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A Global View on Irrigation Development

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CORNHUSKER ECONOMICS

A Global View on Irrigation Development

Market Report	Yr Ago	4 Wks Ago	4/20/07
<u>Livestock and Products,</u>			
<u>Weekly Average</u>			
Nebraska Slaughter Steers, 35-65% Choice, Live Weight	\$82.86	\$97.67	\$96.11
Nebraska Feeder Steers, Med. & Large Frame, 550-600 lb	127.97	124.72	128.44
Nebraska Feeder Steers, Med. & Large Frame 750-800 lb	105.47	105.28	108.62
Choice Boxed Beef, 600-750 lb. Carcass	142.28	161.66	166.79
Western Corn Belt Base Hog Price Carcass, Negotiated	59.61	57.01	66.58
Feeder Pigs, National Direct 50 lbs, FOB	51.86	69.67	65.84
Pork Carcass Cutout, 185 lb. Carcass, 51-52% Lean	61.62	65.11	69.66
Slaughter Lambs, Ch. & Pr., Heavy, Woolled, South Dakota, Direct	68.00	85.87	87.50
National Carcass Lamb Cutout, FOB	221.58	247.14	242.47
<u>Crops,</u>			
<u>Daily Spot Prices</u>			
Wheat, No. 1, H.W. Imperial, bu	3.97	4.42	4.81
Corn, No. 2, Yellow Omaha, bu	2.08	3.78	3.40
Soybeans, No. 1, Yellow Omaha, bu	5.34	7.29	6.70
Grain Sorghum, No. 2, Yellow Columbus, cwt	2.93	6.21	5.43
Oats, No. 2, Heavy Minneapolis, MN, bu	2.03	2.97	2.72
<u>Hay</u>			
Alfalfa, Large Square Bales, Good to Premium, RFV 160-185 Northeast Nebraska, ton	130.00	*	135.00
Alfalfa, Large Rounds, Good Platte Valley, ton	65.00	*	92.50
Grass Hay, Large Rounds, Good Northeast Nebraska, ton	55.00	*	90.00
* No market.			

Given the current problems that Nebraska is facing with respect to water management and the need to reduce water consumption, it is worthwhile to consider what the relevant issues related to water consumption and management are in other parts of the world. Are other parts of the world facing similar shortages in water availability? What are the historical roots behind the development of irrigation?

Historical Background: An Era of Water Development

The post-World War II era has witnessed a drastic increase in irrigation activities which has contributed substantially to the massive growth in agricultural production that enables humanity to feed its doubling population.

Figure 1 (on next page) shows the worldwide expansion of irrigated acres between 1960 and 2005, and compares it to the growth in irrigated acres in Nebraska. Given the similarities of these trends, it is not surprising that many of the water management problems currently facing Nebraska are also seen in other parts of the world.

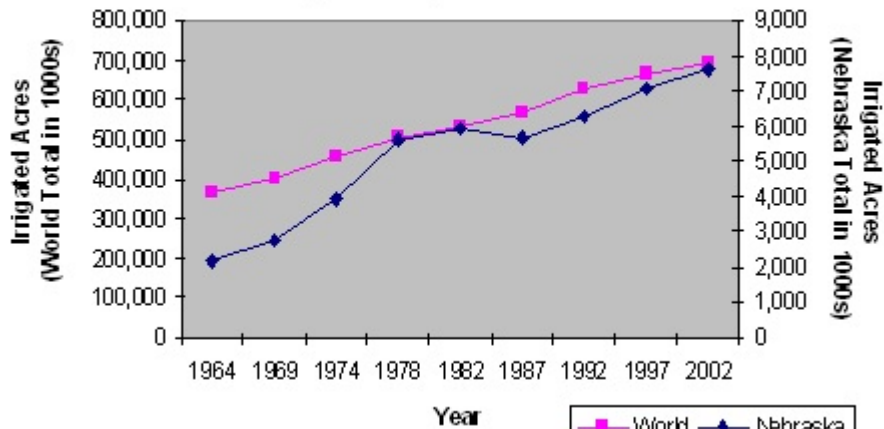
To understand the impacts of this expansion, a distinction has to be made between the overall positive contribution of irrigation and water to agricultural productivity and economic welfare, and a significant amount of misallocation and mismanagement of resources that have accompanied the expansion of irrigation.

In many cases, water resources have been overdeveloped; there has been overspending on capital; and significant costs in terms of loss of ecosystems, extinction of fish species and contamination of water sources.

Benefits of Irrigation Development

Increased supplies of irrigation water have been instrumental in feeding the populations of developed and developing countries in the last fifty years. Irrigation has increased food security and improved living standards in many parts of the world. Fifty years ago it was common to hear concerns of food shortages and mass starvation, and while

Figure 1: A Comparison of Nebraska and Worldwide Irrigation Expansion Trends



Source: FAOSTAT (World data); USDA (Nebraska data)

malnutrition is still a concern in many countries, the reason is not an insufficient global food supply. A report by the International Food Policy Research Institute shows that between 1967 and 1997, global cereal production increased 84 percent at a time when population increased by 67 percent, and that malnutrition among children under the age of five in developing countries declined from an aggregate rate of over 45 percent to 31 percent during this period.

There is indisputable evidence that irrigation leads to increased land productivity. Globally, 40 percent of food is produced on irrigated land, which makes up only 17 percent of the land being cultivated. This differential in productivity is reflected in land values. For example, in a recent study of land values in Nebraska, Dr. Bruce Johnson, Professor at the University of Nebraska–Lincoln, found an average value of \$1,088 for dryland cropland with no irrigation potential, \$1,556 for dryland cropland with irrigation potential, and \$2,202 for gravity-irrigated cropland.¹ This pattern is observed in land values worldwide.

It is clear that irrigation has increased food production, and led to higher land productivity and land values. Other benefits associated with irrigation expansion have included increased employment opportunities, higher incomes and improved flood control.

Costs of Irrigation Development

While there are many benefits from the increase in irrigation availability in the past 50 years, there have also been negative impacts from water projects. There have been financial, environmental and social costs of developing water systems. Environmental problems include those caused by irrigation *development* and those caused by the *overuse* of freshwater supplies for irrigation.

¹ See the March 22, 2006 issue of *Cornhusker Economics* for additional details.

Irrigation development, and the reservoirs and canals associated with it, have led to the deterioration of fish habitat. In the Pacific Northwest, numerous obstacles such as dams and reservoirs have made it nearly impossible for juvenile salmon to reach the ocean. A lack of freshwater in the San Francisco Bay Delta has led to a near collapse of the delta smelt fish species and to its inclusion on the Endangered Species Act. These impacts have not been confined to the United States. Construction of the Porto Primavera Dam in Brazil has obstructed the migration of native fish species, leading to an 80 percent decline in upstream fish catch.

In addition to the environmental problems associated with irrigation development, are those problems associated with the overuse of freshwater supplies (both groundwater and surface water). This idea is not a surprise in Nebraska, as data has repeatedly shown a declining groundwater table in many areas of the Great Plains Aquifer. Internationally, the overdraft of aquifers is leading to a sinking of the ground level in areas such as Jakarta and Bangkok. In Bangkok, one-third of the city is below sea-level. While Nebraska residents do not have to worry about their land sinking below sea-level anytime soon, improving the long-run viability of groundwater resources is a concern around the world.

In summary, the same reservoirs and groundwater development that have allowed improved timing and management of irrigation water supplies have also had large environmental costs. While there have been significant benefits from the expansion of irrigation in the late twentieth century, societies need to approach further development with caution. Better management of our existing water supplies can be achieved through tools such as water trading and improved efficiency of water use.

(This article summarizes some of the major points from Schoengold, K. and D. Zilberman, “The Economics of Water, Irrigation and Development,” forthcoming (2007) in the *Handbook of Agricultural Economics*, Vol. 3, editors Robert E. Evenson and Prabhu Pingali.)

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