

The Economic Importance of Western Irrigated Agriculture Impacts, Water Values, and Strategic Policy Questions



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Editor's Note: The following paper represents a transcription of the speaker's remarks made at the conference. Remarks were edited for publication by the editor. The speaker did not review this version of his presentation and the editor is responsible for any errors.

Good morning, and thank you very much for the invitation here today. I like coming down to New Mexico because it is like being immersed in water policy reality. You folks have real issues and problems, and they usually revolve around water supply. I come from the Pacific Northwest and eastern Washington—our idea of a bad year is when we are down to 140 million acre-feet. We have fights and we have management problems, but they are all kind of metaphysical in comparison.

One of the problems throughout the Southwest is the difficulty in getting across to policy decision makers the magnitude and the implications of irrigation agriculture to the economy. The Environmental Protection Agency invited the Family Farm Alliance and others to visit Washington D.C. to explain to their upper management the impact and value of water to the nation. EPA asked three very specific questions and we answered those questions very specifically. They asked us about values. What is water's dollar value impact? Because we are economists, we think about economic value. And they asked how well we knew what we were doing—how certain were we? They asked us to express key issues and questions and what changes we would make.

We described to EPA staff the economic engine that is agriculture, and it is literally an economic engine in the West. We stressed the concept of opportunity

costs, and opportunity costs is the most violated principle in research economics. It is violated at the federal level as well as at the state and local levels. It is even violated in my household. It is very hard to get across the principle that the trade-offs you make are not about the value you get, but the value of what you give up. We tried to express to the EPA that these agriculture's opportunity costs are "silent opportunity costs" and explained how those costs can affect the food security issue. We turned the food security issue away from things like terrorist activities, imperfections, pesticides, and so on that you normally hear about, to economic impact. It is a recent shift—only since 2012—that we and others have made.

When referring to the irrigated agriculture industry, I am talking about three sectors: direct agricultural production, agricultural services (the red tractors, green tractors, etc.), and food processing (dry goods, frozen good, etc.). When we talk about economic impact, the statistic we focus on is household income. In discussing our key measure of household income impacts, we work with values that you are used to seeing. Figure 1 shows estimated irrigated acres from 2008 to 2012 in the western United States, totaling over 42 million acres. You get a very strong appreciation for states like California and Texas and the contributions from other states. Another statistic

that you are used to seeing is production value (Fig. 2). State agriculture agencies, agricultural services, or the agricultural census provide the estimated agricultural production value in dollars. What you do not see are the algorithms and equations that are used to derive the irrigated agriculture numbers, which includes vegetables and fruits, grains, and cattle and dairy. Taking into account affected industry like cattle and pasture, how do we make this estimation? Basically, over the past 25 years of experience, state economists have been able to produce these estimates in a way that they are happy with. The punch line is that about 70% of total agriculture in the western U.S. is directly tied to irrigated agriculture, and that is about \$117 billion worth of farming product.

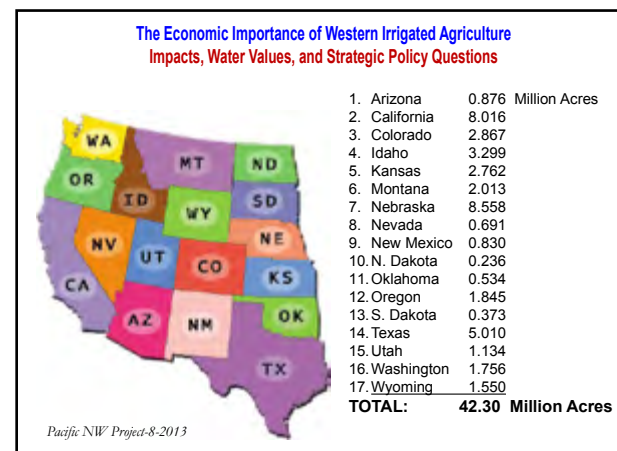


Figure 1. Western U.S. estimated irrigated acres 2008-2012

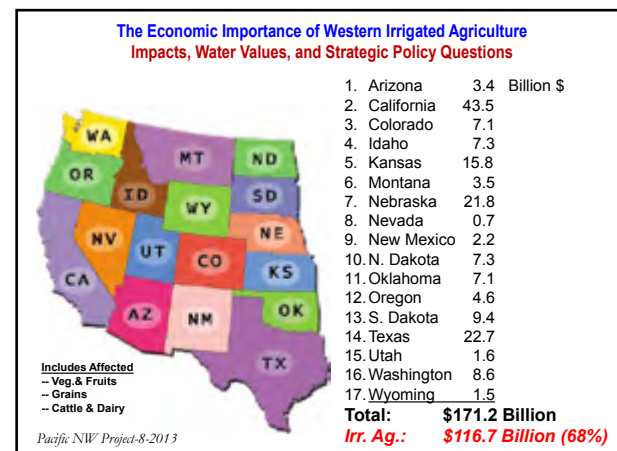


Figure 2. Western U.S. estimated agriculture production value in 2011 dollars

Figure 3 shows trends over the past decade on product and farming value. It is basically the same trend that has been repeated over the past decades, and typically you see a plateau period and then a spike, like the 2006-2007 period. A decline was tied to recession, followed by an uptick, and then another plateau period. If you were to take 2011 and flatten it to a horizontal line, that is what we expect for the next seven or eight years in terms of agricultural production prices. Something can always go wrong as the cattle guys often worry about and the apple guys who are always convinced that what goes up always comes down. But when we look at the numbers, we see a stable period for agricultural commodities and prices over the next seven or eight years.

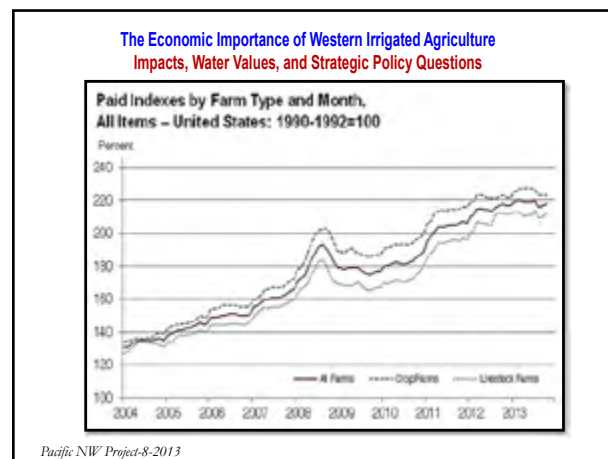


Figure 3. Paid indexes by farm type and month, all items

Taking those numbers that you are used to seeing and turning them into numbers that you are not used to seeing is reflected in Figure 4. No one else tries to measure household income for irrigated agriculture on a state by state basis or west-wide in the United States. We are the only ones that do it and we have done it only a couple of times for the Family Farm Alliance and others. These are fairly unique numbers because you have to work through the algorithms for each state, look at commodity to commodity considering what is allocated in irrigated agriculture, and then add the multiplier effects for the agriculture industry. The industry includes agricultural production, services, and processing as well as other impacts like those from butchers, bakers, economists and statisticians, fertilizer people, and basically everybody else who is providing services. At the end of the day, our industry is about \$156 billion a year for household income generated in the western United States. This is a big number. It is competitive with any

other industry groups in the West like Boeing, aerospace, or the electronics industry. The only other group that rivals agriculture is the health care industry. People don't realize agriculture's huge impact. As we went through this with the D.C. folks, you could see they were waking up to the importance of the agriculture industry.

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Irrigated Ag. Annual Income Impact:			
	Direct \$	Multiplier	Total \$ Impact
1. Arizona	\$1.8	2.5	\$4.5
2. California	31.2	2.5	77.9
3. Colorado	1.7	2.2	3.9
4. Idaho	2.7	2.5	6.7
5. Kansas	2.0	2.2	4.4
6. Montana	0.4	2.1	0.9
7. Nebraska	4.2	2.5	10.7
8. Nevada	0.4	2.1	0.8
9. New Mexico	1.5	2.2	3.3
10. N. Dakota	0.9	2.1	2.1
11. Oklahoma	1.0	2.2	2.2
12. Oregon	1.7	2.2	4.0
13. S. Dakota	1.6	2.1	3.4
14. Texas	6.9	2.5	17.1
15. Utah	0.8	2.1	1.7
16. Washington	4.7	2.5	11.7
17. Wyoming	0.2	2.0	0.3
TOTAL INCOME IMPACT:			\$156.0 Billion

Figure 4. Irrigated agriculture annual income impact

New Mexico has about 830,000 acres of irrigated agriculture with major productions areas of cattle; milk and dairy; hay and hay products; nursery and greenhouse products; and fruits and vegetables. With the drought conditions, I think New Mexico may have less than 800,000 acres currently. Total farm production expenditures are \$2.0 billion each year. We can say with technical confidence that the impact of the irrigated agriculture industry to New Mexico is over \$3 million dollars in annual household income. It is a substantial number for the state.

My presentation is not complete without discussing water values. What is the value of water, particularly irrigated agriculture water, in the West? Looking at water markets in the West, particularly as they relate to irrigated agriculture, we are somewhere between \$1,500 and \$3,000/acre-foot capital values (Fig. 5). It is important to remember that municipalities' marginal cost of water and marginal value is essentially at the top end of the marginal value. They can always go out and make purchases or transactions. Figure 6 shows market and non-market values of water and is essentially the direct net opportunity costs of irrigated agriculture. Economists are good at quantifying just about anything that moves. We have experience quantifying market things like

water and power, and other things that we consider non-market, such as recreational use like boating. We are also getting pretty good about dealing with climate change. We can put values on climate change assuming that the base numbers are correct. These statistics become the direct net value or opportunity costs.

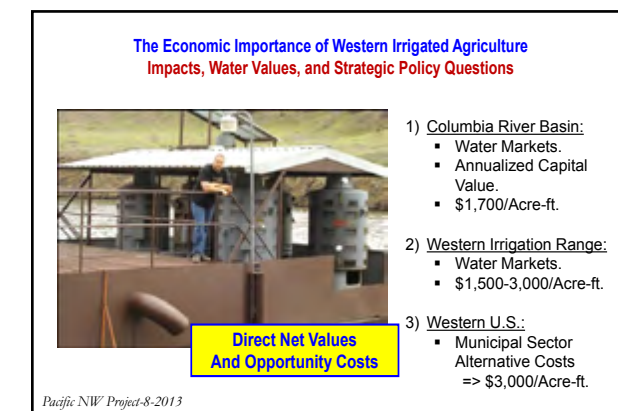


Figure 5. Direct net value estimates for irrigated agriculture

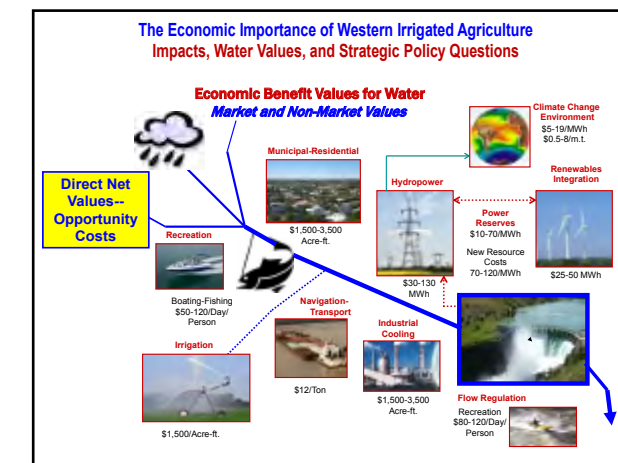


Figure 6. Market and non-market values for water

When talking with the Washington D.C. folks, we briefly informed them that there is another set of opportunity costs that we are not accounting for here with irrigated agriculture. If you start taking water away from irrigated agriculture, there are other tertiary benefits in place, and there are opportunity costs associated with what happens with the impacts to the economy. Those kinds of impacts are where we should be addressing the food security issues. Interestingly, we are not the only ones saying this.

Concerning the food security issue, we can look at organizations like the World Bank, the Institute of World Economists, and all of the NGOs involved in international work. They are indicating that food security is directly and squarely targeted on the water available for irrigated agriculture worldwide. You know, they made this pivot. They are literally alarmists about this. We have picked up a change in their attitude as these international organizations, international monetary funds, and so on, are now suddenly bringing up the United States. These organizations are concerned with food security issues in the United States as they relate to irrigated agriculture and impacts to our economy. They are concerned about the impacts of our consumer economy. About 70% of our economy is the consumer economy, and we have that economy because of the amount of disposable income we are able to spend on things other than food. There is no better representation of this than what is on this Figure 7. The graph shows the amount of food costs relative to disposable household income since World War II to the present. We have gone from having nearly 25% of our household income directed toward food to where now we are down to around 6%. This is almost entirely unique to the United States. Anyone who travels around the world will tell you, particularly in Europe or Asia, that they have much higher household income expenditures directed toward food. It is very low in the United States, and irrigated agriculture has significantly contributed to that.

So, our punch line both to the D.C. people and to our local folks is what I would like to illustrate in an example. Three weeks ago I had lunch with our director in the Department of Ecology, and the Washington State Department of Ecology is a major industry regulator. We sat down, and in Washington State we are kind of enthralled by CO₂. There is a battery of folks working on that issue, because among other things, it is a very sexy issue you know, with national and international implications. So we sat down and said to her, you might get tired of working on this. When you do, do you really want to work on an issue that has a reality and a material impact on the U.S. and world economy? Because, that is what we do with irrigated agriculture in the West, and we have an opportunity to do something with irrigated agriculture in the West in each state. So when you ask what can we do to change things, you can go in and start bringing state level policy makers up to speed on these issues of irrigated agriculture, food security, and the impact that it has on our economy as well as the world economy. Part of the things that we are saying to them as well is that there is a lot of emphasis on efficiency in irrigated agriculture. We are big proponents of that, but we are saying that we need to drill those efficiencies back into irrigated agriculture. We need to both protect the industry, and where we can in certain places in the West, expand the industry because it does have very concrete impacts to our economy and the health and well-being of what we are doing in the U.S. as well as other countries. So that is my pitch for change. Thank you.

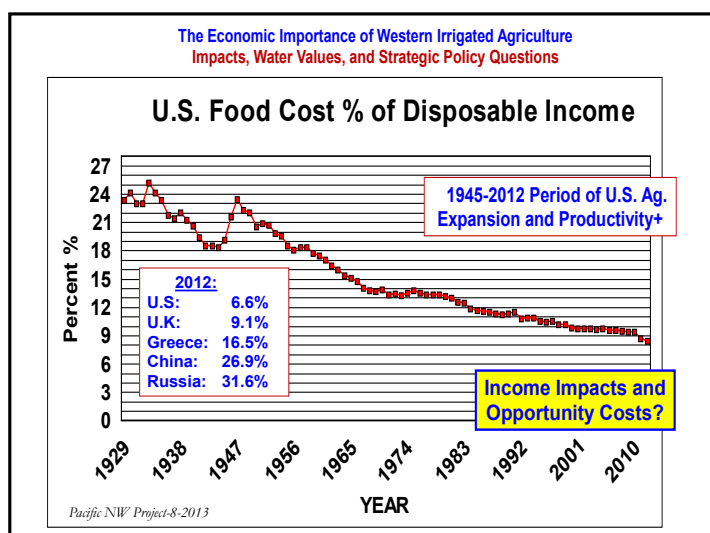


Figure 7. U.S. food cost as a percentage of disposable income