Belen area (Blaney and Hanson, 1965). This compares to 17.94 inches per acre for sorghum, which is also grown in the MRG region. Switching 5,000 acres from alfalfa to sorghum would reduce consumptive water use by an estimated 4,275 acre-feet per year of water. There are also varieties of alfalfa that use less water, which local farmers turn to during sustained periods of drought. Switching all current alfalfa acreage to an alfalfa variety that uses 15 percent less water over the growing season would reduced annual consumptive water use by 7,473 acre-feet in the MRG planning region.

Under current irrigation and institutional practice there is no economic incentive for local farmers to switch to lower water using crops. Farmers in the Middle Rio Grande Conservancy District (MRGCD) face a zero marginal price for agricultural water. Reducing consumptive water use does not lower the farmer's dollar cost of irrigation water. By switching crops the farmer will

likely incur additional business costs that cannot be recovered out of reduced outlays for irrigation water. Thus, the benefit/cost ratio for switching to lower water-using crops is negative Though some farmers within the region have chosen to grow produce or other lower water use crops, the negative benefit/cost ratio indicates that widespread changes in crop patterns is not likely to occur unless incentives are implemented or market changes occur.

Table 11-1. Irrigated Crop Acreage, 2000 in the Middle Rio Grande Planning Region

Crop	Bernalillo	Sandoval	Valencia	Total
Alfalfa	4,600	4,100	12,500	21,200
Chile	500	400	80	980
Corn	700	425	1,071	2,196
Fruit orchards	130	410	60	600
Grapes	200	35	25	260
Other hay	400	---	1,700	2,100
Melons	---	---	25	25
Miscellaneous field crops	200	400	15	615
Miscellaneous small grains	160	100	500	760
Miscellaneous vegetables	400	1,000	110	1,510
Nursery stock	---	---	50	50
Pasture	1,600	2,370	6,050	10,020
Pecan orchard	---	---	2	2
Dry beans	---	10	1	11
Rye	20	---	---	20
Sod	---	---	230	230
Sorghum	200	50	35	285
Wheat	80	50	500	630
Total	9,190	9,350	22,954	41,494

Source: U.S. Department of Agriculture, New Mexico Agricultural Statistics Service. 2001 New Mexico Agricultural Statistics. Las Cruces, New Mexico.

Furthermore, in the MRGCD there is no on-farm metering of irrigation water **use**. This means that even if a marginal price were charged for irrigation water, there is currently no mechanism to measure the quantity of water applied to irrigated crops. Under current irrigation practices, saving water does not economically benefit the individual farmer.

In fact, there is a disincentive or impediment to the use of lower water-use crops under current institutional arrangements. Under the prior appropriation water right system, water must be put

to beneficial use. If agricultural water is conserved but not used, it may be subject to forfeiture. The local farmer's water right is limited to the actual consumption of water by the crop grown, and not by the water diverted. Thus, switching to a lower water use crop financially undermines the local farmer in a region where water rights currently sell for approximately $5,000 per acre-foot. Water rights attached to the land are part of the wealth of the farmer. Switching to lower water use crops has the potential to reduce the farmer's right to water, and thus reduce his future wealth.

There are other obstacles to the implementation of this alternative. A change of crops may require a different business infrastructure in the agricultural sector than is currently available. Vegetable and fruit crops are more labor-intensive, requiring periodic weeding and hand-harvesting in many cases. Farm labor is generally not available in the MRG planning region, since the predominant alfalfa crop does not require such farm labor. Different planting and harvesting equipment will be necessary. Crop storage and processing facilities would have to be built and different marketing and distribution networks would have to emerge. New farm cooperatives and marketing associations would be needed to achieve the necessary volume to successfully market other crops. Such cooperatives would also be needed for the grading and sorting of agricultural produce as well as the leasing of necessary capital equipment.

Other crops would have different business risks associated with them. Orchard fruit, for example, can be a total loss due to a late spring frost. Vegetable crops may be a total loss if sufficient water is not available throughout the entire growing season. Crop yields for many vegetable crops can be improved by a more deliberate application of water, taking into account the quantity of necessary water, timing, and meteorological conditions. The latter will require metering of irrigation water.

According to the Valencia County Extension Office, farmers in the MRG planning region are at a competitive disadvantage in the market for fresh produce serving local consumers. Compared to southern New Mexico, this region has a shorter growing season, lower yields, no established infrastructure for food processing, inadequate farm labor, and smaller farms so that economies of scale cannot be easily attained in crop production. International competition for New Mexico's chile crop is now a concern, since New Mexico cannot compete with the low cost labor in Mexico. Capital-intensive chile harvesting techniques are now under development in an

attempt to maintain the competitiveness of New Mexico chile production. Similar international competition can be expected in the production and marketing of other vegetable crops.

3. Alternative Evaluation

Alfalfa, the predominant crop in the MRG region's agricultural sector today, is a water-intensive crop. However, alfalfa is well-suited economically to the region's agricultural marketplace. It is a drought tolerant crop whose demand comes from local cattle ranchers, recreational horse owners, and dairies. It can be grown with less business risk by part-time farmers on small land plots.

Switching to low water-use crops would be one alternative to conserve water in the MRG planning region. However, such a water conservation strategy presents obstacles. Crop production for consumer markets would face intense regional and international competition. A different business infrastructure for local farmers would have to be developed to include seed and fertilizer suppliers, planting and harvesting equipment, the availability of farm labor, processing and sorting facilities, marketing and distribution networks, and even agricultural research and training.

Finally, economic incentives must be found to encourage local farmers to switch to low water-use crops and to offset current disincentives and impediments. Farmers currently pay zero marginal price for irrigation water and there is no on-farm metering of water use. Thus, farmers would have no cost savings from the use of less irrigation water. Farmers could lose water rights by shifting to crops with lower consumptive use under current water rights laws, resulting in a diminution of farmer wealth. Thus, legal and institutional practices would also have to change.

3.1 Technical Feasibility

Enabling New Technologies and Status

No new agricultural technologies would be required.

Infrastructure Development Requirements

New business infrastructure in the agricultural sector would be necessary. This would include seed and fertilizer suppliers, availability of farm labor for planting and harvesting crops, agricultural machinery, processing facilities, and marketing and distribution arrangements.

Total Time to Implement

Time needed would be based upon the economic viability of changing crop patterns and the provision of financial incentives to local farmers.

3.1.1 Physical and Hydrological Impacts

Effect on Water Demand

This alternative has great potential to reduce water demand in the agricultural sector. Current crop patterns are water-intensive in an arid climate.

Effect on Water Supply (surface and groundwater)

None anticipated.

Water Saved/Lost (consumption and depletions)

This depends upon the amount of irrigated acres switched to low water-use crops. For example, switching 5,000 acres from alfalfa to sorghum would reduce consumptive water use by an estimated 4,275 acre-feet.

Impacts to Water Quality (and mitigations)

None anticipated.

Watershed/Geologic Impacts

None anticipated.

3.1.2 Environmental Impacts

Impact to Ecosystems

Water savings would be available for other water uses, including the maintenance of riparian habitat.

Implications to Endangered Species

Water savings would be available for other water uses, including instream flow to maintain habitat for the silvery minnow.

3.2 Financial Feasibility

Local farmers have no financial incentive to implement this alternative. A farmer's marginal cost of irrigation water is $0, since there presently is no on-farm metering and water pricing is based on a flat per acre assessment. Thus, any water savings would not reduce a farmer's annual cost of production. Furthermore, if agricultural water is conserved and not used, it may be subject to forfeiture under the prior appropriation water right system. Switching to lower water-use crops has the potential to reduce the farmer's right to water and thus his personal wealth.

3.2.1 Initial Cost to Implement

Unknown, but this alternative would require large, up-front expenditures to establish new business infrastructure and to provide financial incentives to farmers to switch crops.

3.2.2 Potential Funding Source

The federal government is the primary governmental organization that subsidizes agriculture in the U.S. Because of the importance of water management in New Mexico, state government should have a significant interest in financing this alternative. State government must also make statutory changes to water laws so that water savings become the water right of the farmer. Local organizations such as the MRGCD must implement water metering and acre-foot water charges to provide financial incentive for farmers to switch to low water use crops.

3.2.3 Ongoing Cost for Operation and Maintenance

Unknown. Ultimately this would be determined by the market for alternative, low water use crops.

References/Bibliography

Belin, A., C. Bokum, and F. Titus. 2002. *Taking charge of our water destiny: A water management policy guide for New Mexico in the 21st century.* 1000 Friends of New Mexico. 2002.

Blaney, H.F., and E.G. Hanson. 1965. *Consumptive use and water requirements in New Mexico.* Technical Report 32. New Mexico State Engineer Office, Santa Fe, New Mexico.

Brown, F.L., and H.M. Ingram. 1987. *Water and poverty in the southwest*. The University of Arizona Press, Tucson, Arizona.

Dickerson, G.W. 2000. *Vendor/grower and crop/product survey for Santa Fe and Albuquerque growers' markets 1996 and 1998.* Technical Report 33, New Mexico State University Cooperative Extension Service. April 2000.

Henderson, D.C., and E.F. Sorensen. 1968. *Consumptive irrigation requirements of selected irrigated areas in New Mexico.* Bulletin 531, New Mexico Agricultural Experiment Station.

McWilliams, D. 2002. *Drought strategies for alfalfa.* Circular 581, New Mexico State University Cooperative Extension Service. October 2002.

Middle Rio Grande Council of Governments and the Middle Rio Grande Water Assembly. 2001. *Future water use projections for the Middle Rio Grande Water Planning Region.* September 2001.

New Mexico Department of Agriculture. Undated. New Mexico Agricultural Statistics. Las Cruces, New Mexico. Annual report.

Putnam, D. 2001. *Alfalfa: History of alfalfa in the US.* National Alfalfa Information System, Forage Information System. November 14, 2001.

John Shomaker & Associates, Inc. and Pioneer West. 2000. *Historical and current water use in the Middle Rio Grande Region.* Prepared for Middle Rio Grande Council of Governments and Middle Rio Grande Water Assembly. June 2000.

Velasco, D. 2002. Natural bargain. *In Albuquerque Journal Business Outlook.* October 31, 2002.