

Retiring agricultural land

Estimating the regional economic impacts of retiring agricultural land: methodology and an application in California

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Land retirement is one option that can be used to address water shortages in agricultural areas. The regional economic impacts of land retirement should be considered when evaluating these proposals. This paper presents a methodology for estimating these impacts, including guidelines that should be considered during such an evaluation. A case study of an application in California indicates that the overall regional economic impacts of land retirement in agricultural areas will probably be negative, but the associated mitigating activities greatly reduce the magnitude of these impacts.

Keywords: land retirement; water shortages; regional economic impact

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CONFLICTS BETWEEN various water uses in the western United States have existed for many years. In many areas there is simply not enough water available at critical times of the year to meet all the needs. In these instances, water must be allocated to different uses based on legal, political, economic, or some other criterion. One option is retiring irrigated agricultural land. Under a land retirement scenario, irrigated land could be leased or purchased by a government or private entity and the water could then be used for some other purpose. Land could also be retired to alleviate groundwater overdraft problems.

Land retirement is an economically viable water management option when the benefits of such a shift in water use are greater than the costs imposed on the activity losing water (Dinar and Zilberman, 1991). Even though there may be economic benefits associated with retiring agricultural land, significant regional economic impacts can be imposed on the local community where the land is retired: reduced expenditure and income associated with land retirement will likely result in a decline in the overall economy of the region.

The regional impacts must be considered when evaluating the impacts of a land retirement alternative as part of an environmental analysis. These impacts are important to local residents and may represent a significant change in the social and economic environment.

This paper presents a general methodology for estimating the regional economic impacts from retiring agricultural land along with an application based

on a Central Valley Project Improvement Act Land Retirement Program Demonstration Project. The methodology includes some basic guidelines and areas of impact that should be considered when doing the evaluation. The application provides a real world example of the types of data needed to complete such an analysis.

Categories of impact

The regional economic impacts from retiring agricultural land can be separated into five general categories:

- impacts from reduced agricultural production inputs;
- impacts from reduced farm income;
- impacts from income received from land payments;
- impacts from annual maintenance expenditure and habitat restoration of the retired land;
- impacts from changes in state and local tax receipts.

Impact categories 1, 2, and 5 represent losses in regional economic activity, while 3 and 4 represent positive regional economic influences. Retiring land from privately owned agricultural production also affects county governments through reduced property tax payments, although some US government payment programs exist that partially offset these fiscal impacts.

Reduced agricultural production inputs

Irrigated agricultural land generates regional impacts through payments for crop production inputs such as labor, fertilizer, pesticides, fuel and oil, machinery, and custom work. Retiring irrigated agricultural land will change the types of input required on the land and will typically reduce input expenditure. However, expenditure associated with use of the retired land, such as the establishment of native vegetation or recreational activities, can mitigate some of the loss in irrigated input payments. Estimating the change in input expenditure requires knowledge of expenditure under current conditions and what would be required after the land is retired.

For example, assume that a plot is currently used to produce alfalfa and the land will be retired and become part of a wildlife preserve. The water currently used for irrigation will be used to enhance in-stream flows. The retired land will require establishment of a cover crop as well as some annual re-seeding and weed control. The change in input expenditure that generates regional impacts is represented by the total input expenditure associated with alfalfa less the estimated input expenditure from establishing the cover crop and annual maintenance costs.

Input expenditure represents demands for goods and services provided by both local and non-local retailers and wholesalers (Davis, 1993). To the extent that these goods and services are purchased from within the region, this expenditure generates positive economic impacts in the form of income and employment. The level of expenditure required for the retired land will generally be much lower than for irrigated production. Therefore, land retirement will generally result in negative regional impacts with respect to the level of input expenditure.

Reduced farm income

A shift from irrigated agricultural production to dry-land use will generally result in lower net farm revenues and lower levels of household income. Net farm revenues represent funds that are available for purchasing goods and services. For a family farm operation this expenditure is typically for household goods and services. Net revenues from larger operations may be reflected through re-investment in the farm operation or investment outside the farm in addition to household goods and services. If a farm is leased, then a representative lease payment would need to be subtracted (along with any other payments to the owner) from net farm income to represent local household expenditure (unless the owner receiving the lease payment lives in the study area).

Income received from land payments

Payments made to landowners willing to sell or lease their land for retirement can generate positive regional impacts, the extent of which depends on where the landowner receiving the payments resides. If the landowner lives outside the study region, or in the study area but plans on taking the sale/lease payments and retiring outside the study area, then the payments will not generate regional economic impacts. However, if the landowner lives in the study area and plans to remain there after the land retirement payment is made, then some or all of the payment will create regional economic impacts. The extent to which payments to local landowners generate regional economic impacts depends on the proportion of money used to purchase goods and services in the region. It cannot be assumed that all land retirement related payments will be spent in the region and will generate regional impacts.

For example, suppose that 20,000 acres of land are going to be retired and the average land retirement payment is US\$200 per acre. Also assume four individuals each own 5,000 acres of this land. If one of the owners is an absentee living outside the impact area, then US\$1,000,000 in land payments will not generate regional economic impacts. If another owner plans on retiring out of the state after selling the land, that represents another US\$1,000,000 in land payments that will not create regional impacts. If a third landowner plans on investing one-half of the land

payment outside the region, then US\$500,000 of payments will not generate regional impacts. Assuming the fourth landowner will remain in the region and spend all their land payment there, a total of US\$1,500,000 in land retirement payments will actually generate positive regional economic impacts.

Maintenance expenditure and habitat restoration

Expenditure related to land use after retirement will create positive regional economic impacts. This expenditure may be the result of re-establishing native grass for wildlife habitat erosion control or some other goal. It could also be some type of on-going annual expenditure such as weed control or ground water recharge activities. Expenditure related to the new use of retired irrigated land can mitigate some of the negative regional impacts associated with lost irrigated production.

Changes in state and local tax receipts

Privately held irrigated land is generally subject to local property taxes in the United States. Government land retirement programs reduce the funds available for various local services because government-held land is not subject to taxation in the same way as privately held land. Payment in lieu of taxes (PILT) programs exist that require the government to contribute funds to the local government to partially mitigate the fiscal impacts of land retirement. These contributions typically do not fully compensate for the loss in tax revenue. The net loss in funding for local services is a negative impact from land retirement.

Previous studies

Previous studies have estimated some specific impacts associated with reduced agricultural production. However, they have not presented a general framework for estimating the wide range of impacts that would be expected from land retirement.

Some studies have evaluated the regional impacts from the Conservation Reserve Program (CRP) in

the United States. The CRP was authorized as part of the 1985 Food Security Act (Public Law 99-198) and its primary objective is to take highly erodible land out of production to protect the long-term productivity of the land and reduce the adverse environmental effects of wind and water erosion.

Landowners participating in CRP agree to implement a conservation plan. In return, the federal government pays the landowner an annual contract payment that is established through a bidding process. There are parallels between the regional economic effects of the CRP and an irrigated land retirement program, since both provide government payments in return for taking agricultural land out of production. Therefore, previous regional impact analyses of CRP can help in developing a methodology for evaluating the impacts from land retirement.

A study of the regional impacts of CRP in South Dakota by Janssen, Venhuizen, and Beutler (1997) indicated that the CRP actually had a positive impact on the South Dakota economy as a result of land payments and higher crop prices, which more than compensated the loss in farm revenue and expenditure impacts from taking highly erodible land out of production. The farm-sector economic impacts of CRP were the result of changes in agricultural land use, agricultural production, commodity prices, government program payments, and CRP payments.

In an analysis of the regional impacts of CRP in North Dakota (Leistritz, 1998), the direct effects of program participation on farm expenditure and income were estimated and the regional impacts of these effects were estimated. Expenditure estimates in the study were placed into three categories: reduced input expenditure; reduced federal commodity payments; and increased CRP contract payments and upkeep costs.

The sectors included in the analysis are retail trade, finance, insurance, real estate, business and personal services, and household. Net farm revenue and CRP contract payments were included in the household sector. Data used for the North Dakota study were obtained from a survey of North Dakota CRP participants. In addition to the CRP payment information, the survey provided data on future retirement plans of the landowner and the location of retirement.

The direct effects from changes in expenditure, farm income, and CRP payments were applied to an input-output model to estimate the total regional impacts of the CRP program. The analysis revealed that the economic effect of CRP in North Dakota was negative but relatively small. Reduced direct expenditure caused by taking CRP land out of production totaled US\$55 million for the state with nearly 62% of those impacts on the retail sector.

An analysis by Otto and Smith (1996) estimated the regional impacts of CRP on 89 rural counties in Iowa. The study considered three categories of impact: reduced crop production; maintenance of vegetative cover; and CRP payments reflected as

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increased household expenditure. Changes in expenditure for all these categories were estimated as gross changes in the value of final demand. No attempt was made to separate the gross values into various crop production expenses and net revenues. The results showed negative income impacts of US\$11.70 per acre and negative employment impacts of 1.8 jobs per 1,000 acres in CRP.

Other regional impact studies have been completed that looked at the regional impacts from reduced agricultural production on a local economy. Brown *et al* (1996) used a crop production model to estimate the local impacts of a cutback of federal surface water deliveries to agricultural production and crop revenues in California's San Joaquin Valley. The model includes an agricultural production component, a ground water component, and an economic impact component. However, similar to the Otto and Smith (1996) study, gross crop revenues are used to evaluate the regional impacts.

A study by Ingram and Lewandrowski (1998) estimated the economic impacts on farms and counties from a 10% reduction in grazing on Federal lands in the West intended to protect threatened and endangered species. The annual impacts were estimated to be US\$56.4 million in lost cattle and sheep sales and US\$42.8 million in indirect and induced costs. County level data were used and applied to specific acreage reductions and the impacts are based on changes in gross revenue for ranch and range-fed animals and cattle feedlots.

Information needed for analysis

Estimating the regional impacts from retiring irrigated land requires detailed revenue and cost information for agricultural production on land targeted for retirement and expenditure data for activities associated with the new land use on that land (MIG Inc, 1999). The value of payments made to landowners for retired land as well as current land tax payments and any estimated payments in lieu of taxes must also be estimated. In addition, data is needed on spending patterns of current residents, landownership, and the location of landowners participating in the land retirement system. The information required for an impact analysis of land retirement is presented in more detail below.

How much will the land payments be?

The most basic piece of information needed to complete a land retirement impact analysis is the payment that will be made for the land to be taken out of production. This could be based on a willing seller basis, where the land payment is determined through a bidding process and the landowner that is willing to sell at the lowest price is accepted into the program. It could also be based on an average market value, where those willing to sell at the average price will participate. Another possibility is that a

higher than average market value payment could be offered to landowners who are located on land that is specifically targeted for retirement. Last, a combination of land leases, easements, and sales could be used to achieve acreage retirement goals.

If a bidding process or targeted land retirement approach is used, the value of land payments for retiring land will not be known in many cases until the program is actually implemented. If an average land value is going to be used to determine retirement payments, there is no guarantee that the average market value will result in land sales that meet the land retirement goal. However, average land value information can be used to represent a reasonable approximation of land retirement payments for an impact analysis. A range of possible land values appropriate for the region could also be used as a sensitivity analysis.

Land value information can be obtained from the county assessor or real estate specialists in the area. Information from the US Department of Agriculture (USDA) on agricultural land values may also be useful in helping determine a reasonable land payment from which regional impacts can be estimated (USDA, 2003). In the case where prices will be negotiated in order to meet land retirement targets, results from previous land retirement programs or site-specific data can be used when available. If resources are available, surveys could also be used to collect information on prices at which landowners would be willing to sell their land.

What will be the terms of the land retirement payments?

If the landowner receives a one-time land payment and there will be a permanent change in land use from irrigated agriculture to some other use, then the regional impacts from retiring the land will be generated by the one-time payment and the loss of agricultural production in perpetuity. Short-term temporary leases could also be used: these require a specific non-irrigated crop to be planted on the land or require the land to be left fallow for a specified period of time. A temporary lease could be from one to several years in length and the regional impacts would result from the lease payments and loss of production over that period.

The terms of land retirement will also affect the magnitude of regional impacts. For example, if there is a one-time payment to keep the land out of production in perpetuity, then the landowner selling the land may be more likely to retire and move out of the region. A short-term land retirement arrangement implies a smaller chance of this happening. Therefore, an analysis of land retirement impacts must account for the location decisions of the seller or lessor.

What crops are currently grown on the land targeted for retirement, what is the crop input expenditure, and what is the net revenue from agricultural production on that land?

The regional economic impacts attributable to agricultural production are the result of expenditure for production inputs, spending from net profit, and tax expenditure. Estimates of these expenditures are needed to determine the value of regional activity lost as a result of reduced agricultural production and tax receipts on the retired land. Information that can be used to estimate input expenditure and revenue from crop production can be obtained from county extension service or other agricultural agency farm budgets (NRCS, 2002b), cost and return budgets from private consultants, and Agricultural Census data (USDA, 2002).

What will the water from the retired land be used for?

The primary objective of a land retirement program is to increase the amount of water available for other non-agricultural uses. If a program is targeted toward water quality and/or soil/drainage problems on a specific parcel of land, then the water may be retained within an irrigation district for use on another parcel of land that will not cause these problems. In this case, agricultural input expenditure and revenue may not change significantly and there may not be regional economic impacts associated with land retirement.

Except for the case where irrigated production is shifted from one area to another within the study region, land retirement is likely to lead to a change in the type of activity supported by the water resource. If the land retirement program requires a change in water use, then the input expenditure on, and income generated by, the new use must be estimated and compared to the expenditure and income associated with irrigated agricultural production. The change in expenditure and income are then used as the basis for estimating the regional economic impacts of land retirement.

Several different activities could potentially be enhanced by water supplies made available through land retirement. Additional stream flows or reduced groundwater use could benefit fish and wildlife, recreation, municipal water supplies, or other uses and values. These activities have different regional

impacts associated with them compared to irrigated agriculture. For example, increased stream flows associated with improved fish and wildlife habitat may generate considerable benefits but may result in little or no economic activity within the study area because of low expenditure associated with that type of activity. In order to estimate the net impact from land retirement, the expenditure associated with the new water use must be estimated.

Where do the landowners receiving land retirement payments live and where will they spend their money?

For those landowners that do not live in the region where the land is being retired, land retirement payments will not generate regional economic impacts because the money does not enter the region. Payments made to landowners that reside in the study region will generate impacts if the money is spent there. Therefore, to account accurately for the regional impacts of land retirement payments, the analyst must be able to estimate the purchasing patterns of those landowners who will receive retirement payments.

Spending patterns may be very difficult to estimate unless a survey of potential program participants can be completed. Land ownership data from the county assessor that indicates the location of the owner could be used to estimate the number of owners who live in the study region. However, this information does not help estimate the number of those who will move outside the region once they get their land retirement payment. Information from local agricultural experts such as lenders and suppliers could also be useful.

What proportion of income is currently spent within the study area and what types of goods and services are purchased by the current landowners? What will the proportion be after land retirement?

The value of goods and services purchased inside the study region by farm operators for household goods and services (goods and services other than agricultural inputs) under current conditions provides a baseline level of impacts from net farm revenues without land retirement. These expenditures need to be grouped into categories of goods and services to reflect correctly the regional impacts from these expenditures. Different expenditure categories will have different regional impacts associated with them.

If survey data on spending patterns of local households are not available, then professional judgment must be used to estimate the amount that will actually be spent in the region. The percentage of income spent on different categories of expenditure could be estimated from the US Bureau of Labor Statistics Consumer Expenditure Surveys (US Department of Labor, 2003). Expenditure associated with goods and services that would be expected to be purchased from nearby suppliers, such as groceries

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and gasoline, could be considered as a local purchase, while other items that may be bought from more distant suppliers, such as vehicles, could be considered out-of-region expenditure.

What are the local tax payments from current land use and how will they change with the new land use after the land is retired?

Tax payments to local governments from agricultural landowners help support local services and infrastructure, such as roads and schools. Therefore, retiring agricultural land will adversely affect the funds available for these services. Tax rate information from the county assessors' office can be used to estimate the reduced tax payments associated with retiring agricultural land. For qualifying land, the Payment in Lieu of Taxes (PILT) program can partially reduce the fiscal impacts of land retirement on local governments.

PILT payments are federal payments computed and disbursed by the Bureau of Land Management (BLM) to local governments and provide additional support to local governments that have eligible Federal land within their boundaries. Payment eligibility is reserved for local governments (usually counties) that provide services related to public safety, environment, housing, social services, and transportation and that contain nontaxable Federal lands.

The PILT Act (PL 97-258, as amended) identifies several categories of land that are eligible for payments. They include Federal lands in the National Forest System and the National Park System, lands administered by BLM, lands in Federal water resource projects, dredge areas maintained by the US Army Corps of Engineers, inactive and semi-active Army installations, Federal lands acquired after December 30, 1970 as additions to lands in the National Park System or National Forest Wilderness Areas, Federal lands in the Redwood National Park or lands acquired in the Lake Tahoe Basin, and some other donated lands.

PILT payments are based on the number of acres of Federal entitlement land within each county. The amount of qualifying land is multiplied by a dollar amount per acre set by law and payments are subject to limitations based on population. Congress sets annual PILT program funding limitations that may also affect the amount of the payments under the program. BLM calculates and distributes PILT payments to all eligible counties and units of local government.

Some states also have PILT programs where state agencies make payments to local governments for state-owned land. In most cases, the federal and state PILT payments combined will not completely compensate for the loss in property tax revenue to local governments. Therefore, the difference between tax revenue from privately owned agricultural land and PILT payments must be estimated to evaluate the impacts of land retirement on local services.

Case study

Land retirement program demonstration project

The Central Valley Project Improvement Act (CVPIA) was enacted by Congress on October 1992 as Public Law 102-575. Section 3408(h), Title XXXIV of the law authorized the Department of Interior's Land Retirement Program. The CVPIA authorizes the purchase of land, water, and other property interests from willing sellers. The land must receive CVP water to be eligible and land retirement is voluntary under the program.

Retiring land eliminates the application of irrigation water, thereby reducing the amount of subsurface drainage water produced from a particular piece of property. The amount of salts and other solids passing into the drainage water would be reduced because, with less water moving through the soil profile, less leaching would occur. Reductions in the amount of agricultural drainage, and resultant improvements to sub-surface water quality will benefit wildlife and associated habitats. Additionally, retired agricultural lands, once rehabilitated, may provide upland habitat for declining wildlife populations and may contribute to recovery of sensitive, threatened or endangered species.

The criteria used to select lands for retirement include depth to groundwater, selenium concentrations in soil and groundwater, soil drainage class, drainage outlet, parcel size and location, potential to rehabilitate the parcel to native upland habitat, and the amount of water available. Lands having drainage and groundwater quality problems will be given priority in selection. All lands will be acquired at fair-market value.

The Demonstration Land Retirement program in the San Joaquin Valley in California includes a total of 15,000 acres in two basins that are drainage impaired (US Department of the Interior, 1999). The project includes 7,000 acres in the Westlands Water District (WWD) in western Fresno County and 8,000 acres in the Atwell Island Water District and the Alpaugh Irrigation District in western Tulare County and eastern Kings County.

About 1,700 acres have already been acquired in Westlands Water District (US Department of the Interior, 1999). The retired land in this area will be managed by the Bureau of Reclamation in cooperation with an interagency Land Retirement Team. The second study area will be managed by the Bureau of Land Management in cooperation with the Land Retirement Team and the US Fish and Wildlife Service's Kern and Pixley National Wildlife Refuges. The large number of willing sellers in the area provides the potential to acquire large blocks of land that are suitable for creating a corridor for wildlife.

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and have economies based predominantly on agricultural production, resulting in a large number of migrant workers in the area. The region has lower than average levels of income compared to all of California, higher than average unemployment, and a relatively high percentage of employment in the agricultural sector. The importance of agricultural production increases the potential impact of land retirement on the local economy.

Estimating the impacts

The regional impacts from changes in agricultural production and land payments are analyzed using the IMPLAN (IMPact analysis for PLANing) model initially developed by the US Forest Service and now supported by the Minnesota IMPLAN Group in Stillwater, Minnesota (MIG Inc, 1999). The model uses the Department of Commerce national input-output model to estimate flows of commodities used by industries and produced by them.

Social accounts, which represent the flow of commodities to industry from producers and consumers as well as consumption of the factors of production from outside the region, are included in the IMPLAN model database for each region under consideration. Social accounts are converted into input/output accounts and the multipliers for each industry within the region, which accounts for the multiple effects of changes in spending associated with land retirement. The percentage of expenditure in each category that would remain within the region and that would flow outside the region are also accounted for within IMPLAN.

The size of the impact area used in the analysis is important because the magnitude of impacts will tend to increase as the size of the impact area increases (MIG Inc, 1999). For example, the economic impacts on the State of California will be larger than those on Fresno County from retiring the same 7,000 acres. This is because of the differences in leakages that occur for different impact regions. The State of California has many different types of business and industry that Fresno County does not have. Therefore, Fresno County cannot supply some goods and services that other regions of California can. This

represents a leakage of expenditure, which reduces the economic impact of activities within the County compared to all of California.

Impacts are estimated at two levels of detail for land retired in the WWD and three levels of detail for land retired near Alpaugh, California. Regional impacts for land retired in WWD are evaluated for Fresno County and for the area that includes the zip codes for Mendota and Tranquility. Evaluating impacts for both regions can help determine where the majority of impacts will occur. The regional impacts from retiring land near Alpaugh are evaluated for Alpaugh, the zip code that includes Alpaugh and Earlimart, and for Tulare and Kings Counties.

Regional impacts from changes in production

Approximately 80% of the land targeted for retirement in the WWD is currently producing cotton and 20% alfalfa hay. The percentage of hay grown in Tulare County is considerably higher than in WWD, based on California Department of Agriculture data (US Department of the Interior, 1999). Approximately 40% of the combined hay and cotton acreage in Tulare County is planted in hay and 60% is cotton.

The San Joaquin Valley Drainage Program Final Report (1990) indicated 90% of irrigable land is in production at any one time. Some of the acreage in the Alpaugh Irrigation District targeted for retirement has not been in production for several years, resulting in a somewhat lower percentage of productive acres during any one year. It is assumed for this analysis that 90% of the potential retired land in WWD and 85% of the potential retired acreage near Alpaugh is in production during any one year. Therefore, it is estimated that 5,040 acres of cotton and 1,260 acres of alfalfa will be retired in WWD

Table 1. Representative crop production expenses

Costs	Cotton (US\$ per acre)	Alfalfa (US\$ per acre)
Machinery cost		
Ownership	141.26	421.60
Operating	78.95	246.56
Materials cost		
Fertilizer	16.50	5.03
Seed	15.65	10.00
Herbicide	5.88	0
Insecticide	31.05	0
Water	11.70	45.83
Irrigation labor	4.80	5.46
Defoliation (custom)	10.00	0
Defoliant	7.93	0
Gin (custom)	89.63 (0.09/lb)	0
Twine	0	35.00
Fuel	36.78	75.27
Labor (excluding farm household)	32.92	67.08
Capital costs	13.63	158.73
Total expenses	496.68	1,070.56

and 4,080 acres of cotton and 2,720 acres of alfalfa production will be retired near Alpaugh.

To estimate the regional impacts from lost agricultural production, the expenses and farm income derived from the production of cotton and alfalfa must be estimated. Crop enterprise budgets developed by the Natural Resources Conservation Service (2002a) were used to estimate the cost of crop inputs needed to produce cotton and alfalfa (see Table 1).

Five-year average Fresno and Tulare County yields and state level prices were used to estimate crop revenues (US Department of the Interior, 1999). Average alfalfa yields are 8.1 tons per acre for Fresno County and 8.5 tons per acre for Tulare County. Average cotton yields were 1,370 pounds per acre for Fresno County and 1,173 pounds per acre for Tulare County. It is expected that the yields on the land targeted for retirement would be somewhat less than the county average because of drainage problems associated with land. Therefore, an alfalfa yield of 7.0 tons per acre and a cotton yield of 1,000 pounds were used in this analysis. These are representative of low yields found in these counties. The alfalfa price used was US\$108 per ton and the cotton price was US\$0.78 per pound of lint. Cotton seed is also sold as part of the cotton crop. Cotton seed revenues were applied to the cost of cotton ginning.

The production cost per acre estimates for each category of costs are multiplied by the number of productive acres and summed to estimate the total farm expenditure for each category of cost attributable to the retired acreage. The same procedure was followed for estimating net farm revenue, which was estimated

estimated to be about US\$164 per acre for the WWD and about US\$44 per acre for the Alpaugh area.

These cost and revenue estimates were then input into the IMPLAN model to estimate the total regional impacts from crop production on retired land. The regional economic impacts from farm input expenditure are presented in Table 2 and the impacts from farm income in Table 3. The impacts are measured in terms of total output, which is the total dollar value of output associated with the impacts; employee compensation; value added, which includes employee compensation, self-employed income, property income, and indirect business taxes; and employment, which may be full-time, part-time, or temporary.

Regional impacts from land retirement payments

Payments made to landowners for land targeted for retirement represent a potential positive regional economic impact. A survey of potential land retirement participants in WWD indicated that they generally live outside the impact region, which includes Tranquillity and Mendota (US Department of the Interior, 1999). Therefore, land retirement payments for land in WWD are assumed to have no impact on local spending.

The same assumption cannot be made for the Alpaugh and Atwell Island Irrigation Districts. Many of the landowners in these districts live in or near the impact area. As a result, land retirement payments here will have an impact on the local economy. It was assumed that 50% of the land retirement payments would remain within the impact area. The regional

Table 2. Impacts from agricultural production inputs on land targeted for retirement

Impact area	Total output (US\$)	Employee compensation (US\$)	Value added (US\$)	Employment
Acreage retired in Westlands WD				
Mendota and Tranquillity	1,725,500	649,600	1,151,300	70
Fresno County	3,845,700	1,187,900	2,248,900	94
Acreage retired near Alpaugh				
Alpaugh	298,600	31,500	175,000	9
Earlimart/Alpaugh zip code area	1,303,500	525,100	885,400	60
Kings County	733,800	212,100	411,900	17
Tulare County	3,973,600	1,150,900	2,186,600	84

Table 3. Impacts from net farm revenue expenditures

Impact area	Total output (US\$)	Employee compensation (US\$)	Value added (US\$)	Employment
Acreage retired in Westlands WD				
Fresno County	1,060,500	259,100	644,100	15
Acreage retired near Alpaugh				
Alpaugh	3,700	1,600	2,900	0.1
Earlimart/Alpaugh Zip code area	22,300	8,700	14,800	0.3
Kings County	35,100	7,700	20,800	0.5
Tulare County	239,500	53,800	145,900	3.5

economic impacts from potential land retirement payments were estimated using an average land payment of US\$2,300 per acre for WWD and US\$1,500 per acre for the Alpaugh area (see Table 4).

Regional impacts from land restoration activities

If land is retired for wildlife purposes, some land restoration will be necessary and the associated expenses will have positive regional impacts. Land restoration is estimated to have a one-time cost of US\$600 per acre (US Department of the Interior, 1999). These costs are divided into four categories: agricultural services (60%); seed (30%); equipment (5%); and water (5%). The estimated regional impacts from land restoration are presented in Table 5.

Net regional impacts from land retirement

The regional impacts estimated above can be summed to determine the net regional economic impact from the Demonstration Land Retirement program. The loss in agricultural input expenditure and net farm revenue represent negative regional impacts while the land retirement payments and land restoration costs represent positive regional impacts. The net regional impacts are presented in Table 6.

Retiring agricultural land will have some impact on county governments through reduced property tax payments. Although federal PILT may partially offset these impacts, some reduction in county property tax revenues are expected. Table 7 shows the estimated county property tax revenue impacts from retiring land without considering potential PILT

payments. Even without PILT payments the impact of land retirement on county property tax revenues is very small. The amount of potential PILT payments cannot be accurately predicted in the future because of the variables involved, such as inflation and deductions for prior year payments to counties from other federal programs. However, any PILT payment would reduce the adverse impact of land retirement on county tax revenues.

Summary

The regional economic impacts from changes in agricultural land use are an important consideration in the implementation of soil and water conservation activities, such as land retirement. The Natural Resources Conservation Service has a list of economic training recommendations for conservation planners. This list includes the ability of planners to explain the economic impacts of conservation and watershed projects at the national and regional levels to local sponsors (NRCS, 2002b). Therefore, a generalized procedure for estimating these types of impact is useful for accurately measuring the economic impacts.

This paper has presented a general framework for estimating the regional economic impacts from agricultural land retirement and an application in California. Generally most analyses focus on the negative impacts of land retirement. However, as this analysis shows there may be some mitigating impacts associated with land payments and restoration activities.

Table 4. Regional impacts from land retirement payments

Impact area	Total output (US\$)	Employee compensation (US\$)	Value added (US\$)	Employment
Acreage retired in Westlands WD				
Fresno County	957,100	233,900	581,300	13
Acreage retired near Alpaugh				
Alpaugh	4,300	1,900	3,300	0
Earlimart/Alpaugh zip code area	25,800	10,000	17,100	0.3
Kings County	45,500	13,300	25,100	0.5
Tulare County	271,700	57,700	167,500	3.5

Table 5. Regional impacts from land restoration activities

Impact area	Total output (US\$)	Employee compensation (US\$)	Value added (US\$)	Employment
Acreage retired in Westlands WD				
Tranquillity and Mendota	256,100	99,700	169,100	14
Fresno County	375,500	128,700	234,300	15
Acreage retired near Alpaugh				
Alpaugh	50,200	1,400	33,100	2
Earlimart/Alpaugh zip code area	283,400	113,600	187,900	15
Kings County	72,400	24,000	45,900	3
Tulare County	332,000	117,000	206,700	13

Table 6. Net impacts from land retirement

Impact area	Total output (US\$)	Employee compensation (US\$)	Value added (US\$)	Employment
Acres retired in Westlands				
Tranquillity and Mendota	-1,469,400	-549,900	-982,200	-56
Fresno County	-3,573,600	-1,084,400	-2,077,400	-81
Acres retired near Alpaugh				
Alpaugh	-247,800	-29,800	-141,500	-7
Earlimart/Alpaugh zip code area	-1,016,600	-410,200	-695,200	-45
Kings County	-651,000	-182,500	-361,700	-14
Tulare County	-3,608,600	-1,030,000	-1,958,300	-70

Table 7. Property tax revenues in study area counties

County	Representative property tax payments on lands targeted for retirement (US\$ per acre)	Acres to be retired in project area (US\$)	Estimated project area current property tax revenues (US\$)	Total property tax revenue to county in 1997 (US\$ million)	Percentage loss in property tax revenues compared to 1997
Fresno	3.68	7,000	25,800	49.6	-0.05
Kings	4.60	1,600	7,000	9.8	-0.08
Tulare	6.44	6,400	41,200	26.5	-0.16

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