

Irrigation

The Water/Energy /Environmental Matrix

by David Zoldoske

One of the many lessons learned in the last few months is that change, good or bad is part of our life. This is true of irrigation development in the West as well. During the 1960's, few irrigators were concerned with irrigation uniformity, the cost of energy, or the impact on the environment. Later, in the 1980's, drought caused us to focus on irrigation uniformity; oil prices made us aware of energy, but the environment still had not made it to the radar screen.

In the last few years, irrigation uniformity has been a key selling point with new systems, the cost of energy went through the roof, and the environment became the most important issue facing irrigated agriculture. In low water years, agriculture is the last to receive water, and may have to go without (e.g. Klamath Falls).

What does the future look like for irrigated agriculture? For starters, California is expected to see an estimated 50 percent increase in population over the next 20-25 years. A disproportionate number of this increase will come to irrigated agricultural areas due to land and water availability. The impact on agriculture will not only be to those lands and jobs directly converted to urban use. Shrinking the agricultural base will reduce flexibility in fallowing farmland during periods of prolonged drought. Urban areas cannot be fallowed, putting additional pressure on the remaining farmland.

The demand for energy will follow population increases. New homes require significant more energy than those of our parents. Air quality concerns may require agricultural water

pumping to use cleaner, more expensive electricity. And worldwide oil production is expected to peak by 2010 or so, further driving up energy prices.

There is no question that the Endangered Species Act has dramatically affected water development and allocation. It's just a shame that farmers can't get themselves listed as endangered. Water supplies are likely to become less dependable, forcing irrigation systems and planting patterns to become flexible.

Water quality standards are also becoming a major issue. Growers will be held responsible for surface runoff and deep percolation from irrigated fields. Fertilizers and other chemicals

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used in farming must not leave the field or reach the aquifer. Air quality standards will force reductions in fugitive dust, aerosol drift, and diesel emissions.

Accurate record keeping will be required to "prove" compliance with environmental regulations. The economics of farming will be heavily impacted by the new cost of protecting the environment, previously ignored or tolerated in the public sector. And with increased contact with growing urban communities, agriculture MUST find ways to mitigate its impact, or it will lose.

Technology will help provide the answer. Each irrigation method impacts farming practices differently. In drier climates, weeds are primarily germinated by irrigation water. Weed suppression can require additional tractor work, chemical applications, or hand labor. Tractors create dust, and burn fossil fuels. Chemicals add to the potential for runoff and deep percolation problems, as well as aerosol drift. And hand labor is increasingly harder

to find.

Pressurized irrigation systems are more easily automated and can be designed for data collection. Records can be kept on irrigation timing and amount. Chemical application timing, concentrations, and amounts can also be monitored. Wellhead safety equipment and controls will become standard practice. Remote sensing may record deep percolation and runoff events.

Some irrigation systems are more energy and water efficient. Since practically all water is pumped, the energy component of each unit of water must be considered. Higher water application efficiencies tend to lower total applied water and energy use. System design must account for long-term energy requirements, as well as one time purchase cost. And proper training and maintenance is required with the use of advance technology.

Keys to Success

Water applications must be monitored, measured, and verified. Irrigation systems should be flexible, automated, and dependable.

Energy use needs to be minimized while meeting the demands of high efficient delivery systems. And systems must be engineered, not put together by "rule-of-thumb" (eliminate slop factor).

Implementation

It all starts with education. Legislators must recognize the benefits and need for incentives to promote high tech irrigation systems. The public must be educated on the benefits of irrigation. And the end-users must understand they are not just buying an irrigation system, but a farming system.

Finally, agriculture may find itself with strange bed partners. The environmental community has strong political connections. Agriculture represents less than two percent of the population. The environmental benefits of efficient irrigation are many. It may require the partnership of agriculture and environmental factors to get the political incentives needed to support the adoption of key irrigation technologies. Only time will tell.

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