

ROUGH DRAFTIRRIGATION DISTRICTS AND ECONOMIC DEVELOPMENT IN THE SAN JOAQUIN VALLEY
OF CALIFORNIA: THE ROLE OF LAND TAXATION1. Growth of Farming in the San Joaquin Valley

The rapid growth of intensive irrigated agriculture in California is one of the more striking developmental achievements of modern times. In 1870 California was noted for its cattle, wheat, and inordinate concentration of landholding. Today the highly developed farm areas of California look to the easterner more like gardens, and more like towns than countryside, so close are the homes, so narrow the network of roads, ditches, and utilities.

The period of most rapid growth was from 1890 to 1930, when California's irrigated land increased from one million acres to four, a compounded rate of per annum. This rate was matched by other western states, but California excelled in the intensity of her development so that her share of the nation's cash receipts from farming rose from % in 1890 to % in 1920 and % in 1954. A semi-arid desert became the greatest farm state in the Union.

In the San Joaquin Valley this growth is closely tied to a developmental institution named the Irrigation District, which is the focus of this study. Acreage in California Irrigation Districts rose from none in 1887 to in 1920 and in 1954, of which is in the San Joaquin Valley.

2. Relevance to Problems of Retarded Countries Today

There was a time when "economic development" meant industrialization, but today most developing nations have recognized the equal importance of modernizing their farming. They are pouring much of their developmental capital into irrigation work, and attending to land tenure reform.

They will not fail to avail themselves of the technical experience of America. It is less certain that they will adopt the social institutions that made possible the technical advances, but it is probably more important that they do so: the American techniques are capital intensive in lands of cheap labor. But, the institutions have more general relevance.

One historical experience is not freely transferable, it is true, to another time, place, and culture without considerable adaptation. Yet we need not be "ugly Americans" to divine that our rapid progress must reflect in part the operation of some principles worthy of preservation. The excesses of boosters abroad may betray not too deep an appreciation of American institutions, but too shallow. In a spirit neither Chauvinistic nor apologetic I suggest we undertake to sift the wheat from the chaff of history and define the essential ingredients of such success as we have achieved.

3. The Parallel of California Then to Retarded Areas Now

California in 1870 bore important likenesses to many underdeveloped lands of today. It was not an entirely "new" country where settlers found themselves liberated from the obsolete institutional constraints of the old. Many of the best lands were in vast Spanish grants, validated by the United States at Guadalupe-Hidalgo (1848), and never open to homesteading or even surveying. Other giant holdings developed from railroad grants, the Desert Land Act, the Swamp and Overflow Lands Act, and several other ineptly designed and laxly administered Federal land laws.

On these large holdings had developed a culture in some ways quite hostile to irrigation. Ranchers who had early seized riparian lands opposed upstream diversions that threatened their status quo. Wheat

farmers regarded the irrigator's life with contempt and his numbers with fear.

Perhaps these reactionary interests were less entrenched than their counterparts in retarded countries today. On the other hand they were less decadent. By 1880 California had just become the nation's leading wheat producer. Throughout its development, irrigation had to overcome a class of successful large wheat farmers in their full vigor.

Land subdivision is an essential part of developmental programs in many areas today. So it was also in California. Irrigation required the transfer of land from the large holders, with their primitive extensive culture and aristocratic outlook, to small operators willing to assume the exacting labor of irrigating and to risk their savings improving their small holdings rather than expanding them.

(Inadequacy of economic analysis alone. These were private empires, with their own police and government, as in Latin America today.)

4. Problems Leading to the Formation of Irrigation Districts

The earliest irrigation was by individuals near streams, and below points of easy diversion. When the easiest natural possibilities were exhausted, or at least preempted, it became evident that large-scale works were needed to carry water far from its origin, to distribute it, and to store surplus spring waters for summer use. The question arose of how individuals might best cooperate to provide these works.

There was no shortage of enterprising men who projected canals as commercial ventures. But most of these quickly met severe frustrations and failure. The frustrations centered on the relations of the water supplier to the lands served. For a commercial enterprise to succeed,

in any but the most favorable physical circumstances, it was necessary for the owners of the enterprise and the lands to be one. Some of the most important reasons for this are the following:

a. Seller cannot capture most of benefits he brings in prices he charges.

(i) Extremely diminishing returns to water

Today, e.g., a water supply of 3 afy in So. San Joaquin Valley might change land valuation from \$50 up to \$1050, or by \$1000, but the landowner might not be willing to pay more than \$5. for a fourth afy. At 10% interest, the \$5. is worth \$50 capitalized value for the 4th afy; but the average afy is worth $\frac{\$1000}{3} = \$333.$

(Adam Smith on value in use and value in exchange.

So most of the benefit inures in form of changed land rent capitalized into land value.

(ii) Spillovers

(a) Technological

Ground water.

Captured by neighbors. Hard to control. So non-buyers get much benefit. (Today, aquifer management, becoming more and more the frontier, need is ever greater for a public agency.)

Negative spillover--drainage problem. (The garbage from irrigation) Required common control, community works.

Flood control. A joint product of water supply, where multi-purpose development is possible. But private company had no way of getting reimbursed.

(b) Pecuniary

Development of rural community raised value of neighboring lands. In part a product of the irrigation investment, but not recapturable.

But the big thing was secondary benefits, captured by towns and cities. The sort of thing that moves from Atlanta to Seattle when Boeing captures a contract from Lockheed; or from Bishop to Los Angeles when Los Angeles bought Owens water.

b. Space factors

Distribution cost is major cost of supplying water.

Distribution cost is not primarily a function of the amount of water delivered; or even of the capacity to deliver at peaks. Rather, cost is a function of the length of lines.

Volume effects vs. distance effects. Decreasing costs to volume; increasing costs to distance.

So distribution cost, and therefore all cost, is primarily a function of the area over which service is given.

Premium is therefore on compact settlement, compact service area, in which nearly all landowners participate.

c. Time factors

Advance commitment by seller. Cannot lay another ditch-let, or a 1st pipe, all the way, each time a new farm taps on. To get economies of scale--volume effects--must lead the market. The market can't be there first.

Must minimize waiting period, for financial success. Must be compact in time as well as space.

~~Problem of slow adapters. Lag of land settlement behind civil engineering, of private investment behind public. Teele, Weeks and West.~~

Problem accentuated by land speculation. I.e., land values rising each year, makes it possible for individual to hold land idle, or dawdling, and get his payoff in increasing land valuation.

$$\frac{MR}{P} = i - \frac{AP}{P} + t$$

(To analyze effect of higher P, multiply by
(P, thus: $MR = Pi - AP + Pt$)

For those with low interest costs, they can hold idle.

The theory is less convincing than the facts. Empirical evidence is overwhelming. Land sold by mail, all over world. Lure of something for nothing.

Like Reno and Las Vegas. One could hardly predict them, reasoning a priori from mechanistic and simple postulates. Is the nature of the human beast.

Strong irrational element in it, revealed by fact, probably true, that most lost money.

d. Credit factor

Commercial irrigation companies had trouble raising money, long term--no collateral.

e. Canal costs are high relative to water's value. Financial success requires that canal mileage be minimized. This in turn requires a compact service area in which almost all the lands participate.

f. Lag of private response behind public initiative; of land settlement behind civil engineering. W & W. Canals must generally be built before their customers are situated, since settlement and subdivisions are virtually impossible without a ready water supply. Financial success

requires that the period of waiting be minimized before actual water users are ready to fructify the sunk investment in the canal system. Land speculation was aroused by building works.

g. Credit was allocated by collateral security of landownership. Tax power gave the water agency a piece of the land, thus gave it a credit rating. General obligation bonds better than revenue bonds.

h. Need for drainage works to remove irrigation return flows and prevent salinity buildup.

i. Flood control need.

j. Remove works from County tax rolls; in more recent times the power to sell municipal bonds free of Federal income tax has risen to a major advantage.

k. To be relieved of "due diligence" in developing water rights on which have filed.

l. To get eminent domain for access to water (?).

m. To get right to generate and even distribute power. (To get income from this tax free, by getting free water, instead of a dividend from power sales.)

n. To fight for water rights against riparians. Irrigation Districts were all appropriators, serving lands away from river banks.

o. To contract with wholesale agencies.

In light of these relationships there was a general opinion in the 1870's and 1880's that irrigation development would depend on large landholders' building works to water their own lands. To this end public policies like the Desert Land Act encouraged concentration of landholdings.

And indeed several early canal systems were undertaken by large landholders specifically to enhance the value of their lands, either for sale or rental. Whatever the merits of this procedure in certain areas--and we will return to survey its results presently--it was not generally feasible where landholdings, even though large, were smaller than the optimal distribution and storage system. Nor did the giant landholders like Miller and Lux, and Haggin and Carr, show any inclination to more than skim the cream from their natural opportunities, of which they had early preempted the choicest. The more ambitious jobs, demanding much more expenditure and risk, were left for smaller holders of less individual means, scattered among larger dry-farmers of whom many were aggressively hostile.

5. Irrigation Districts

In this extremity the small farmers needed an effective organization. To the organization which they developed may be attributed much of the success of intensive irrigated agriculture in the San Joaquin Valley, as well as in many other sections of the arid West where the California model was copied. The organization is the "Irrigation District." Many students of the District would say, with a prominent San Jose attorney, that ". . . the discovery of the legal formula for these organizations was of infinitely greater value to California than the discovery of gold a generation before."

In 1887 California's Legislature passed the Wright Act, enabling farmers to borrow the State's sovereignty to organize their water supply as a municipal-type function. Wright Act Districts today may be formed by simple majority vote of the resident voters of the proposed District. (Fn.: Before 1920 the law prescribed a 2/3 majority.) There is no property qualification on voting. (Fn.: California is the only state with this provision, all others limiting the franchise to landholders in the District.) Districts may levy taxes and issue bonds, both without legal limitation, which are first liens on the taxable property in the District, including that of the dissenting minority. They may if they wish put a toll on water delivered, in addition to or instead of levying taxes. They may include urban lands not receiving water and tax them ad valorem in recognition of secondary benefits, but District taxes are not limited to benefits received. Irrigation Districts may also regulate ground water levels by recharge and drainage, generate and distribute power, and in general undertake any function related to water supply.

One thing an Irrigation District can not do today is to tax improvements on the land. Under the original Wright Act of 1887 Districts levied on all real estate, but in 1909 the Legislature gave them the option, which most of them exercised, of exempting improvements. In 1917 the exemption became mandatory.

This unusual tax policy makes the Irrigation Districts of California a social laboratory of much interest to economists, who have long suspected that taxes levied on land alone might significantly accelerate economic development. Over 100 independent Districts present a large sample in which to evaluate the results of the policy, applied with varying force from inactive Districts that have never voted a bond issue to extremely vigorous ones that have subjected their lands to some of the heaviest land taxes and bonded debts and liability to future taxation (which we will see is particularly important in its effects) to be met in history. The effects of these taxes on land development are the particular focus of this study.

6. Solutions to problems, via Irrigation Districts

a. Collected consumer surplus, and spillovers.

No company town necessary.

Included cities (Ad valorem approach let them collect for pecuniary externalities, even though these were not demonstrable benefits.)

Towns took the lead.

Drainage.

Taxed for ground recharge.

Power flood control--multipurpose. Even distribution of power.

b. Space factors

Compact settlement

c. Time factor

Fast settlement

Is like extending credit to settler

d. Credit factor

Had lien on land. General obligation bonds.

e, Other advantages--not so social

No county property taxes

No Federal income taxes

Preferential water rights position--no due diligence

Contract with wholesalers

7. Probably the most remarkable feature of Irrigation Districts was not their works themselves but the rapid and intensive development of the lands served by those works. It was this that made it possible to pay for the works and establish the reputation needed to finance more works. It is to this that the study directs particular attention.

8. The role of land taxation in economic development

It is freely alleged that heavy taxes on landholding, levied on potential best use rather than actual use, tend to force land to its highest use. But it has never been demonstrated to my knowledge why a tax should be more effective in this regard than the implicit opportunity cost would be in the absence of any tax.

The exemption of improvements may be part of the explanation. But in Irrigation Districts improvements are generally subject to all the usual taxes levied in humid areas for county and school functions. I would like to suggest that it is not so much the absence of taxes on improvements as it is the positive working of a heavy tax on land that accounts for the remarkable flowering of Irrigation Districts.

This conclusion follows from two postulates which in this study I will take as given. One is that land prices are on the whole derived from more remote future expectations than are the prices of other assets, hence are particularly sensitive to discount rates. Two is that the rates at which different individuals can afford to discount those future expectations vary over a wide spectrum which the credit markets do not narrow down to anything approaching one "market" interest rate.

In the absence of heavy land taxes, therefore, the ability to buy title to land depends as much or more on the individual's financial position than it does on his ability or desire to put land to productive use. The sort of individual who is willing to undertake the exacting and confining labor of developing new irrigated land is not typically a man of great property or high credit rating. He would often be unable to buy land in competition with his financial "betters."

Most economists seem inclined to accept the resulting pattern of landownership as an economical adjustment to the facts of life. They regard the financing of land titles as a necessary economic function which the invisible hand rightly assigns to those with strong finances. In the words of one of them, weakly financed individuals "have no business holding land," however great the marginal product they can impute to it.

But the imposition of heavy land taxes completely alters the financial character of land titles and throws the question in a new light. It is not, after all, socially necessary for landholders to carry a heavy financial burden of holding title. The prices of land titles are drastically reduced and the major cost of carrying title becomes payment of the annual tax. In these circumstances land tends to be allocated more according to marginal productivity and less according to the financial power of different bidders.

Let us illustrate this principle graphically. Assume there are two rival bidders, one a dry-farmer, the second an irrigator. Assume that the marginal productivity of a certain acre would be \$10 a year if incorporated into the dry farm, but \$15 a year on the irrigated farm. Finally, assume that the dry-farmer is an older man whose means have outrun his enterprise, who discounts future values at 4%; while the irrigator is an energetic young immigrant without credit standing who discounts future values at 8%.

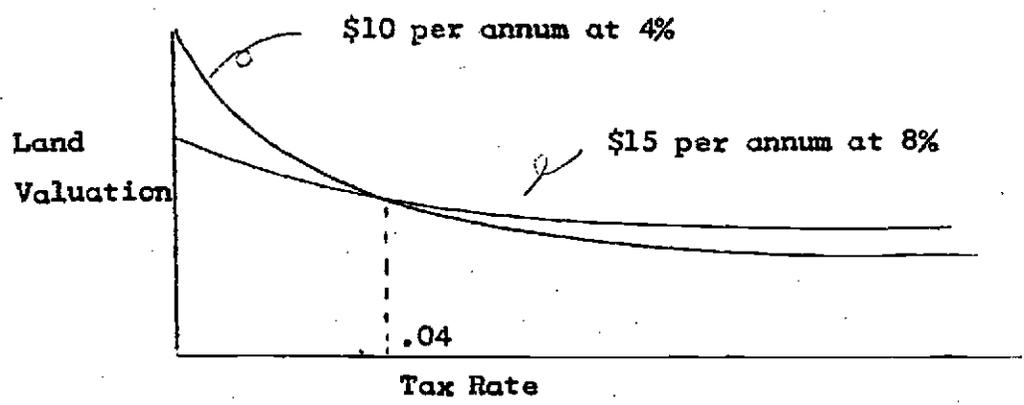
In the absence of any land tax the dry-farmer will outbid the irrigator by the excess of \$250 over \$187.50. But the imposition of a land tax causes their relative positions to shift until when it becomes high enough the lower bidder becomes the higher. Sample figures are in Table 1, and graphed in Figure 1.

Table 1

Value placed on title to land by a dry-farmer with marginal productivity of \$10 and discount rate of 4% compared to value placed on the same land by an irrigator with marginal productivity of \$15 and discount rate of 8%, at different rates of land tax

Tax Rate % (t)	Valuation by Dry-Farmer \$ ($\$10/.04+t$)	Valuation by Irrigator \$ ($\$15/.08+t$)	Advantage of Dry-Farmer as % of lower figure
00	250	187.50	34
01	200	167.	20
02	167	150.	11
03	143	136.	05
04	125	125.	-
05	111	115	-3.6
06	100	107	-07
--			-
20	42	54	- 29
--			-
30	29	39	- 34

Figure 1



When the tax rate reaches 4% land changes hand. At all higher rates the irrigator outbids the dry-farmer.

As an important corollary this consideration calls for some revision of the received theory of tax capitalization. From this it appears that taxes are not fully capitalized, but after a point cause a transfer of land to those whose bidding is not so much affected by increase of taxes.

The case is stronger, and more relevant, when land value increments are expected.

$$\frac{MR}{P} = i - \frac{AP}{P} + t$$

Additional space must be devoted to expanding and clarifying this thesis.

Another way of viewing the Irrigation District tax is as a means of extending cheap credit to settlers. The credit is extended via lower land prices, which prices have been lowered by the District's having assumed heavy bonded debt and announcing its intention to tax land. In effect the District extends cheap credit to settlers by taking a mortgage on their land, which the settlers pay off through the tax mechanism

9. Further gains--develop total rural community

Initial pattern of land settlement: a tail that wags a big dog.
Everything conforms to it.

Gave to farmer the advantages of living in the city.

Provided via the market mechanism all the things that under iso-
lated conditions must be provided by vertical integration. Thus our
economic community and a market could develop in place of a company
town, a plantation, an absentee owner, a factory-in-the-field.

Also a social and political community. "Total community."

10. Some criticisms of Irrigation District policies

Today many Districts have become instrumentalities for holding
underdeveloped water rights, thus assuming the same role toward out-
siders as reactionary dry-farmers in the Districts once assumed toward
irrigators.

Tying the water to the land, which has so many positive aspects,
also lends to stickiness. Problem is to get the good without the bad.

11. Summarize implications of U.S. experience for underdeveloped
countries today

Our posture before the world is often as the arch-capitalist nation
whose brilliant success has derived from freeing individuals from com-
munity constraints through deifying the institution of private property.
This is far from the truth. Where private property conflicted with
economic progress we have oftentimes prostrated it with a right good will.
Our institutions are not so absolutely individualistic as sometimes
painted. In a full appreciation of this fact and its implications
there may lie the basis for a long-term reconciliation between ourselves
and our Communist rivals.