New realities for irrigated agriculture

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The practice of irrigation has been indispensable in bringing California agriculture to the preeminent status that it enjoys today. Hydrologic variability, a two-season climate and sparse precipitation in arable areas all conspire against profitable and sustainable rain-fed agriculture in California. Thus, the production of high-valued fruit, nut and vegetable crops would simply not be possible without irrigation.

Despite its critical importance to California, there are signs that all is not well with irrigated agriculture. Increasingly, water traditionally allocated to agriculture is viewed as a potential supply for urban and environmental uses. It is also apparent that public policies governing water development are becoming less favorable to irrigated agriculture. These challenges likely mean that agriculture of the future will be different in some important respects from what it is today.

The intensifying competition for scarce water supplies almost certainly means that some agricultural water will be reallocated to urban and environmental uses and there will be somewhat less water available for agriculture. Other challenges will likely come from policies that will increasingly require those engaged in irrigated agriculture to operate in more environmentally friendly ways and to demonstrate the efficient use of public resources such as water, air and, in some cases, land.

Simultaneously, the economic circumstances of California agriculture will become more demanding as global markets increasingly drive the agricultural economy. As difficult as it may be, California growers will adapt to these new and rapidly changing circumstances as they have always done — through innovation and entrepreneurship.

The Division of Agriculture and Natural Resources (ANR) must play a large role in developing and disseminating the science needed to ensure that policies governing agriculture and the allocation of water are based on sound science. Additional research will be needed to provide the scientific basis for new technical and managerial innovations.

For example, where water is to be reallocated from agriculture to support environmental objectives, it will be important to avoid the problems and shortcomings that characterized the Klamath Basin reallocation in 2001. In the Klamath Basin, irrigation diversions were halted by the Department of Interior to provide additional water in-stream in response to concerns about population declines of several endangered fish species (see page 118). The decision to halt diversions was based in part upon a biological opinion prepared by the U.S. Fish and Wildlife Service. Subsequently, two independent peer reviews conducted by ANR and the National Academy of Sciences revealed that the science underlying this biological opinion was inadequate and concluded that it was based on oversimplified indicators of ecosystem health. The peer reviewers also noted that there was little or no actual information on the pertinent hydrological or biological processes or on effects of those processes on the fish of concern. The lack of science to support these kinds of decisions has been evident elsewhere in California and the West.

ANR faculty and other researchers from UC must redouble their efforts to develop a broad understanding of aquatic ecosystems if a repeat of the unfortunate circumstances last year in the Klamath Basin is to be avoided. What little is known is fragmented and piecemeal and there is a clear lack of knowledge about aquatic systems in a broad context. Additional research will be needed to help determine the water requirements of aquatic ecosystems and address issues related to the protection of rare and endangered species. In the absence of scientific information from comprehensive systems-based research, decisions to reallocate water from agricultural to environmental uses may have the twin drawbacks of doing significant economic harm to growers while failing to improve environmental conditions.

Regardless of how well we come to understand the science of aquatic ecosystems, the intensity of competition for water means that some reductions in agricultural water supplies are probably inevitable. Extensive research efforts must be mounted to develop the scientific knowledge needed for new and innovative technical and managerial irrigation regimes that will allow agriculture to adapt to diminished water availability. Some of the work reported in this issue of *California Agriculture* is illustrative of this type of research (see pages 121 through 138). For example, it is imperative to know how irrigation regimes vary with soil type, how different irrigation practices affect crop susceptibility to disease, and how complementary inputs such as land and energy can be managed to create efficient and productive systems.

But much more will need to be done. The potential of genetic modification to improve crop water use needs more comprehensive exploration. New knowledge will be needed if irrigation water is to be managed efficiently, to maintain productivity while limiting salinization, erosion and chemical contamination. ANR is committed to doing all that it can to provide the scientific knowledge needed for sound public policies to provide the means of adaptation to the new realities of irrigated agriculture.