

**Section 7**

**Regional Criteria**





## **Agricultural Regional Criteria**

### **INFORMATION REQUIRED OF DISTRICTS LOCATED IN THE DRAINAGE PROBLEM AREA**

The District is in the Westlands Subarea, as identified in A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley (September 1990). This section presents recommendations from this report that have been incorporated into our water conservation program to improve conditions in the drainage problem areas. The recommendations for 2040 in the Westlands Subarea include:

1. Source Control
2. Reusing drainage water
3. Evaporation ponds
4. Pumping the semi-confined aquifer
5. Retiring irrigated agricultural lands

The following discussion is provided for information purposes only and is not a plan for future action. The drainage obligation question is in litigation. It is inappropriate for the District to make a commitment to future drainage actions prior to resolution of the litigation.

#### Background

Since 1985, the District has studied a number of available or emerging drainage technologies, at a cost of over \$8 million, none of which proved to be both technically and economically feasible. This includes land application, evaporation and solar ponds, biological selenium removal, a deep injection well, cogeneration, agro forestry, and upper zone pumping.

Source control efforts have proven successful in reducing problems in the drainage-impacted areas of the District. Sound water management by affected farmers has reduced deep percolation below the crops' root zone and lessened the immediate impacts of the lack of artificial drainage. Westlands' Water Conservation Program has been actively involved in providing District farmers with information and assistance directed at achieving higher irrigation efficiencies and reducing deep percolation. This was the main emphasis of the District's 1987-91 Irrigation Improvement Program in which almost \$1 million was provided to District farmers to obtain the services of irrigation consultants. Under this program consultants evaluated the farmers' irrigation systems and management and made recommendations that were directed at increasing irrigation effectiveness and reducing deep percolation.

Results from the Irrigation Improvement Program as analyzed by District staff show that the deep percolation goal of 0.4 AF/Acre (AF/Ac) in the shallow groundwater areas has already been achieved as recommended by the San Joaquin Valley Drainage Project (SJVDP). Irrigation data analyzed in shallow groundwater areas of 20 feet or less and 5 feet or less show the average deep percolation to be about 0.4 AF/Ac and 0.2 AF/Ac,

respectively. The District-wide deep percolation averages .47 AF/Ac as shown on Table 14 of this document.

### Current Efforts

Currently two agro forestry demonstration projects, managed by the Westside Resource Conservation District, are being conducted on lands within the District. These projects concentrate subsurface drainage water by using it on salt tolerant trees and halophytes and finally use solar evaporation to reduce the saline water to salt. The San Joaquin Valley Drainage Plan set a goal of reusing drainage water to irrigate about 12,100 acres of salt-tolerant trees and halophytes with subsurface drainage water by 2040. A reprint of a November/December 1998 Irrigator article describing the current status of one of these demonstrations follows:

#### **Results at Diener's Red Rock Ranch Drainage Project Are Encouraging** ***Diener recognized for his commitment to good irrigation management***

“The Westlands Irrigator”, November/December 1998

Much attention has been focused on John Diener's Red Rock Ranch drainage/agro forestry demonstration -- and with good reason. The results from the three-plus year demonstration project show the concept is working, and helped Diener earn the recent honor as being named the California Grower magazine/Center for Irrigation Technology Irrigator of the Year award.

Diener admits there still are some unanswered questions, but the reclamation of a previously saline field now planted to broccoli indicates the concept's success. Three years ago before tile drain lines were installed under the now-planted, 30-acre broccoli field, Diener tried to farm wheat. His yield was a dismal two tons of wheat and the salinity level of the soil was 10 units of electrical conductivity (EC) in the upper one-foot of the soil. Today, three years later, the EC is 1 unit in the upper portion of the soil -- an acceptable level for most vegetable crops and EC levels are down by as much as 50 percent in the next two-to-three feet of soil, said Diener. Next year, Diener plans to plant processing tomatoes on the field.

The tile drain lines were placed six-feet deep, 400-feet apart throughout the full 150-acre field. The field is irrigated using the District's surface water, with well water serving as a supplemental supply. Eucalyptus trees were planted along the western border of the field to help intercept regional subsurface drainage flows coming under his field. This helped reduce the subsurface drainage flows to a more manageable level.

Working with cost-share funds from a Bureau of Reclamation challenge grant, and with expertise from the Westside Resource Conservation District, U. S. Natural Resource Conservation Service (formerly the U.S. Soil Conservation Service), and the State Department of Water Resources, Diener embarked on the agro forestry concept that encompasses a whole section of land. The project was designed to tile one-quarter of land each year, beginning in 1995. The fields tilled in 1996 and 1997 are beginning to show similar progress as the first field, said Diener.

The other fields are on their way to raising salt-sensitive crops, but still are being reclaimed through alfalfa and safflower. This next year, Diener will be planting dehydrator onions on the field tilled in 1996.

All of the drainage water coming off these fields is collected at the low-end of the fields and is pumped to an adjacent 120-acre field. Commingled with the subsurface drainage flows are six-inches of the District's surface water and surface tail water return flows. This water is used to irrigate salt-tolerant sugar beets, alfalfa seed and crested wheat grass which is used for grass hay. Diener said this field showed "reasonably good yields," with the sugar beets producing 28 tons per acre at 15.5 sugar. The grass hay netted about five-tons per acre.

The next step in the process collects the subsurface drainage water which is used to irrigate 13 one-acre blocks of feed crops. At this point, the drainage water is about 8,000 to 9,000 parts per million total dissolved solids. In comparison, seawater is about 40,000 ppm TDS. Salt grass, a coastal type of Bermuda grass used for grass hay, is one of the varieties planted in this third step.

In the fourth step, salt-tolerant halophytes, like atrofex, salicornia, cord grass and iodine bush, are planted in an experimental basis. "The ease of management is the primary focus of selecting halophytes," said Diener. The idea is to enhance the salt concentration to about 25,000 ppm TDS of the drainage water entering the last stage in the solar evaporator.

The plastic-lined, two-acre solar evaporation field is the final stage of the process. The water is contained in the evaporation pond-type facility, equipped with sprinklers to disburse the water and accelerate evaporation, and to help keep any water from ponding. The idea is to keep any birds from visiting or nesting in the evaporator. The process has reduced the volume of water, so that all that is left is the salt. And, Diener has ideas on how to manage that.

The residual salt, a combination of sodium sulfate, has been tested in the making of high-quality glass. The salts also contain some boron and selenium, most of which has been reduced by as much as 60 to 80 percent through volatilization by the crops.

Diener is hopeful the boron derived from the process can have a market on the west side. "Some of the areas in the District that are not irrigated with well water may actually have a boron deficiency. Many vegetable crops, like broccoli and cauliflower, need about three-to-four pounds per acre of boron," said Diener. "We may have a place to go with this stuff," he added.

Diener is hopeful that the research for uses of the salt and minerals will continue. "We're reading the results as we get them, using the information to make the next move a right one," said Diener, who's motivated by a strong sense of stewardship for the productive west side soils and efficient use of water.

A study will be prepared next year on the results of the Red Rock Ranch project, with the hope that farmers and others will be able to use to process to help reclaim drainage-impacted areas. Diener hopes that funding will become available to help support four-or-five more of these drainage/agro forestry demonstration projects in other drainage areas. The sustainability of this project makes it so appealing for farmers, like Diener who do not have an outlet for their drainage water, as well as for farmers in the San Joaquin River/Grasslands drainage areas who must reduce selenium loads and address River water quality issues.

### Land Retirement

In 1998 the USBR, with participation of the District, has established and funded a voluntary land retirement program established with the goal of retiring 15,000 acres of drainage affected lands. This program will retire the lands from irrigated production but the water will remain within the District with the land being dry land farmed. The San Joaquin Valley Drainage Plan set a goal of retiring 33,000 acres of drainage problem lands by 2040.

The USBR suspended this program due to insufficient environmental documentation. A draft EA/FONSI issued in 1999 calls for a 7,000 acre land retirement/project in Westlands Water District.

### **Urban Regional Criteria**

There are no regional M&I criteria for this region.