SOCIO-ECONOMIC IMPACTS OF LAND RETIREMENT IN WESTLANDS WATER DISTRICT

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ABSTRACT

Westlands Water District (Westlands, or the District) in California includes more than 560,000 irrigated acres of diversified crops on some of the most productive soil in the world. Land retirement has been proposed as a solution to two serious problems confronting the District: inadequate drainage on lands overlying shallow groundwater, and insufficient and increasingly unreliable water supply.

Large portions of the west side of the San Joaquin Valley are affected by salinity and drainage problems. This affected area includes approximately 300,000 acres of the District's farmland. The U.S. government has long been aware of these problems and congressional authorization of the San Luis Unit facilities mandated drainage service as part of this project. When Westlands entered into a water supply agreement with the U.S. Bureau of Reclamation (Reclamation), the provision of drainage service was expressly included as a contract term. Although Reclamation has studied the issue for many years, the drainage service options identified are extremely costly and their effectiveness is uncertain.

Land Retirement could address two of the District's most significant problems, those being drainage and water supply. But the decision to accept this proposal would not only affect the District farms. In addition, communities, employees, and businesses depend on the District's agricultural economy. In order to help the District make an informed decision on land retirement, Westlands completed an economic impact analysis.[2]

INTRODUCTION

Westlands Water District

The lands that comprise Westlands were first farmed during California's Gold Rush. Irrigated agriculture began in 1915, and by 1942, landowners had organized to develop a water supply system. Westlands was formed in 1952 to serve agricultural water users on the west side of the San Joaquin Valley. In 1968, the San Luis Canal was completed and water deliveries began under a contract with Reclamation.

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[2] "Analysis of Economic Impacts of Proposed Land Retirement in Westlands Water District", Westlands Water District, May 2003.

Today, Westlands is the largest agricultural water district in the United States, with more than 560,000 acres of diversified crops on some of the most productive soil in the world. Farms within Westlands produce $1 billion worth of food and fiber per year. This translates into $3.5 billion in farm-related economic activity, nearly one-third of the $12.5 billion generated by the agricultural-based economy of Fresno County.

In addition to the farms within Westlands, several communities depend on the District's agricultural economy. These include the towns of San Joaquin, Tranquillity, Huron, Firebaugh, Mendota, Kerman, and Coalinga. The location of Westlands and the surrounding communities are shown in Figure 1. This figure also shows the region within Westlands that is affected by poor drainage.

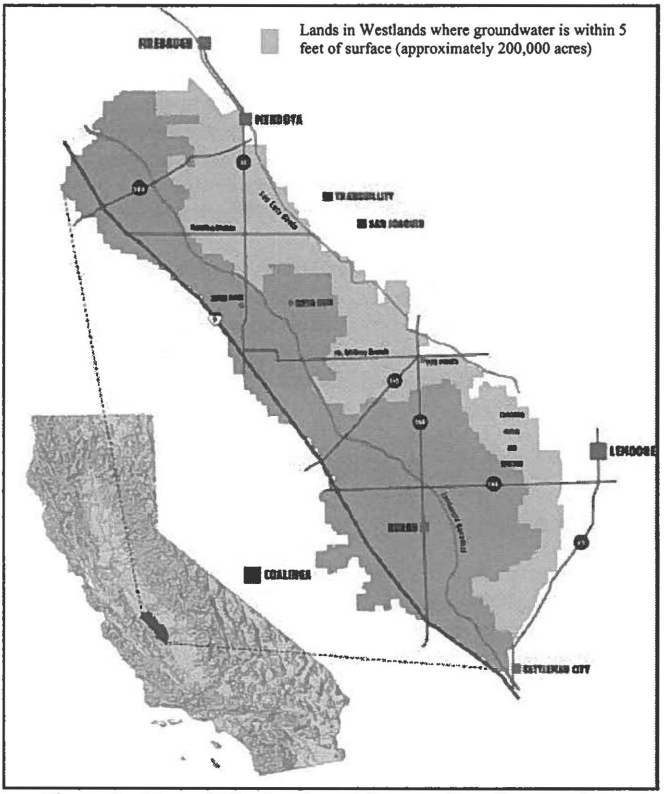

Figure 1. Map of Westlands and Surrounding Communities

Water Supply

Westlands has experienced a dramatic reduction in the amount of water it receives from the Central Valley Project (CVP). Since 1991, Reclamation has reduced water deliveries to Westlands to the point where today, the District can expect to receive about 65 percent of the water supply specified in the original contract in a normal hydrologic year. Due to the implementation of the Central Valley Project Improvement Act and other environmental regulations, Westlands has had to bear the brunt of reductions in water deliveries resulting from decisions to protect the environment of the Bay/Delta region. Table 1 provides historical CVP allocations to Westlands, water year type, and acres fallowed. Figure 2 shows the drought period of 1986-1993 with the lighter columns depicting the water allocation during this period assuming pre-1990 state and federal regulations relating to the

Table 1. CVP Contract Deliveries and Acres Fallowed in Westlands

Year	% of Contract Delivered	Year-Type	Acres Fallowed
1994	43%	Dry	75,732
1995	100%	Wet	43,528
1996	95%	Wet	26,754
1998	100%	Wet	33,481
1999	70%	Wet	37,206
2000	65%	Above Normal	46,748
2001	49%	Dry	73,802
2002	70%	Below Normal	94,557
2003	75%	Above Normal	76,654

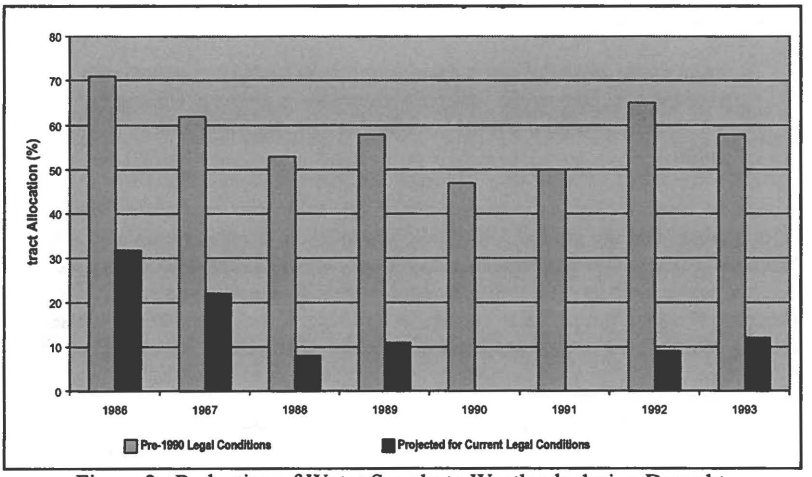

Figure 2. Reduction of Water Supply to Westlands during Drought

operation of the CVP. The darker columns depict what the deliveries would have been for that period from the CVP under regulations currently imposed on the project. The reductions range from 40% to 50%.

Although farmers in the District have improved irrigation efficiencies and the District has implemented a supplemental water purchase program, the reduction in CVP water deliveries has reduced the average quantity of water available per irrigated acre in the district. This has limited farm management options, increased farmers' financial risk, and made planning more difficult. Farmers increasingly rely on supplemental water supplies, including groundwater and water transfer purchases. Overdraft of the aquifer and severe subsidence in some parts of the District has made long term pumping of additional groundwater infeasible. Water transfers are becoming more costly and more difficult to obtain as competition for limited supplies intensifies across the state.

The water supply outlook for Westlands is not promising. It is unlikely, that in the near term, Westlands CVP contract supply will increase, groundwater pumping has already exceeded a sustainable level, and supplemental water purchases are becoming increasingly expensive. Over the long term, less reliable and more expensive water will reduce district farm revenues, limit cropping choices, and erode land values. Ultimately, marginally productive lands may be removed from cultivation due to insufficient or too costly water supply.

Drainage

Large portions of the west side of the San Joaquin Valley are affected by salinity and drainage problems. The Final Report of the San Joaquin Drainage Program stated the following:

> *Inadequate drainage and accumulating salts have been persistent problems in parts of the valley for more than a century, making some cultivated land unusable as far back as the 1880s and 1890s."*[3]

A shallow layer of clay under some parts of the Valley prevents water from filtering deep into the ground. With no place to drain, the water builds up – or "perches" – above this impermeable clay layer. Problems associated with the perched water table have been further exacerbated by the region's soils. The Drainage Program's report also stated that soils on the western side of the valley are derived from the marine sediments that make up the Coast Range and are high

[3] San Joaquin Valley Drainage Program (1990), "A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside of the San Joaquin Valley: Final Report," U.S. Department of Interior and California Resources Agency.

in salts and trace elements that occur in a marine environment. Irrigation of these soils has dissolved these substances and accelerated their movement into the shallow groundwater. As the salty water rises to the surface, it affects the roots of crops, reduces yields, and eventually makes the land unproductive.

The federal government was aware of drainage problems in the Westlands area before the District was formed. Congressional authorization of the San Luis Unit of the CVP in 1960 also mandated construction of an interceptor drain to collect irrigation drainage water from the service area and carry it to the Delta for disposal. When Westlands entered into a water supply agreement with Reclamation, the provision of drainage service was expressly included as a contract term.

Construction of the interceptor drain began in 1968, and by 1975 the initial stages comprised 85 miles of the main drain, 120 miles of collector drains, and the Kesterson regulating reservoir. In 1983, the U.S. Fish and Wildlife Service recorded high incidences of mortality and deformities among waterfowl in Kesterson Reservoir. These were believed to be the effects of toxic concentrations of selenium in the drain water. The reservoir was closed to agricultural drainage water in 1986 and Westlands and other districts served by the San Luis Unit have been without drainage service since that time.

Nevertheless, the U.S. government remains obligated by law to provide drainage services to Westlands as specified in the original supply contract. In February 2001, the 9th Circuit Court of Appeals affirmed that, "The Department of the Interior must act to provide drainage service. The Bureau of Reclamation has studied the problem for over two decades. In the interim, lands within Westlands are subject to irreparable injury caused by agency action unlawfully withheld."

The issues that the Reclamation must deal with to provide this drainage service have become more challenging and costly. Environmental restrictions have made the original drainage disposal strategies less tenable. Researchers have identified several potential alternative drainage service strategies including treatment of agricultural drainage water, deep-well injection and use of evaporation ponds; however, all are costly and their long term effectiveness is unknown.

Agricultural Production

With the addition of irrigation water, the climate and soils within Westlands allows for the production of a rich and varied mix of agricultural crops. Prior to the delivery of CVP water, Westlands farmers primarily grew cotton, wheat and barley, with some vegetables. Over time cropping patterns changed, with increasing acreages first in truck crops (vegetables and melons) and more recently in orchards and vineyards. Westlands' farms now produce over 60 different crops, double cropping on some acreage when sufficient water is available. The

District produces nearly 30 percent of the state's processed tomato crop and over 20 percent of its cotton. Table 2 summarizes the major categories of crops grown in the District in 2001 and the approximate value of those crops.

Table 2. Cropping Patterns and Crop Value within Westlands in 2001

	Total Acres	Total Value ($000)
Cotton	188,569	$215,211,980
Grain/Field	87,878	$66,109,633
Orchard	46,166	$125,156,062
Row*	80,177	$284,089,451
Tomatoes	85,122	$150,709,329
Other	64	Not Available
Fallow	73,802	$0
Grand Total	561,788	$841,076,455

The cropping patterns differ between the shallow groundwater region and the remainder of Westlands acreage. In general, acreage in the shallow groundwater region is more likely to be fallowed or to grow lower valued crops (field/grain, cotton). While 32 percent of Westlands' acreage is affected by shallow groundwater, only an estimated 21 percent of crop value is produced on this acreage.

LAND RETIREMENT

Proposal

Following the recent 9th Circuit Court of Appeals decision affirming the government's obligation to provide drainage, U.S. government representatives approached Westlands with a proposal to remove up to 200,000 acres of drainage-impacted lands from production as an alternative to providing drainage service. Westlands viewed this proposal as a potential opportunity for solving the dual problems of drainage and worsening water supply reliability.

Currently, the general outline of the land retirement proposal is as follows[4]:

- The U.S. Government would purchase up to 200,000 acres of drainage-impacted lands, permanently removing them from irrigated agricultural production. These lands would be owned by Westlands and managed as wildlife habitat or put to other beneficial uses. Westlands would manage

[4] The Land Retirement Proposal was generated by Westlands Water District and provided to the US Department of Interior, Bureau of Reclamation and other interested agencies.

the retired lands in ways compatible with continuing agriculture on the remaining farmlands.

- Westlands would receive a new, more reliable water-supply.
- The United States would be relieved of its obligation to provide drainage service to Westlands.
- As it has considered the proposal, Westlands has adopted a set of guiding principles it will use to evaluate the plan:
  - The plan must provide balanced benefits for all affected parties.
  - The plan must provide farmers a fair and reasonable price for their land, with values determined as if those lands had drainage services provided.
  - The program must be voluntary, involving only willing sellers.
  - No harm or loss of water should occur to any other Central Valley Project water user.
  - Third-party impacts must be identified and addressed.

Economic Impacts

To better understand the economic impacts, Westlands analyzed the short and long term differences between a no-action scenario, land retirement scenario, and drainage service scenario assuming that Reclamation provided drainage service to the District in a timely manner. The short term reflects the assumed conditions after the implementation of the land retirement proposal within two to three years. The long term reflects the assumed conditions in 2020.

Short Term. For the short term, the following key assumptions were made to develop the three scenarios:

- For the no-action scenario, Westlands has acquired lands within the District that are assumed not to be irrigated. District cropping patterns are assumed to be similar to harvested acreage in 2001, with those lands acquired removed from irrigation subtracted proportionately from crops currently grown in the shallow groundwater region of the District.
- For the drainage scenario, no provision of drainage is assumed to have taken place by this time. Therefore, the short term results for the drainage scenario are the same as for the no-action scenario.
- For the land retirement scenario, land within the shallow groundwater region is assumed taken out of production by proportionately reducing the crops currently grown in the shallow groundwater region of the District. Changes in cropping patterns in response to the greater reliability of CVP water supplies have not yet occurred.

Table 3 summarizes the estimated short term effects on the region. In the short term, farm revenues and income would be the same under the no-action and drainage scenarios, but both would initially drop as a result of the land retirement. These reductions would initially affect on-farm employment and income, and in turn other income and employment within the region. For the land retirement scenario, the table shows that the most significant effects are on agricultural production, employment and proprietor income. Employee compensation is estimated to change less than employment, because the major reduction in employment is in farm labor, which has lower average incomes than do other sectors. It should be noted that all of these changes are the same as or less than changes that have occurred in the past because of decreases in water supply or cyclical shifts in commodity prices.

Table 3. Short Term Economic Impacts Compared to No Action Scenario

Economic Measure	**Scenario**	
	Drainage	Land Retirement
Agricultural Production	No Change	-10.2%
Employment	No Change	-7.3%
Employee Compensation	No Change	-5.1%
Proprietor Income	No Change	-7.4%
Property Income	No Change	-1.9%

Long Term. The estimates for long term impacts are reported in Table 4. By this timeframe, the following conditions are assumed to have changed:

- In the no-action scenario, increased salinity has reduced the yield of crops in the shallow groundwater region. As a result, the only crops that are economic to grow within that region are cotton, alfalfa, hay and grains. The acreage acquired by Westlands identified in the short term scenario is assumed to remain out of production.
- In the drainage scenario, provision of drainage is assumed to have occurred by 2020 and to have restored fertility within the shallow groundwater region to equal that of the remainder of the District. This assumes that Reclamation has provided drainage service in a timely manner. The reliability of CVP water deliveries is the same as in the no-action scenario. The acreage acquired by Westlands is assumed to be returned to irrigation.
- In the land retirement scenario, CVP water deliveries are assumed to be increased. Model-estimated plantings in perennial crops, which were assumed to be less sustainable in other scenarios, are maintained as a reflection of the more reliable water supply in this scenario.

In all scenarios, the demand for fruits and vegetables is projected to steadily increase over time as a result of expanding international markets and shifts in

consumer preferences. As a result of these changes, the economic situation of farmers in the District, and most of the local communities in and near the District, is estimated to be improved in both alternate scenarios over that estimated for the no-action scenario. Agricultural production, total employment and employee compensation are highest in the drainage scenario, reflecting the increase in irrigated acreage enabled by drainage service. However, farm sector proprietor and property income are lower in the drainage scenario than in the land retirement scenario due to the cost of drainage service, supplemental water supply, and water supply restrictions. Overall, regional income is predicted to be highest under the land retirement scenario.

Table 4. Long Term Economic Impacts Compared to No Action Scenario

Economic Measure	**Scenario**	
	Drainage	Land Retirement
Agricultural Production	+11.5%	+4.2%
Employment	+10.9%	+7.3%
Farm Sector	*+12.8%*	*+6.3%*
Non Farm Sector	*+8.2%*	*+8.7%*
Employee Compensation	+10.2%	+7.7%
Farm Sector	*+13.1%*	*+5.9%*
Non Farm Sector	*+8.4%*	*+8.8%*
Proprietor Income	+5.4%	+14.0%
Farm Sector	*+4.1%*	*+16.4%*
Non Farm Sector	*+8.4%*	*+8.4%*
Property Income	+6.5%	+12.5%
Farm Sector	*+4.3%*	*+17.8%*
Non Farm Sector	*+8.3%*	*+8.3%*
Total Income	+8.2%	+10.3%

Because of the differing assumptions, significantly different tradeoffs in production are demonstrated in each of the scenarios considered. Under the no-action scenario, lack of drainage within the shallow groundwater region progressively increases soil salinity. As a consequence, cropping choices become increasingly limited, crop yields decrease, and farm returns fall. Vegetable and fruit production, in particular, is constrained by soil salinity, thereby decreasing the regional demand for farm labor. Additionally, CVP supply constraints under this scenario would subject the region to significant swings in production. During dry periods, large amounts of acreage may be removed from production due to lack of water supply. In wet years, the opposite might occur. The boom-bust cycles associated with inadequate and unreliable water supply are likely to be very pronounced under this scenario.

Under the drainage scenario, production constraints associated with soil salinity are removed. However, the cost of drainage service and unreliable water supply combine to drive up farm production costs, and drive down farm returns. While

the modeling results indicate higher levels of farm production and employment, they do not show a corresponding increase in farm returns. Although farm finances are improved relative to the no-action scenario, they remain tenuous both because of the cost of drainage and because water supply remains unreliable. As with the no-action scenario, the regional economy would be subject to large swings in production associated with water supply availability.

For the land retirement scenario, production costs are stabilized. However, this is achieved by removing a significant amount of land from irrigated farm production. For the lands remaining in production, drainage and water supply constraints are largely resolved. Under this scenario, farm output and employment is lower because of the land retirement, but farm and regional income is higher because of increased production of higher value crops and lower production costs. As a result, communities on the western side of the District will be positively affected by the retirement. Because the land retirement would also stabilize the District's CVP water supply, swings in farm production would be lowest under this scenario. Boom-bust cycles associated with water supply would be less frequent and of shorter duration than would be the case under the no-action or the drainage scenarios. The benefits of this production stability to the regional economy are likely to be significant.

In summary, regional employment is highest under the drainage scenario, regional income is highest under the land retirement alternative, and both of these options are improvements over the no-action scenario. Another important difference between the scenarios is that the no-action and drainage scenarios are based on average water supplies that are expected to exhibit wide variation, and would also exhibit sharp decreases in employment and income in dry years and sharp increases in wet years. The benefits of stability in the supply of irrigation water are far reaching. Over time, with a stable water supply the local economy can adjust to supply the level of services required. However, under the no-action and drainage scenarios the region would continue to experience boom and bust cycles induced by the wide variations in water supply from the CVP. In addition, such loss of jobs resulting from periodic water shortages would be region-wide, not concentrated on the eastern side of the District.

CONCLUSIONS

Westlands Water District completed a study in recognition of the potential for impacts as a result of land retirement and to assist the District, local communities, landowners and water users and the United States to make informed decisions concerning land retirement. The retirement of otherwise productive farmland is not without significant issues. However, it does appear to provide a reasonable solution to the District's long term drainage and water supply challenges from an economic perspective.