ENVIRONMENTAL, SOCIAL, AND ECONOMIC IMPLICATIONS OF THE 160-ACRE LIMITATION LAW FOR CALIFORNIA

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I. Introduction.

Recent controversy over the enforcement of the Reclamation Law of 1902 has raised new questions concerning farm size, economic efficiency, and social welfare. The argument in favor of enforcement has relied on the social and cultural value of family farming as a way of life. The argument opposed to enforcement has relied on economic efficiency and high yields associated with large-scale production techniques. Yet increasing concern over the environmental impact of large-scale farming methods and techniques requires a broadened perspective in assessing the economies of scale in agricultural production. This matter must be addressed if we are to embark on rational social policy in agriculture.

This paper brings together existing studies and data on the question of farm size and economic, environmental, and social costs. Based on a critical appraisal of the information available, we draw conclusions about the desirability and difficulties of enforcing the 160-acre limitation and other provisions of the Reclamation Law.

We argue that justifying subsidization of large farms on grounds of their asserted economic efficiency is unsound. Such a policy would be expected to lead to an over-allocation of resources (especially capital goods in the form of machinery, pesticides, and fertilizer) to the agricultural sector--a sector historically plagued by over-production. Over-production in agriculture appears to result from excess capitalization rather than from an excess number of farm units [13].

We further argue that rational economic policy must take into account

the acknowledged social and environmental external diseconomies associated with large-scale farming. Once this is done, the efficiency arguments favoring large-scale farming practices disappear. Current evidence indicates that the primary advantages of large-scale farms are pecuniary and institutional rather than a reflection of their efficient resource usage.

We conclude that these pecuniary and institutional factors present barriers to the fulfillment of the Reclamation Act goals as interpreted by Congress and the Courts. Administrative enforcement alone cannot accomplish the economic goal of supporting the family farm in either the Westlands or the Imperial Valley--the areas which would be affected in California.

The first section of our paper presents a summary interpretation of the historical background to the Reclamation issue in California. The second section contrasts and assesses the economic arguments surrounding the controversy. The third section discusses the external social and environmental costs associated with large-scale farming practices and argues that promotion of the family farm is one step toward a more environmentally sound economic policy for agriculture. The last section presents our recommendations with respect to the enforcement of the Reclamation Act provisions in California.

II. Historical Interpretation.

> We are opposed to further grants of public lands to corporations and monopolies, and demand that the national domain be set apart for free homes for the people.
> *Republican National Platform, 1872*

> We are opposed to all further grants of lands to the railroads or to other corporations. The public domain should be held sacred to actual settlers.
> *Democratic National Platform, 1872*

The 1862 Homestead Act, which helped settle the Mississippi Valley, failed to work in the arid West. 160 acres, the amount of public land given

to each homestead, was inadequate in the West to support a family. But if the land were irrigated then it could support homesteading. The Reclamation Act of 1902 was the necessary accompaniment to the Homestead Act to bring success to settlement of the public lands in the West.

In the 1900 presidential election, both major political parties adopted planks favoring federal reclamation for the West. In his first message to Congress in 1901, Theodore Roosevelt laid out its purpose and intent: "The reclamation and settlement of the Ohio and Mississippi Valleys brought prosperity to the Atlantic States. . . Successful homemaking is but another name for the upbuilding of the nation"[31].

To make the Reclamation Act more acceptable to the East, the home-building aspects were emphasized as in the Homestead Act. Thus restrictions on size and residency that would encourage the homestead or the family farm were included. The Act specified a maximum farm size of 160 acres to qualify an individual for federally subsidized water. The Act also required the farmer to live on or near his land if he wished to receive federal water. Today the limit on acreage has been raised through administrative interpretation to 320 acres for husband and wife. In 1910 the Department of Interior defined residency as within 50 miles of the project.

Three other important features were added to the reclamation program in the next years. The first (in 1906) was the Townsite Act, which authorized the Bureau of Reclamation (hereafter referred to as the Bureau) to build hyroelectric power plants to help irrigators repay project costs.

The second feature was the Warren Act of 1911, which authorized the sale of surplus water to nonfederal lands or private individual holdings, and the construction of drainage works for such lands. This act was of prime importance, since the Bureau was running out of project sites within the public domain.

The need for enforcement of both an acreage limitation and a residency requirement arise from this shift of reclamation from public lands to privately owned lands.

The third important feature of the reclamation program was the 1914 Reclamation Extension Act which stated:

> Before any contract is let or work begun for the construction of any reclamation project adopted after August 13, 1914, the Secretary of the Interior shall require the owners of private lands thereunder to agree to dispose of all lands in excess of the area which he shall deem sufficient for the support of a family upon the land in question, upon such terms and at not to exceed such price as the Secretary of the Interior may designate; and, if any landowner shall refuse to agree to the requirements fixed by the Secretary of the Interior, his land shall not be included within the project if adopted for construction.
> (quoted in [30]: p. 194)

This was necessary since considerable speculation had occurred on private lands between 1911 and 1914. The original 1902 Act did not require the landowner to sell his excess lands; it had been designed to distribute the 160-acre irrigated homesteads from the public domain.

The remaining history of reclamation law pertinent in the West--especially in California--centers around two issues: (1) the 160-acre limitation and excess land sales, and (2) the residency requirement and leasing and tenancy arrangements. Each of these issues deals with an aspect of the original intent of the 1902 Act. The first issue focused on how the land is farmed, whether by an absentee landlord (often in the form of a large corporation) or by an individual owner-operator. The second issue has focused on problems of land redistribution and has involved limited land reform issues for California.

In 1924, a special advisory committee to the Secretary of the Interior came out with a set of proposals known as the *Fact Finders Report*, which found that the basic intent of the 1902 Reclamation Act had not been realized. This

report led to the Omnibus Adjustment Act of 1926, which stipulates that no water can be delivered to a new project service area until a contract is signed between the Secretary of Interior and the Irrigation district. Specifically, with regard to the 160-acre limitation, it states:

> ...all irrigable land held in private ownership by any one owner in excess of one hundred and sixty irrigable acres shall be appraised in a manner to be prescribed by the Secretary of the Interior and the sale prices thereof fixed by the Secretary of the Interior on the basis of its actual bona fide value at the date of appraisal without reference to the proposed construction of the irrigation works; and that no such excess lands so held shall receive water from any project or division if the owners thereof shall refuse to execute valid recordable contracts for the sale of such lands under terms and conditions satisfactory to the Secretary of the Interior.
>
> (quoted from [31]: p. 73)

An individual may receive water on excess acres if that individual agrees by recordable contract, to divest the excess lands within ten years of the contract date at the approval of the Secretary of the Interior.

It is interesting that the 1926 Omnibus Adjustment Act addresses itself only to excess land sales, whereas the *Fact Finders Report* noted that there would be turnover of reclamation land that falls within the 160-acre limitation. All land sold, excess or not, would have increased in value due to the presence of irrigation water. Those who sold reaped the increment as a capital gain. Speculation was certain to occur, and it was not limited to excess holdings. The *Fact Finders* drafted a bill regulating all sales until construction charges had been paid. According to that bill, the seller would turn over to the government one-half of the amount by which the sale price exceeded the appraised pre-water price. This proviso did not appear in the 1926 Act.

The 1926 Act does not mention the residency requirement. Historically the Bureau has not enforced the 50-mile residency requirement. In 1940, Congress passed a bill suspending the requirement for military personnel, which seems

to say that Congress at least still believed in the validity of a residency clause. In 1972, a Federal District court ruled that the residency requirement remains in effect (*Yellen v. Hickel*), although the case was later dismissed for lack of standing [20].

In 1938 and 1940, Congress made two exemptions from the acreage limitation. The first was for the Colorado-Big Thompson project, exempted because few land holdings in the project exceeded 160 acres and because the increase in irrigation would not provide a significant increment in the value of the farms. The second was for the Washoe and Humboldt Projects. The argument presented here was that due to very low agricultural productivity of the project lands (because of high altitude and short growing season), the 160-acre farm was not economically feasible.

An unsuccessful attempt to exempt the Central Valley Project (CVP) from the acreage limitation was made in Congress in 1944. The CVP was born in the 1920's. Its chief proponent was Colonel R.B. Marshall, chief hydrographer for the U.S.G.S. Marshall proposed a series of reservoirs on the Sacramento River system, and two large canals to carry water into the San Joaquin Valley. The CVP bills were passed by the State Senate but failed in the State Assembly primarily because of opposition by P.G. & E. and other utilities who objected to the public production of power. The law authorizing the CVP was finally passed by the 1933 legislature which provided for the issuance of 170 million dollars in revenue bonds. Financial studies by the State showed that the project would not be able to repay the revenue bonds if sold. It was almost impossible to sell state or local bonds in the mid-thirties so the State turned to the federal government to finance the project. In 1935 the Central Valley Project was authorized by Congress.

In 1944 the CVP started deliveries from the Friant Dam, and the Bureau

recommended enforcement of the 160-acre provision. This sparked congressional debate over the applicability of the 160-acre limitation to the CVP. The Elliott amendment (which would have repealed the limitation) passed the House but was rejected by the Senate.

Governor Warren of California had argued that the CVP was not a reclamation project but a conservation project, and therefore should be exempt from the 160-acre limitation. Senator Downey (D-Calif.) carried the argument in Congress that 160 acres could not and should not apply to the Valley. His main argument for this was that ground water which would be used for irrigation also, can't be separated from project surface water. When the exemption failed the California State Senate did a feasibility study on purchasing the CVP. When this idea failed also the State began to develop the Feather River Project, which would bring state water south, water not subject to an acreage limitation.

In 1959, the U.S. Supreme Court unanimously reversed the California State Supreme Court in *Ivanhoe Irrigation District v. McCracken*. McCracken challenged the right of the Irrigation district and the Bureau to require him to sell his excess lands. The U.S. Supreme Court basically upheld the 1902 Federal Reclamation Act noting that the purpose of the 160-acre limitation was "to benefit people, not land." In another case dealing with excess land sales, *U.S. v. Tulare Lake Canal Company*, it was held that even when users paid back the construction costs allocated to irrigation of the Pine Flat Dam (an Army Corps of Engineer project), they were not exempt from the acreage limitation.

Most of the large excess landowners in the CVP Friant-Kern Canal service area sold when their ten year grace period on excess land ownership expired. The DiGiorgio Fruit Corporation was among those with large excess land holdings

to sell. The Bureau first offered the DiGiorgio land in small blocks at "approved pre-water prices." Only one sold. DiGiorgio then sold the remaining blocks at the going market price which was incidentally lower and moved operations north into the Sacramento Valley. The fact here is that the "approved pre-water price" set by the Bureau bore no relation to the real pre-water value of the land. Thus, DiGiorgio was able to reap the whole windfall gain due to the development of irrigation and cheap water. The farmers moving in paid both for the land and for the project water.

The current controversy over enforcement of federal reclamation law involves two California irrigation districts: The Imperial Valley Irrigation District and the Westlands Water District.

The Imperial Irrigation District.

In 1901 the California Development Company began efforts to divert water from the Colorado River. The Alamo Canal was built by the private company to deliver the water to the Imperial Valley for irrigation. The canal was built on both sides of the U.S.-Mexican border because of the more difficult terrain on the U.S. side. In 1911 the Imperial Irrigation District was formed, and by 1932 it was serving more than 400,000 acres. In 1932 Congress enacted the Boulder Canyon Act, part of which authorized construction of the All American Canal to replace the Alamo Canal. It was to be built entirely on United States soil by the Bureau of Reclamation.

Since the original project was built 30 years earlier, Secretary of the Interior Ray Wilber administratively exempted the Imperial Irrigation District from the 160-acre rule. The debate since then has been in the courts, the two major cases being *Yellen v. Hickel* and *U.S. v. Imperial Irrigation District*. The latest ruling in 1977, in an appeal court, reversed the lower court by affirming that the acreage limitation applies to the Imperial Irrigation District.

The U.S. Department of the Interior has estimated that 265,000 acres (about 60% of the irrigated acres) is excess in Imperial County. From the data in Table 1, a U.S.D.A. study [28] concluded that: "It seems likely that much of the excess land is farmed by the 150 operations that exceeded 1,000 acres in 1974 and is probably owned by the 204 partnerships and corporations."

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Table 1

DISTRIBUTION OF FARMS BY SIZE AND TYPE OF BUSINESS ORGANIZATION FOR THE IMPERIAL COUNTY/IMPERIAL IRRIGATION DISTRICT[a/b]

Farm Size	Number of Farms	Percent of Total
up to 179 acres	335	47%
180-499 acres	131	19%
500-999 acres	91	13%
over 1000 acres	150	21%
TOTAL	707	100%

Type of Business	Number of Businesses	Percent of Total	Average Size
sole proprietors	505	71%	490 acres
partnerships	120	17%	1175 acres
corporations	84	12%	1465 acres
other	6	1%	113 acres
TOTAL	715	100%	

[a]Since farming in Imperial County is the same as farming in the Imperial Irrigation District, the data is identical for both jurisdictions.
[b]from [28]; source, U.S. Bureau of the Census: *Census of Agriculture, 1974.*

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The Westlands Water District.

Westlands, the largest water district in the country, is the biggest recipient of water from the San Luis Unit of the Bureau's CVP. Currently the 600,000-acre water district is under criticism for failure to comply with the reclamation law. The major issue in the Westlands is over land concentration and the social efficacy of subsidizing large corporate landholders. Southern Pacific Land Company has 109,000 acres in Westlands; Standard Oil

of California has 11,500 acres; the list of large corporate landholders goes on [1].

When the San Luis Unit was authorized in 1960, the Bureau of Reclamation's feasibility report argued that the service area potentially could be typified by farm units ranging in size from 40 to 160 acres--in all, a projected 87,500 people. Ray Brody, the chief counsel for the District, reported that 300 new homes had been built in the district by 1977, bringing the actual number of residents up to 6,000. It was not specified that these were farmsteads. While there are 4,216 recorded owners, there are only 216 operators, averaging 2,200 acres each in the District. As of December 1976 there were 226,291 excess acres under recordable contract to be sold, and another 221,000 not under contract; some receiving project water, others using ground water. With some 125,173 excess acres sold already, Brody claims progress is being made [30]. Yet the manner in which the large holdings in Westlands are being broken up is questionable.

At present the Bureau's enforcement of the reclamation law permits sales to groups of purchasers through a variety of arrangements which address the issue of ownership but circumvent the issue of control. The Bureau's position on acceptable sales is:

> (1) that a competent participant in the multiple ownership arrangement has a partitionable possessory interest in the land...(or its equivalent, the right to receive rents from the land as the lessor of the land), and
> (2) that the participant have a right to alienate his interest.
>
> (quoted in Special Task Force, [30])

These criteria were used to approve the "Rogers Group" sale, a joint grant arrangement, in which each member of a group held an undivided interest in a large tract of land. 2,000 acres were sold on the same day, subject to a trust deed held by Nissho-Iwai Corporation and then leased back to Jubil

Farms. Jubil Farms is controlled by William and Judith Rogers with Nissho-Iwai Corporation controlling 20% interest [30].

While this and similar arrangements are not in violation of the letter of the law, they do not appear to promote the small family farm for which the benefits of federal reclamation were intended. If the owner-operator family farm is the goal of the Bureau, then besides the 160-acre limit, there must be a residency requirement and a ruling on tenancy. On tenants, the *Fact Finders Report* noted:

> The tenant is not desirable on Federal irrigation projects for the reason that these projects were authorized with the homebuilding idea as a central consideration.
> (quoted in Special Task Force, [30]: p. 199)

Westlands now uses about 0.5 million acre-feet of ground water; before the project the area was using about 1.2 million acre-feet. A study by the Bureau in 1976, looked at water pumping levels for two parcels in Westlands. It showed the water table dropping from 1952-1967 from 440 feet to 610 feet or an average of over 10 feet per year. Since 1967, when the project deliveries began, the water table has returned to the 1952 level. A Bureau official estimated that without project water these parcels would be pumping at 650-700 feet at a cost of $30 per acre-foot. With the improved water table the cost range is $16-$18 per acre-foot, creating a savings of $12-$18 per acre-foot because of the project [30].

One of the main arguments favoring the San Luis Unit was to recharge the overdrafted ground water on the Westside of the San Joaquin Valley [30]. Senator Downey and others have said that enforcement of the acreage limitation is impossible without the integration of ground water with project surface water [6]. Without state or federal laws on overdrafts and some integration of the two water supplies, the large farmers in the Westlands can continue to use project water without falling under the jurisdiction of the Reclamation

Act.

We have seen that the intent of the Reclamation Law, as interpreted by the U.S. Supreme Court, was to help establish the small farm as the basic economic unit in agriculture. Reclamation did proceed thanks to federal water subsidies, but the farms that were subsidized tended to be large. The two main provisions of the Law designed to promote family farming were not enforced.

Proponents of the Law argue that the social advantages are paramount, and the correct criterion for judging appropriate farm size is economic viability rather than economic efficiency.

Opponents argue that enforcement of the Law would demolish the economies of scale that accompany large land holdings using federally subsidized water. To them, economic efficiency is the appropriate criterion in judging the validity of the 160-acre limit.

III. The Economic Arguments.

In this section, we will first review the studies on farm size and economic efficiency for California. We examine the implications of using efficiency as a criterion for subsidization of farming units. Further, we examine the problems inherent in judging social efficiency of resource use using costs and returns generated in the market and their specific application to the problem of the acreage limitation. Finally, we survey recent economic viability studies for small farming units in California.

The case for economic efficiency rests on the argument that since current economic reality and economies of scale dictate large farms, a policy to encourage small farms would lead to a socially inefficient use of resources. The most frequently cited economy of scale stems from the advantages of full utilization on larger farms of the most modern machinery and equipment.

The argument is made up of two parts: (1) the assertion that large farms are economically more efficient than small farms, and (2) the assumption that it is socially and economically desirable to subsidize the most efficient farming units.

Economic efficiency is achieved when an output is produced at the least resource cost to society. Simultaneously the pursuit of economic efficiency means production of the greatest value of output for a given social resource cost. It follows that the farm size which generates the lowest average costs of production will lead to the best use of social resources: land, labor, and capital.

A distinction is made in the economic literature between short-run and long-run average cost. That is, a distinction between the best use of resources within a given farm scale and the best combination of resources when farm size is variable.[1] It is long-run average costs (LAC) which are the relevant costs to the question of optimal farm size. The studies and results cited below all attempt to determine the scale of farm operations which realizes the lowest long-run average cost per unit output or per acre.[2] Once the long-run average cost curve has flattened out there will be no further economic advantage to be gained from increasing farm scale. This point is often assumed to occur at that scale which spreads the most modern machine technology and capital costs over the maximum acreage.

Studies on Economies of Scale in California Agriculture.

Listed below is a chronological list of studies done for various farm

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[1]Throughout the text the following distinction between farm scale and farm size is used. Farm scale refers to a fixed capital-worker base with variable land and other purchased inputs. Farm size refers to a fixed land base with the remaining factors variable.

[2]Note that these will be identical only if yields are constant with respect to farm size and scale.

types and locales in California agriculture.

1. A 1960 study [3] of cash crop farms producing sugarbeets, tomatoes, milo, barley, alfalfa, and safflower in Yolo County found all relevant economies of scale were realized by 600 to 800 acres. Rising average costs were observed beyond 1,400-acre size farms.
2. A 1962 study [2] of field crop farms and vegetable farms located in Imperial Valley found a relatively flat LAC curve. Some economies of scale were observed up to 1,200 to 2,000 acres. When custom work was taken into account for smaller vegetable farm units, all economies of scale were realized by 640 acres. In addition the difference in efficiencies was minor for sizes below 640 acres compared to larger farms.
3. A 1963 study [8] of Kern County cash crops for farms raising cotton, alfalfa, milo, and barley found the lowest average costs were achieved at 640 acres. The long-run cost curve remained flat until around 3,000 acres where it began to rise.
4. A 1963 study [4] of average costs of cling peach production in Sutter County found the minimum average cost was realized with an orchard size of 90 to 110 acres.
5. A 1965 study [18] of Fresno County cotton farms found the most efficient farm size was the 4-person farm with 700 acres for heavy soils and 1,400 acres for light soils.
6. A 1971 study [14] of Imperial Valley farms found economies were achieved by farm units up to 1,500 to 2,500 acres in size. This is consistent with the 1961 study cited above. Interestingly, the study related variable non-land costs with size and found very little difference in cost per dollar output for all farm unit sizes. When land costs, especially under pressure of appreciation, are included they make an important dif-

ference in total average operating costs.

7. A 1974 U.S.D.A. study [see 24], arrived at figures for an optimal irrigated cotton farm in California of 400 acres and an optimal size for a California vegetable farm of 200 acres.

Methodology and Limitations.

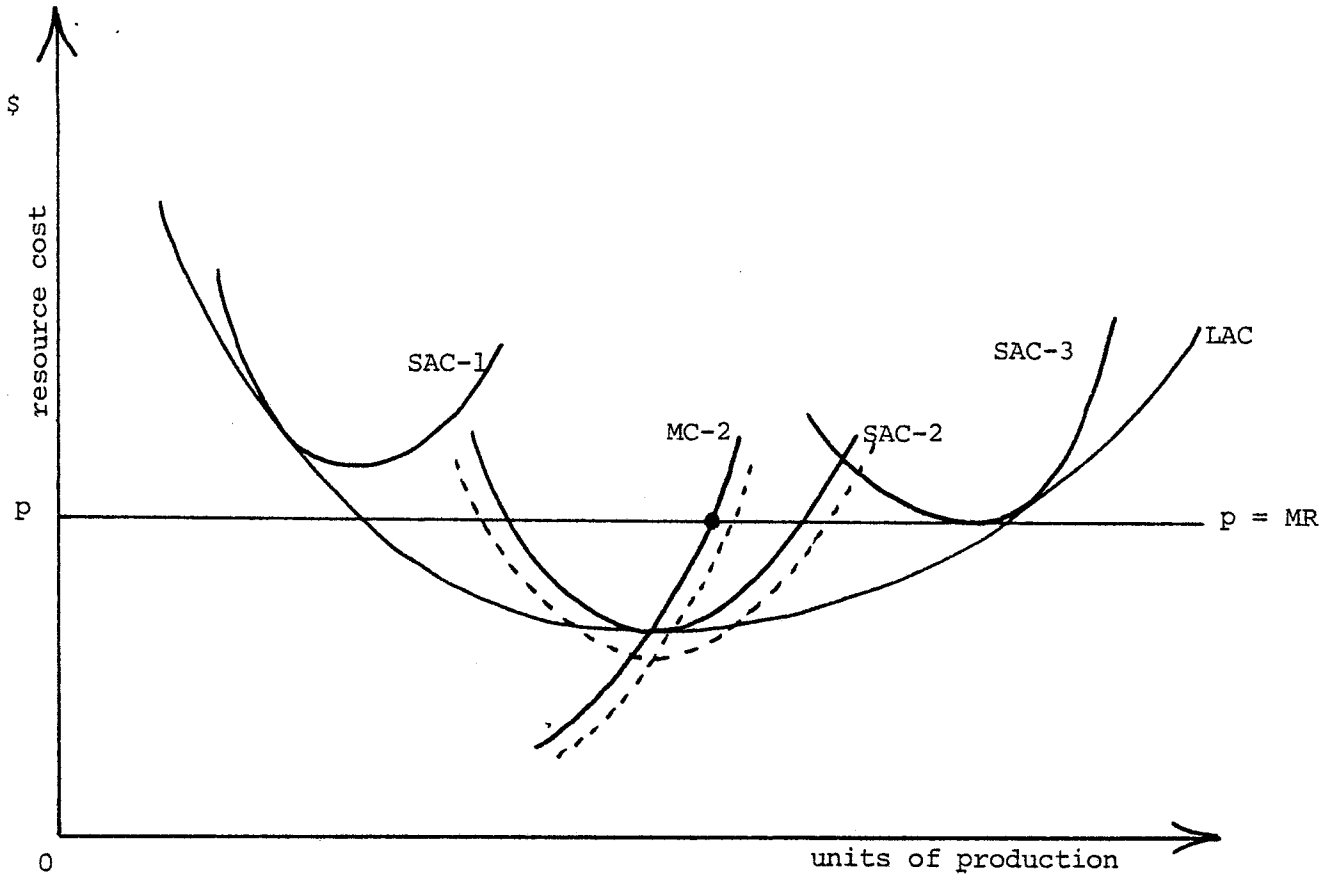
All of these studies are examples of synthetic firm analysis. The investigator assumes a given mix of machinery and other inputs to represent each farm scale. Scales are often designated as one-person, two-person, etc., with the necessary complement of capital to constitute a modern farm. Using technical information available, hypothetical short-run average cost curves are derived for each assumed scale. From this information an envelope long-run cost curve is constructed.

Throughout the analysis static competitive conditions are assumed to hold. Thus the results give the optimal farm size when these assumptions are realized rather than corresponding to actual operating conditions by farm sizes. As will be pointed out below, there is considerable discrepancy between the ideal conditions assumed and actual operational market conditions in agriculture. In addition, these assumptions tend to insure the result that larger farms have lower costs. First fixed costs are spread over larger acreage as farm size increases. Since the most modern technology tends to be adapted to large-scale farm units, smaller farm units under this method invariably have higher fixed costs than their larger counterparts.

Figure 1 presents the short-run (SAC) and long-run (LAC) cost curves assumed to hold under competitive conditions. If we accept the argument that SAC-2 corresponds to the typical large-scale farm operating with excess lands receiving reclamation water, it is relevant to ask if subsidizing these farms is economically sound. The dashed SAC-2' and MC-2' curves show the

impact of water subsidy in lowering these units' cost curves.

Figure 1



The price line has been drawn in the graph to reflect capital losses expected to be experienced by smaller farm units, profits to the efficient farm units, and a break-even situation for very large units. The effect of the water subsidy then will be to increase production by the efficient units encouraging them to further accumulate resources including land and eventually increase their scale. An additional impact is to widen the spread in costs between the small and the efficient units and increase the vulnerability of the smaller units to falling market prices expected from the increased production promoted by subsidization of the efficient units. The net impact

will be expansion of the efficient farm sizes at the expense of the smaller units most likely accompanied by a redistribution of resources from the small units to the larger units, and shifting the larger units toward the rising portion of the LAC curve.

In practice something like this has been happening in response to input subsidies as well as government price subsidies, the lion's share of which has accrued to the larger units [21, 26].

If larger farm units are already efficient, subsidization of either inputs or the output can only lead to more resources being devoted to agricultural production than is optimal. This will in turn draw away resources from other sectors within the economy, and if we expect these resources to be primarily capital goods then the effect will be to increase the demand in capital markets and exacerbate the current capital shortage. A policy which facilitates further capitalization and expansion of agricultural production will worsen the chronic over-production problem of U.S. agriculture [11, 13].

Even if we were willing to accept the highly dubious argument that there is any merit to subsidizing already efficient production units, it is necessary to accept the proposition that prices in agricultural input and output markets reflect social value. Massive government intervention in output markets, the growth of agribusiness and the development of monopoly power in input markets and in output distribution and processing markets, a decided bias against smaller units in credit markets, all contribute to the distortion of the price structure in reflecting competitive economic costs.

Census data shows declining average costs in California only for cash grain farms. The opposite occurs for vegetable, fruit, and nut farms. If

we consider family farms to be inclusive of farms with gross sales of less then $100,000, they have lower labor costs, and pay less per dollar of output for rent, mortgage interest, and administrative overhead. Despite this cost pattern large farms have higher gross sales per acre [22, 24].

The development of large-scale agribusiness and the concomitant shift to the increased importance of manufactured and purchased inputs in agriculture has eroded the competitive structure of input markets.

The farm unit now purchases pesticides and agricultural chemicals from Standard Oil, machinery from John Deere, and contracts to sell its output to Del Monte, and other oligopolistic food processors. Government subsidies and acreage allotments have undermined the efficiency implications of the price mechanism in certain output markets. Given the nature of long-term contracts with monopsonistic agricultural processors which dominate specialty markets prevalent in California agriculture, it is equally dubious whether these output prices can realistically be considered as reflecting social value.

Federal government water subsidies in California have flowed to districts with larger than average acreage holdings. Table 2 presents the average irrigated acreage for the two major recipients of the reclamation water subsidy, the Westlands Water District and the Imperial Irrigation District, and compares it with California and Fresno County where Westlands is located. The figures indicate that these larger farms will have lower costs to cover than comparable smaller unit farms, other things being equal. This further undermines the argument of economic efficiency based on a market criteria.

Moore and Hedges [19] found a positive, empirical relationship between

Table 2

AVERAGE IRRIGATED ACREAGE PER FARM WITH SALES OVER $2,500

Area	Year	Average Size
California	1974[a]	199 acres per farm
Fresno Co.	1974	208 acres per farm
Westlands	1975[b]	1,280 acres per farm
Imperial Co.	1974	764 acres per farm

[a]all 1974 data from U.S. Bureau of Census: *Census of Agriculture, California, County Summary Data on Irrigation* [24].

[b]from Ely, et. al., [7].

quantities of irrigation available and farm earnings.[3] Hence we would expect enhanced profitability for farm units with access to federal water which coincidentally are the larger irrigated farm units in California.

If all farm units do not face the same set of prices in both output and input markets then the income and profit advantages argued for larger units will not reflect technological advantages implicit in Figure 1 but rather institutional and pecuniary advantages. The Report of the Small Farm Viability Project [22] cites considerable evidence that the latter is indeed the case among California farms.

We conclude on the basis of evidence available and analysis founded on the competitive economic model that there is considerable room for doubt regarding the technological efficiency of large farm units and that regardless,

[3]availability is considered to be reflected by the price of water and therefore quantities demanded by farm units.

further subsidization would only exacerbate an already socially questionable situation.

Studies of the Economic Viability of Small Farms in California.

A considerably more rational policy from a social point of view would be to subsidize the smaller farm units thereby flattening the LAC curves at lower output levels and enhancing the stability of smaller farm units. The critical question here is whether the small farm is economically viable. Can a small farm unit provide an adequate income to its owner-operator? We turn now to a survey of recent viability studies of small scale units.

The viability studies have either tried to estimate income potential of small farm sizes or have looked at the farm size necessary for various crops to provide a given amount of income to the owner-operator family.

The 1977 Report of the Small Farm Viability Project [22] presents estimates for acreage needed to provide an annual $15,000 income for different crop choices. Two alternative sources of data were used, one for 1974 conditions and prices, the other for 1975 conditions and prices. In each case the required acreage was well below the minimum 160 acres specified in the Reclamation Law. Their results are summarized in Table 3 below.

Table 3

ESTIMATED ACREAGE NEEDED TO INSURE $15,000 INCOME

data source	vegetable crop	fruit and nut crop	irrigated cash grain
U.C. Cooperative Ext. cost sheets (1975)[a]	50 acres	60 acres	-----
Agricultural Census, Calif. (1974)[b]	59 acres	100 acres	144 acres

[a] using 1975 prices and assuming family labor only.

[b] using 1974 prices and assuming 1.5 family workers, remainder hired.

source: *The Family Farm in California* [22]

Other studies have tried to estimate the income which could be expected from an irrigated farm of 160, 320, and 640 acres in California by location using various assumptions regarding output prices, crop mixes, and costs. A recent U.S.D.A. study [28] presents a range of estimates for each of the three typical farm sizes associated with 1-, 2-, and 3-person family farms within the Westlands Water District and the Imperial Irrigation District. The range covers the possibility of a 15% increase or decrease in output prices for each farm size. It is important to note that in each case, except the 160-acre farm in Imperial, the income estimates based on current prices exceeds the respective county median income.

The Hellyer study [7] used a similar farm budget methodology and reached very similar results for estimates using current prices for the Westlands area. Both of these studies demonstrate the importance of pre-water prices for land in determining the size of the income for each farm size. If current land prices, reflecting the windfall gain accruing to present land owners due to the development of the San Luis Unit and water in the Westlands, are used, the income possible is considerably lower.

The Department of Interior [29] reports lower possible returns for the Westlands based on Bureau of Reclamation payment capacity studies. Their income figures represent an adequate income for a typical family for repayment purposes of the Bureau.

The only negative study we have found was presented in testimony at the 1976 Joint Hearing before the Select Committee on Small Business and the Committee on Interior and Insular Affairs [26] by John C. Harris of Harris Farms, Inc., a current farm operator within the Westlands Water District. The Harris study presented profit and cash flow figures for a 160-acre farm under current crop conditions. His results for a first

year of operation showed a net income of $10,355 but a negative cash flow of $8,657.50.

The results of all these studies are summarized in Table 4 for the Westlands and Table 5 for the Imperial Valley.

Table 4

ESTIMATED OWNER-OPERATOR RETURN BY FARM SIZE FOR WESTLANDS

study	assumptions	160 acres	320 acres	640 acres
U.S.D.A. 1978 [28]	current prices	$25,000	$54,000	$81,000
	±15% price range	$10.000-40,000	$23,000-84,000	$25,000-135,000
	current crop pattern	---	$21,773	---
Dept. of Interior 1978 [29]	field crop, forage grain crop pattern	---	$20,531	---
Hellyer, 1977 [7]		---	$48,602 $42,602[a]	---
Harris, 1976 [26]	first year of operation	$10,355 <$8,657>[a]	---	---

[a]cash return to farm; all others are returns to management and operator labor.

Table 5

ESTIMATED OWNER-OPERATOR RETURN BY FARM SIZE FOR IMPERIAL VALLEY

study	assumptions	160 acres	320 acres	640 acres
U.S.D.A., 1978 [28]	current prices	$6,000	$21,000	$61,000
	±15% price range	$<8,000>-20,000	$<7,000>-49,000	$<6,000>-128,000

The bulk of the studies presented here indicate a 360-acre farm is economically viable based on income estimates. Virtually all report income level in excess of the 1976 U.S. median farm family income of $11,663 [27]. There remain serious financial problems facing the family farm despite these

optimistic income estimates.

A discussion of farm credit is beyond the scope of this paper, but it must be cited as one of the greatest problems facing the "new" family farm. Testimony cited in the San Luis Task Force Report [30] and references cited in the Hellyer document [7] indicate lenders do not consider 320-acre farms viable and would be unwilling to finance such operations.

Smaller farms are more vulnerable with respect to output contracts with processors of specialty crops. Processors often require certain techniques to be employed which may or may not correspond to the estimates utilized in the viability studies. In addition, most of the studies based their estimates on recent prices which have been better than usual in the historical record. All of these uncertainties do not argue against encouragement of the family farm but rather that the device of excess land sales and federal water subsidies will probably be inadequate to accomplish that end single-handed. For such a policy to be successful considerably broader-reaching policies affecting the industrial structure of agriculture would likely be necessary.

The next section presents arguments and evidence as to the social and environmental costs of current large-scale farming practices. For economic efficiency arguments to have any meaning, it is necessary for market prices of inputs in the production process to reflect fully these costs. If they do not, then there will occur misallocation of resources and a decrease in social welfare. In the next section consideration of social and environmental costs in California agriculture leads us to the conclusion that broader reaching policies to rationalize agricultural production are imperative. One of the alternatives to the dominant production techniques is employed by the family farm.

IV. Environmental and Social Costs.

The establishment of the family homestead and the social environment which accompanies it has stood as the major rationale for federal reclamation in the West. In California, land concentration goes back to U.S. expropriation of the enormous land holdings of the Spanish rancheros. In an environment of large landholdings, the enforcement of the intent of the 1902 Reclamation Act has become a land reform issue. Land reform in this context is a singlealternative economic and social arrangement based on the family enterprise.

> When the motives of all parties to the controversy are taken into account, it is clear that the question asked by the Senate Subcommittee on Small Business, "Can the Small Family Farm Survive in America?" is only part of a larger question. It is certain that the Reclamation Act of 1902 has not been enforced. It is not certain whether it could be enforced within the given political and economic realities of contemporary America.... Cooperative farms, farms with communal ownership but private use under usufruct arrangements, state farms, small private holdings closely regulated by central authority and specially supported and guided by government credit, marketing, and tax arrangements; *all these and a variety of other possibilities would have to be considered if the Reclamation Act of 1902 were to be responsibly fought out as a land reform question in the broad sense.* For the moment all parties seem to find it advantageous to narrow the question to the battle between large and small holdings, and between resident and non-resident ownership.
>
> (italics added, Wright [33])

For the purposes of this paper we consider only the narrow question of small vs. large farms as the beneficiaries of federal reclamation policy and the implications for environmental and social costs.

To economists, social benefits cannot be directly measured because they do not go through a market evaluation. None the less they are important, and need to be taken into account in assessing alternative uses of society's resources. Quality of life as an environmental issue has become an important topic in the economic literature in the 1970s. The presence of increasing industrial and agricultural pollution has severely eroded the American quality

of life and the integrity of the ecosphere of which the economy is a part.[4]

The industrialization of U.S. agriculture which has been proceeding since the end of World War II has contributed significantly to the deterioration of the social and physical environment. The farm has undergone rapid mechanization, has had a dramatic increase in the use of commercial fertilizers, and has seen the introduction and widespread use of agricultural chemicals for pest and weed control. Average farm size has steadily increased as farm units have moved away from joint production to single product specialization.

Both pollution and environmental disruption have resulted from these shifts in the pattern of production--a pattern which has developed more rapidly in California than in the rest of the United States. Agricultural wastes and runoff constitute a serious threat to water quality. Pesticide residues and other agricultural chemicals are overloading the environment's ability to assimilate and degrade both toxic and nontoxic substances.

Water pollution from agricultural waste runoff has become a significant problem. The closed cycle of nutrients--from soil to plants, to animals, to man, and back to the soil again--has been cleaved by the shift in production patterns. An American Water Works Association 1967 Task Force Report indicated that up to 60% of the nitrogen and 40% of the phosphorous in the U.S. water supplies originates in agriculture. (The reduction of phosphorous in detergents and municipal secondary sewage treatment since

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[4]See for example, E.J. Mishan's *Technology and Growth: The Price We Pay* (Praeger Publishers, New York), 1969; Barry Commoner's *The Closing Circle* (Bantam Books, New York) 1971; and Allen V. Kneese and Blair T. Bower's *Environmental Quality Analysis* (The John Hopkins Press, Baltimore), 1972.

1967 has likely increased the agricultural contribution to water pollution.)

The heavy impact of larger and more specialized farm units on the environment has been noted in the recent literature [9, 11, 32]. The data for California supports this correlation. For 1969 farms with gross sales over $100,000 constituted only 13.7% of all farms yet controlled 52% of the cropland in California. These farms used 69% of the pesticides and 67% of the fertilizers purchased [24]. Data from the 1974 *Agricultural Census* again supports the correlation between high gross sales (hence large farm size) and the disproportionate use of both pesticides and fertilizers.

For 1974 the four largest agricultural counties in California: Fresno, Imperial, Kern, and Tulare, accounted for 33% of California's farm output value. These counties contain the bulk of the excess acreage in California. They had 36% of the irrigated acres, while using 40% of the irrigation water. Even though they accounted only for 31% of the total production expenses for the state, they consumed 37% of the commercial fertilizer and 43% of the agricultural chemicals [24].

As cited earlier, the major argument favoring the creation of family farms is the social value of the communities they support. Available evidence for California suggests that this social value is positive and significant. Put differently, the social costs incurred by development of large-scale farms are large and significant.

The Hellyer study [7] presented data on housing and population characteristics for the Westlands area census tracts and rural Fresno County (i.e., outside the city of Fresno). Selected data is reproduced in Table 6. It suggests that the Westlands, an area dominated by large and concentrated farming operations, supports a poorer, less educated, and less stable social base than the rest of rural Fresno county.

Table 6

SELECTED POPULATION AND HOUSING CHARACTERISTICS OF WESTLANDS AREA WITHIN FRESNO COUNTY, 1970 CENSUS AND RURAL FRESNO COUNTY[a]

	Westlands Area Census Tracts[b]			Fresno Co.
	78	79	83	(excl. city)
POPULATION				
Total	3,524	1,142	5,632	247,081
% Black	2.6%	2.6%	3.6%	1.8%
% Spanish Language	60.7%	52.9%	70.8%	30.1%
% foreign born	14.3%	5.6%	15.7%	7.5%
Median School Years Completed	7.8	9.6	7.0	11.7
% of Total Employment in Farm Work	55.7%	50.3%	50.7%	16.5%
HOUSING				
% Owner-Occupied	15.2%	14.2%	23.0%	56.5%

[a] from [7]; source: U.S. Bureau of the Census: *Census of Population and Housing, 1970;* "Census Tracts, Fresno, California SMSA", 1972.

[b] Not all tracts are exclusively within Westlands. The estimated total populations of Westlands is 6,000 [30].

Community control and provision of social services (through property taxes) are severely limited in the Westlands area, undermining any pretense to democratic decision-making. The Special Task Force on the San Luis Unit [30] noted:

> Because votes are cast on a property-weighted system, it is possible for a small number of landowners to directly control the outcome of an election. It was found in a study in 1972, for example, that in Westlands Water District, 11 of more than 3,000 eligible voters can decide an election. Again, the propriety of this system must be left to the State of California. However, because the district is the only level at which public participation is now required, it must adequately represent the public interest if the public interest is to be served.

Only one systematic study of the differences in social conditions between a large-scale farming community and a small-scale family farm community has been done for California. In 1945 Dr. W. Goldschmidt studied the social conditions in two San Joaquin communities which had similar economic and population conditions. Arvin, in Kern County, was (and is) dominated by large commercial farms while Dinuba, in Tulare County, was (and is) surrounded by small family farms. His study was extensively updated by the Small Farm Viability Project [22]. Both the original study and the update present evidence on community structure which strongly suggest that substantial social costs are incurred under conditions of large-scale commercial farming.

The goal of establishing the family farm cannot be considered as only some halcyon dream but rather as one of the alternative rural economic models. Taking into consideration the social and environmental costs associated with large-scale farming practices, we conclude that enforcement of the Reclamation Act as interpreted by Congress and the Courts is one step toward the creation of a sound rural economy.

V. Recommendations.

In conclusion, we see a policy of encouraging the development of small-scale family farming units in California to be socially rational from an economic, environmental, and social standpoint. We emphasize that such enforcement, by itself, cannot achieve the goal; enforcement is a necessary but not a sufficient condition.

The acreage limitation, a residency requirement, and leasing restrictions are all necessary to insure the creation of a family farm community. Control of price and sale conditions of excess acreage and the inclusion of groundwater within the jurisdiction of the Bureau's enforcement powers are

necessary to distribute, in a socially constructive way, the capital gain created by the presence of project water.

We offer the following specific recommendations:

1. Residency: Farmers should reside within 25 miles of the farm site. Current owners of non-excess acreage and owners with medical problems could be exempted.
2. Acreage: Farms should be limited to 320 acres, except where the current limit has proven not to be economically viable.
3. Leasing: Leasing should be limited to 320 acres with no leaseback agreements permitted.
4. Sales: All land, excess and non-excess, should sell at pre-project prices in current dollars until the project is paid for. This insures that the increment remains with the land, and thereby helps establish a durable family farm community.
5. Lottery: If land were priced at pre-project prices--below the current market value with the water--we would expect excess demand. Thus to stymie illegitimate transactions the Bureau should offer the land through public lottery to eligible buyers. Criterion for eligibility should reflect ability to realize the Act's goals.
6. Groundwater: Groundwater as well as project water should be subject to reclamation law. The State of California needs to change present laws on ground water rights, and both the State and the Bureau need to set limits on overdrafting.

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