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WATER FROM POWER: WATER SUPPLY AND REGIONAL GROWTH IN THE SANTA CLARA VALLEY*

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The principal task is to uncover the origins of water development in a major urban area. The major thesis examined is that the demand for water arising from agricultural and urban growth is the dominant variable and that a political growth coalition has operated to see that water shortages and costs do not stand in the way of local development.

The present study is directed at three important gaps in the water resources literature. Our principal task is to uncover the origins of water development and overdevelopment in a major urban area. Most attention in the field of water resources has been focused on the economic efficiency of water projects [*2; 16*] or the bureaucratic and legislative politics behind them [*19; 30; 32*]. Little attempt has been made to go beyond the most readily apparent "institutional" or economic causes of water supply to the political economy of regional growth. A notable exception is LeVeen [*28*]. Our thesis is that the demand for water arising from agricultural and urban growth is the dominant variable and that a political growth coalition, backed by class power, operates to see that water shortages and costs do not stand in the way of local development.

*We wish to acknowledge the cartographic assistance of Adrienne Morgan.

A second goal is to shed light on the relation between water supply and regional development. Studies of industrial location and regional growth occasionally deal with the causal role of water but have come to no consensus [*10; 17; 24; 31; 36*]. Because these inquiries treat water supply in isolation from political-economic forces, however, they ask the wrong questions. It is not how water predetermines development, but how water supply is created in the development process.

Finally, we relate the history of water development in San Jose and the Santa Clara Valley. Many water histories of the other great cities of California exist [*8; 15; 22; 26; 57*]. Yet San Jose has never had an adequate coverage, despite being the fourth largest city in the state, the world center of microelectronics, and a textbook case of rapid growth.

In the first three sections of this paper we lay out a descriptive history of regional development and water supply.

In the last two sections we try to answer the two principal questions posed above. We do so, first, by seeing how conventional institutional and economic explanations measure up against local evidence and, second, by looking more closely at the politics of water development. In the process we discover that there is only *one* question concerning water and regional growth: how the former is to be mobilized to serve the latter.

HISTORICAL DEVELOPMENT OF THE VALLEY

Santa Clara County lies at the foot of San Francisco Bay. Its heart is the Santa Clara Valley, flanked by the Santa Cruz mountains and the Diablo (or Hamilton) Range. There are really two valleys, separated by Coyote Gap, and the principal site of development has been the broad northern plain. The county has a mild mediterranean climate, relatively free of winter frosts and summer coastal fog. Winter rainfall is about 10–20 inches in the valleys and 30–50 inches in the mountains. Local streams are small and generally dry during the summer. The valley is blessed with deep alluvial deposits of substantial water-holding capacity. There are three interconnected groundwater basins: Llagos in the south, Coyote in the center, and Santa Clara in the north. Broad alluvial fans cover much of the valley, particularly on its western flank. Toward the central spine of the valley less permeable clays predominate. At the far southern end lies one significant area of poor soil, the alkali "Bolsa" [7].

The modern land use history of the Santa Clara Valley can be divided into two periods, the agricultural and the urban, with World War II as the turning point. Agriculture went through several phases characteristic of California, with transformations working a revolution on valley land use and economic development [*7; 29*].

European settlement began in 1777 with the Spanish mission at Santa Clara and Pueblo at San Jose. The semi-feudal mission supported a mixed and largely self-sufficient agriculture. When Mexican independence brought secularization of the land after 1832, ranchos were established and commercial cattle raising began. Hides and tallow were shipped via the embarcadero at Alviso. Following the Gold Rush, the valley lowlands were converted to wheat, as Santa Clara County became a trading center in the great California wheat boom of the 1860s and 1870s (Figure 1).

San Jose and the city of Santa Clara were the only significant towns in the nineteenth century (Figure 2). San Jose served as the hub of the farm economy, a character retained until World War II [*7; 54*]. It dominated export trade, services, finance, manufacture, education, and government. A rail link to San Francisco was forged in 1863 and to the transcontinental railroad in Oakland in 1869. Manufacture in the nineteenth century consisted almost wholly of agricultural processing activities such as milling and tanning. A few crossroads villages such as Gilroy, Mountain View, Sunnyvale, Evergreen, Milpitas, Coyote, and Morgan Hill arose to provide local services.

A dramatic changeover to intensive agriculture began in the 1880s. Orchard and vineyard acreage grew to 90,000 by 1900, then leveled off, relative to the still limited market (Figure 1). Vegetables expanded rapidly in the next 20 years, followed by another round of orchard development in the 1920s, reaching a peak of 110,000 acres by 1930. About 85,000 acres were in prunes, winning for the valley the reputation of "prune capital of the world." Santa Clara ranked fifth among U.S. counties in agricultural sales in 1919 and 12th in 1929. In 1930 it produced roughly one-third of the world's prunes [7].

Orchards and vineyards covered most of the western slope of the north valley, a narrow strip along the east side, the area from Coyote Gap past Gilroy, and a few foothill margins to the south. The middle of the valleys were occupied chiefly by field crops. Only in a few places were

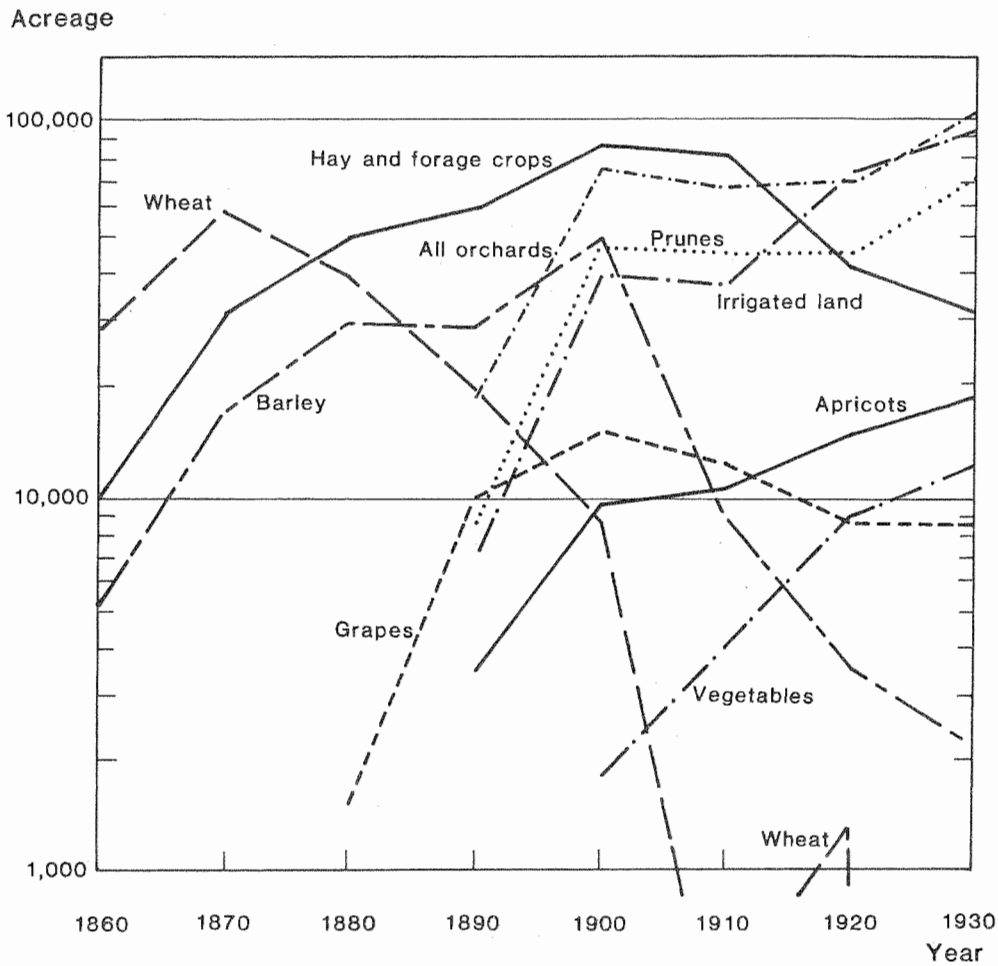

Fig. 1. Growth of Irrigated Agriculture in Santa Clara County, 1860–1930 (after Brock [7]).

soils too poor to support intensive agriculture [7]. Intensification brought dramatic subdivision of land holdings, especially on slopes previously held as livestock ranches [7]. Several new towns arose during the period of intensification, especially in the northwest corner of the county.

The fruit economy of Santa Clara County depended on drying and canning for export. San Jose thus not only benefitted from the general agricultural prosperity but developed the region's first real industry, canning and packing, becoming for a time the nation's leading fruit-canning center [58]. There were 52 canning and packing plants in the north county in 1932 and 7 in the south [7]. They employed 76,000 people—or one-third of the county's entire non-agricultural labor force—at their peak in 1921. Food processing still employed 42 percent of the county's manufacturing labor force of 28,000 as late as 1947 [23]. It also promoted the container, food machinery, metalworking, paper, and lumber industries. Nevertheless, as late as 1930 only nine percent of county employment was in manufacturing. Santa Clara Valley was still an agricultural periphery of the Bay Area.

World War II effected another revolu-

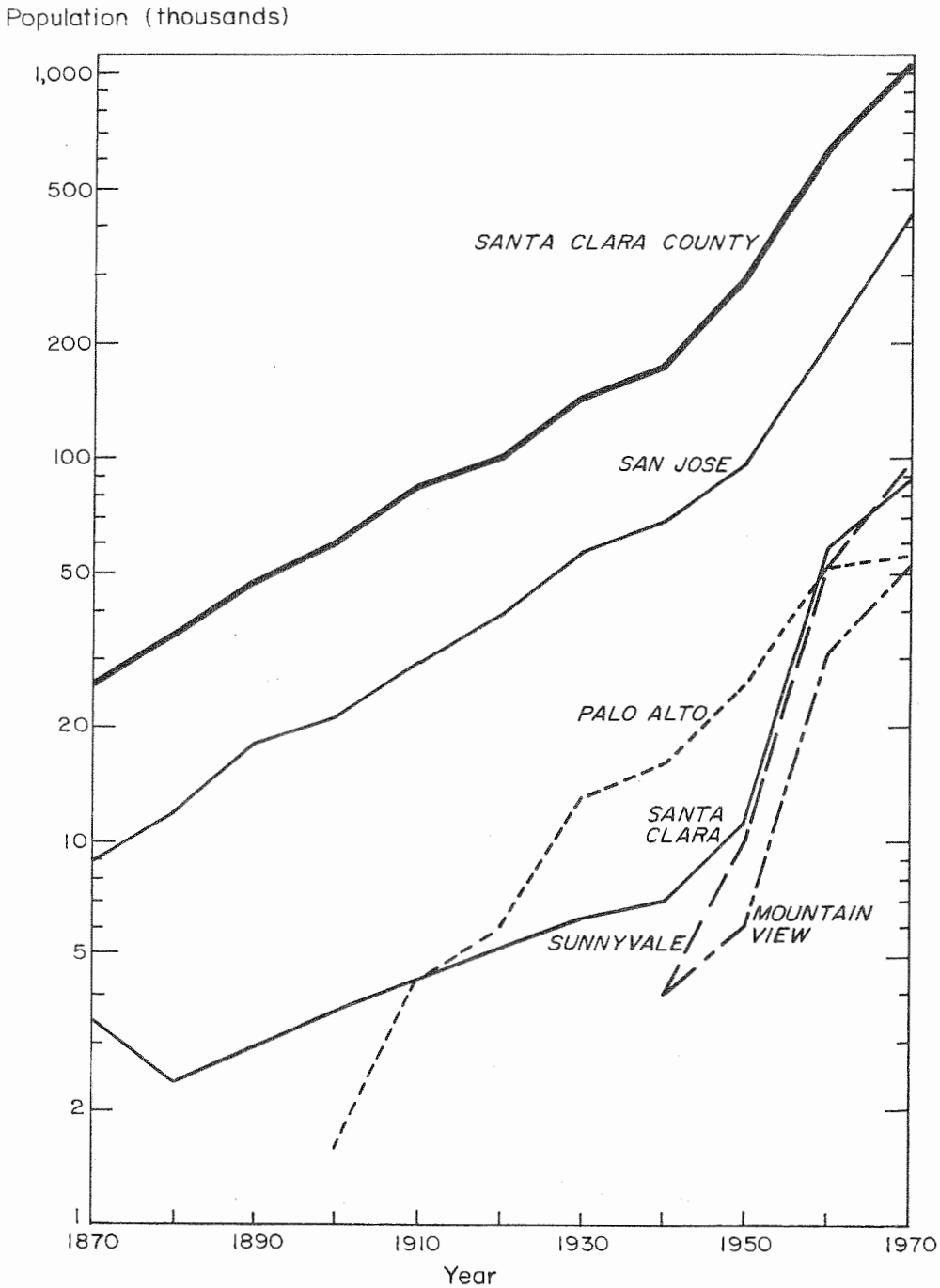

Fig. 2. Population Growth in Santa Clara County, 1870–1970.

tion on the local economy. A new era of industrially-led growth began. This was helped greatly by military spending, both during and after the war. Santa Clara County had the largest amount of capital spending on new plants and the second

largest total capital investment in the Bay Area [58].[1] Yet the greatest expansion, led by electronics, did not hit until after 1955 [5; 14; 46].

The Santa Clara Valley electronics industry began in the late 1930s when two Stanford University electrical engineering graduates, William Hewlett and David Packard, set up shop in Palo Alto. Firms also came from outside the area: IBM built its first San Jose (Campbell) plant in 1943, General Electric in 1946. The National Aeronautics and Space Administration located its Ames Research laboratory at Moffit Naval Air Station in the early 1950s. In 1954 Stanford University, at the urging of Engineering Dean (and later Provost) Terman, opened part of its extensive landholdings as an industrial park. Hewlett-Packard, Varian, and Lockheed, among others, became tenants. Lockheed moved to Sunnyvale to build its huge Missiles and Space Division plant in 1957. IBM broke ground for its large computer-components facility in southern San Jose in 1956.

The most important branch of the electronics industry for the valley, semiconductors, got off the ground in 1956, with the founding of Fairchild Semiconductor in Mountain View. Almost all of the dozens of now-existing semiconductor firms can trace their lineage to the group who started off at Fairchild. Santa Clara County is now home for five of the world's eight largest semiconductors firms and is the acknowledged world leader in the field [5; 46]. From prune capital it has become "silicon valley."

Urban growth and pupulation expansion have steadily accelerated over the last century. County population grew from 30,000 in 1880 to 1,200,000 in 1970 (Figure 2). Recent growth has been notable also for the extremely space-extensive pattern of land use and the shift from complete dominance by San Jose, which in 1920 had 40 percent of the county's population, 56 percent of its manufacturing, and 52 percent of its total employment [7], to the fast-growing towns of the northwestern corner of the county, from Palo Alto to Sunnyvale. The latter became the employment center of the electronics industry. By 1978, total employment in the county had risen to 521,000; "basic" manufacturing accounted for 184,000 jobs, and two-thirds of those were in electronics [1]. The county's share of Bay Area employment is 23 percent, its share of California industrial employment about 11 percent [1]. Today the north valley is almost completely urbanized. The southern valley remains agricultural, but subdivisions are rapidly encroaching.

[1] Ford Machinery Corp. built an armored vehicle plant in 1951; Falstaff Beer a brewery in 1953; Ford Motors an assembly plant (in Milpitas) in 1953; General Package a factory (in Sunnyvale) in 1954.

WATER SUPPLY DEVELOPMENT

The water supply history of Santa Clara County can be divided into three phases: extensive agriculture, irrigated agriculture, and urban. The pressure on local resources has increased from phase to phase, forcing even more intensive and far-reaching efforts to generate additional supplies.

In the early stages of the valley's development, water was abundant relative to needs, thanks to the low water demands of mission agriculture, stock raising, and dry wheat farming as well as to ample groundwater resources. Prior to 1890 irrigation was little used and confined almost wholly to artesian wells and diversions from local streams. Some 460 flowing wells were counted that year. Artesian wells were commonplace until World War I. Water for the towns of San Jose and Santa Clara was organized under the privately-owned San Jose Water Company. The company began with a cistern and went on to build four small reservoirs on the streams coming out of the Santa Cruz Mountains between 1870 and 1900.

The spread of orchards soon prompted innovation. The real change came with the dry years of the late 1890s, helped by improvements in well drilling, development of electric pumps, and discovery of

the benefits of summer watering. By 1900 just under 40,000 acres of the valley were being irrigated (including truck and dairy farms as well as vineyards and orchards) [7]. Pumped groundwater soon eclipsed all other forms of water supply. By 1920 one-third of valley cropland was irrigated (Figure 1); the number of wells had increased to 1700 and groundwater withdrawals had risen to about 40,000 acre-feet annually. As a result, the water table fell from about 30 feet in 1910 to 55 feet in 1920 at a United States Geologic Survey sample well (Figure 3), and artesian wells ceased to exist in the north. The 1920s brought another burst of planting and well-digging that put more pressure on groundwater. Pumping exceeded 130,000 acre-feet in 1933 [*20*]. Helped by below average rainfall for the whole period 1920--1935, the water table fell steadily—to 80 feet at the USGS well. Additionally, land subsidence due to aquifer compaction was occurring, first noticed in 1932; in places the ground had dropped over four feet since 1912 [*39*] (Figure 3). Hardest hit was the northwest portion of the county, where the average depth of wells dropped from 200 feet in 1920 to 400 feet in 1930 [7].

In response to the overdraft, a study of local water resources was made [*50*]. A system of dams to divert winter runoff into percolation beds for groundwater recharge was recommended. Winning approval from the farmers, however, was no easy matter. First, a water conservation district was needed. Such a district was authorized in 1921.[2] It still required approval by county voters, who turned it down in 1921 and 1923, probably owing to insufficient general awareness of the groundwater problem, fear of tax burdens, and the devastating slump in food prices and farm incomes in the early 1920s. But the water problem became worse, and interest in reversing the decline intensified. In 1926 a committee undertook to demonstrate the feasibility of conservation by building nine low earth-fill dams on the west side of the valley to spread water across stream beds for greater infiltration. But the greatest impetus to action was the widely publicized refusal of the Farm Loan Bank in 1928 to lend to a valley farmer because of uncertainty over water.

In 1929, the Santa Clara Valley Water Conservation District (WCD) was reauthorized by the legislature and approved by 90 percent of the voters.[3] In order to placate farmers, however, no bonding power was included in this authorization, so money to build the dams recommended by Tibbetts and Keiffer was lacking. New legislation had to be approved in 1931. Voters turned the bonds down in 1932 but passed them in 1934.[4]

Six dams had been completed by 1936 (Figure 4), and the water table began to rise again—helped by improved rainfall (Figure 3). A reversal of fortunes came with poor rainfall in 1943–45 combined with wartime demand. The WCD moved to complete the last and biggest dams of its system, Lexington and Anderson (Figure 4). Bond issues were approved in 1947 and 1948 and work completed in 1950 and 1952, respectively. These helped slow the descent of the water table but could not reverse it. The Tibbetts and Keiffer plan based strictly on local water resources

[2]Irrigation districts had been legal in California since 1887 and water districts since 1913, but this one required special legislation because it had more than one source of water.

[3]The WCD extended only as far as Morgan Hill. In 1938 Gilroy farmers created the South Santa Clara Valley Water District, which exists to this day. It built Uvas and Chesborough reservoirs. The Morgan Hill area formed the Central Santa Clara Valley Water District, which was consolidated with the WCD in the 1950s.

[4]The margin each time was 7 to 1. Three things may explain the contrasting election results: (1) the initial proposal was too ambitious, so the two most expensive dams were dropped for the time being, lowering total costs from $6 to $2 million; (2) the federal government offered to pay 30 percent of construction costs as part of the New Deal public works program; and (3) economic conditions had improved slightly, helped by New Deal agricultural stabilization policies.

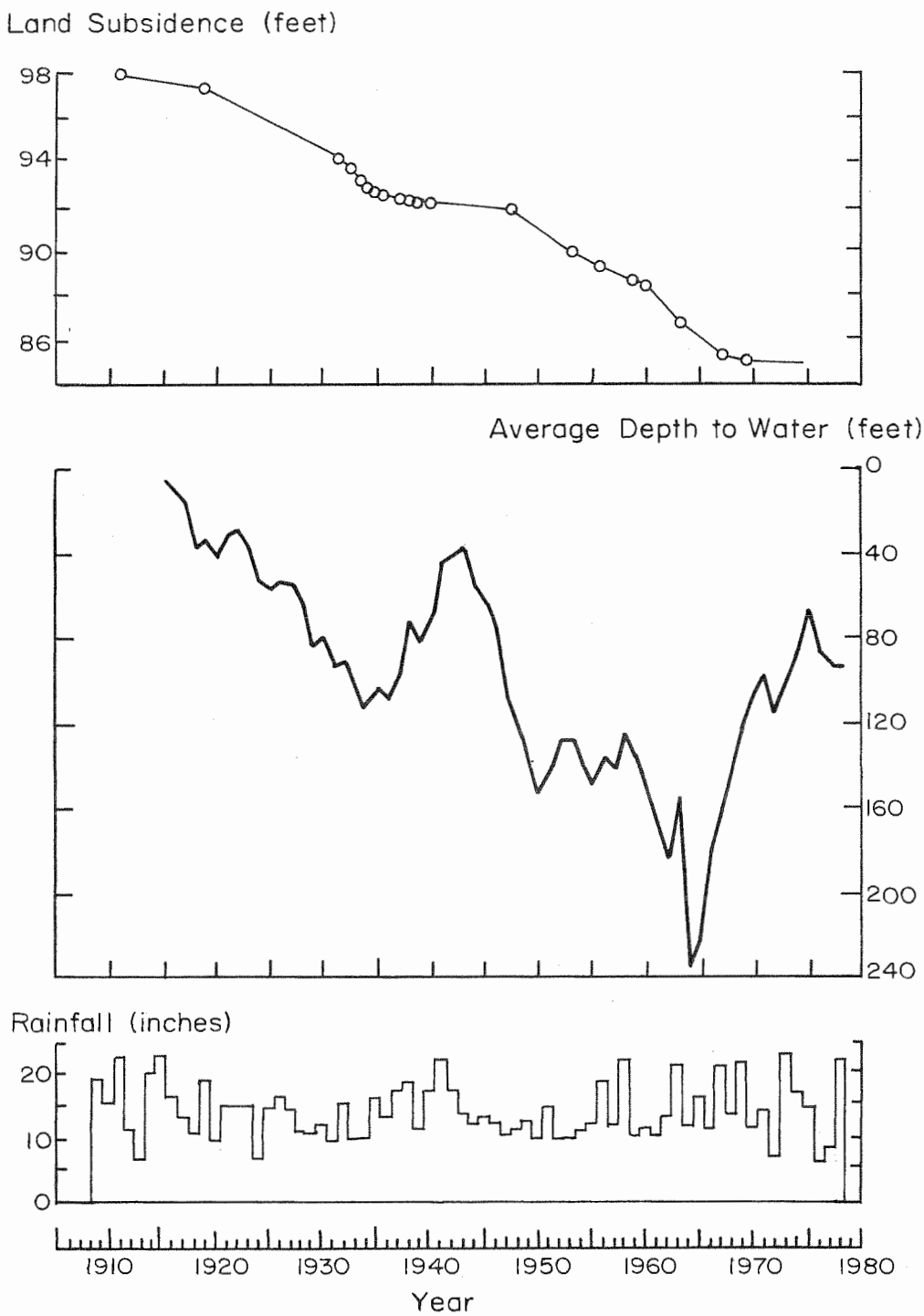

Fig. 3. Land Subsidence, Depth to Water and Rainfall, San Jose, 1908–78. (Santa Clara Valley Water District and U.S. Weather Bureau data. Subsidence measured at USGS BM P7, after Poland [39]; maximum annual water depth measured at well #07S/01E-07R99; rainfall measured at downtown San Jose.)

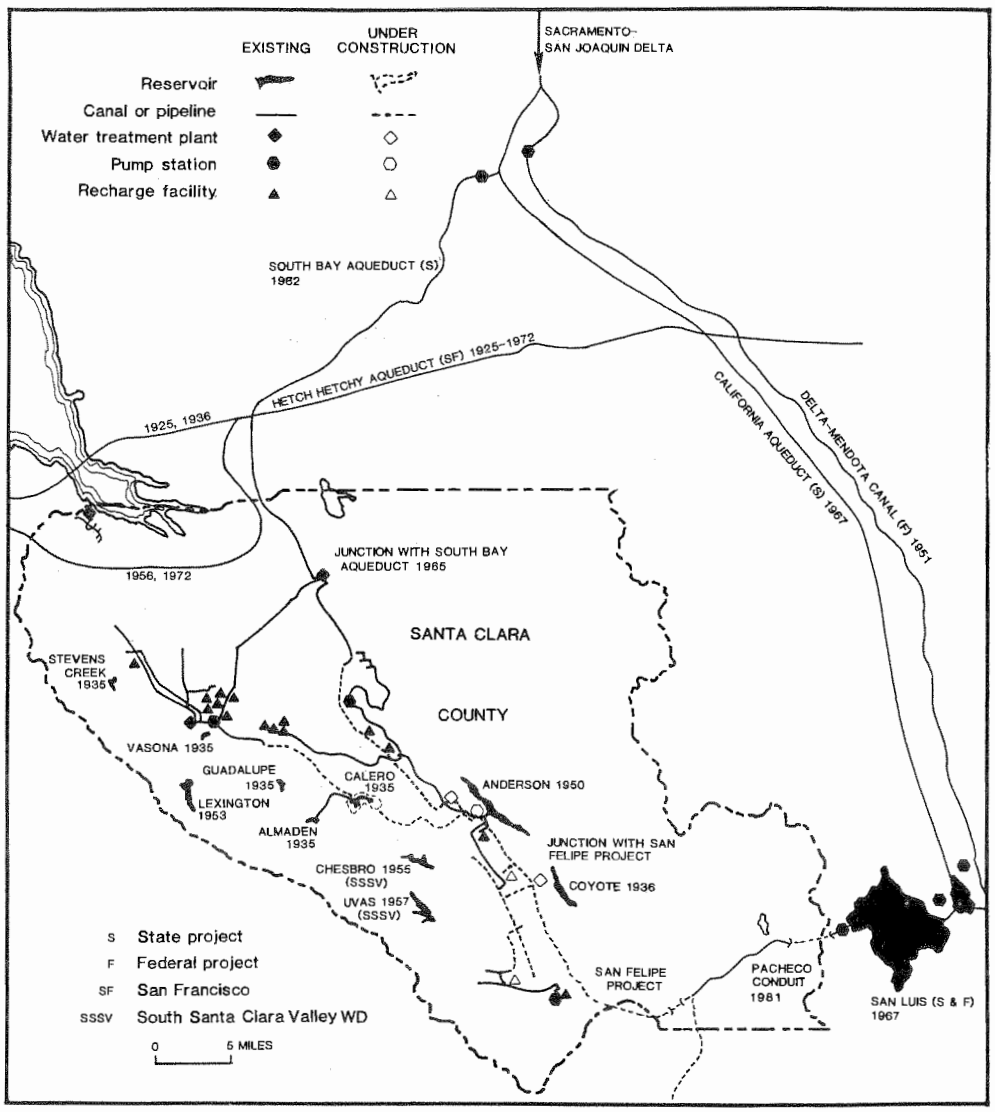

Fig. 4. Sources of Water Importation and Local Storage, Recharge and Distribution Facilities in Santa Clara County.

was soon overwhelmed by urban-industrial growth.

Water demand was not lessened by urbanization. Residential watering often used more water per acre than the orchards it replaced, thanks to the convention of the detached home in an English garden transferred to a semi-arid climate. Agricultural use increased per acre, as the remaining farms changed over from orchard to truck crops. The downward trend in indicator wells, which everyone expected, showed up again after 1955. San Jose Water Works was drilling deeper wells, outcompeting many farmers in the north central valley; and the land had sunk farther (Figure 3). It was clear to everyone that supplemental water would have to be brought in from outside the valley.

TABLE 1

WHOLESALE SOURCES AND USES OF WATER IN THE SANTA CLARA VALLEY

Source		Acre-feet		
Santa Clara Basin (northern valley)			287,661	
Local surface water diversions		19,950		
San Jose Water Works	15,490			
Miscellaneous	4,460			
Ground water pumping		149,711		
Local recharge	111,594			
South Bay aqueduct	38,117			
Imports for direct delivery*		118,000		
South Bay Aqueduct	67,394			
Hetch Hetchy	50,606			
Coyote Basin (middle valley)				
Groundwater (all)			13,200	
Llagas Basin (south valley)				
Groundwater (all)			77,000	
TOTAL:				377,861
Use:				
Santa Clara Basin (northern valley)			287,661	
Agricultural		14,516		
Non-agricultural		273,145		
Coyote and Llagas Basins (Central & South valley)			90,200	
Agricultural		65,200*		
Non-agricultural		25,000*		
TOTAL:				377,861

*Estimates

Source: Santa Clara Valley Water District [*44; 45*].

Water supply became more complex after 1950, with the addition of a second local water district and three outside suppliers. Following a winter of serious flooding in the valley, a Santa Clara County Flood Control District (FCD) was established in 1951 by the state legislature. The FCD encompassed the mountainous areas of the county as well as the valley floors served by the rival WCD. It was also authorized to supply water. The County Board of Supervisors served as its Board of Directors.

Three potential sources of imported water were the City of San Francisco's Hetch Hetchy system, the California State Water Project, and the Federal Central Valley Project.[5] All were ultimately tapped. (Figure 4; Table 1).

San Francisco built Hetch Hetchy reservoir in Yosemite National Park under authority granted by Congress in the Raker Act of 1914. The original aqueduct passed under the South Bay. Palo Alto first tapped Hetch Hetchy water in 1938; Stanford University[6] did so in 1942 [*26*]. Two additional barrels, built in 1956 and 1972, were routed around the south end of the bay. When plans for a third barrel were unveiled in the late 1940s it set off a flurry of interest in the Santa Clara Valley. Hetch Hetchy imports amounted to only 12,000 acre-feet per year prior to 1961, when Mountain View, Sunnyvale, Milpitas, Santa Clara, and Palo Alto municipal water departments and Stanford University signed 30-year contracts with San Francisco for a minimum of 44,000 acre-feet annually to replace dwindling local wells.

The State Water Project was initiated in 1944, finalized in 1957, and funded in

[5]Another source proposed in the 1950s but vetoed by neighboring Santa Cruz County was to tap San Lorenzo Creek in the Santa Cruz Mountains.

[6]The Stanford Industrial Park, a key unit in the county's industrial base, plugged directly into the third barrel as it crossed Stanford land in 1954. The park's first tenant, Eastman Kodak Company, preferred this because water quantity and quality were more reliable than from Palo Alto's wells.

1960. Thereafter the state sought contracts with local water districts. Although designed primarily to serve San Joaquin Valley agriculture, the project included a South Bay aqueduct to carry water from the Sacramento Delta to Santa Clara County. In 1961 the FCD contracted for 88,000 acre-feet of "firm yield" (more is available in wet years). A bond issue for local conveyance facilities was passed in 1963, and water delivery began in 1965. This water all went for groundwater recharge until a treatment plant was built in the late 1960s (water quality is inferior to Hetch Hetchy).

The federal Central Valley Project (CVP) was authorized by Congress in 1937 and its original features completed by 1951. The San Luis Unit, a joint state-federal undertaking, was added to the system by 1967. Santa Clara County will soon receive water from San Luis reservoir via the San Felipe Project. The idea of bringing in federal water goes back to 1944, the Pacheco Pass route was first suggested in 1949, and the project officially launched in 1961 by a special Tri-County Authority formed in 1955 at the behest of the WCD. The project was authorized by Congress in 1967. [53]. Seventy-five percent of San Felipe's 216,000 acre-foot capacity will go to Santa Clara County, the rest to three adjoining counties. Of the former amount, 140,000 acre-feet are targeted for municipal and industrial use, the rest for agriculture; 60 percent will be used for groundwater recharge, 40 percent for direct delivery [52]. Amidst considerable controversy, a bond issue for local conveyance facilities was approved by county voters in 1977. Completion is scheduled for 1987, but litigation continues.

The Water Conservation District and Flood Control District were merged, with voter approval, into the county-wide Santa Clara County Flood Control and Water District in 1968, renamed The Santa Clara Valley Water District (SCVWD)[7] in 1947 [33].

Water development in Santa Clara County has been a familiar California tale. In the nineteenth century supply was essentially a private affair, but as water demands grew in the twentieth century, so did organized public action to secure further supplies. In the period of agricultural dominance unrestricted groundwater mining led to falling water tables and rising pumping costs, which prompted local conservation efforts. Later, rapid urbanization outran local supplies and led to major water importation schemes. Unlike San Francisco, Oakland, or Los Angeles, however, San Jose never developed an independent source in the Sierra Nevada Mountains and still relies principally on groundwater pumping and local surface recharge, supplemented by outside purchases.

URBAN WATER DELIVERY SYSTEMS

The San Jose metropolitan area is unique among major California cities in that it relies for most of its water delivery on private companies. Retail sources, deliveries, and service areas are shown in Table 2 and Figure 5.

The three main private water retailers in the county are San Jose Water Works Corporation, California Water Service Company, and Great Oaks Water Company, San Jose Water Works, incorporated in 1866, is the oldest privately-owned utility in California and claims to be the most profitable today. It has been locally controlled except for a period 1929–45 when it was absorbed by an eastern holding company, General Water, Gas and Electric. The name was changed to the San Jose Water Company at this time. Ralph Elsman, who became President and Chairman of the board in 1936, engineered a transfer of ownership back to a group of local investors, including himself, in 1945. The Water Works is by far the largest retailer of water in the valley, accounting for over half the water

[7]The Board of Directors of the Water District consists of five members elected by supervisoral districts and two appointed at-large by the Board of Supervisors.

TABLE 2

RETAIL WATER SOURCES AND DELIVERIES NORTHERN SANTA CLARA VALLEY

	Sources by Share* (percent)	Deliveries*		
Municipal Agencies	Wells	Hetch Hetchy	South Bay Aqueduct	(acre feet)
Cupertino	1	100	99	2,780
Milpitas		100		5,670
Mountain View	25	75		14,020
Palo Alto		100		16,000
San Jose Muni	10	14	76	5,510
Santa Clara	75	5	20	24,150
Sunnyvale	25	50	25	25,400
				93,530
Private Companies				
California Water	37		63***	11,030
Great Oaks	100			9,075
Purissima Hills		100		**
San Jose Water Works	60		31****	127,665
Cambell Water Company (bought by SJWW, 1980)	70		30	3,200
Stanford University	*****	100		**
Subtotal				150,970
Self-supply:				
Agricultural (est.)				14,500
Industrial (est.)				29,000
				43,500
TOTAL (est.)				288,000

*Figures vary according to yearly weather patterns, etc.
**Figures not available but very small.
***Additional small amounts purchased from San Jose Water Works.
****Additional 9.3 percent derived from own local reservoirs.
*****Some grounds watered from local wells and reservoir.

Source: Recent agency and company data; Melton [33].

sold. As San Jose grew from seventeen to 157 square miles from 1950 to 1980, the Water Works' mains expanded from 481 miles in 1948 to 2,016 in 1978. The Water Works absorbed another private retailer, the Campbell Water Company, in 1980.

California Water Service Company, long the number two retailer in the county, serves cities throughout the state and is the largest private water utility west of the Mississippi. It originated as a holding company (named Federal Water Service) in 1926; it was also sold to General Water, Gas and Electric and later to Elsman's group. California Water Service and Water Works have had the same lead-

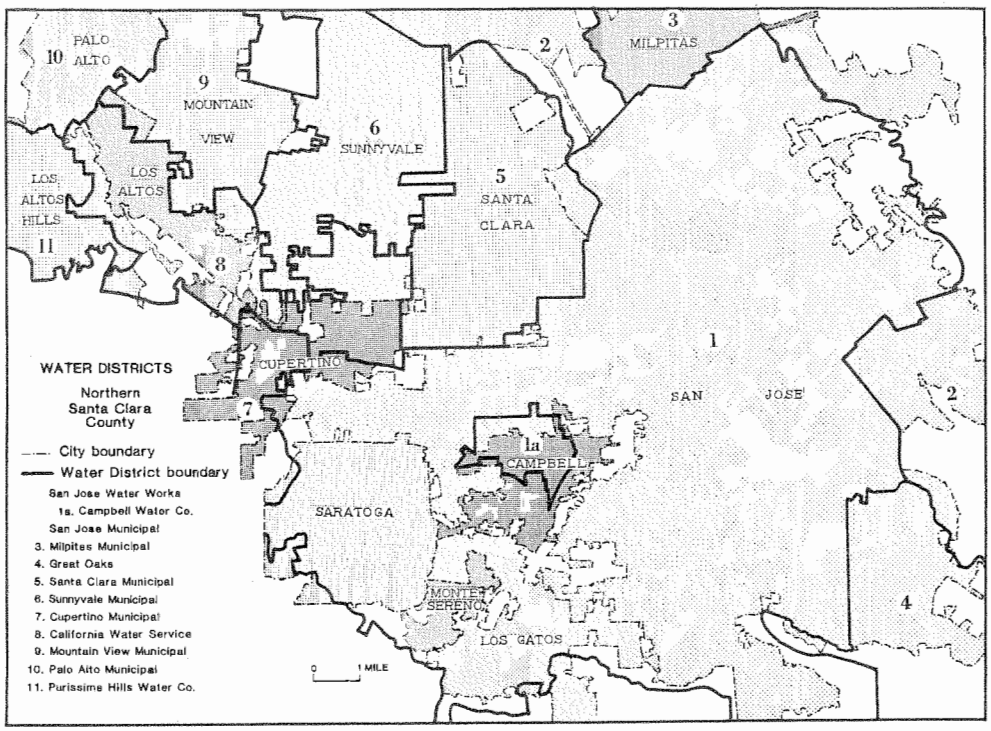

Fig. 5. Service Areas of Public and Private Water Agencies in Northern Santa Clara County.

ership since. Its mains are old and small.

Great Oaks Water Company was organized in 1959 to supply water to a subdivision located beyond the service area of the San Jose Water Works.[8] It is still owned and operated by the founder's wife, without any public issue of stock. Great Oaks is in an excellent position to grow, occupying a strategic position where San Jose is spilling over into the south valley.

Several Santa Clara County cities have municipal water systems. Santa Clara, incorporated in 1852, was served by the San Jose Water Company from 1869 to 1895, when it municipalized the private system. Palo Alto voters approved a bond issue for purchase of several small water companies in 1896, two years after incorporation. Mountain View established its water service before 1910. Sunnyvale and Milpitas both formed city water departments at the time they incorporated, in 1949 and 1954, respectively. San Jose also formed a small municipal water system in 1959.

[8] The developer did not want to pay the price of a main from the Water Works' trunk line and the latter were not enthusiastic about the extension, so the developer sought approval of the California Public Utilities Commission (PUC) to form his own company. Normally the PUC prefers extension by an established utility rather than proliferation of companies. But since Great Oaks could supply water from a nearby well, approval was granted.

THE ORIGINS OF WATER POLICY: INSTITUTIONAL AND ECONOMIC DYNAMICS

Water supply and delivery policies in the Santa Clara Valley have been geared to facilitate agricultural and urban growth, even to promote it. Such a conclusion is common in the literature on water resources development [*2; 11; 16; 18; 36*]. Water policy is considered irrational by these writers because supplies are developed too soon and at too great

capacity, while deliveries are made at too great distance and too large a quantity. Water resources are overdeveloped because neither true economic demand (social benefits) nor the marginal costs of supply are adequately considered by water planners.

We agree with this critique and believe that it applies to Santa Clara County. But we do not entirely agree with the reasons usually given for why water policy is so apparently "irrational." In the traditional critique, overdevelopment is ascribed to the arrangements of water supply.[9] There are three types of explanation. One is that the debris of history—laws, agencies, etc.—has never been sorted out in a rational fashion. Another is that government institutions are flawed by legislative log-rolling, interest-group politicking, or bureaucratic self-perpetuation. A third approach focuses on ideologies such as the "engineering mentality" or the "growth ethic" rather than formal institutions. Predictably, previous treatments of San Jose's water development emphasize the irrationalities of bureaucratic competition, service agency zeal, and obsolete water law [2; 25; 37]. In our study we have found a measure of truth to the institutional critique. But these agreements need to be supplemented by further considerations of the economic incentives for supply expansion. More importantly, however, attention must be redirected from the internal dynamics of water *supply* to an analysis of the demand for water and the political economy of regional growth as a whole.

INSTITUTIONAL MOTIVES FOR SUPPLY EXPANSION: IDEOLOGY, BUREAUCRACY, AND LAW

Agency Zeal and the Service Mentality. A growth ideology pervades both private and public water agencies in Santa Clara County. In our interviews[10] we repeatedly heard of dedication to serving all customers and the necessity of meeting "water needs," whatever and wherever they may be. No mention was made of weighing the economic value of water uses against costs of demand management.

There is ample evidence of agency zeal running to extremes regarding overall water supply. The best documented case is the promotional campaign behind the San Felipe Project which was fervently opposed by no-growth advocates [3; 4; 37]. For example, prior to the 1977 bond election, the San Jose Water Works illegally mailed advocacy literature to its 40,000 billing customers. In another instance, the SCVWD discovered its "need" projections, based on linear extrapolations of past water use growth, were too low to justify San Felipe; shortly thereafter it published upwardly revised figures on past use.

[9] The usual remedy prescribed is a stern dose of the free market, such as greater freedom to buy and sell water, better benefit-cost analysis or improved pricing policies.

[10] Personal interviews with leading figures in Santa Clara Valley water supply are drawn on throughout the rest of the paper. As most of the information was corroborated by two or more people, no individual citations are given. People interviewed were:

Bruce Allen, Assemblyman, 1953–1963, presently Superior Court Judge;
Robert Minge Brown, Chairman of the Board and President, San Jose Water Works, 1960–1980, and Chairman of the Board, California Water Service Company, 1960–1980;
Alden Campen, former Chair of Industrial Development Commission of San Jose;
Sam Della Maggiore, Board of Supervisors, 1952–1968;
L. F. Dunton, Vice-President, San Jose Water Works Company;
Albert Henley, attorney, Santa Clara Valley Water District and former Mayor, Los Altos Hills;
Daniel Kriege, Head of Operations, Santa Clara Valley Water District;
Charles Lieb, Board of Directors, San Jose Water Works;
Ralph Mehrkens, Board of Supervisors, 1960–1975;
John Motch, Supervisor of Quality Control, Eastman-Kodak, Palo Alto;
Betty Roeder, owner, Great Oaks Water Company;
unidentified staff members, State Public Utilities Commission, San Jose Water Works Company, California Water Service Company, Santa Clara Valley Water District.

In terms of distribution policy, the SCVWD, principal water wholesaler in the county, has always regarded its responsibility as replenishing groundwater wherever and however it is used. This requires costly storage dams, importation schemes, distribution canals, pipes, percolation beds, and some treatment works. Cost recovery up to 1964 was solely by property taxes (on land, not improvements), so there was no relationship between price and supply, either in location or quantity. Such policy is a license to overpump groundwater. Since 1964, financing has been by a dual system of property taxes and water charges,[11] but taxes still account for one-third of revenues. Groundwater charges amount to another third and are assessed by zones that correspond to the three groundwater basins. This so-called "pump tax" was $54.00 per acre-foot in the north valley in 1980. The effort to relate pricing to service costs is attenuated for farmers, however, who pay only one-fourth the municipal-industrial rate.[12] The last one-third of revenue comes from direct delivery of South Bay Aqueduct water.

Retail agencies have encouraged growth, both in terms of spatial extension and quantity consumed, through their location and pricing policies. San Jose Water Works can be used as an example, though the public water department's behavior is not noticeably different. First, the Water Works extends mains to virtually any new subdivision, including those "leapfrogging" to cheaper land beyond the built-up part of the city. Sometimes service anticipates development. For example, when a feeder main was built into the then lightly settled Alum Rock area, the company [*41*] proclaimed:

> These photos portray, as no words can, the valley's eastward growth in a period exactly spanning San Jose Water Works' service. . . . Now, stately homes are *following our services* up these once-bare hills in the foregrounds (emphasis added).

Secondly, the company uses a "postage-stamp" rate for service, even though the marginal costs of serving distant customers is higher than serving those near to wells and trunk lines. These two policies contribute to a pattern of residential sprawl rather than a more compact, sequential form of development that would minimize costs of servicing. As a result, the water works system followed San Jose's notorious crazy-quilt expansion over the last thirty years (Figure 6). Thirdly, prices have traditionally followed a "declining block rate" schedule, or quantity discount. Hence, prices are lowest for the biggest (and most prolific) users.[13] The Water Works was ordered to eliminate block discounts in 1978 by the State Public Utilities Commission. In short, water conservation, via pricing or any other means, has demonstrably not been a goal of the Water Works or other valley retailers (or of the SCVWD). This was shown once again by their casual attitude toward water saving during the drought of 1976–77.

Agency Competition. There are excellent examples of bureaucratic rivalry in the valley at both the general supply and retail levels. The most famous is the struggle between the Flood Control District (FCD) and the Water Conservation District (WCD) that ran from the early 1950s to the mid-1960s [*2; 25; 37*]. The FCD favored the South Bay Aqueduct, the WCD favored Hetch Hetchy and San Felipe. In the 1950s, the WCD opposed granting money to study the aqueduct, tried to block assignment of water rights to the county, and pushed the San Felipe proposal via the Tri-County Authority. In

[11] The present scheme dates from 1971 and is currently under reconsideration because of the limitation on property taxes under Proposition 13.

[12] The Water Works also charges less to agricultural users.

[13] Size of feeder-main, as well as quantity of water, is included in the rates; this, too, favors larger users, because price is by diameter, not area of cross-section. According to local officials, industry uses one-quarter to one-third of local water supplies. In addition, some draw their water directly from wells.

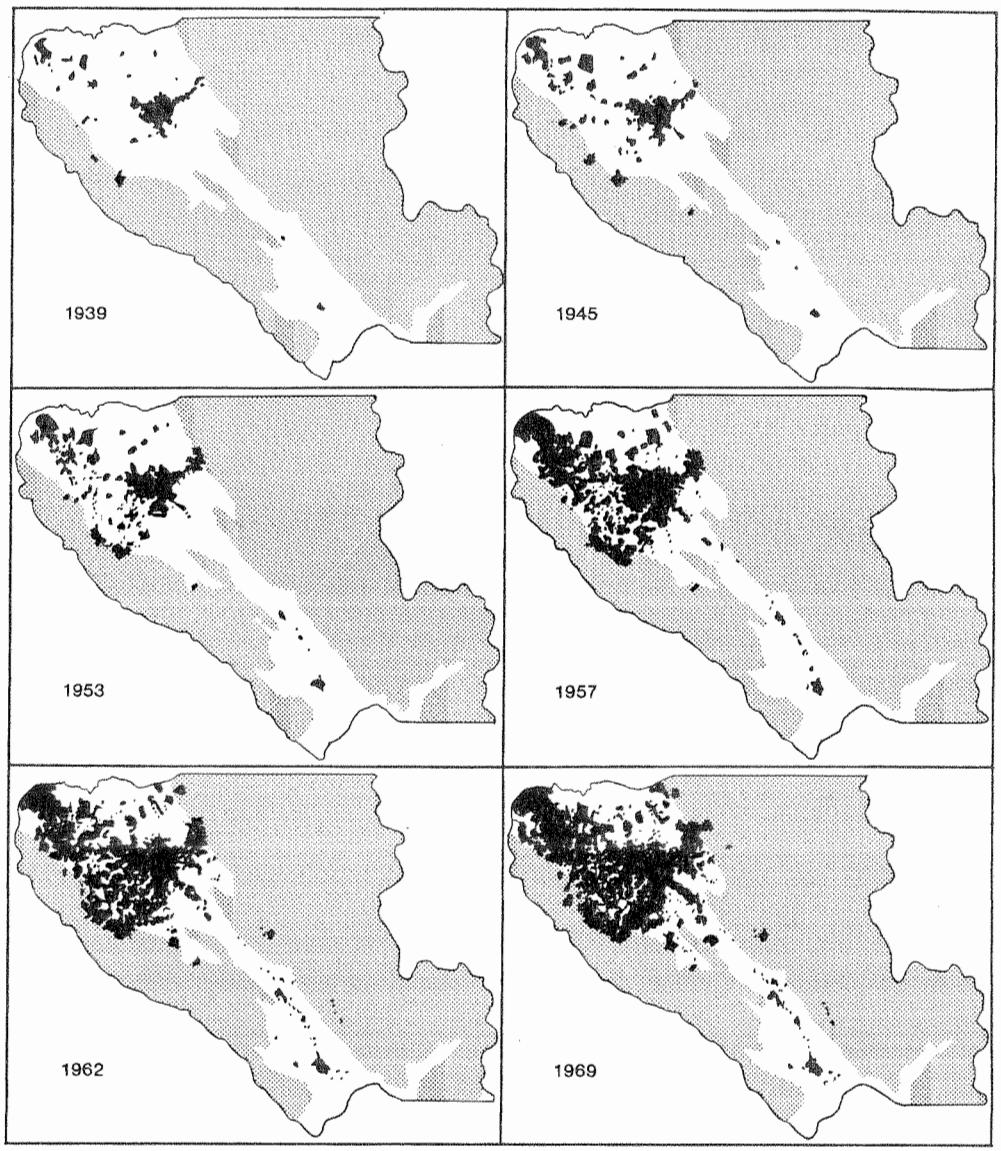

Fig. 6. Expansion of Urbanized Areas of Santa Clara County, 1939–1969.

early 1961, the FCD was negotiating with the cities of the northern county, which had the most serious groundwater problem, to buy state water. In order to outflank its rival, the WCD offered these cities a $20.00 per acre-foot subsidy if they would buy water from San Francisco, which wanted $70.00 per acre-foot versus the FCD price of $50.00.[14] Given the superior quality of Hetch Hetchy water, the offer could not be refused. Not to be thwarted, the FCD signed a contract with the state anyway, despite a shortage of customers. It subsequently

[14] The official explanation for this action was that the alternative cost of bringing water from south county storage reservoirs was rougly $20.00 per acre-foot [25].

bypassed the WCD groundwater recharge system with much of the state water, by building an unnecessarily large treatment plant and distribution system [37].

In retailing, agencies and companies have continually jockeyed for position as the cities of the valley have grown. No one had a secure monopoly on new territory. Since the state Public Utilities Commission does not allow leapfrogging over another utility's service area, the consequences of being outflanked are clear. This is shown by the Great Oaks Company blocking the Water Works at Coyote Pass, Campbell Water Company being geographically engulfed by the Water Works before selling out, and the California Water Service Company's inability to expand.

A common explanation for agency zeal (and competitiveness), whether public or private, is bureaucratic self-interest [97]. Most employees, especially executives and professionals, prefer to work for organizations that "move ahead." Growth brings promotions and salary increases, while guarding against lay-offs and bankruptcy. People also frequently prefer to work for a company that can call itself the biggest or best, for the indirect prestige and self-importance this brings. Loyalty and personal identification with the organization are factors. Personal interviews with employees of the Water Works and other water agencies lend support to these notions.

Water Law. Water law has been an important contributor to water supply overdevelopment. A common problem with appropriative water rights is that the rules of "first in time, first in right" and "use it or lose it" lead users to secure and develop water rights in advance of need [2; 22]. These principles were also built into the Raker Act, which granted San Francisco exclusive rights to secure Tuolumne River water within federal lands. The Act requires the city to develop this water with no lapses greater than three years or forfeit all remaining water rights. Water contracts with federal and state projects have a similar dynamic. When it came time to contract for water from the state, the Flood Control District had to take everything offered, when it was offered, or lose its chance. The SCVWD had the same concern regarding San Felipe: that it must push ahead to secure a share of Central Valley Project water or miss its chance. At the same time, abundant water used for agriculture in the Central Valley is unavailable to the cities, despite urban users' considerably higher ability to pay, because of prior rights and contracts to farmers [49]. Groundwater law is also based on a first-come, first-served system; there are essentially no limits on individual pumping. As a result, overdraft of groundwater resources has been the rule in California [13].

In sum, all three types of "institutional" motives have played a role in water supply policy in the San Jose area, but on the whole they are insufficient to explain that policy. We must turn to economic and political economic analyses to supplement the institutional approach.

DIRECT ECONOMIC MOTIVES FOR SUPPLY EXPANSION

The simple economics of water supply growth are as important as "institutional" arrangements in explaining excessive water development. The immediate economic incentives to water companies, departments, and districts for rapid expansion include common property exploitation, company profits, bond repayment, and outside subsidies.

Pumping and the Commons. The groundwater overdraft in the Santa Clara Valley is a textbook case of overexploitation of a common property resource. Each pumper looks only to his/her own calculations of present costs and benefits. Indeed, each must do so if they are in economic competition; restraint only aids one's competitors. This is particularly true in agriculture, where the number of producers is large and the degree of price control low. Urban agencies do not behave very differently, because they,

too, have strong incentives not to limit pumping without supplemental surface water. The San Jose Water Works simply outran farmers in the center of the north valley in the race for deeper water.

Profits and Growth. Because so much of San Jose's water is privately supplied, supply growth was pursued because it was profitable. Conversely, water conservation has been avoided because it might decrease revenues. (The company's zeal in resisting municipalization over the years similarly reflects its profitability.)

The rule of profits must be modified to include long-term accumulation; in other words, growth of markets is as important as short-term profit per unit sold. Only in this way can one explain the use of average cost pricing and quantity discounts. Also, without expanding service areas aggressively, one's competitors might take away future customers. Finally, where public utility regulation puts a ceiling on the rate of return, surplus revenues are plowed back into construction (capital-bias).[15]

Bond Financing. Municipal agencies and water districts do not operate as profit-making enterprises. Nonetheless, the rule of profits operates indirectly through bond financing because investors want to insure *their* rate of return. Most funds for major capital expenditures by public water districts and private companies are raised by sale of capital improvement bonds at fixed interest rates.[16] The marketability and interest cost of bonds depends on the ratings given by Moody's or other financial houses, which depend, in turn, on the seller's record of repayment and prospects for future revenues. A good record of growth makes raising capital easier and cheaper.

Growth breeds growth through bond financing in another fashion. Once a repayment commitment is made, based on certain estimated growth and revenue-generating capacity, any cutback in water sales will jeopardize ability to meet repayment obligations. This happened during the drought of 1976–1977, putting several water agencies in the Bay Area in a financial pinch. For the same reason, conservation cutbacks by water customers are seen as financially undesirable.

External Subsidies. Four instances of growth incentives via external subsidy can be noted in the case of Santa Clara County. First, both the federal Central Valley Project (San Felipe Unit) and the state Water Project (South Bay Aqueduct) deliver water at less than cost, owing to subsidies on non-reimbursables, interest repayment, surplus power revenues, and cost overruns [*2; 27; 48*]. Agriculture is much more subsidized than municipal and industrial users, and the federal government is much more generous than the state. Any region that spurns water imports from these sources in favor of local conservation efforts is looking a gift horse in the mouth.

Second, local property tax revenues have been used to reduce or eliminate water charges by the county water districts, as described previously.

Third, San Francisco uses surplus Hetch Hetchy water to raise extra revenues for the city treasury. An incentive exists for the city to expand its sales, regardless of the Raker Act. However, the city does not subsidize Santa Clara County users; it charges them more than its own citizens.[17]

Fourth, the critical links in geographic expansion by retailers (feeder mains to new housing developments) are subsidized and facilitated by state regulation and the federal treasury. Since 1954, the Public Utilities Commission has required developers to advance to the local utility the money necessary to build the mains. The advance is repaid by selling water to

[15] In the case of California Water Service, which cannot grow, investment in new mains is low. Management may be milking it in anticipation of future municipalization.

[16] San Jose spends twice the average of all California cities per capita on debt retirement of all kinds.

[17] Indeed, several cities are suing San Francisco for allegedly charging too much.

new homes. This eliminates any financial disincentive to extend mains freely for both the utility and the developer, who further cushions the blow by charging homebuyers extra to cover the "advance."[18] Furthermore, even though the costs are covered by the developer, the Internal Revenue Service allows private utilities to write off depreciation on the main capital, and the PUC allows a return on this fictitious capital "outlay."

In sum, the purely economic incentives for rapid and frequently excessive expansion among both public and private suppliers of water are considerable. Much of the agencies' behavior allegedly caused by "institutional" factors can be explained better by simple economics. The same may be said for groundwater overdraft. Nonetheless, there are limits to an overly narrow economic analysis as well. One has to look beyond the immediate concerns of water supply agencies to the dynamics of regional development as a whole, from which derives the growing demand for water and the political will to see that it is met. We now turn to this overarching cause of water supply development and overdevelopment.

THE CAUSES OF WATER POLICY: THE POLITICAL ECONOMY OF GROWTH

Water supply does not develop in isolation; it must be seen in relation to the economic growth of Santa Clara Valley and the exercise of class power. The one generates water demand and the other the political ability to secure it through government action. This is the lesson of the water history of the San Jose area. Moreover, it confirms several hypotheses on the political economy of urban growth.

A powerful urban "growth coalition" typically dominates local public policy [*34; 35*]. Exactly such a political consensus has prevailed in support of agricultural and urban-industrial development in the Santa Clara Valley [*11; 47*]. San Jose has been notorious for its boosterism. The powerful city manager, A. P. Hamman, once declared proudly that he would make San Jose "the Los Angeles of the North" [*40*]. The growth coalition is not simply a post-war phenomenon. The character of the valley's economy and the specific issues have changed over time, but the commitment to growth has not.

Water development shows the growth coalition at work. The pursuit of water has been a major preoccupation of county political leaders. Herbert Coffin Jones, State Senator in the 1920s and 1930s, epitomizes their zeal. He not only led the fight for the Water Conservation District but was known statewide as the father of the Central Valley Project. In the 1940s, when Jones was serving as executive head of the WCD, he came up with the idea for San Felipe and created an "American River Development League" in the hope that water from Folsom Dam would be earmarked for Santa Clara County. Later, county leaders zealously supported the Trinity River and San Luis Unit additions to the Central Valley Project, the state Water Project, and, today, Phase II of the state project (despite general antipathy to the Peripheral Canal in the Bay Area) [*56*].

Locally there has been no shortage of enthusiasts pushing various water schemes. Overall unity of purpose has been striking, even across rural-urban lines. The Chamber of Commerce, downtown merchants, canners, and the Water Works were avid supporters and financiers of the early campaigns for conservation works. The county farm bureau and many individual growers returned the favor by supporting the South Bay Aqueduct, a principally urban project. In the 1960s and 1970s, a new alliance was forged between the traditional boosters of water and the new electronics companies, such as IBM and Hewlett-Packard, to promote San Felipe.

The earlier support of city dwellers for agricultural water development is under-

[18] This practice does not appreciably lower housing demand, despite higher prices, because the practice is uniform over the whole state and because the addition is such a small part of the cost of a house.

standable, given their economic dependence on the farm sector. More surprising is the reverse situation in later years. Partly it came through shared needs for more water; but the ease with which most of the political leadership of the country crossed over from rural backgrounds to urban-industrial careers, during the transition period of the 1940s and 1950s, is remarkable. Even Herbert Jones, who was closely identified with the farming class, helped establish a Milpitas Water District to attract Ford's assembly plant in the early 1950s and later declared that he was "for *any* growth" [*21*].

Unity of purpose was achieved in spite of divisions over tactics, special interests, and even class interests. Such differences are revealed by the jostling among supporters of Hetch Hetchy, the South Bay Aqueduct, and the San Felipe Project from the late 1940s to early 1960s. Much more was involved than a simple bureaucratic dispute between the Water Conservation District and Flood Control District.

The WCD favored Hetch Hetchy and opposed the South Bay Aqueduct. They were joined by Palo Alto and Sunnyvale, whose leaders felt that they had little to gain from state water. The WCD also allied with a small faction within San Jose in a drive to municipalize the Water Works, on the grounds that Hetch Hetchy water could not, under the Raker Act, be bought and sold by a private utility.[19] (The WCD may also have been miffed because the Water Works had been cool to its Lexington and Anderson dams [*21*].) The Water Works and its allies naturally opposed this scheme, which was defeated in 1949 and 1950 [*12*]. The WCD also single-handedly promoted San Felipe. But political support fell in behind state water because Hetch Hetchy was thought to be insufficient for future growth, municipalization of the Water Works undesirable, and San Felipe a more distant hope than the South Bay Aqueduct.

[19]Congressman Chas. Gubser (D-Santa Clara) tried unsuccessfully to have this restriction removed from the Act [*21*].

In part, this was a dispute over tactics among growth advocates. In part, it reflected the WCD's personal commitment to Jones even after he retired in the mid-1950s.[20] In part, WCD leaders no doubt had career or corporate interests in their project winning out. But, most of all, the WCD position reflected the interests of a good portion of the farm class, its traditional clientele. Jones [*21*] held that farmers needed cheap water. In keeping with this, Hetch Hetchy was to be paid for entirely by urban customers. Moreover, municipalization would have removed the main groundwater competitor from the valley; and Hetch Hetchy was also the quickest response to the immediate groundwater overdraft problem farmers were experiencing. As for the future, state water would be more expensive than San Felipe water, because of larger federal subsidies to irrigators. Finally, as one interviewee complained, "The farmers never understood that a big city needed a water supply." The farmers' class position was rather fragile, however, given the rapid disappearance of farms, the eagerness with which most farmers sold out for subdivisions, and the ease with which the economic roles of valley families shifted from farm to urban occupations.

By the mid-1960s, the basis for antagonism between the districts was past. The South Bay Aqueduct was built, Hetch Hetchy water was also contracted for, and the farm sector had been decimated. Moreover, it had become apparent to all water seekers that federal water would eventually be required; hence, everyone jumped on the San Felipe bandwagon.[21] Finally, the wasteful redundance of the two water districts was apparent; for example, the FCD was having trouble paying off its unneeded treatment and distribution works [*37*]. The two districts

[20]Jones even had his own special interest in all this. The Milpitas tie-in to Hetch Hetchy served an area largely owned by the family of the wife of his closest friend, Fraser Reed.

[21]Except Great Oaks Water Company, which was adequately supplied with groundwater.

were merged in 1968, allowing a united front on San Felipe and a price rise on pumped water to cover treated water costs.

One might even go so far as to say that this "plurist" competition over water supplies was functional for growth as a whole because it opened up a variety of avenues to pursue, all of which eventually were needed [55].

Moreover, despite various schisms, the fundamental commitment to growth was never in doubt. Those who stood in the way or did not move quickly enough were in danger of being swept away. This holds even for such mainline institutions as the WCD and the Water Works. When the WCD took its ill-starred stand against the South Bay Aqueduct, it lost monopoly over valley water supplies; moreover, the Board of Supervisors tried to relegate it to caretaker status [2] while local state legislators introduced bills to abolish it altogether.

The Water Works has been threatened with municipalization at least three times. In 1895 the city of Santa Clara took over its portion of the system, claiming poor service and maintenance. In 1936–1938 San Jose's political "boss" tried again, apparently fearing that the Water Works might go bankrupt, leaving the city unserved. Public control was sought once more in 1948–1950. The largely successful resistance of the Water Works to public takeover is noteworthy, given that this has been the rule in big American cities [6]. The reason for municipalization has almost always been the inability or unwillingness of private companies to build systems large enough or soon enough to service urban growth and provide dependable fire protection. The Water Works' saving grace has been the groundwater recharge system of the valley, which leaves to public agencies the responsibility for water conservation and importation schemes, while the company has only to drill wells. On the distribution side, the Water Works has survived because it has been willing to accommodate virtually all growth. In the two notable cases where it did not expand into new territory fast enough, it was circumvented: first in the licensing of Great Oaks Water Company and later in the takeover by San Jose of the small Evergreen Water Company under a newly formed city water department. Both cost the Water Works subsequent growth opportunities. In other words, the pro-growth policy of agencies such as the WCD and the Water Works is as much an externally imposed requirement for survival as an internally generated goal.

Furthermore, while everyone in the valley may have wanted growth, not everyone makes water policy decisions. A relatively small group of men, tied to the business interests of the valley, whether agricultural or urban, have formulated water policy. This is readily apparent in the case of the private San Jose Water Works. The company was started by the owners of San Jose's first industry, an iron works. Later presidents included bankers, industrialists, and major landowners [38]. Ralph Elsman, president from 1937–1960, was wealthy from investments in eastern utilities before moving west. He passed the mantle on to Robert Minge Brown, who served on the Boards of Directors of Greyhound, Hewlett-Packard, and Stanford University. A close friend of Elsman, long a board member of the California Water Service, Paul Davies was the leading industrialist of the county as President of FMC Corporation and a member of the boards of IBM, Wells Fargo Bank, PG & E, Southern Pacific Railroad, and the National Association of Manufacturers. Today, the best connected businessman in the valley, Halsey Burke, is again on the boards of the two water companies. The Water Works has been cited as a key link in the power structure of San Jose, which accords with a reading of valley politics thirty years earlier [*12; 51*] (Table 3, Figure 7).

In public water supply the man who stands out before World War II is Herbert Jones. He was the dominant figure in county politics for 30 years, an ardent

TABLE 3

DIRECTORS OF TWO LARGEST WATER COMPANIES, SANTA CLARA COUNTY

San Jose Water Works

1952	Ralph Elsman	Chairman and President
	Ernest N. Curtis	Director, Surety Savings & Loan
	Leland S. Prussia	Director, Surety Savings & Loan
	Charles M. O'Brien	Owner, O'Brien's Restaurant
	Clyde L. Fischer	Co-owner, Darling & Fischer Garden Chapel
	Edmund N. Richmond	President, Richmond & Chase Company, canners
	George C. Singletary	President, Singletary Bros., investment bankers
1965	Ralph Elsman	Chairman & President
	Robert Minge Brown	Partner, McCutchen, Brown & Enersen, San Francisco Director, Greyhound Corporation Director, Hewlett-Packard Corporation Trustee, Stanford University Chairman, California Water Service Company
	L. M. Cali	Third largest stockholder in the company
	Charles B. Lieb	Attorney
	Fred J. Oehler	Vice-president, Wells Fargo Bank, San Francisco
	E. W. Vodden	President, Western California Telephone Company
	Frank F. Walker	Investment Banker, Dan Witter & Co., San Francisco (2nd largest stockholder in the Water Works)
1980	Robert Minge Brown	Chairman & President, Attorney at Law, partner, McCuthen, Doyle, Brown & Enersen, San Francisco, Chairman of the Board of California Water Service Company, San Jose. Director, The Greyhound Corporation and Hewlett-Packard Company. Director of SJWW since 1959. Trustee, Stanford University.
	Halsey C. Burke	Chairman of the Board and President, Burke Industries, Inc., San Jose. Director of Standard Insurance Company, Portland, Oregon and Bank of the West, San Jose. Rotary, San Jose Chamber of Commerce, San Jose State U., Sainte Claire Club, United Way and Santa Clara County Manufacturers' Group. Director of SJWW since 1971.
	Mark C. Cali	Attorney at Law, partner, Keough, Cali & Arzino, San Jose (Cali family are 5th largest shareholders). Director of SJWW since 1971.
	Ronald R. James	President and Chief Executive Officer, San Jose Chamber of Commerce. Ex-major of San Jose. Director of SJWW since 1974.
	M. J. Kendall	Retired as President of the Company, August 1, 1974. Director of SJWW since 1968.
	C. B. Leib	Attorney at Law, San Jose. Also a director of California Water Service Company (grandfather and uncle were also directors of SJWW). Director of SJWW since 1954.
	J. W. Weinhardt	President and Chief Executive Officer of the Company. Director of SJWW since 1975.

California Water Service Company, 1979

Robert Minge Brown	Chairman of the Board of the Company Partner, McCutchen, Doyle, Brown & Enersen, Attorneys Director, Greyhound Corp., Hewlett-Packard Corp.; Trustee, Stanford University
William E. Ayer	Management Consultant, Individual Practice
Robert W. Foy	President, Transportation and Warehousing Group, Pacific Storage Company
Robert J. Glaser, M.D.	President and Chief Executive Officer Henry J. Kaiser Family Foundation
Robert K. Jaedicke	Acting Dean, Stanford Graduate School of Business
L. W. Lane, Jr.	Chairman of the Board of Lane Publishing Company, *Sunset Magazine*, Books and Films; Director, Crown Zellerbach Corp.; Member, Pacific Basin Economic Council, Alaska Business Council
Ralph D. Lindberg	President and Chief Executive Officer of the Company
C. H. Stump	Executive Vice President of the Company

Sources: Water Company Annual Reports; *Who's Who in America, 1980.*

spokesman for the farm economy, and a close friend with the valley's largest real estate investor. After the war, key figures were: supervisors Al Levin, Bud Hubbard, Sam Della Maggiore, and Ralph Mehrkens, all local businessmen or growers; State Senator Jack Thompson, an Evergreen farmer who sired the Flood District; Assemblyman Bruce Allen, lawyer, and later judge, who pushed for the

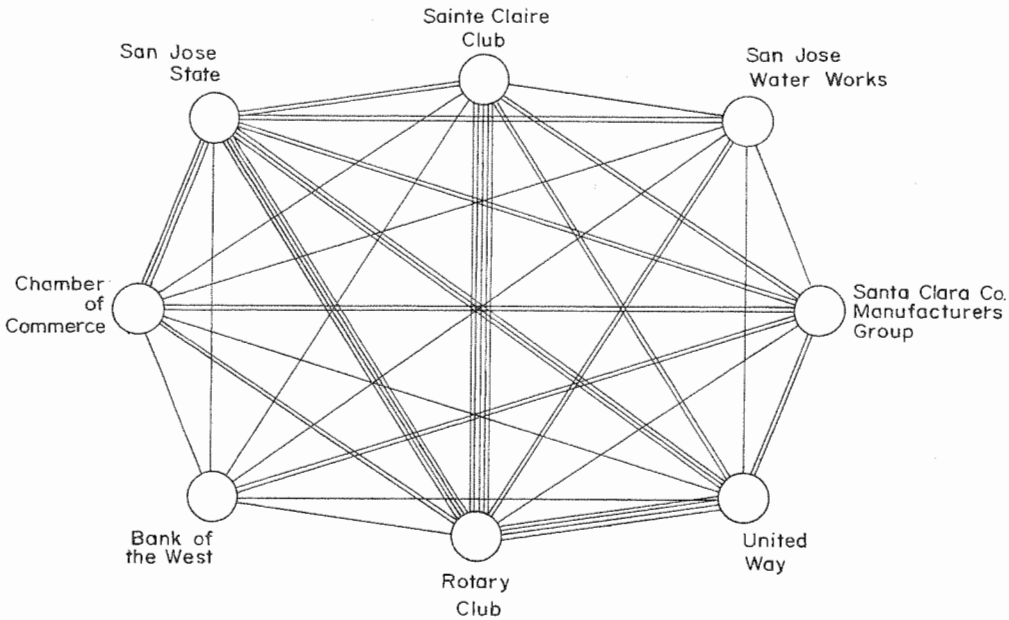

Fig. 7. Interlocking Memberships/Directorships of Leading Santa Clara County Institutions, 1979 (after Traunstine [*51*]). Each line indicates a shared membership or director.

South Bay Aqueduct on the other side of the legislature; Dan Currlin, Executive Director of the FCD and the Water District; and Alden Campen, one of five major downtown landowners, who failed in a bid for city council on a municipalization platform but went on to chair the Industrial Development Commission and head the fundraising committee for San Felipe.

While public figures are never the whole story in local politics, people typically move quite freely between government and business careers. As one interviewee said: "we all started out on the Chamber of Commerce and Junior Chamber"; and it was there that they often became interested in water development. In fact, interest in water, which has figured in virtually every election campaign for 50 years, was frequently a ticket to public office. Party lines have also been very flexible in the valley, although most politicians were Republicans until recently. The social network of friends and relatives is striking. For example, Albert Henley, attorney and principal figure in the Water Conservation District and SCVWD, is H. C. Jones' son-in-law and protege. Clark Bradley, assemblyman in the 1950s (and cool to the South Bay Aqueduct), married Jones' secretary. Bud Hubbard was close friends with David Packard, who has recently been an important industrial backer of water development. Ralph Mehrkens and Ralph Elsman were also good friends.

Given the realities of power in private companies, city governments, and county politics, it is disingenuous to think that agency water policies arose principally from bureaucratic dynamics or engineering mentality. Elsman and Brown set policy for the Water Works and California Water Service Company for nearly 50 years; Jones and Henley did so for the Conservation District; the county supervisors and Currlin directed the Flood District. The clear policy and ideology of these men was the "service approach" that water must be developed to meet all demands engendered by growth. Employees ignored this policy at their own risk.

The history of water development in the Santa Clara Valley illustrates how a small business class can pave the way for industrial and urban growth by pursuing their own interests and ideology. Big industrialists played a secondary role on fund-raising and support committees and did not apparently have to take the initiative. The electronics industry played no part in water policy until very recently. For this reason, a common complaint among the older leadership of the county is that the new industrialists have no sense of "civic responsibility" [*46*].

This leads us finally to consider the second of our original questions: How important is water supply to economic growth? Water in large quantities is essential to intensification of agriculture, but the financial ability of most farmers to supplement local water supplies is relatively limited. Growers must therefore turn to government for aid. Industry as a whole uses much less water than irrigated agriculture; in only a few cases is either the quantity or quality of water significant and even less frequently is water a major cost item; ability to pay and substitution potential are markedly higher than in agriculture [*49*]. Industry is often most affected by water sufficiency for the residential and commercial developments that serve its workers. Housing developers naturally have a keen interest in securing water service. The literature on industrial location and regional development is divided on the importance of water. But it overlooks the most important point: water supply is not an exogenous factor, whose initial presence or absence determines very much. While growing areas such as the Santa Clara Valley might be able to make do with much less water, it is always a basic requirement of development. In agriculture the costs are relatively great but the benefits of cheap and abundant water are equally so; in urban development water is a relatively minor cost and, therefore, it is unthinkable that lack of it should stand in the way of the immense profits to be made in manufacturing, commerce, or residential development. Therefore, water supply is not left to chance. As noted in the points above, political power is mobilized to see that it meets demand or even anticipates and creates it. The answer to our second question is, thus, the same as that for the first one: water resources development is embedded in the matrix of regional growth.

In short, then, *efficiency in water supply and water use is not a major policy concern*, despite the preoccupations of most in the water resources literature. The essential question is how supply serves the larger interest in regional economic growth. Inefficiency and overdevelopment will be tolerated or even encouraged if growth is anticipated or is proceeding apace. This is not to condone such inefficiency, only to see it in the harsh light of the real political-economic purposes behind government policy. Of course, water costs may be so large as to seriously distort regional development or to block it altogether. In California the former situation may have been reached [*28; 49; 56*], but the latter never has.

CONCLUSION

The history of water development in the Santa Clara Valley not only provides insight on a particular region but offers a number of lessons of more general applicability. It warns against simple interpretations of water resource development. In particular, interpretations of behavior based on such "institutional" factors as bureaucratic rivalry and explanations attending only to the economics of supply are deemed inadequate. Water must be understood in terms of the political economy of regional growth in which the wealth and other rewards of capital accumulation are the motivation, the business class the central mobilizing force, and the successful growth coalition the means by which aggressive water supply politics are generated and water resources overdeveloped for local gain. In the words of the San Jose Water Works: "There can be no growth without adequate water; water must be found" [*38*].

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