

The
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ROBERT A. KENNELLY, *Editor*
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A black outline map of the state of California is positioned on the left side of the title. The map shows the state's irregular coastline and internal borders.

The California Geographer



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THE STATUS OF URBANIZATION IN THE REPUBLIC OF SUDAN

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Since the Second World War, a new interest has grown among American research scholars concerning the "backward or poor" countries of the world. Consideration of these areas has changed. This re-thinking has been both attitudinal and perceptual rather than material. The "backward" became the "underdeveloped," and the finally the "developing." As colonialism is replaced by "foreign aid" and United Nations Organization help programs, a new vista of momentum is emerging, riding the crest of the concept of "economic development." It has been recognized that rapid economic growth necessarily involves enormous elemental culture change. Thus, great pressure has been exerted to understand the processes of growth and patterns which growth has assumed.

More and more, geographers are becoming involved investigating problems which have "practical" rather than "theoretical" value. In the writer's own regional specialization, Africa, it has long been said that "... behind every market mammy in Africa sits an anthropologist." Now, it would seem, a similar claim may be made for geographers. With increasing frequency, scholars traveling in foreign areas have felt compelled to quip: "you find geographers in the damnedest places."

One of the areas in which geographers can contribute useful insight for economic development is in the field of urban geography. Like plantations and mines, cities are prime vehicles of culture change in a society and in the development of cities a measure of that change. According to William Hance:

" . . . (cities) tend to expedite the evolution to a modern economy, to loosen the hold of traditional beliefs and values, to print a greater degree of specialization through the acquiring of new skills, to provide incentive for developing more diversified economies, and to develop concentrated markets for domestic produce."¹

Thus, urbanism in previously little urbanized areas is the result, vehicle, and measure of culture change.

In this paper an attempt is made to analyze urbanization in the Republic of Sudan in terms of its distribution, basic characteristics and functions, modes of growth, and implications for economic development. Interpretations and conclusions are tempered by field experience in the Sudan in 1964. The definition of urbanism as used by the 1955-56 census is accepted in full, and the writer claims no part of the "What is Urban?" dialetic.

Situated south of Egypt and lying athwart the Nile River, the Republic of Sudan is the largest country in Africa, and ninth largest in the world, with an area of just under 1,000,000 square miles. It is, however, one of the more sparsely populated countries in the world, with an average density

¹ William A. Hance, *The Geography of Modern Africa*, New York: Columbia University Press, 1964, p. 52.

of approximately 10 person per square mile. This density is less than one-fifth that of the United States, for example. The sparseness of population is aggravated by uneven distribution owing primarily to the river system and to vagaries of climatic conditions. The country encompasses the full transition of physical and cultural complexes associated with the Sudanic Belt of Africa. Ninety-two per cent of the population is engaged in primary production of agriculture, herding, fishing and forestry, while only three per cent is engaged in manufacturing and other secondary activities. Per capita income is approximately \$80.00 per annum.² The country has a long but discontinuous tradition of urbanization based on Islamic commercial and political centers. The Sudan is, however, much less urbanized than other North African and most African countries. According to the 1955-56 census, less than five per cent of the total population lived in centers of 20,000 or more inhabitants.³ This datum contrasts with Egypt, Morocco, and South Africa, all of which have over 25 per cent of their populations in urban forms of greater than 20,000.

It would appear that the relative abundance of land, thus a lack of land hunger, has minimized urban population. In many areas of the world, notably North Africa and India, overcrowding and severe poverty in farming areas have driven peasants to migrate to cities. Urban areas are not burdened so heavily in the Sudan as in other countries with problems concomitant with accommodating a massive influx of unskilled workers seeking refuge from rural poverty and under-employment.⁴

The Sudan is divided into nine administrative provinces of unequal size (Figure 1). The three southern provinces of Upper Nile, Equatoria, and Bahr el Ghazal are the least developed economically and least urbanized. Next in order of development are the three northern provinces of Kordofan, Darfur, and Northern. The remaining three provinces — Khartoum, Blue Nile, and Kassala — are the most developed economically and most urbanized.

In the southern provinces individual towns have an administrative and commercial core occupied by Northerners and built in a British Colonial and northern Sudanese motif. Residential units consist of widely scattered, circular wattle and daub huts with conical, thatched roofs. The towns contain large agricultural elements. The largest town in each province and the only towns of any size are the province capitals of Juba, Wau, and Malakal. Malakal, however, is more typical of middle zone towns in that its residential pattern is much more compact and includes little agriculture. The savanna type of this zone is much more arid than that of the humid South. In contrast, northern cities are made up almost wholly of squat, dried mud, rectangular dwelling with flat roofs. Morphologically, living patterns vary from town to town and province to province throughout the country based on such things as occupation, national origin, tribe, regional source, religious sect, and economic level.

² Roushdi A. Henin, "Economic Development and Internal Migration in the Sudan," *Sudan Notes and Records*, Vol. 44 (1963), p. 102.

³ United Nations, *Population Growth and Manpower in the Sudan*, Population Study No. 37, 1964, p. 38.

⁴ *Ibid.*, p. 40.

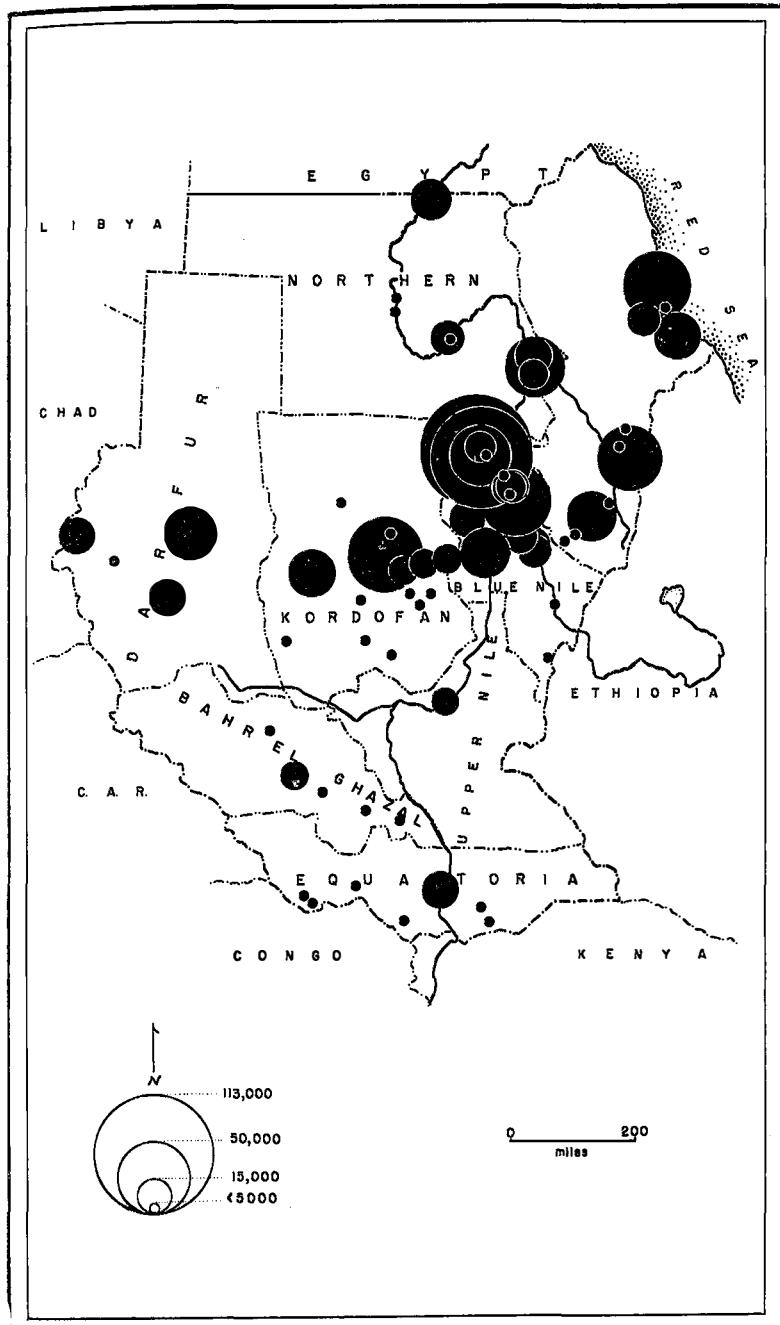


Figure I. Urban Population in the Republic of Sudan — 1955-56

Historically, urban functions of Sudanese towns have been administrative, with few specialized activities. Today, this lack of functional diversification is breaking down. It is now possible to recognize Atbara as a railroad town, Port Sudan for its port functions, Khartoum North as an industrial city, and Omdurman as a commercial center. However, such specialization is little developed outside of the large urban centers.

For the purpose of the 1955-56 population census urban areas included any settlement previously selected by a district commissioner as an administrative center, and those settlements which the Department of Statistics felt had 5,000 or more inhabitants.⁵ Sixty-eight settlements, ranging in population from 699 to 113,000, were included (see Table 1). Of these,

Table 1
TOWNS ARRANGED IN POPULATION-SIZE ORDER

Rank	Town	Total De Jure Population	Rank	Town	Total De Jure Population
1	Omdurman	113,551*	35	Sinkat	5,175
2	Khartoum**	93,103*	36	Bara	4,884
3	El Obeid**	52,372*	37	Kadugli	4,716
4	Wad Medani**	47,677*	38	Wagar	4,676
5	Port Sudan	47,562*	39	El Kamlin	4,341
6	Kassala**	40,612	40	Suakin	4,228
7	Khartoum North	39,081*	41	Abu Kershola	4,154
8	Atbara	36,298*	42	Er Roseires	3,927
9	El Fasher**	26,161	43	El Hawata	3,921
10	Kosti	22,688	44	Yambio	3,890
11	Gedaref	17,537	45	Muglad	3,735
12	Tokar	16,802	46	Aroma	3,451
13	En Nahud	16,498	47	Dongola	3,350
14	Ed Dueim	12,319	48	Zalingei	3,314
15	Nyala	12,278	49	El Mesellemiya	3,131
16	Geneina	11,817	50	Quala'en Nahl	3,083
17	Shendi	11,031	51	Nzara	2,971
18	Wadi Halfa	11,006	52	Rumbek	2,944
19	Berber	10,977	53	El Abbasiya	2,846
20	Juba**	10,660	54	Talodi	2,736
21	Malakal**	9,680	55	Aweil	2,438
22	Singa	9,436	56	Torit	2,353
23	Ruf'a	9,137	57	Argo	2,329
24	Sennar	8,093	58	Showak	2,171
25	Wau**	8,009	59	Tonj	2,071
26	Umm Ruwaba	7,805	60	Burri el Lamab	2,016
27	Tendelti	7,555	61	Yirai	1,895
28	Es Suki	7,388	62	Sodiri	1,804
29	Er Rahad	6,706	63	Rashad	1,683
30	Shambat	6,611	64	Kurmuk	1,647
31	El Hasaheisa	6,600	65	Merowe	1,620
32	Karima	5,989	66	Maridi	893
33	Dilling	5,596	67	Yei	739
34	Ed Damer**	5,458	68	Katire	699

Source: First Population Census of Sudan 1955/56, Town Planners' Supplement, I, 1960, p. 206.

* Urban large

** Province capital

⁵ Henin, *op. cit.*, p. 111.

seven were classified as "urban large" in that they had populations of 20,000 or more and had dominantly urban functions. Three towns having more than 20,000 inhabitants were not included as they were deemed not sufficiently urban-like. These latter units plus the remaining fifty-eight towns having less than 20,000 population were classified as "urban small." Thirty-three towns had less than 5,000 population.

High population primacy is concentrated in a single urbanized area — the Three Towns, which is made up of Khartoum, the capital of Sudan, Omdurman, and Khartoum North. Considering Linsky's generalizations concerning "primate cities," this primacy is not surprising in that population density in the Sudan and per capita income are very low, and that there is a dependence for national income mainly on one or two agricultural export commodities with a high percentage of the population employed in primary activities.⁶ Located at the juncture of the Blue and the White Niles, the Three Towns conurbation has nearly 30 per cent of the urban population in the Republic of Sudan (see Table 2). All cities

Table 2
MODE OF LIVING AND PROVINCE
(000)

Province 1	Total 2	Urban			Rural
		Large 3	Small 4	Sedentary 5	Nomadic 6
SUDAN	10,263	430	424	8,023	1,386
Bahr el Ghazal	991	—	17	974	—
Blue Nile	2,070	48	96	1,781	145
Darfur	1,329	—	54	1,010	265
Equatoria	903	—	22	881	—
Kassala	941	48	101	290	502
Khartoum	505	246	9	197	35
Kordofan	1,762	52	63	1,293	354
Northern	873	36	52	718	67
Upper Nile	889	—	10	879	—

Krotki, Karol Jozef, 21 Facts About the Sudanese, First Population Census of Sudan 1955/56 (1958), Table 12. Ia, p. 35.

(Percentage)

Province 1	Total 2	Urban			Rural
		Large 3	Small 4	Sedentary 5	Nomadic 6
SUDAN	100	4	4	78	14
Bahr el Ghazal	100	—	2	98	—
Blue Nile	100	2	5	86	7
Darfur	100	—	4	76	20
Equatoria	100	—	2	98	—
Kassala	100	5	11	31	53
Khartoum	100	49	2	39	10
Kordofan	100	3	4	73	20
Northern	100	4	6	82	8
Upper Nile	100	—	1	99	—

Ibid., Table 12. Ib, p. 35.

⁶ Arnold S. Linsky, "Some Generalizations Concerning Primate Cities," *Annals, Association of American Geographers*, Vol. 40, No. 3 (September, 1965), pp. 507-508.

in the country with a population of 30,000 or more, with the exception of Port Sudan, the country's major sea port, are located within 430 miles of this complex. As urban development is inextricably linked with industrialization, it is interesting to note the large portion of the country's present potential for industrialization which is concentrated in such a small area. Of the 240 industries in the Sudan in 1961, more than 100 were in Khartoum Province, though the province contained less than five per cent of the total population.⁷ An industrial location in or near the Three Towns now offers the best prospects for success. Existing routes of transportation, complementary industries, power supply, and facilities for communication and marketing are established there. Part of the local population has some experience in non-primary occupations, and the resident population, as the most affluent in the Sudan, offers a considerable market.

This concentration of advantages for economic development in one location is not good for the country as a whole. The absence of any "urban large" center in the three southern provinces and in Darfur is a major handicap, not just for economic development, but also for the establishment of better health and educational facilities. It is difficult and costly to extend such services into areas far removed from urban centers of any size. The problem is especially difficult where rural population densities are low and settlement widely dispersed. Thus, progress in economic development, health, and education would be furthered by greater urban development outside of the Three Towns, preferably in the least developed southern and northern provinces.

As things stand now, most money for economic development is being invested in agriculture and transportation. Irrigation projects such as Khashm el Girba, Kanana, the Manquil Extension of the Gezira, and many smaller pump schemes along the Niles, in addition to experiments with intensification techniques, are receiving primary attention. Large sums of money are also being expended on rail transport improvement, bridge construction, and road building. Interest and investment in these two areas are vital for laying an economic base for industrial growth. For, while agriculture remains dismally underdeveloped and the vast majority of the population operates at the subsistence level, efforts toward large scale industrialization are untenable.

Industry is not a panacea for economic development, for the latter, reflected in terms of high per capita income, usually includes high-level production in all sectors of the economy, including agriculture. The agricultural revolution is just as essential as the industrial revolution. In fact, agricultural development must precede and finance industrial development, for industrialization is the result of and major outlet for capital accumulated in commercial agriculture.

The rate of growth of the large urban centers, which is approximately four per cent per annum, is not great. Of this figure, approximately one per cent per annum is due to migration,⁸ the remainder being attributable

⁷ United Nations, *op. cit.*, p.40.

⁸ R. A. Henin, "The Future Population Size of Khartoum, Khartoum North, Omdurman and Port Sudan," *Sudan Notes and Record*, Vol. 42 (1961), p. 87.

to births over deaths. An analysis of data on place of birth versus place of residence (see Table 3) reveals a number of interesting factors relating to trends in settlement patterns in the Sudan for approximately the last thirty-five years. Far and away the greatest movement has been from rural nomadic to rural sedentary. In fact, the growth in rural sedentary was eight times that of urban large. The tendency for settlement of nomads in sedentary agriculture is to be expected as it is a world-wide trend and, to this point, government policy, but it is also significant for the degree of "pull" exhibited by agriculture. Therefore, the large government investments in agriculture seem justified. Another factor of great significance is the relative loss of population by small urban centers primarily to agriculture and secondarily to large urban centers, for the rate of growth of small urban centers has been less than births over deaths. Large urban areas have gained slowly in population, drawing mainly from urban small and rural sedentary.

In the more developed provinces of Kassala, Khartoum and Blue Nile both large and small urban areas are growing. The less developed provinces of the North and South, on the other hand, are characterized by growth in large urban areas, where they exist, but declining small urban centers.

In summary, urbanization in the Republic of Sudan has reached a very modest level. Much of this urbanism is highly concentrated in a few large urban centers. Some of the smaller urban areas have urban features only to a limited extent, and extensive areas of the country are yet remote from any urban area of real importance. The Sudan still lacks dispersion and functional diversification of city and town that would help in an effective development of resources and would contribute to progress in education and health.

As long as economic development continues to be agricultural rather than industrial, sedentary ruralization rather than urbanization will continue to be the dominant trend. Small urban centers will continue their relative decline and large urban centers will grow at a moderate rate as industrial and commercial sectors increase and transportation is improved.

Table 3
ANALYSIS OF GAINS (+) AND LOSSES (-)
(000)

Mode of living	Net Gains +	Urban		Rural	
		Losses -	Large	Small	Sedentary
Urban large	+123	—	—	+48	+68
Urban small	-125	—	-48	—	-74
Rural sedentary	+950	-68	—	+74	—
Rural nomadic	-948	-7	+3	—	-944

Source: First Population Census, Final Report, 1962, Table 7.5, p. 361.

PREHISTORIC TRADE ROUTES BETWEEN MESOAMERICA AND THE AMERICAN SOUTHWEST: A TENTATIVE ASSESSMENT

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There are many indications that cultural traits, both material and nonmaterial, were introduced into the American Southwest during prehistoric times. As these items coincide rather remarkably with traits found in Mexico, group lines of movement or trade routes are presumed to have existed during the prehistoric. This paper presents a tentative assessment of these early routes.

In analyzing this question, three general possibilities will be investigated. The first is the West Coast Route, following the Gulf of California coastal lowlands¹ into Sonora, then turning due north with the grain of the topography to enter what is now southeastern Arizona. The second possibility is to follow the grain of the topography within the Sierra Madre Occidental all the way into southeastern Arizona, following the north-south sections of the stream valleys. The last possibility is the route at the eastern base of the Sierra Madre Occidental, coinciding with the western margins of the interior basins. These three routes will be referred to as the western, central and eastern routes, as they are depicted in Figure 1.

PHYSICAL GEOGRAPHY OF THE THREE ROUTES

Because of the primitive nature of the travel, by foot traffic, all three of the routes appear to be acceptable as possible on the basis of physical geography. Considering primitive foot travel for the American Southwest, Colton² postulated that the Indian routes tended to follow the rivers. In basin and range country the routes followed water resources available in the ranges, which in this area average about twelve miles apart. Also referring to Indian travel, Sauer³ correlated travel with terrain, the need for food and drink, reasonable security, and the previous long-term experience. It is in these terms that the possibilities of three routes will be discussed.

The western route, generally following the edge of the coastal plain that merges with the basin and range, is inland from the swampy coastal spots. Along this route, the ranges are aligned north to south and thus were no barrier to foot traffic. The savanna climates in the south and the steppe and desert climates in the north yielded adequate sources of water even during the drier winters. The higher adjacent terrain provided the necessary watershed for the Culiacan, Sinaloa, Fuerte, Mayo, Yaqui and Sonora

¹ The coastal lowlands will include the coastal plain and the strip of basin and range topography adjacent to it.

² Harold S. Colton, "Prehistoric Trade Routes in the Southwest," *Scientific Monthly*, Vol. 52 (1941), pp. 308-319.

³ Carl O. Sauer, "The Road to Cibola," *Ibero Americana*, Vol. 3 (1932), p. 1.

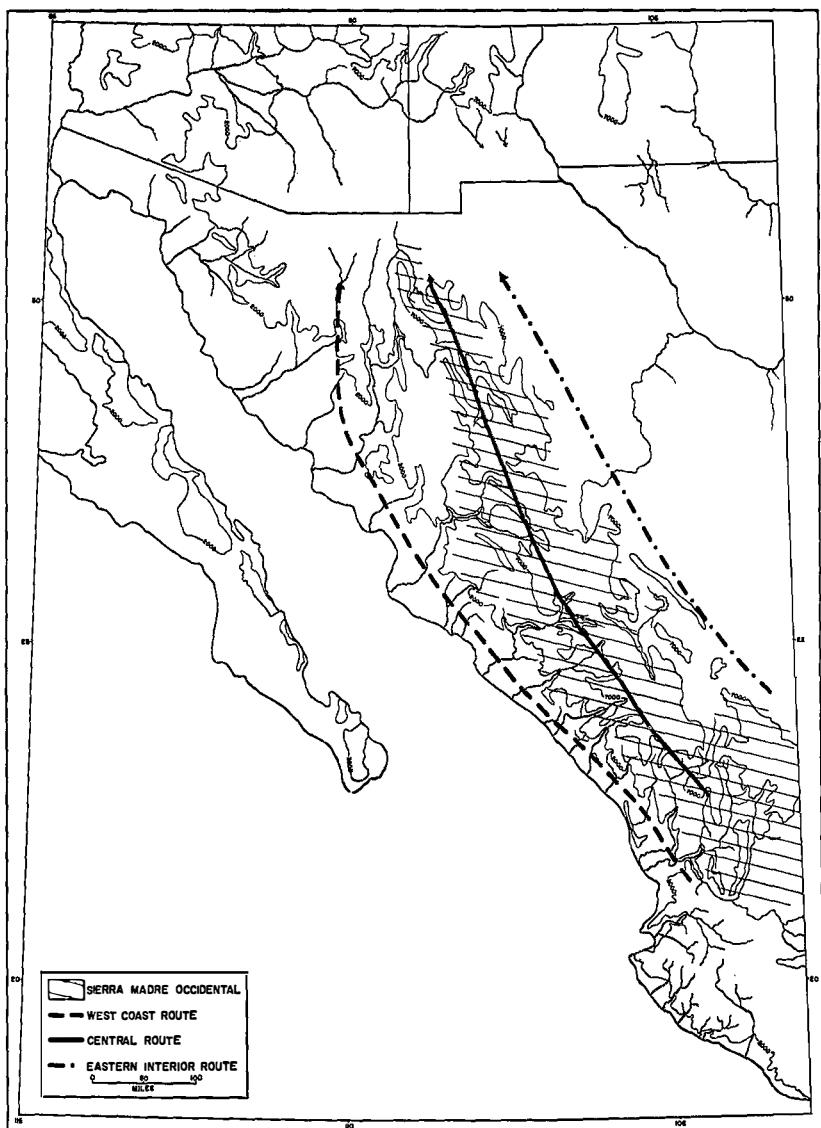


Figure 1. Postulated Trade Routes Between Mesoamerica and the Southwestern United States.

Rivers. Vegetation was generally of monte or scrub thickening to the south and merging into more xerophytic types in the north. The route veers inland where it was associated rather closely with the interfingering oak-grass and steppe vegetation. Both Sauer⁴ and Carter⁵ concluded that the natural requisites for travel were present here. As to seasonal differences, neither the winter dry season with occasional cyclonic precipitation nor the summer wet season with accompanying flooding are severe enough to prohibit traffic.

The central route covers a rather wide band. It could include the baranca country west of the divide, the crest line of the sierras generally following the divide, or the less rough area east of the divide. One problem is that the divide area has been cut from west to east, so that the quebradas actually infringe on the area east of the divide. As will be shown in the discussion of the eastern route, these two could be construed to mean the same route. Regardless of the exact alignment of this postulated route, it was cooler and wetter, consisting of patchy forests of pine, open grassy areas, and belts of oaks. Here also the gross patterns of the topography are aligned northwest to southeast. Major segments of the streams flow north and south for moderate distances before emerging from the escarpment zone to flow west toward the coast. This terrain analysis led Lister⁶ to report that despite the present position of the Sierra Madre as a barrier to east-west travel, the chain is gashed by a series of north-south canyons. "Modern-day Indians move freely through the sierras on foot, avoiding both the humid coastal plain and the sere central plateau. It seemed highly possible, therefore, that in prehistoric days the well-watered elevated mountains would have provided a corridor rather than a blockade for movements of indigenes."⁷ A recent appraisal was the group consensus reported by Nicholson,⁸ which concluded that "the Sierra Madre Occidental by no means constituted a cultural barrier; the eastern slope region probably served as a major corridor of communication between Mesoamerica and areas to the north, along which axis moved raw materials, finished products, ideas, and perhaps groups of people."⁹

The eastern route was somewhat similar to the western in that terrain was generally built on Quaternary sediments, resulting mainly in smooth slopes between the localized rough pass areas. These passes within the basin and range are not difficult to travel, and the large stretches between the passes are easy to negotiate. Once again watersheds were present in the Sierra Madre, providing the sources for the eastward flowing streams like the Nazas, Conehos, Santa Maria and Casas Grandes. These streams

⁴ *Ibid.*

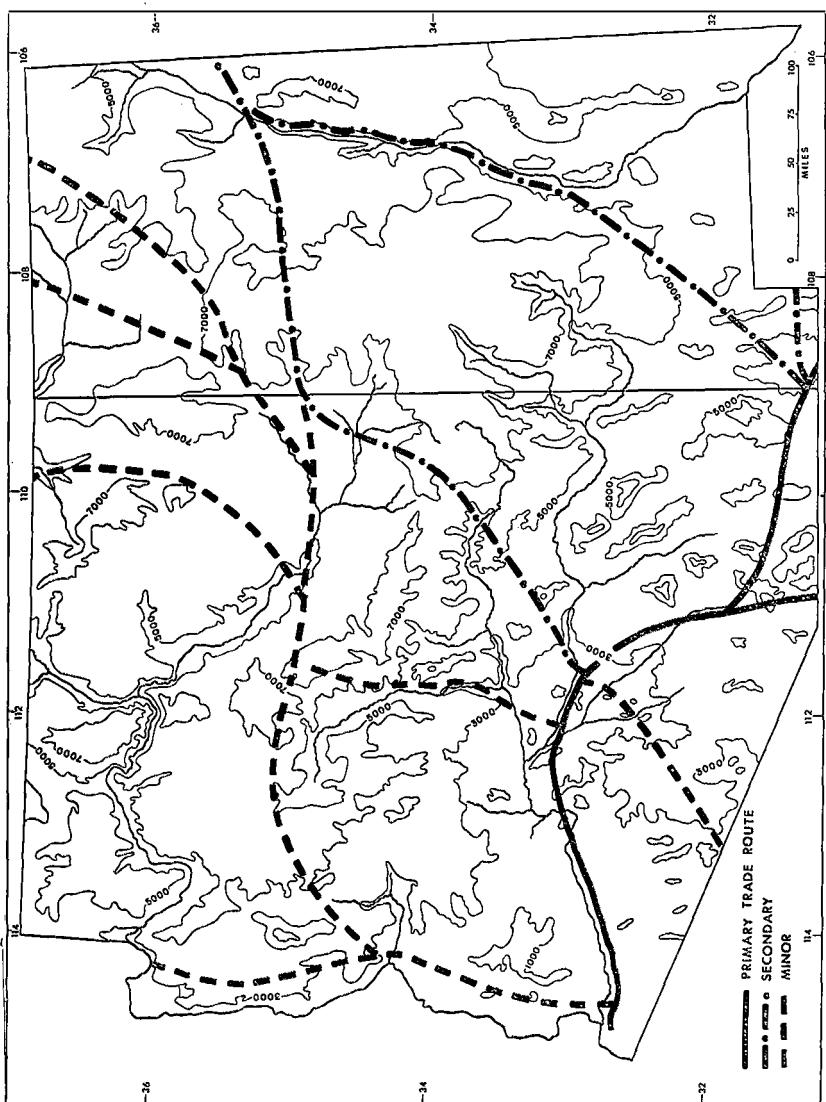
⁵ George F. Carter, "Plant Geography and Cultural History in the American Southwest," *Viking Fund Publication in Geography Number Five*, New York (1945), pp. 105-108.

⁶ Robert C. Lister, "Plugging the Cultural Gap," *Desert*, Vol. 23, No. 12, (December, 1960), pp. 8-11.

⁷ *Ibid.*

⁸ H. B. Nicholson, "Notes and News, Middle America," *American Antiquity*, Vol. 27, No. 4 (1962), pp. 617-624.

⁹ *Ibid.*, p. 618.



fluctuated between the flood periods of summer and the occasional high water of winter following the passage of cyclonic storms. The vegetation was generally steppe in the middle elevations, desert in the lower parts of basins, and oak woodlands on the margins of the sierras. The route today presents no serious physical barrier.

On the basis of physical geography, a comparison of the three routes outlined above with aboriginal routes in the Southwest might help in determining the best possible routes. Brand¹⁰ made a map of aboriginal routes based on the presence of shells, given here as Figure 2. In trying to correlate the shell routes with the physical environment, one can ascertain a general pattern to the one previously outlined by Colton.¹¹ On Figure 2, one of the major routes is between the Pacific coast and the confluence of the Gila and Salt Rivers. The section between the Colorado River and Phoenix follows the Gila, and beyond Phoenix it follows the Santa Cruz. These river transport lines correlate with Colton's water course routes. After leaving the Santa Cruz, this route crosses the high undissected basin and range country north of the Sierra Madre Occidental. This route roughly parallels the present international border as far as the Casas Grandes area of Chihuahua. It is similar in pattern to Colton's "range-to-range" routes. Another conclusion possible from the map is that the aboriginal peoples evidently traveled just about everywhere, even in deserts and extremely rough land. The suggestion is that a wide variety of physical landscapes could be coped with.

HISTORICAL SOURCES FOR THE ROUTES

Another means of probing for aboriginal trade routes is to investigate the routes taken by the Europeans at the time of contact. Sauer¹² noted that footpaths and packtrails rarely differ, and that the explorers followed main trails established by generations of Indian travel. Perhaps if the established routes of the Spanish could be found, some correlation with routes two centuries earlier could be established.

The first recorded travel between what is now the American Southwest and the Mesoamerican region was that of Cabeza de Vaca. Sauer,¹³ as indicated on Figure 3, has traced this journey across the area in question. From the confluence of the Rio Grande and the Conchos River, the route starts on the great detour north rather than proceeding down the eastern route through the interior bolsons. The route enters Arizona in the San Simon Valley, crosses by the spring in Apache Pass, continues southward through the Sulphur Springs Valley and enters Mexico at Douglas. The connection with the Camino Real from Douglas is at Corazones II via Fronteras. Krieger¹⁴ has recently revised the northern part of this route.

¹⁰ Donald Brand, "Aboriginal Trade Routes of Sea Shells in the Southwest," *Yearbook of the Association of Pacific Coast Geographers*, Vol. 4 (1938), pp. 3-10.

¹¹ Harold S. Colton, "Prehistoric Trades Routes of the Southwest," *op. cit.*, p. 318.

¹² Carl O. Sauer, "The Road to Cibola," *op. cit.*, p. 1.

¹³ *Ibid.*

¹⁴ Alex D. Krieger, "The Travels of Alvar Nuñez Cabeza de Vaca in Texas and Mexico, 1534-1536" in *Instituto Nacional de Antropología e Historia, Homenaje a Pablo Martínez del Río* (1961), pp. 459-474.

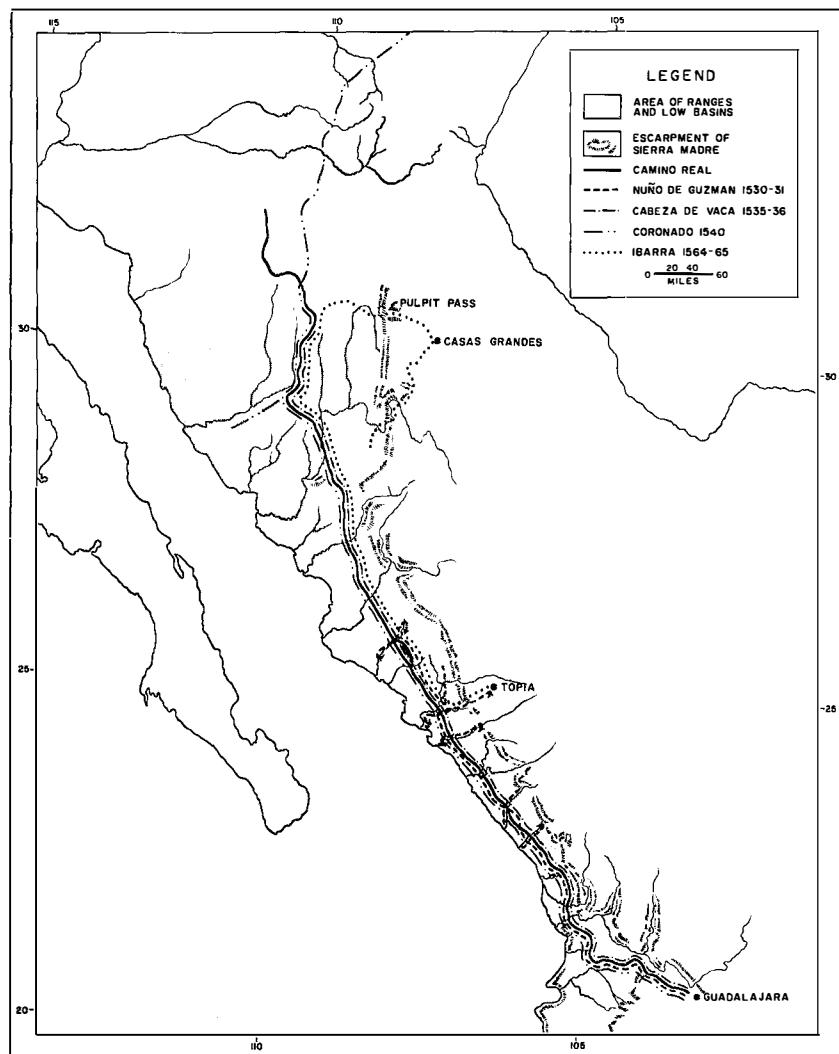


Figure 3. The Western Corridor (Source: Carl O. Sauer, "The Road to Cibola," *Ibero Americana*, Vol. 3, 1932).

Rather than having it pass into New Mexico and Arizona, he favors a route through northern Mexico passing perhaps through Casas Grandes, but north of the Sierra Madre.¹⁵

The route of the Camino Real down the west coast was the established colonial route that linked the Southwest with Mexico. In the sixteenth century it was used by Fray Marcos, Coronado, and Ibarra. The outline of this route is not only based on the positive acts of the explorers coming up from Mexico, but also on the fact that if alternate routes were readily available to the east, it seems likely that Cabeza de Vaca would surely have chosen them as he had approached from that direction.

For a more comprehensive picture of the routes taken during historical times, Figure 4 is presented as a summary of the colonial routes. Two patterns of note are present. The routes within Arizona are east-west, across northern Arizona through the Hopi villages and through southern Arizona along the Gila and its tributaries. The north-south routes along the Rio Grande and along the international border follow the structural alignment of the basins and ranges. These two patterns form a knot in the Hohokam country, where the east-west and north-south routes intermingle. Further observation of the map reveals that the Conchos-Rio Grande route came later in the sixteenth century (Espejo 1583, Oñate 1598). It was in a sense exploration over "new" territory in search of possible colonization and mining sites, rather than in seeking dense populations that might already have acquired mineral wealth. Despite this kind of exploration, the predominant role of modern Pueblos, (Zuni, Rio Grande and Hopi villages) indicates the importance of previously settled areas in establishing the routes of travel. Terrain, the need for food and drink, and existing patterns were of utmost importance across the intervening areas.

According to West,¹⁶ the main line of travel during the colonial period east of the sierra went north from Mexico through Durango. Extensions from this main route went north into New Mexico, west to the coast, and east into the basin floors, all as secondary lines of travel. This main road was harassed by Indian raids and sometimes floods, but grass and water for livestock and people were plentiful.

West also delimited the east-west lines of travel that connect the eastern and western routes. North of the main route through Guadalajara was the Topia Road,¹⁷ connecting the plateau with Sinaloa. This significant road was used in the sixteenth century, and by inference probably had been an Indian line of travel, despite its rugged route. The last east-west route, through Pulpit Pass, connected the plateau with Sonora via the northern end of the Sierra Madre Occidental. This was also used in the sixteenth century, and it follows somewhat the east-west flow of traffic shown by Brand¹⁸ for aboriginal routes in the Southwest.

¹⁵ *Ibid.*, p. 463.

¹⁶ Robert C. West, "The Mining Community in Northern New Spain: The Parral Mining District," *Ibero Americana*, Vol. 30 (1949).

¹⁷ R. C. West and J. J. Parsons, "The Topia Road: A Trans-Sierran Trail of Colonial Mexico," *Geographical Review*, Vol. XXXI (1941), pp. 406-413.

¹⁸ Donald Brand, *op. cit.*

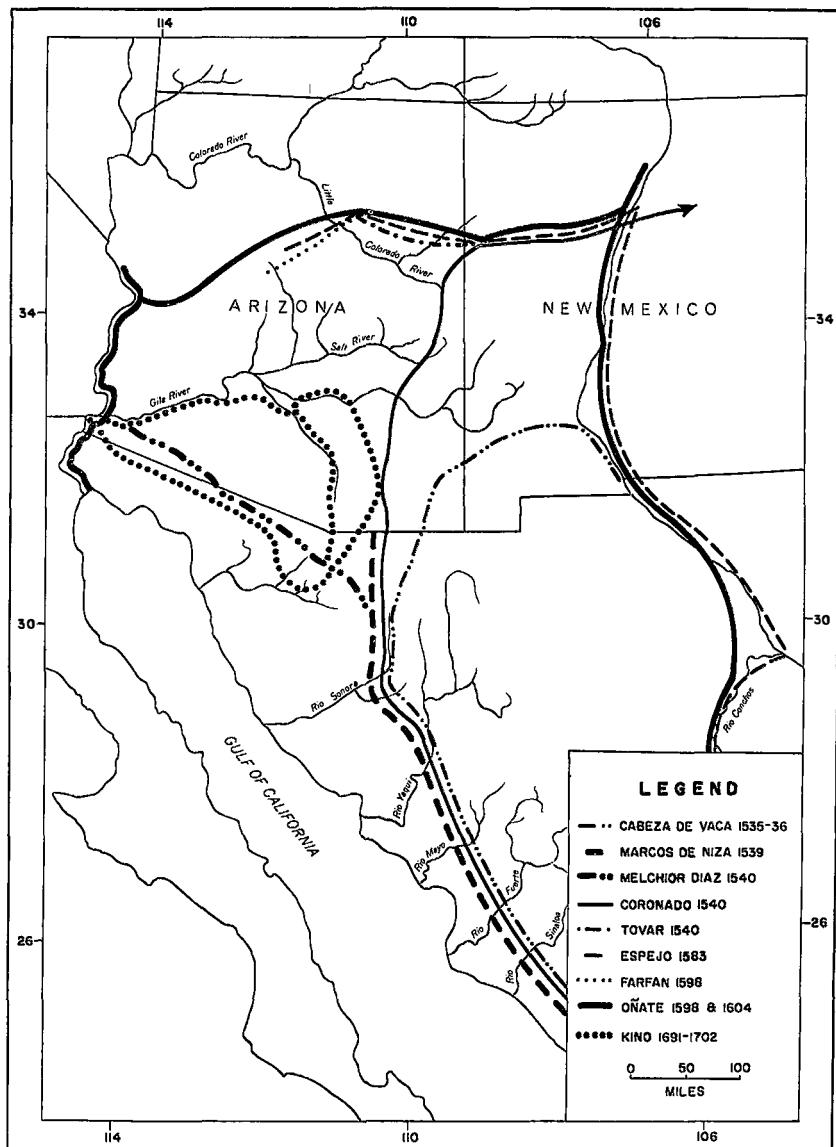


Figure 4. Spanish Exploration in the Southwest (Source: Jack L. Cross, et al, [eds], *Arizona: Its People and Resources*. Tucson: University of Arizona Press, 1960).

On the basis of historical evidence at the time of contact, it seems that the western route, veering inland through Sonora, was the main line of traffic between Arizona and Mesoamerica during the sixteenth century. Other routes, like the postulated eastern route and the two or three routes crossing the sierra, were also present. They were probably present for some extended period prior to contact.

LINGUISTIC CONSIDERATIONS

Kroeber¹⁹ recently stated that linguistic considerations might be important in linking the Southwest with Mexico, depending on whether or not the present Pima and Papago of southern Arizona are descendants of the Hohokam. To use Kroeber's words,

"If the Hohokam⁴ culture was replaced by Pima and Papago culture, particularly if it turned into it, the fact that these two tribes today possess rather close linguistic relatives as far south in Mexico as Durango and Jalisco is almost certain to have relevance to Hohokam history, either at its beginning or its end."²⁰

one finds it possible to link these two areas by any one of the three postulated routes.

Taylor²¹ has also made recent studies of language as a tie between the two areas. One of his conclusions was that the highlanders could very easily have passed cultural influences back and forth between the high cultures of the Southwest and Mesoamerica. As to the meaning of highlanders, this may not be a restrictive term in relation to the three routes.

ARCHAEOLOGICAL CONSIDERATIONS

Although the eastern route has long been mentioned as a vague line of trade,²² very little has been done to archaeologically pinpoint the route until recent years. Lister²³ accepted the possibility of the eastern route but rejected it owing to lack of evidence. Pendergast²⁴ found the northern portion of this route feasible, although he gave it secondary importance. Ferdinand²⁵ perhaps was the main advocate of a Central Mexican-Southwestern route after 1050 A.D. His evidence came from architectural traits that he traced into the Southwest via Zacatecas and Durango. The exact route was not traced, but the implication was that the most direct one would be the eastern one.

¹⁹ A. L. Kroeber, *A Roster of Civilizations and Culture*, (Chicago: Aldine Publishing Co., 1962).

²⁰ *Ibid.*

²¹ Walter W. Taylor, "Archaeology and Language in Western North America," *American Antiquity*, Vol. 27 (1961), pp. 71-81.

²² Donald Brand, et al., *Tséh Ho, A Small House in Ruin*, (Albuquerque: University of New Mexico Press, 1937), p. 57, mention that copper as a general supposition is traded into the Southwest from the south, possibly from Durango or Zacatecas.

²³ Robert H. Lister and A. N. Howard, *op. cit.*, p. 129.

²⁴ David M. Pendergast, "Metal Artifacts in Prehispanic Mesoamerica," *American Antiquity*, Vol. 27, No. 4 (1962), pp. 520-545.

²⁵ Edwin N. Ferdinand, "A Trial Survey of Mexican-Southwestern Architectural Parallels," *Monograph of the School of American Research*, No. 27 (1955).

For over a decade, Lister²⁶ advocated the central route through the Sierra Madre Occidental. He was led to this conclusion partly on negative evidence from both the west coast (because of Sonora) and the plateau. Archaeologically, he postulated three waves of influence passing through the mountain corridor. The first was that of agricultural techniques based on corn. The earliest corn of Bat Cave in New Mexico and other highland strains seems to strengthen this assumption. The second wave was based on pottery, presumably coming into the Southwest at about 1 A.D.²⁷ The third wave, beginning in the tenth and eleventh centuries, includes most of the items listed in Table 1. Lister²⁸ has been doing field work in the moun-

TABLE 1
ITEMS POSSIBLY LINKING MEXICO AND THE AMERICAN SOUTHWEST

Item
1. Architecture — adobe cell construction, compounds, house mounds, square gallery fronts, temple structures, towers.
2. Ball Courts.
3. Burial Patterns, urns and pit cremations.
4. Canal Irrigation.
5. Clay, dippers and figurines.
6. Corn.
7. Macaw-Parrots.
8. Potters — animal jars, baking griddles, band designs, basket handles, bossed decoration, effigy vessels, footed pots, pictorial elements, repeated designs, ticked lines.
9. Religion.
10. Shell Artifacts.
11. Stone Artifacts — crescents, crosses, figurines, mano and metate shapes, mosaics, nose plugs, pendants, three-quarter axes.
12. Textiles — cotton and loom, gauze weave, spindle whorls.
13. Turquoise mosaics.

tain area to find the evidence. Nicholson²⁹ reports that the consensus now is that the Sierra Madre was no cultural barrier, and that the eastern slope of the mountains may have been a corridor.

The west coast route has been most recently advocated by Meighan³⁰ and Pendergast³¹ primarily on the basis of metalworking at Amapa, Nayarit. The specific evidence is the typology of the bells, mentioned as being similar in type and earlier in time than those from either the Southwest or

²⁶ Robert H. Lister, "The History of Archaeologic Field Work in Northwest Mexico," *El Palacio*, Vol. 67, No. 4 (1960), p. 21.

²⁷ Gordon R. Willey, "Developments in the Archaeology of Nuclear America, 1935-1960," *American Antiquity*, Vol. 27, No. 1 (1961), p. 49, notes that the missing link between red on buff pottery in the Valley of Mexico and the Hohokam area is presumed to lie on a pre-Chalchihuites horizon in northern Mexico.

²⁸ Robert H. Lister, "Plugging the Cultural Gap," *Desert*, Vol. 23, No. 12 (1960), pp. 8-11.

²⁹ H. B. Nicholson, *op. cit.*

³⁰ Clement W. Meighan, "Prehistoric Copper Objects from Western Mexico," *Science*, Vol. 131, No. 3412 (1960), p. 1534.

³¹ David W. Pendergast, *op. cit.*

northern Mexico. Ferdon³² has also recognized a west coast corridor, but the evidence led him to believe that the western route had its main importance in the period prior to 1050 A.D. Root²³ suggested the western route not only on the typology of bells in the two areas, but also on the basis of impurity similarities in the metals used for casting. Meighan³⁴ lists many items that are found along the west coast of Mexico, such as ball courts, construction types, shell bracelets, pottery, and many types of stone artifacts. Kelley³⁵ also concluded that Mesoamerican influence spread to the classic Hohokam via Sinaloa rather than through the Chalchihuites.

All three routes discussed appear as possibilities for prehistoric utilization, but the importance of the east-west line of travel north of the Sierra Madre Occidental cannot be overemphasized. As part of a tentative assessment, it may be the northern counterpart of the east-west movement across the volcanic belt in the densely populated area of Mesoamerica.

³² Edwin N. Ferdon, *op. cit.*

³³ W. C. Roots, in James B. Griffin (ed.), "Essays on Archaeologic Methods," *Anthropological Papers, Museum of Anthropology, University of Michigan*, No. 8 (1951).

³⁴ Clement W. Meighan, "New Findings in West Mexican Archaeology," *Kiva*, Vol. 25, No. 1 (1959), pp. 1-7.

³⁵ J. Charles Kelley, "North Mexico and the Correlation of Mesoamerican and Southwestern Cultural Sequences," in Wallace, Anthony F. (ed.), *Men and Cultures* (Philadelphia: University of Pennsylvania Press, 1960), p. 571.

USING THE SCIENTIFIC METHOD TO SOLVE GEOGRAPHIC PROBLEMS*

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Able teachers seek to improve their teaching, and to get children intrigued about the topics they are studying. With the overwhelmingly rapid rate at which new knowledge is accumulating today, however, it is difficult for most classroom teachers to keep up with the pace. Specialists in various academic disciplines have therefore recently been working with teachers to develop new curricula which would include many of the new ideas. The new physics, mathematics and biology curricula are all evidences of this trend. They share another factor: emphasis on learning through discovery. In place of memorizing many facts and laws, students are encouraged to develop their own generalizations and to view science as on-going and constantly developing, not as static and complete.

Many teachers know little about similar developments which have been occurring in geography as well as in other social sciences. Increasing emphasis is being laid upon the development of generalizations and the understanding of observations made about the world. In geography, for example, emphasis is shifting from the memorization of facts about the names of cities, mountain ranges and rivers to the understanding of principles underlying the location of various physical and cultural features, and the relationships between them.

Experienced teachers are often helped to learn about these developments through in-service training, workshops and summer courses. Prospective teachers may also learn about them, and practice the newer approaches so that they may later apply them in their own classrooms. Students who participated in the projects reported here have had this opportunity, and have found that elementary school pupils enjoy discovering the principles of location of cities, for example, and working out the possible locations for major cities from general knowledge of the area.

Underlying this approach is the trend in geography as a social science toward increasing use of scientific method. Although most teachers are familiar with the scientific method as it applies to the natural sciences, few of them have learned to apply it to the social sciences such as geography, sociology or economics. A brief review of the major points involved may serve as a basis for discussing the projects which students carried out in learning to apply the scientific method to the study of a geographic problem.

WHAT IS THE SCIENTIFIC APPROACH?

The "game of science" begins with the scientist's asking questions about a particular phenomenon which he has observed. He wishes to find out *how* it behaves and *why*, in the sense of determining relationships between it and other phenomena. In thinking about possible explanations, he

* This is a revised version of a paper presented at the annual meeting of the Association of American Geographers, April 18-22, 1965.

attempts to discern patterns of regularity among his observations, drawing upon existing knowledge and theory. He formulates a series of "hunches" or "educated guesses" which, when formalized as proposed statements of regularity, are termed hypotheses. He constantly works back and forth between theory and observation, testing his guesses, re-formulating them and re-testing them in the light of new observations. When necessary, he revises theories to fit newly discovered facts or laws.

APPLICATION OF THE SCIENTIFIC APPROACH TO THE STUDY OF GEOGRAPHY

The study of geography is often purely descriptive; students are taught the content of different areas on the earth, or *what* is found *where*. Emphasis is placed upon the ways in which areas differ from each other; that is, upon the unique features of each area. As early as the 1840's, however, von Humboldt and Ritter suggested that the task of geographers was not simply to describe and map the face of the earth, but to go beyond this collecting of facts to search for laws which would explain or account for the distribution of phenomena on the earth's surface. In so doing, they stressed the importance of recognizing the relationships which existed among the spatial distributions of various phenomena.

Similarly, many contemporary geographers believe that it is essential to go beyond the cataloguing and mapping of their observations, and attempt to explain how and why various phenomena are located. Viewed in this light, geography is the science which studies the location and distribution of phenomena on the face of the earth. Geographers study different kinds of phenomena: physical, social, economic and political. Their concern is with the distribution of these phenomena. They are interested in the phenomena themselves only to the extent that such knowledge is needed for explanation of their distribution. For example, geographers study the location of industry. They are concerned with the process of making shoes or steel only to the extent that this knowledge is essential for explaining the location of shoe factories or steel mills. It is important for them to know that the raw materials for the making of steel are heavy, so that steel mills may be located relatively close to the sources of raw materials, and that cheap transportation would be a highly desirable factor. Since the raw materials for making shoes are lighter in relation to the cost of the finished product, closeness to the sources of raw materials would be less important to shoe manufacturers seeking a plant location.

Geographers who use the scientific approach are not interested in listing or cataloguing the content of individual areas or regions, nor do they attempt to explain any occurrence in isolation. For example, they do not try to explain why Boston or Chicago is located where it is. Instead, by observing many major cities, they seek to find a number of factors which may be related to their locations, such as transportation, communication, and the presence of industry. Relationships which are found between the spatial distribution of any of these phenomena and the actual location of major cities provide the basis for making generalizations about the location of cities. These generalizations may then be used to predict locations in which one would expect to find major cities. The predictions are tested empirically to find out whether cities are actually located where one would expect to find them if these generalizations were valid.

A SPECIFIC EXAMPLE

A social education class provided the author with the opportunity to present future teachers with some of these geographic concepts. Throughout the course, two parallel objectives were borne in mind: 1) presentation of the scientific approach to geographic study and 2) application of this approach in public school classrooms. Material was presented on a college level, in keeping with the age and maturity of the students. At the same time, examples were given to show how this new approach could be used in teaching children.

As a term project, students applied their new knowledge to the analysis of a specific problem. The area and the general topic to be studied were selected by the instructor, as would usually be the case in a public school. The area chosen was the State of Washington, since most of the students lived and expected to teach there. The general topic to be studied there was population. When the topic was presented to the class, members were asked to suggest specific topics dealing with population, the distribution of which they could study. Some of the topics suggested were: percentage of older people; educational level, measured either by the percentage of males with four or more years of college or by the median grade level completed by all persons age 25 and over; and number of people employed in construction.

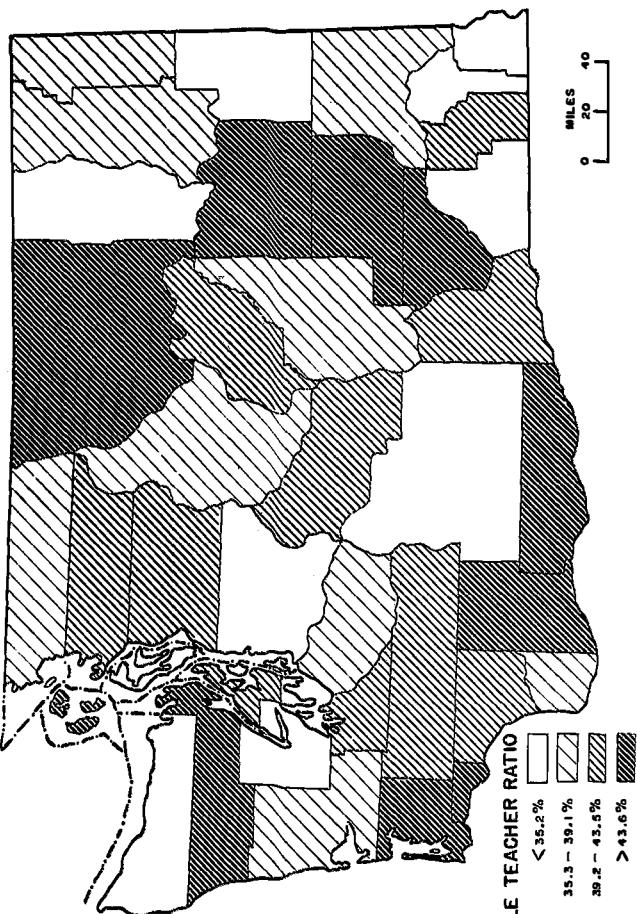
Since the course lasted only one quarter and time was limited, the format of the project was specified. As an exercise in application of the scientific approach, it involved the aspects usually considered to be included in the approach: selection of a phenomenon for study, termed the dependent variable, and precise definition of it; collection of data for the dependent variable for each county by drawing upon existing knowledge; mapping of the data, showing the distribution by county for the entire state; formation of hypotheses to account for this distribution; collection of data for the independent variables—the phenomenon hypothesized as related to the independent variable; testing of the hypotheses and drawing conclusions.

One of the student projects is discussed here in order to illustrate how the projects were carried out. Because the emphasis was on method and approach rather than content, the topic chosen and the conclusions reached by the student are of lesser concern.

The topic chosen by the student was the distribution of male teachers in the State of Washington. Beginning with this broad topic, it was necessary for the student first to define it more precisely and in form compatible with available data. After collecting data on the ratio of male teachers employed in each county from the 1960 Census of Population, she ranked the counties from highest to lowest. She then computed the mean, and divided the array into four equal-sized groups, with two below and two above the mean. Using this grouping, she prepared a map showing the distribution (Figure 1).

Her next task was to search for possible explanations of the spatial distribution depicted by the map. Formulating hypotheses was for her, as for most students, one of the more difficult steps. In class, an hypothesis had been described as being, in essence, an "educated guess"; in this instance, one which might account for the spatial distribution of the dependent variable, or phenomenon being studied. It was also pointed out that to

**MALE TEACHER RATIO - WASHINGTON
PER CENT OF ALL TEACHERS**



SOURCE : U.S. CENSUS OF POPULATION : 1960

STATE MEAN (R) 39.15%

Figure 1

"account for" or "explain" a phenomenon meant to find other phenomena which were distributed in a similar pattern. In areas where there were greater amounts of the dependent variable, there would also tend to be greater amounts of the independent variables selected (or, in the case of an inverse relationship, lesser amounts).

Studying the map depicting the distribution of the dependent variable helps to suggest other phenomena with similar distributions which may be selected for testing as independent variable. It is apparent that extensive knowledge regarding the distribution of many phenomena over the entire state of Washington is necessary as a basis for formulating valid hypotheses. For example, there are wide variations in the amount of rainfall throughout the state, with large amounts along the coastal portion and smaller amounts in most portions east of the Cascade Mountains. Vegetation and crops also differ from the forested coast to the drier inland areas. Population is concentrated in the Puget Sound area, with other smaller concentrations around Spokane, Yakima, Richland and few other areas.

On the basis of her knowledge about the state, the student selected three phenomena which she believed might be related to the male teacher ratio in an area: 1) the proportion of the population living in urban places, 2) the median salary for teachers, 3) the number of named lakes and streams. She believed that there would be a higher ratio of male teachers in those counties with higher median salaries, since a male teacher, who would probably have a family to support, would seek employment in an area which offered a relatively high salary. She also thought that male teachers might be attracted by fishing opportunities, and so chose the number of named lakes and streams as a second independent variable. In the choice of the third variable, she reasoned that more male teachers would be attracted to urban places than to more remote or rural areas.

Various methods had been suggested in class for testing hypotheses. Since few students had taken a statistics course, no statistical tests of the hypotheses were used. Instead, scatter diagrams or contingency tables were constructed, and the hypotheses tested by inspection of these. If the distribution of dots on a scatter diagram was generally elliptical, the hypothesis was considered to have been supported by the evidence (*Cf.* Figure 4 and Figure 2). Figure 4 is a scatter diagram depicting the relationship between the proportion of population living in urban places and the male teacher ratio in each county; it shows a generally elliptical pattern. In contrast, Figure 2, which shows the relationship between the median salary of teachers and the male teacher ratio, shows what appears to be an almost random distribution of dots. The same can be said of Figure 3, which illustrates the relationship between the number of named lakes and streams and the male teacher ratio.

Inspecting her scatter diagrams, the student decided that her first two hypotheses were not supported by the data. For the third one, although a relationship was found, it was the inverse of that which she had hypothesized; that is, the male teacher ratio tended to be higher in counties with a smaller proportion living in urban places. In her conclusions, she suggested possible reasons for the lack of significant findings for the first two hypotheses and for the possible importance of the relationship found for the third.

MEDIAN SALARY IN 1000'S OF DOLLARS
PLOTTED AGAINST MALE
TEACHER RATIO

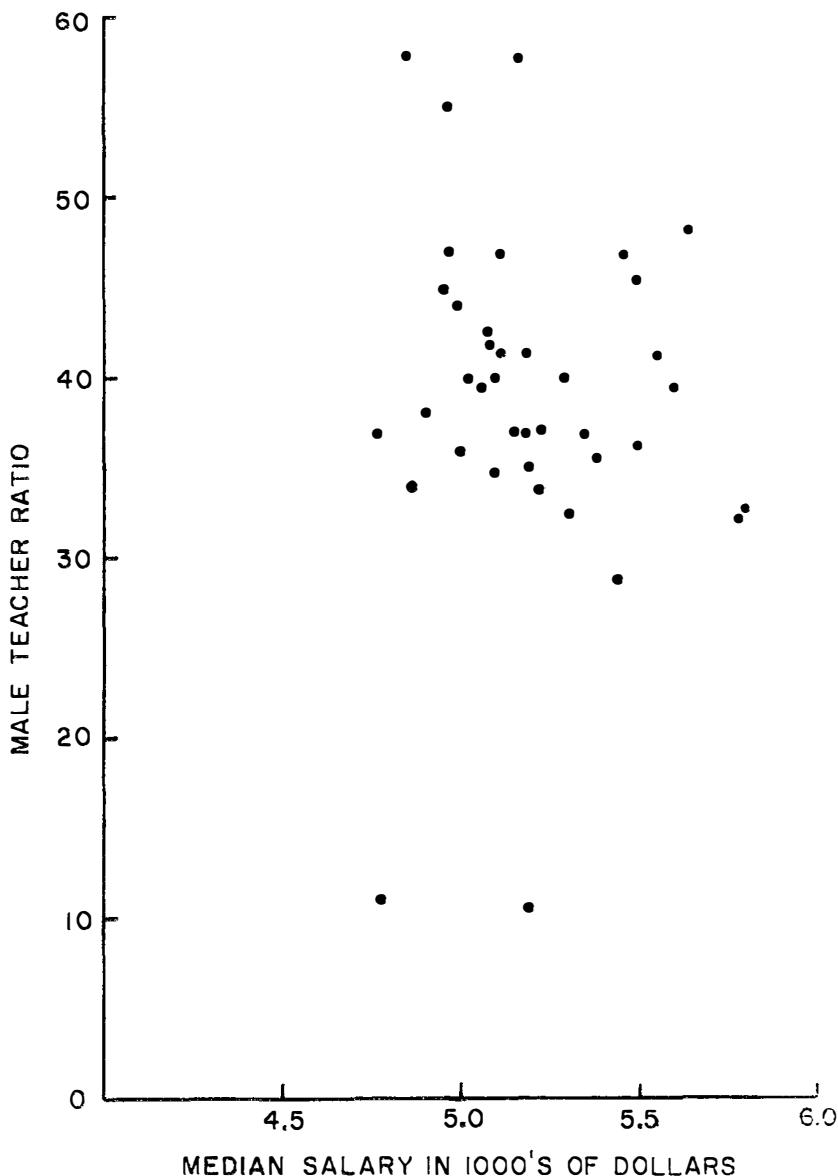


Figure 2

NUMBER OF NAMED LAKES AND STREAMS
PLOTTED AGAINST MALE
TEACHER RATIO

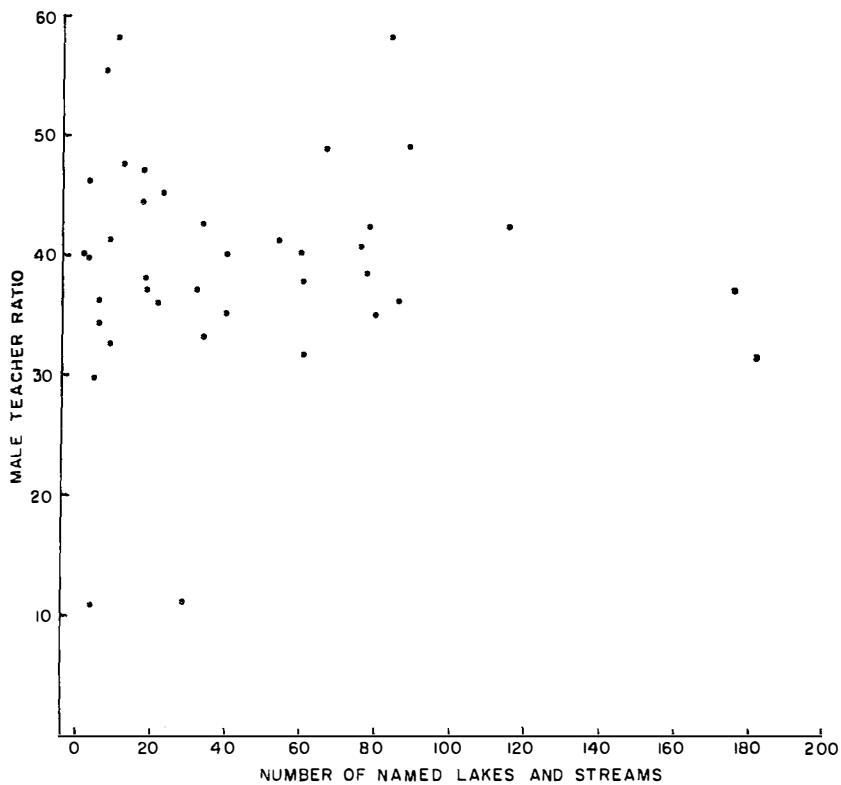


Figure 3

PER CENT OF POPULATION URBAN
PLOTTED AGAINST MALE
TEACHER RATIO

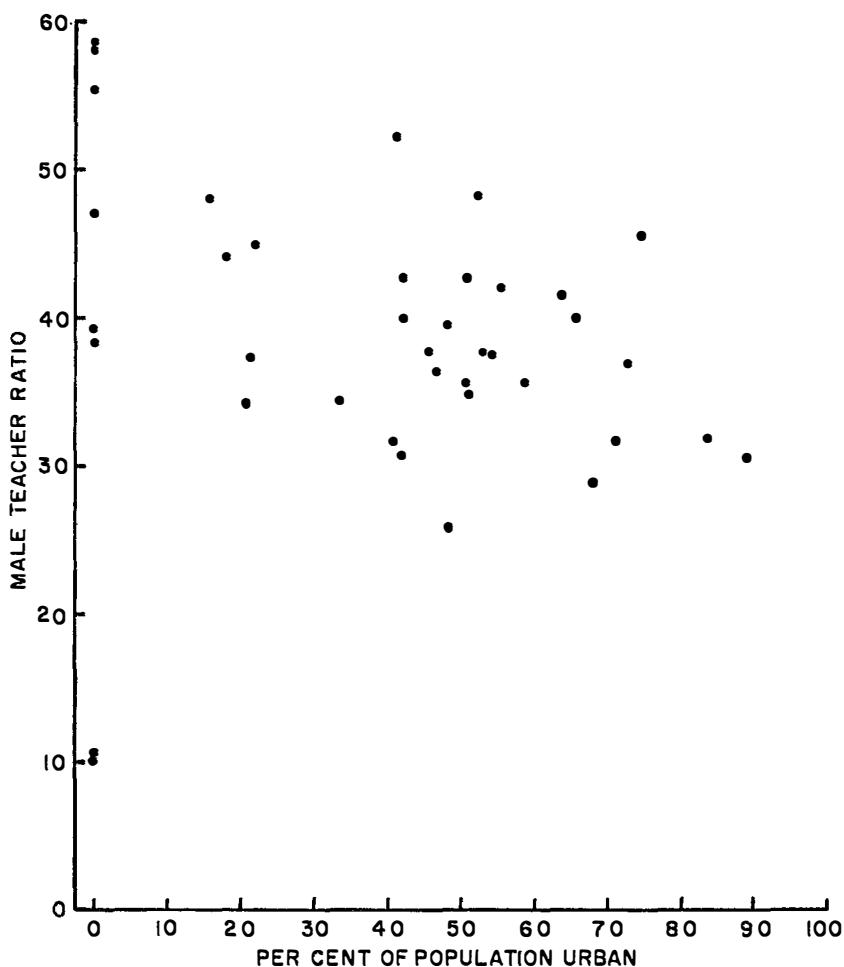


Figure 4

She realized that, further, more detailed study would have to be done before any definite conclusions could be drawn.

LEARNINGS RESULTING FROM THE PROJECTS

For many students, the completion of this project was a struggle. In spite of, or perhaps because of, the effort put forth, the majority of students felt that the project had been valuable and that it should be continued with future classes.

Student learnings emerged in four broad areas: 1) consideration of a viewpoint in geography involving the study of variations in the spatial distribution of phenomena on the face of the earth; 2) practice in applying the scientific approach to the study of a geographic problem, in keeping with this viewpoint of geography; 3) learning of many study skills needed to carry out the project and 4) gaining and understanding of ways in which this knowledge might be applied in public school classrooms.

1) In general, students were reluctant to recognize and accept a view of geography which did not coincide with preconceived ideas, however hazy and ill-defined these may have been. They knew that the study of geography involved learning place names, imports and exports, and similar geographic facts. They did not see, however, that these facts could be inter-related within the framework provided by the scientific approach. Because this approach to the study of geography was unfamiliar, it was difficult for most students to grasp it in the short space of a single quarter. It was believed that progress, nevertheless, in introducing the notion of searching for relationships among the spatial distribution of various phenomena as one which is basic to geography.

In a concrete way, students realized that knowledge of geographic facts, although not an end in itself, was essential to successful completion of the projects. As they studied many phenomena in their own state, they found that more thorough knowledge of these facts would have enabled them to formulate hypotheses more intelligently, and to discard before testing some hypotheses which proved to be untenable. They also found that carrying out a project of this type involved learning many geographic facts at the same time.

2) Students learned to apply the scientific method in geographic study, and to consider the subject matter within a problem-solving framework. They found that what might appear self-evident was not necessarily valid, and had to be tested before being accepted even tentatively.

3) Students also acquired or improved a number of study skills and realized that such skill must be taught as an integral part of the curriculum if they are to be mastered and used. Completion of the term project required such activities as the collection of data from census reports, ranking data and dividing it into groups, making maps, constructing scatter diagrams and contingency tables, and writing up the completed project in a form acceptable as to contents, proper use of English, and neatness.

Similarly, students in an elementary or secondary classroom would be expected to use reading and library skills in accumulating information about an area, arithmetic and map skills in organizing and visualizing information,

and communication skills, both oral and written, in summarizing and reporting the findings.

4) Applicability for the classroom teacher should be the justification for including such a project in a social studies education class. Throughout the quarter, therefore, students were encouraged to draw parallels between their own present class experiences and the experiences of their future pupils. They were continually asked to think of ways in which the scientific approach could be applied in teaching at different grade levels.

In the intermediate grades, one area of the world is often selected for study. It is commonly divided into political or physical regions which are studied one at a time. For example, the continent of South America may be studied either by countries or by physical regions such as the coastal lowlands or the highlands of the Andes. The teacher can encourage pupils to suggest topics such as transportation, manufacturing, cities, population, rainfall, and vegetation for investigation within all regions. As each topic is studied, hypotheses may be formulated about the relationship between it and other topics. The degree of sophistication of the hypotheses would depend upon the pupils' maturity and ability. As study proceeds, the validity of the hypotheses would be tested by finding out whether generalizations about the location of phenomena derived from the study of one area, appear to be applicable to other areas. Older or more capable pupils might be able to derive abstract principles of location for a particular phenomenon. From these, they could hypothesize its expected location in other areas. Such an approach is reported by Bruner.¹

A sixth grade class, having been through a conventional unit on the social and economic geography of the Southeastern states, was introduced to the North Central region by being asked to locate the major cities of the area on a map containing physical features and natural resources but no place names. The resulting class discussion very rapidly produced a variety of plausible theories concerning the requirements of a city—a water transportation theory that placed Chicago at the junction of the three lakes, a mineral resources theory that placed it near the Mesabi range, a food-supply theory that put a great city on the rich soil of Iowa, and so on. The level of interest as well as the level of conceptual sophistication was far above that of control classes. Most striking, however, was the attitude of children to whom, for the first time, the location of a city appeared as a problem, and one to which an answer could be discovered by taking thought . . .

Jakubek² has reported using the scientific approach to the study of a social problem with a high school social problems class. The problem chosen, namely, the spatial distribution of automobile accidents by county throughout the state of Iowa, concerned the students directly. They hypothesized four factors which might be related to spatial distribution of automobile accidents: total population, proportion of population living in urban areas, proportion of population of age 65 and over, and per capita liquor sales. The hypotheses were tested by visual comparison of the maps of each independent variable with the map of the dependent variable. Students concluded that the spatial distribution of each of the first two independent variables was sufficiently similar to that of the dependent variable to accept

¹ Jerome Bruner, *The Process of Education*, Cambridge: Harvard University Press, 1960, pp. 21-22.

² Otto F. Jakubek, "Geographical Investigation of a Social Problem: A Study in Scientific Method," *The B. C. Teacher*, November, 1961, pp. 60-61.

the hypotheses.. For the third, they found what appeared to be an inverse relationship. They rejected this hypothesis and revised it to conform to their findings. They rejected the fourth hypothesis as showing no apparent relationship.

Even at the primary level children can learn to seek out relationships among the distribution of phenomena. In the primary grades, where emphasis is usually placed upon the study of phenomena close to the child's experience, the location of such phenomena as shopping centers, fire stations, schools, bus routes, and factories may be studied. Children can form the habit of asking *why* these are located where they are, and of looking for explanations. It is apparent, for example, that fire stations must be located so that any section of a city can be reached quickly, and that all the fire-fighting equipment for a large population should not be housed at one location. Stated more abstractly, there is a relationship between the location of buildings and the location of fire-fighting equipment.

Asking why and how various phenomena over the face of the earth are related to each other and what the general principles underlying the location of such features are can lead to understanding in the study of geography. By capitalizing on curiosity, teachers can help their students to discover relationships among these phenomena in the world in which they live and to integrate the facts they encounter into a meaningful framework. Approached in this manner, the study of geography contributes to the child's entire sphere of knowledge, instead of being restricted to learning a series of isolated facts, most of which are soon forgotten.

SAVAGE RIVER IRON ORE EXTRACTION: A NEW DIMENSION IN TASMANIA'S ECONOMIC DIVERSITY

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Tasmania, Australia's small island state, is currently a focal point in the continuing pattern of world industrial material procurement.¹ Even with the preparation of production facilities well under way, it is difficult for observers to realize that Tasmania, long isolated from the mainstream of world economic affairs, is to become a significant raw material supplier for the production of one of the world's most important industrial commodities—steel.

The decision of the Picklands Mather Co. and Mitsubishi of Australia, Ltd., to pursue the extraction of iron ore from the Savage River area of northwest Tasmania raises some important points. Two considerations appear to be especially noteworthy: first the extraction of Savage River ore for export will associate the island with one of the world's dynamic industrial communities for the first time—a step of immediate economic significance; and second, that the geographic isolation historically associated with Tasmania has been effectively reduced—an important long term consideration.

The Savage River, as may be noted on Figure 1, is centered toward the northwest part of the island. The ore sites, located primarily on the eastern side of the river, are in a ruggedly unfamiliar and isolated area. Port Latta, located near the town of Stanley on the coast is approximately 60 miles north from the ore bodies, and 280 nautical miles from Melbourne, on the Australian mainland.

Isolation has characterized much of western Tasmania. The present ore sites are approximately halfway between Waratah, a withered ghost town of perhaps a hundred inhabitants, and Corinna, a village numbering thirty or so people near the confluence point of the Savage and Pieman rivers.² A graded gravel road winds tortuously up to Waratah, while the existing road from Waratah to Corinna has been a little more than two well-developed tire tracks.

Topographically the area is not high, but the relief is irregular. The ore bodies are distributed on the hill areas adjacent to the river approximately 1300 to 1500+ feet above sea level.³ The valley is surrounded by hills and low mountains with Mt. Cleveland dominating at 2800 feet. Vegetatively the area is classified by Jackson as lowland rainforest; an excess of eighty inches of rain and an annual temperature average between 52 to 55° F. produces an extremely dense cover of wet sclerophylls dominated by eucalypts. Yellow podzolics are characteristically gradational and are underlain by Precambrian metamorphics.⁴ This combination of soil and vegetation

¹ "West Coast Pins Its Hopes On Iron," *Examiner*, August 10, 1965, p. 99.

² *Pocket Yearbook of Tasmania*, R.M. Archer, Hobart, Tasmania, 1964, p. 61.

³ *Tasmania's Industrial Index*, Industrial Development Branch of the Premier's and the Chief Secretary's Department, Hobart, Tasmania, pp. 33-34.

⁴ *Atlas of Tasmania*, J. L. Davies (ed.), Lands and Surveys Department, Hobart, Tasmania, 1965, p. 5.

has been a strong deterrent to settlement; the whole western part of the island has been only intermittently inhabited since the early 1880's.

Present interest is focused in the ore concentrations in the more northern part of the valley but south of the Long Plains area. Occurring as lenses in a belt of amphibolite that stretches southward for approximately twelve miles, drilling samples from the northern area have yielded magnetite samples of 44% iron content. It is estimated that 165,000,000 tons of this ore can be mined by open cut methods after the overburden and unusable ore are cleared. The ground level will eventually be taken down to 800' which is the approximate level of the Savage River in the area. An additional 30,000,000 tons of lower grade ore is available, and larger deposits of higher ore content can be extracted by underground methods. Two miles south a second large deposit has been identified, and a substantial ore body has been located near the junction of the Savage River and Rocky Creek.⁵

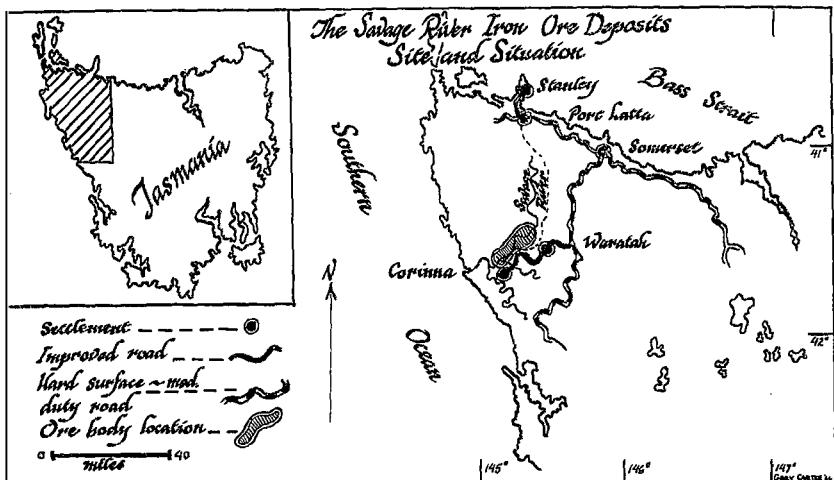


Figure 1

Deposits of iron ore have been associated with the general area of the Savage River for a number of years. Charles Whitman, a student of Tasmanian geology, wrote in 1923 that recoverable iron ore was available. But then, as now, the problem has been how to extract and ship ore economically.⁶

Low grade ore movement in large volume is now a matter of fact. And while Australian producers have never had to turn to Tasmanian ores, such is not the case with the Japanese. The tremendous growth of the Japanese iron and steel community has necessitated exhaustive searches for raw materials and traditional considerations have been displaced by imaginative technology.

Extracting, processing and transporting to a bulk carrier terminal or extracting, transporting and processing are organizational possibilities. Western Tasmania's pattern of high winds, turbulent seas, treacherous coastlines and shallow channel entrances ruled out the chances of bulk shipment from the existing or improved water routes available. Similarly,

overland transportation to a bulk shipping terminal would have been financially prohibitive.

Engineers from the Picklands Mather Co., faced with the imposing physical limitations of the Savage River site, concluded that it might be possible to pump the ore, once it has been crushed and concentrated, in solution to a bulk shipping terminal. Noting that the site is generally near 1500+ feet, a high pressure pipe system would not have to traverse any significant land barriers if oriented northward; hence Port Latta, near Stanley, has been designated as the ore pelletizing station and bulk shipping terminal. Incoming ore of 44% content will be upgraded to 67%, pelletized and shipped. It is expected that the annual production, to commence in early 1967, will be near 2½ million tons of concentrates extracted and processed from 10 million tons of total material.⁸

Eight hundred men are expected to eventually be involved in the Savage River operation. The greatest number of these will be recruited from local sources, experienced in both open pit and underground methods. Coal, tin and copper have long extraction histories in Tasmania, but with an overall decline in mining exports, a number of experienced miners have turned to other gainful pursuits. In 1964 those employed in mining and quarrying represented 3½% of the Tasmanian labor force or about 3500 people. The proposed Savage River scheme will increase the number by over one-fourth.⁹

Excluding the estimated \$84,000,000 to develop the facilities, the proposed export of 2-2½ million tons of concentrated pellets will represent an export value near \$25,000,000. The present plan includes a 45,000,000-ton export contract; if the 2-2½ million tons per annum export is maintained, the scheme would be projected for a twenty-year span, but early indications are that this is conservative. Considering the export income of the island, which is currently dominated by raw wool, wool manufactures and agricultural goods, the Savage River exports should have a salutary effect—particularly in decreasing the dependence upon agriculture exports.

Thus the stage is set for a most significant step in Tasmania's economic future. The initiative and leadership of the Reece government in attracting diversified industrial interests appears to be successful, and Tasmania, long isolated from world affairs, will now be a small but important member of the world's industrial community.

⁵ *Tasmanian Industrial Index*, loc. cit.

⁶ Charles Whitman, *Western Tasmania*, Davis Brothers, Hobart, Tasmania, 1949, pp. 70-71.

⁷ Robert B. Hull, *Japan: Industrial Power of Asia*, Van Nostrand, New Jersey, 1963, p. 63.

⁸ *Examiner*, loc. cit.

⁹ *Pocket Book of Tasmania*, op. cit., p. 161.

URBAN DEVELOPMENT IN AFRICA: THE CASE OF LAGOS

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Redevelopment is a recurring theme in urban history. Just as building was a part of city growth, so rebuilding became necessary to overcome obsolescence and to alter past mistakes. Each rebuilding phase, however, was more costly than the last. This has been particularly true since the Industrial Revolution when our modern cityscape began to develop form and substance. For the first time, it was possible to support large concentrations of people in centers, which, in turn, grew at rates considered impossible by pre-industrial standards. Today, urban growth is no longer a geographic singularity; a unique feature of the Western World. The impact of urbanization on Great Britain and the United States is now being felt in the younger, emergent nations. Here, in fact, the social and physical effects of urbanization are greater. The later a country experiences industrialization, the faster is the process of urbanization.¹ Thus, redevelopment, an essential part of the historic city, has assumed an even more vital and necessary role in our present urban planning concept. But, it remains to be determined just what course future redevelopment should take. The United States, with its seemingly unlimited assets, has been unable to overcome the blighted conditions of her cities through urban renewal. How, then, is redevelopment possible for those countries that are less fortunate financially or materially? And, can redevelopment, as presently conceived, be effectively applied in these areas?

Lagos, Nigeria, capital and principal urban agglomeration of the most populous of African countries, offers a case study whereby this question may be answered. The framework for analysis is the Central Lagos Slum Clearance Project, a scheme that directly attacked the unsanitary and over-crowded conditions prevalent over much of Lagos Island. The purpose is not to criticize the scheme, for this has been done elsewhere in considerably more detail.² Instead, the redevelopment project is evaluated within the broader setting of African urbanization, particularly those aspects of rural immigration and natural population increase.

Metropolitan Lagos numbers approximately 800,000 people,³ distribut-

¹ Kingsley Davis, "The Urbanization of the Human Population," *Scientific American*, Vol. 213, No. 3, September, 1965, p. 43.

² Only a summary of the scheme is given here. For a more detailed analysis of the Central Lagos Slum Clearance Project, see Otto Koenigsberger, Charles Abrams, et al., *Metropolitan Lagos*, United Nations Department of Economic and Social Affairs, 1964, pp. 177-189, and Peter Marris, *Family and Social Change in an African City*, (London: Routledge and Kegan Paul, 1961), pp. 82-95.

³ Koenigsberger and Abrams, *op. cit.*, p. 3.

ed evenly between Lagos Island and the mainland (Figure 1). From a small British trading and slave port, the original Island settlement grew slowly until the beginning of the twentieth century when it recorded 40,000 inhabitants. By 1950, the population had grown to 250,000 resulting in a dense concentration on the island and a spillover of people to the mainland.⁴ The most spectacular numerical increase was yet to come. In the period

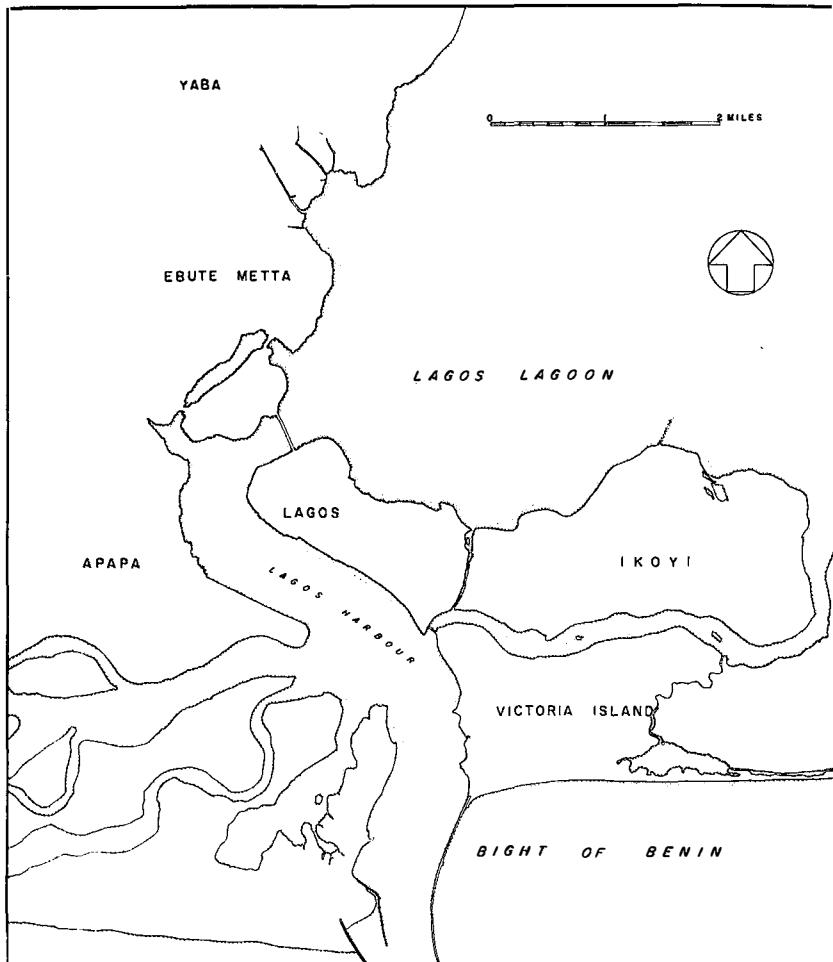


Figure 1. Lagos and Principal Suburbs.

1952-1962, Lagos and its suburbs added over 420,000 people, mainly through immigration.⁵ This latest expansion has occurred principally on the mainland: whereas 36,000 Lagotians lived "off" the island in 1952, and

⁴ Akin L. Mabogunje, "The Evolution and Analysis of the Retail Structure of Lagos, Nigeria," *Economic Geography*, Vol. 40, No. 4, October, 1964, p. 304.

⁵ Koenigsberger and Abrams, *op. cit.*, p. 3.

accounted for 12 per cent of the total urban population, ten years later this group had swelled to 277,000 or 39 per cent of the total population.⁶ At the same time 180,000 new residents were added to what was already a densely built-up and overcrowded island. Undesirable physical and social conditions, which have always been present in Lagos, have been intensified by this recent phenomenal growth in population. For example, Lagos has never had a sewer system. Between the night soil collectors and open storm drains, effluents eventually make their way to the harbor and lagoon. Infant mortality is still a very high 62.9 per 1000 live births, in spite of recent medical advances.⁷ Clearly, something had to be done, if not to make Lagos a better place in which to live, at least to transform the city into a respectable capital worthy of its position in a soon-to-be independent nation.⁸

THE CENTRAL LAGOS SLUM CLEARANCE PROJECT

Redevelopment was applied in Lagos as early as 1928, when the Lagos Executive Development Board, the principal planning authority, was created to deal with redevelopment in an overcrowded and unsanitary port of the city that had experienced an outbreak of bubonic plague.⁹ The Board was founded and maintained as a statutory corporation modelled after the Improvement Trust formula with a two fold purpose: planning authority and executive development. Its powers include the right of interim development and compulsory acquisition of land, but without the authority to levy taxes to insure financial support. Instead, the Board relies on contracts for most of its working capital.

By any density, health, or maintenance standards, the 70-acre area selected by the LEDB in 1951 for redevelopment was a slum (Figure 2). The road to industrialization in Lagos, as in other tropical and extratropical cities, produced physical liabilities as material assets were being created. The tremendous population expansion of Lagos discussed previously left very little breathing time in which to produce even the most rudimentary therapeutic measures.

The land use activities within the redevelopment area were an admixture of commercial, residential, and industrial sites. After land acquisition, the LEDB was to clear the existing structures, replan the entire area with widened streets, rear access service roads, open spaces, and new plot layouts.¹⁰ Twenty net acres for residential redevelopment were to be available, along with 22 net acres for commercial activities.¹¹ After site planning, the first choice of plots went to the former owners, reselling at 120 per cent of the acquisition cost.¹² The government outlay, needed initially to acquire

⁶ *Ibid.*

⁷ Koenigsberger and Abrams, *op.cit.*, p. 198.

⁸ Marris, *op. cit.*, p. 84.

⁹ J. W. Henderson, "Lagos, Nigeria, The Work of the Lagos Executive Development Board," *Journal of the Town Planning Institute*, Vol. XLIV, April, 1958, p. 114.

¹⁰ Lagos Executive Development Board, Annual Report and Accounts (1955-1956), pp. 18-22.

¹¹ *Ibid.*

¹² Koenigsberger and Abrams, *op. cit.*, p. 177.

the land, would thus be partially or wholly recovered. If the holding could not be resold to the former owner, a priority claim would be given for an equivalent area of land within the project, as near as possible to the original site. And, if this was impossible, or if the person so desired, space was provided in other LEDB development freeholds.¹³ The project was drawn up in 1951 and inaugurated in 1955.

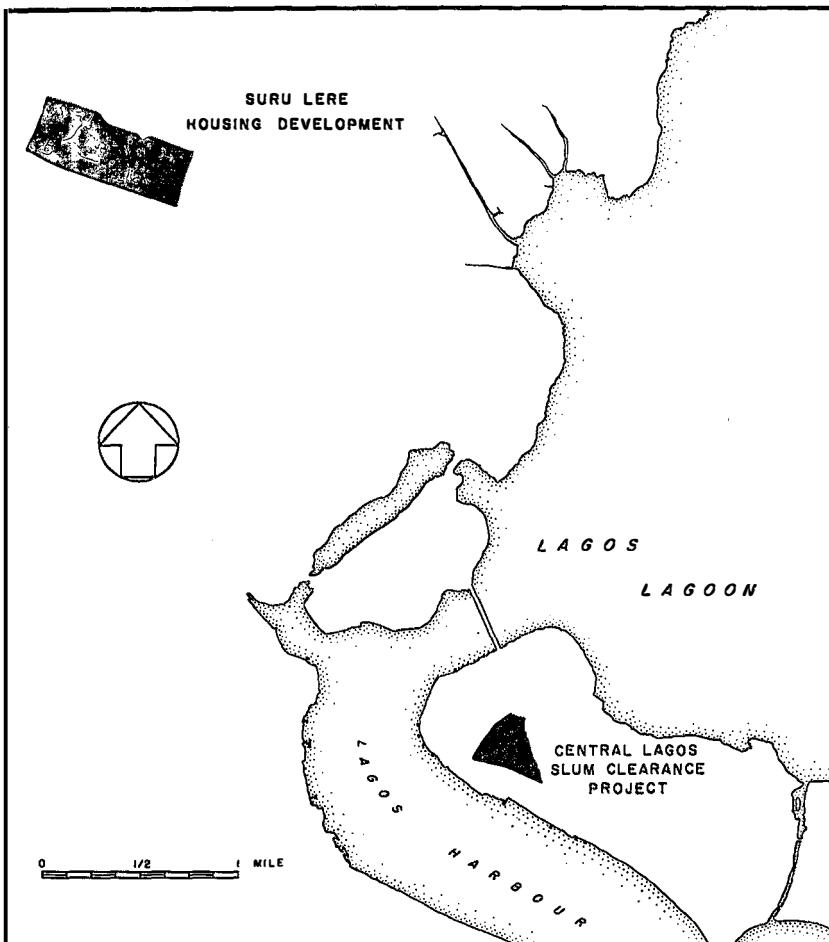


Figure 2. The Central Lagos Slum Clearance Project and the Suru-Lere Housing Estate.

The number of Lagotians directly affected in the project area was estimated at 20,000.¹⁴ Accommodations for these displaced persons were also planned for, and were an integral part of the slum clearance scheme. While demolition was taking place in central Lagos, the LEDB of the island (Figure 2). Funds for the construction at Suru-Lere came from the govern-

¹³ *Ibid*, pp. 177-178.

¹⁴ *Lagos Executive Development Board, Annual Report and Accounts, (1955-1956)*, pp. 18-22.

ment and a fixed rental of 25 shillings per room, per month, was assessed.¹⁵ The new housing was considered "temporary" as the displaced persons were to move back to central Lagos once the slum clearance project was completed (Figure 3).

Initial progress in the project area was good although marred by the protests of people who were to be displaced. During 1956, for example, police assistance was needed on three separate occasions to enforce eviction,



Figure 3. Resettlement Housing in Suru-Lere.

the most serious demonstration taking place in June at Porto Novo Market Street.¹⁶ Eviction proceeded, however, and by 1957, 3,000 people had been removed from the project site. Two thousand settled in Suru-Lere while the remainder found homes for themselves, in many cases by moving into adjacent, overcrowded areas. Housing construction at Suru-Lere was progressing with 550 homes having been constructed and occupied. The erection of temporary shops in the cleared project area was a minor alteration in the original redevelopment plan. Shops were permitted as well in Suru-Lere, but actually represented "restarts" by those individuals displaced from central Lagos. Both areas were to see more of this unscheduled land use in the future.

In the following three years, an additional 4300 persons were removed from central Lagos. The number of temporary shops doubled, and a special mortgage fund was started to assist those former owners who were financially unable to carry out rebuilding according to the LEBD plan. Similarly, the Board admitted for the first time that the financial inability of the for-

¹⁵ *Ibid.*

¹⁶ Marris, *op. cit.*, p. 88.

mer owner would cause a delay in the total rebuilding program.¹⁷ Although 913 houses were available and occupied in Suru-Lere, a further housing scheme was approved in 1957 that added 600 additional low cost houses in an area contiguous to the initial Suru-Lere site. The need for new houses

TABLE 1
Land Use Composition —
Central Lagos Slum Clearance Project

Areal Components	Acres	Percentage of Total Area
Built-up Sites	3.60	14.4
Plots Reconveyed and Ready for Development	4.50	18.0
Building Started	0.70	2.8
Area of Plots Where Deposits Have Been Paid	6.80	27.2
Roads	8.40	33.6
Vacant Area	1.00	4.0
Total	25.00	100.0

Source: Otto Koenigsberge, Charles Abrams, et. al., *Metropolitan Lagos*, United Nations Department of Economic and Social Affairs, 1964, pp. 187-188.

unrelated to increased emigration from the slum clearance project, but was due to the reluctance of those initially evicted from central Lagos to leave Suru-Lere once they had reestablished themselves. This was contrary to the original LEBD plan which called for a constant turnover of tenants,

TABLE 2
Central Lagos Slum Clearance Project
Capital Account, Year Ended March 31, 1964

Item	Expenditure			Income				
	£	Cost	s	d	£	Cost	s	d
Land Acquisition	2,284,359	7	6		Grant and Loan from Nigerian Government	3,060,000	0	0
Building Acquisition	1,065,006	17	10		Sale of Land	776,411	11	0
Transport of Affected Persons to Suru-Lere	11,107	4	5		Deposits on Land	259,581	10	6
Site Development	474,035	13	0		Sale of Salvaged Materials	22,056	10	5
General Development Expenses	253,748	18	5		Other	95,182	2	7
Ex-gratia Compensation including temporary shop erection	177,631	2	2		Surplus Rents, Temporary Shops	79,260	15	0
Total	4,265,889	3	4		Surplus Rents, Temporary	79,260	15	0
				Total	4,292,492	9	6	

Source: Lagos Executive Development Board, Annual Report and Accounts (1963-1964), pp. 58-59.

¹⁷ Lagos Executive Development Board, Annual Report and Accounts (1959-1960), pp. 17-20.

but efforts to remove these "squatters" met with little success. At the same time, the number of temporary service facilities continued to increase, as in central Lagos, and a "temporary" market was created.¹⁸

By 1962, the total number of evictees approached 12,000 and land taking in central Lagos came to a virtual standstill.¹⁹ Table 1 indicates the land use composition and effectively summarizes the project's accomplishments. With only twenty-five of the seventy acres cleared, most of the original slum was intact. Although much of the cleared area was occupied by those initially displaced, they did not build new buildings as planned, but erected temporary structures or rented the same. Only 160 plots were reconveyed while 305 temporary shops were in use. A feeling of permanency settled over the project area (Figure 4). Similarly, the transient



Figure 4. Undeveloped Space and Temporary Structures in the Heart of the Slum Clearance Project.

housing scheme, which provided for the 600 additional homes, experienced the same fate as the initial slum clearance housing scheme, resistance of the tenants to move once they were settled in. The people were not only reluctant to move after displacement, but facilities for settlement in central Lagos were generally lacking.²⁰ Although 1513 housing units were erected at Suru-Lere, some of the 11,800 persons displaced still needed housing.

Ten years have passed since the slum clearance project was started. The original 2.95 million pound expenditure needed to get the project

¹⁸ *Ibid.*

¹⁹ *Lagos Executive Development Board, Annual Report and Accounts (1961-1962)*, pp. 18-22.

²⁰ Koenigsberger and Abrams, *op cit.*, pp. 181-182.

underway has grown to 4.3 million pounds,²¹ exclusive of Suru-Lere (Table 2). Former owners have paid back three-quarters of a million pounds and have made deposits on other sites totaling one quarter of a million pounds. However, a substantial number of the former owners lack the additional means to continue improvements according to the LEBD plan. Even if the money were available, and the initial LEBD compensation retained, the 20 per cent increase in land cost, in most cases, is beyond the means of



Figure 5. Martin Street. High-rise and Temporary Market Stalls

most of those who desire to return to central Lagos. Also, after replanning, the net area available for resettlement in the scheme is 42 acres out of the original 70 acres taken.²² Street widening and open spaces are definite improvements to the general settling, but they mean that all parties cannot be returned to the project.

Benefits have resulted from the project and the skyline of the area has been strikingly altered. Figure 5 illustrates part of the office complex now

²¹ Lagos Executive Development Board, Annual Report and Accounts (1963-1964), pp. 58-59.

²² Koenigsberger and Abrams, *op. cit.*, p. 180.

found on Martin Street. Nearby, the Bristol Hotel and small-scale commercial developments have emerged. Sections of Broad Street could pass for any metropolitan area in the United States and high-rise apartments provide new housing, albeit at higher costs. A new roundabout was created at Tinubu Square, but one block away in any direction, traffic congestion has increased. The taxes on the new additions bring more revenue to the coffers of the Town Council, but increased income has not wiped out the project debt.

The two housing estates at Suru-Lere are meeting yearly maintenance expenses, principally through rents, although the original cost of development is far from being liquidated. The total cost of both estates was 1,309,464 pounds, covered by federal loans of 1,226,700 pounds,²³ 10 per cent of which has been repaid. In both Suru-Lere and the central Lagos project area, over 4,500,000 pounds was supplied by the Nigerian Government.

EVALUATION AND THE SETTING FOR REDEVELOPMENT

The Central Lagos Slum Clearance Project attempted to alter the physical image of the city and to improve the welfare of its inhabitants by removing unsanitary conditions, reducing the density on the land, and decreasing overcrowding. In the final analysis, these worthwhile goals were not accomplished. Although one may support the desire to remake central Lagos because it is a "a disgrace to the capital of Nigeria,"²⁴ or agree with the LEDB argument that "the interests of the residents should not be allowed to override the will of 35 million Nigerians,"²⁵ desire alone is an insufficient moving force, and will is no assurance of success. However, the project failure in Lagos should not be equated with the failure of the redevelopment concept. The principal force that doomed the project, and redevelopment from the beginning, was the increase in urban population after World War II, which reached its greatest intensity during the time of the slum clearance project.

The contemporary growth of Lagos has its origin in two related phenomena—rural-urban migration and natural population increase brought about by an excess of births over deaths. The movement from rural to urban areas was an established fact in Lagos and other African cities before 1955, but appears to have been ignored by those officials responsible for the success of the slum clearance project and Suru-Lere. The pressure of this influx lowered the vacancy rate of liveable structures in the city, which, in turn, lead to further overcrowding. At the same time, the slum clearance project was reducing a housing inventory that was small or non-existent, thereby making the housing shortage in Lagos more acute. Clearly, a large-scale housing program should have preceded slum clearance as the first phase of redevelopment. But housing provisions are a therapeutic measure at best in an urban area whose rapid growth is based on rural emigration.

²³ *Lagos Executive Development Board, Annual Report and Accounts (1963-1964)*, pp. 46-47.

²⁴ Marris, *op. cit.* p. 119.

²⁵ *Ibid.* p. 90.

There are any number of reasons why rural peoples desire to move to a city, and in the case of Lagos, several stand out. A prime motive is economic; if opportunities are felt to be better in the city, people will be drawn to these opportunities. Glamour, or simply the attraction of the city, is another factor of emigration, particularly if combined with economic opportunity. Another important stimulus to movement is the provision of services that cannot be easily or economically supplied to people scattered throughout a rural area. Such services include medical and health facilities, family and educational services, and community facilities; provisions that an American or European are apt to take for granted, but a rural African considers desirable.²⁶ Finally, there is the ability of rural areas to support large numbers of people. If a population boom is combined with agricultural underemployment, this ability is weakened. Both situations exist today in Nigeria, the former helping determine the latter.

Natural population increase is not limited to rural Nigeria, but is a potent force within her cities as well, especially Lagos. Historically, in Western urban development, the mortality rate of cities exceeded that of the rural areas. Eventually the urbanizing nations learned how to keep crowded populations in cities from dying like flies and this knowledge has been passed onto those societies such as Nigeria where urbanization has only recently begun. Thus, in Africa today, the traditional mortality disadvantage of the cities and towns had been wiped out, and in many cases has been reversed.²⁷

Redevelopment in Lagos never had a chance for success, in spite of the efforts of the LEDB staff, or the considerable amount of funds supplied by the Nigerian Government. Rural migration coupled with a disproportionate natural population increase were the cards stacked against any redevelopment project. Such city services as envisioned in Suru-Lere and the slum clearance area could be created fast enough to take care of the never-ending supply of babies and rural migrants swelling an already large urban population.²⁸ One can only come to the pessimistic conclusion that redevelopment in Lagos, or in cities similar to Lagos in other parts of the underdeveloped world, can never be successful so long as the present bases of urban growth remains unhinged from economic development. To attempt other redevelopment projects in the face of this situation is to court further failures.

²⁶ R. W. Steel, "The Towns of Tropical Africa," *Essays on African Population*, ed. K. M. Barbour and R. M. Prothero (New York: Frederick A. Praeger, 1962), p. 264.

²⁷ Davis, *op. cit.*, p. 50.

²⁸ *Ibid.*, p. 52.

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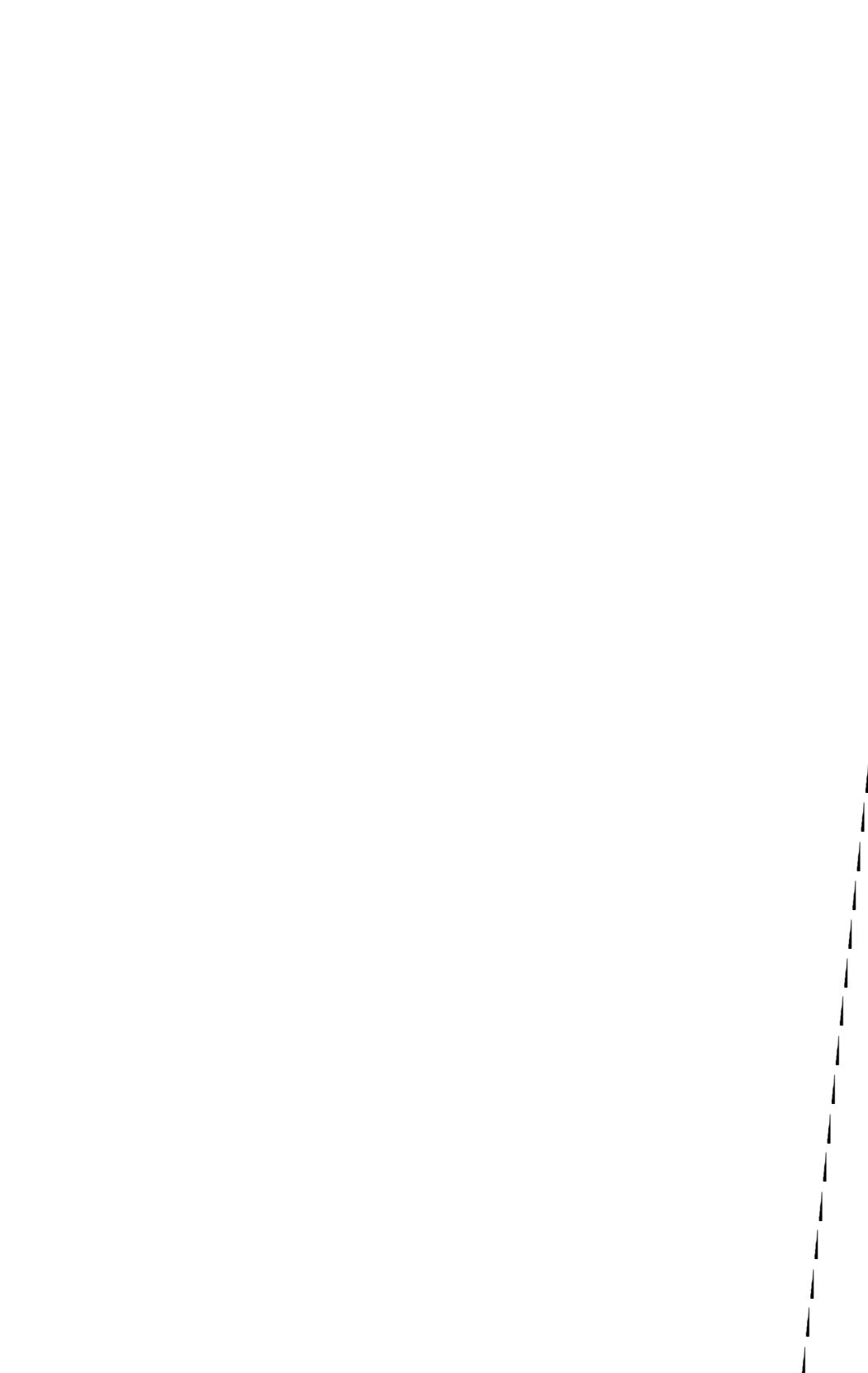
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ESSAYS

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CLIFFORD M. ZIERER

ESSAYS IN HONOR OF CLIFFORD M. ZIERER

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Clifford M. Zierer

FOR FORTY YEARS—CLIFFORD M. ZIERER

Forty years of continued association is really more than sufficient time in which to make an imprint on a university department of geography. But when done with the quiet touch the manifestations of the imprint are subtle and deeply imbedded, and they are not at all obvious to the casual view. Clifford Maynard Zierer came to a freshly reorganized Department of Geography at UCLA in September, 1925, as its youngest instructor, to teach physical and economic geography with North America as the regional stage on which to construct his systems of man living in a living but changing environment. He retired from active duty in June, 1965, as a senior professor who had spent his whole academic life in the department at UCLA. He retired a respected and skillful practitioner who had originated a good many of the courses in the current catalogue, who had in committee faced almost every kind of academic problem, who had as Chairman at a critical juncture urged the directions and patterns of growth which shaped the present UCLA department, and who as an ex-chairman had cooperated fully with the continuing growing elements of the program.

And yet it is somewhat difficult to label pieces of the structure, sectors of the program, graduates of the department, or segments of geography, at UCLA, as being those constructed by Zierer, alone. The unobtrusive and simple suggestion, the calm and measured consideration, the refusal to go overboard in any direction, the denial of the dogmatic creed, the quiet acceptance of change and growth, the repeated initiation of courses later turned over to other instructors, the insistence that there were many approaches to geography, the reserved but insistent demand for excellence, and the progression of his own interests through field after field marked those four decades, and they provided a singular element of continuity to the department. As an undergraduate student in Zierer's classes in those first years, and as a junior colleague for more than half the period, it has been my privilege to watch the application of the skillful but quiet touch in the unobtrusive manner.

An urban geographer by his own graduate training (PhD., Chicago, 1925), Clifford Zierer had come out of a rural background, and everything was grist to the mill, from the agricultural scene to the growing urban complex. A graduate training which focused upon the contemporary scene made his early California interests full of the here and now.¹ These interests were pressed by the rapid change in the California scene, but the vital concerns gradually deepened into a concentration upon the issues of historical change in the landscapes of North America. The necessities of shaping new courses in a growing department found the undogmatic outlook amenable, but they prevented the specialization upon any particular field of research, even though Zierer has been professionally labeled an Australian regionalist by many.² In initiating the first field course, the course in conservation, courses in advanced economic geography, a wide variety of graduate seminars, and the first courses in an American department on

¹ His doctoral dissertation dealt with *The Industrial Geography of Scranton*.

² He traveled to Australia, New Zealand, and several islands in Oceania, in 1938.

Australia offered by an American geographer on the basis of personal field research, Zierer built elements of his own geographical outlook into the permanent structure of the departmental program. Although these have been overlaid by later structural elements his contributions remain fundamental building blocks. Other elements of his impact bear little visible mark of the individual to present day students. Such are one of the best collections of geographical journals available to any group of university geographers, and the widely ranging holdings of the university research library.

Zierer's role in the training of advanced undergraduate and graduate students often was not strikingly noticeable, so quietly was it performed. The refusal of the fixed creed, the variety of his own interests, the changing focus of his concerns, and the insistence that "there are many ways to skin a cat" has not produced a corps of younger geographers clearly branded with a single label. Yet few students who shared in office discussions of widely ranging subjects, who came into his undergraduate courses and graduate seminars, or who had the benefit of his committee membership for thesis or dissertation remained unaffected by his views. Seminars for years met in his own home in an upstairs library work room crowded with books, almost any of which would be hauled out onto the big work table for aid in settling an issue. The quiet insistence upon critical consideration of issues never was matched by the advocacy of particular doctrines laid down for acceptance by the students involved. Zierer's own research and his own doctrinal views often seemed a private affair, even hard to draw from him. His own continuing research seldom was discussed as such, and sometimes was not even known about until a publication appeared, yet each study was a planned part of his own program of increased understanding, fitted somewhere into his formal or informal teaching. His own casual comment that he fell into the department at an opportune time belies the effective ways in which he made the most of the opportunities. Students who took seminars from, or worked under, Zierer have ranged widely through most of the fields of knowledge which interested him, and in a modest assemblage of the sort here presented it would be impossible to reflect the full range of his own interests.

Zierer's publications, by title, do not reflect his concern for historical change, but close reading of many of them will disclose that concern. His on-going research of recent years is not well indicated in the bibliography because it has been long-range in extent, widespread in regional coverage, and not completed at this point, but in the freedom of retirement his wide-ranging curiosity about the changing face of North America keeps him even busier than before. We look forward to some interesting studies as the fruits of mature scholarship.

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An Editorial Note

All of the seven invited papers comprising this *festschrift* reflect in different ways the inspiration of Professor Zierer. And, fortuitously, their contributors span the four decades Professor Zierer held forth at UCLA. Each contributor was encouraged to present a study, one that would be in topic or region kindred to studies directed or influenced by Professor Zierer. Because the doctoral program in geography began only in the post-war period, most of Professor Zierer's earlier students went on to earn advanced degrees at other institutions. Not all of the authors herein were supervised by him in their graduate studies.

Spencer, as a former student and contemporary colleague, was the logical choice to essay the introductory perspective. Friis, a long-standing student of cartographic archives, provides a cogent example of a kindred interest shared by Professor Zierer — the historical cartography of the United States. Both contributors were students in the first decade. Anglo-America — more especially Southern California —, about which Zierer wrote in several veins, is represented in four papers. Gregor examines the cotton plantation, Durrenberger reviews the historical geography of the lemon industry, Steiner analyzes the relationships between urbanization and open space, and Mazzucchelli reassesses the delimitation of the Mohave Desert. Fielding's evaluation of rural development in New Zealand rounds out the *festschrift* with a study taken from field research in a part of Oceania. All of these contributors were students in the two post-war decades.

As an idea, this *festschrift* was proposed to the UCLA Geography Department two years ago when Professor Zierer's retirement was only a few months away. Clifford MacFadden, then chairman of the department, circulated an inquiry among the faculty who immediately encouraged the venture. Howard Gregor and Joseph Spencer provided editorial advice from time to time. Because of the prior commitments and busy workloads of its contributors, publication was held up a year; moreover, such circumstances precluded the addition of several essays by former students, who, in lieu of representation herein, share in the spirit of this *festschrift*. Grateful thanks are expressed to the California Council of Geography Teachers and Robert A. Kennelly, editor of *The California Geographer*, for graciously undertaking publication, and to Professor Zierer's many colleagues and students for defraying all necessary costs.

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The Major Publications of Clifford M. Zierei

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Organizer, contributor and editor.

Stephen H. Long's Unpublished Manuscript Map of the United States Compiled in 1820-1822(?)^{*}

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During the latter half of the eighteenth century geographical exploration of Western North America advanced at a rapid pace and led to a surprising fund of knowledge, some of which has only recently come to light.¹ England, France, Spain and Russia were the principal participants in the drama, the main themes of which were the search for the Northwest and Northeast Passages to the Orient and for the vast riches thought to exist. By the end of the century the advances on all fronts had proved rather conclusively that the North American Continent was indeed a tremendous land mass, a barrier to a direct water route to Asia, though perhaps through it there might be found that conveniently located waterway making transcontinental passage possible. To those who wanted to believe, there appeared to be sufficient proof that the several wide water entrances (e.g., Puget Sound, Columbia River, and San Francisco Bay) led far inland to meet with the rivers, such as the Missouri, draining eastward across the Great Plains and into the Mississippi.²

* Most of the sources used in the preparation of this paper are in the official records of the Federal government in the National Archives in Washington, D.C. The official designation of the principal Record Groups to which they belong are Records of the Office of the Chief of Engineers (RG77) and Records of the Office of the Secretary of War (RG107). When cited hereafter the designation will be simply RG77 and RG107 respectively with appropriate subgroup and series description for each specific citation.

** Mr. Friis earned his B.A. degree from UCLA in 1931.

¹ Among the useful readily available references are Herbert E. Bolton and Thomas M. Marshall, *The Colonization of North America, 1942-1783*, (New York, Macmillan, 1936), 609 pp.; John B. Brebner, *The Explorers of North America, 1492-1806*, (New York, Macmillan, 1933), 502 pp.; Lawrence J. Burpee, *Pathfinders of the Great Plains; A Chronicle of La Verendrye and His Sons*, (Toronto and Glasgow, Brook & Co., 1914), 116 pp.; Idem, *The Search of the Western Seas: The Story of the Exploration of North-Western America*, (Toronto, Macmillan Co. of Canada Ltd., 1935, 2 vols.); Edmund W. Gilbert, *The Exploration of Western America, 1800-1850, An Historical Geography*, (Cambridge, Eng., University Press, 1933), 233 pp.; LeRoy R. Hafen and Carl C. Rister, *Western America; the Exploration, Settlement, and Development of the Region beyond the Mississippi*, (New York, Prentice-Hall Inc., 1941), 698 pp.; John F. McDermott, *The Lost Panoramas of the Mississippi*, (Chicago, University of Chicago Press, 1958), 211 pp.; Abraham P. Nasatir (ed.), *Before Lewis and Clark; Documents Illustrating the History of the Missouri, 1785-1804*, (St. Louis, St. Louis Historical Documents Foundation, 1952), 2 vols.; Reuben G. Thwaites, *A Brief History of Rocky Mountain Exploration, with Especial Reference to the Expedition of Lewis and Clark*, (New York, D. Appleton & Co., 1904), 276 pp.; Reuben G. Thwaites (ed.), *Early Western Travels, 1748-1846; . . .*, (Cleveland, the A. H. Clark Co., 1904-1907), 32 vols., see vols. 14-17; Carl I. Wheat, *Mapping the Trans-Mississippi West, 1540-1861*, (San Francisco, Institute of Historical Cartography, 1957-1963), 6 vols.; and William Winterbotham, *An Historical, Geographical, Commercial and Philosophical View of the American United States and of the European Settlements in America and the West Indies*,

² Charles G. Crampton, "The San Buenaventura, the Mythical River of the West," *Pacific Hist. Rev.*, Vol 25, 2 (1956), pp. 163-171.

Although Thomas Jefferson and other philosophers, naturalists, and politicians in the United States were well aware of the tremendous potential value of the expanse of North America west of the Mississippi River, it was not until 1803 that Jefferson as President of the United States asserted this interest in tangible form.³ In January 1803 Jefferson's report to Congress revealed his primary geographical interest in the West and requested approval to send an exploring expedition toward the Pacific Ocean, ostensibly to trade with the Indians.⁴ News of the purchase of Louisiana from France on July 1 of that year⁵ changed the complexion and, to some extent, the objectives of his Meriwether Lewis and William Clark Expedition, which between 1803 and 1806 transected the area between the Mississippi River and the Pacific Coast, our first official scientific geographical exploring expedition.⁶ Well aware of the importance of having first-hand geographical information about the extensive "plains" area that bisected the continent north-south between the Mississippi River and the Rocky (or Stoney) Mountains, Jefferson dispatched a succession of explor-

³ For information on Jefferson's scientific competence, especially as the the North American continent, see Adolphus W. Greely, "Jefferson as a Geographer," *The Writings of Thomas Jefferson*, Vol. 13, pp. i-vii, (Washington, D.C., Thomas Jefferson Memorial Association of the U.S., 1904); F. B. Luther, "Jefferson as a Naturalist," *Mag. of Amer. Hist.*, Vol. 13 (1885), pp. 379-390; Edwin T. Martin, *Thomas Jefferson: Scientist*, (New York, H. Schumann, 1952), 289 pp.; Harlow Shapley, "Notes on Thomas Jefferson as a Natural Philosopher," *Amer. Philos. Soc., Proc.*, Vol. 87, 1 (1943), pp. 234-237; and Thomas G. Surface, "Thomas Jefferson: A Pioneer Student of America's Geography," *Amer. Geogrs. Soc., Bull.*, Vol. 41 (1909), pp. 743-750.

⁴ For the "Confidential" manuscript original see *Original Messages from the Presidents, 7th Congress, 2nd Session*, House of Representatives RG233, 4 pp., in the National Archives, Washington, D.C. For published versions (apparently not accurate transcriptions) see Reuben G. Thwaites, *Original Journals of the Lewis and Clark Expedition, 1804-1806; Printed from the Original Manuscripts in the Library of the American Philosophical Society and by Direction of its Committee on Historical Documents, . . .*, (New York, Dodd, Mead Co., 1904-1905), 8 vols., Vol. 7, pp. 206-208; and *American State Papers, Indian Affairs*, Vol. 1, pp. 684-685, (Washington, Gales & Seaton, 1832-61).

⁵ See especially Hunter Miller (ed.), "Treaty for the Cession of Louisiana, signed at Paris, April 30, 1803 . . .," *Treaties and Other International Acts of the United States of America*, Vol. 2, Document 28, pp. 498-511, (Washington, Gov't. Print. Office, D.C., 1931). For the manuscript original see in *General Records of the United States Government* (RG1), in the National Archives in Washington, D.C.

⁶ The so-called "official publication" of this expedition is Nicholas Biddle (ed.), *History of the Expedition under the Command of Captains Lewis and Clark, . . . 1804-5-6, . . .*, (Philadelphia, Bradford & Inskeep, 1814), 2 vols. A selection of recent publications of the so-called official records are Elliot Coues (ed.), *History of the Expedition under the Command of Lewis and Clark, . . .*, (New York, F. P. Harper, 1893), 4 vols.; and Reuben G. Thwaites (ed.), *op. cit.* [see footnote 4]. An excellent, scholarly, well-edited publication of the correspondence is Donald D. Jackson (ed.), *Letters of the Lewis and Clark Expedition, with Related Documents, 1783-1854*, (Urbana, Univ. of Illinois Press, 1962), 728 pp. Additional references are John E. Bakeless, *Lewis & Clark, Partners in Discovery*, (New York, W. Morrow, 1947), 498 pp.; Bernard DeVoto (ed.), *The Journals of Lewis and Clark*, (Boston, Houghton Mifflin, 1953), 504 pp.; Herman R. Friis, "Cartographic and Geographic Activities of the Lewis and Clark Expedition," *Journ. of the Wash. Acad. Sci.*, Vol. 44, 11(1954), pp. 338-351; and United States Congress, "Lewis and Clark's Expedition," *American State Papers, Indian Affairs*, Vol. 1, pp. 705-743, (Washington, D.C., Gales & Seaton, 1832-61).

ing expeditions during the period 1803-1806.⁷ Jefferson also had the rare good fortune of visits with the eminent Prussian geographer, Alexander von Humboldt, in the White House (then the President's House) in Washington during which he was briefed by him on the geographical intelligence of Spanish America.⁸ These were the beginnings of a kind of centralized government geographical intelligence bureau on the American West. Unfortunately, as quickly as these systematically-planned projects began, so indeed they quickly closed out by 1807. Of course, it is true that variant forms of intelligence about the West trickled into the official depositories in Washington.⁹ With Jefferson's official passing from the Washington scene, the Federal government had relatively few far-seeing officials who recognized the country's "Manifest Destiny" west of the Mississippi River, that is, until John C. Calhoun became Secretary of War in 1817 and James Monroe was President of the United States (1817-1825).

On March 15, 1817, Major Stephen Harriman Long, who had been employed as a topographical engineer in the northwestern part of the United States during the preceding season, was in Washington. From his hotel he wrote a letter to President Monroe. In his letter he noted that

"I would build a small Steam Boat about 40 feet in length and 7 feet Beam, drawing no more than 14 inches of water. With this I would navigate all the rivers of consequence falling into the Mississippi, meander their courses, and take the Latitude and Longitude of their mouths, and heads of Navigations. I would then ascend the Illinois and pass into the Lakes with

⁷ Simultaneously with the Lewis and Clark Expedition Jefferson dispatched other expeditions into the region west of the Mississippi Valley, to explore especially the riverways westward to their headwaters. For excellent references to these see in John F. McDermott (ed.), "The Western Journals of Dr. George Hunter, 1796-1805," *Amer. Philos. Soc., Trans.*, Vol. 53, 4 (1963), pp. 1-133. In addition to Hunter there were surveys by William Dunbar (with Hunter), John Sibley and Zebulon Montgomery Pike. Of these, Pike's exploration of the Mississippi River to its source in 1804-1805 and to the American Southwest in 1805-1806 was perhaps the most important. For a scholarly definitive work on Pike, see Donald D. Jackson, *The Journals of Zebulon Montgomery Pike* (Norman, Univ. Of Oklahoma Press), 2 vols.

For a good general overview of these expeditions see [Thomas Jefferson], *Message from the President of the United States Communicating Discoveries Made in Exploring the Missouri, Red River, and Washita, by Captains Lewis and Clark . . . Feb. 19, 1806, . . . Printed by Order of the Senate, Washington, 1806*, 178 pp. For the original see in *Records of the United States Senate*, RG46, in the National Archives in Washington, D.C.

⁸ For a history of Humboldt's visit and the geographical intelligence about the West that he gave Jefferson and other top officials of the Federal government see Herman R. Friis, "Alexander von Humboldt's Visit to Washington, D.C., June 1 through June 13, 1804," *Records of the Columbia Hist. Soc.*, 1960-1962, (Washington, D.C., 1963), pp. 1-36. For an account of Humboldt's visit with the scientists in Philadelphia, Washington and in Lancaster, Pennsylvania, see Herman R. Friis, "Alexander von Humboldt's Besuch in den Vereinigten Staaten von Amerika vom 20. Mai bis zum 30. Juni 1804," in *Alexander von Humboldt: Studien zu seiner universalen Geistesaltung*. Herausgegeben von Joachim H. Schultze für die Gesellschaft für Erdkunde zu Berlin, (Berlin, 1959), 277 pp., see pp. 142-195.

⁹ See especially in the *Records of the Office of the Chief of Engineers* (RG77) and *Records of the Office of the Secretary of War* (RG107) in the National Archives in Washington, D.C.

my Boat, which may be easily done in time of high water. I would reconnoiter the coasts of the Lakes, explore the waters falling into them, and take the Latitude and Longitude of all important places. By these means, the courses and relative positions of the rivers may be ascertained, and a correct Plan of the country may be made, with less trouble and expense, probably than by any other method that would be devised."¹⁰

Long's cursory topographical surveys of the Missouri-Mississippi¹¹ waterways in 1817 convinced him of the need of a scientific approach to establishing a network of astronomical and geodetic observations, describing the environment, and mapping the terrain. Late in 1817 Major Long was directed by Secretary of War John C. Calhoun to organize and command an expedition which was to

"...explore the country between the Mississippi and the Rocky Mountains ...

"...explore the Missouri and its principal branches, and then in succession, Red River, Arkansas, and Mississippi, above the mouth of the Missouri ..."¹²

This expedition was popularly referred to as the "Yellowstone Expedition."¹³ A military force, under Colonel Henry Atkinson, was to accompany the scientific force which was commanded by Major Long.

Long's earlier explorations, his topographical know-how, and his confidence in the steamboat for river travel were a substantial background for adequate planning. During the winter 1818-1819 Long selected his military assistants, his scientists, and his crew. He also prepared the design and specifications of his steamboat the "Western Engineer," which was built in the boat yards in Pittsburgh. Long and his military assistants, Cadet William H. Swift and Lieutenant James D. Graham, visited the best instrument-makers and military stores in the East in search of the most reliable instruments available. Long also built up a library of books

¹⁰ Part of letter from Major Stephen H. Long to James Monroe, dated Washington Hotel, March 15, 1817, in *Letters Received*, L-46(10), RG 107.

¹¹ For an account of Long's explorations and observations see especially his "Voyage in a Six-cared Skiff to the Falls of Saint Anthony in 1817," *Minn. Hist. Soc., Coll.*, Vol. 2 (1860), pp. 9-88.

¹² These orders are published in Edwin James (comp.): *Account of an expedition from Pittsburgh to the Rocky Mountains, performed in the years 1819 and '20, by order of the Hon. J. C. Calhoun, sec'y of war; under the command of Major Stephen H. Long. From the notes of Major Long, Mr. T. Say, and other gentlemen of the exploring party. Comp. by Edwin James, botanist and geologist of the expedition . . .* (Philadelphia, Carey & Lea, 1823), 2 vols. and atlas, Vol. 1, Preliminary Notice, p. 3.

¹³ For a good appraisal of the accomplishments see Hiram M. Chittenden: *The American Fur Trade of the Far West; a History of the Missouri Valley and the Rocky Mountains . . .* (New York, R. R. Wilson, 1936), 2 vols.; and his *History of Early Steamboat Navigation on the Missouri River; . . .* (New York, F. P. Harper, 1903), 2 vols.

¹⁴ See for example "Return of Books and Instruments in the Possession of Major S. H. Long, U. S. Engineer, Jan. 1, 1820" in *Monthly Reports from Officers, 1820-1830*, RG77, 5 pp. Most of the forty-three publications he lists concern exploration of North America and astronomical and geodetic observations and surveying. He lists twenty-three different instruments such as measuring tapes, thermometers, chronometers, theodolites, sextants and artificial horizons. All of these items probably were at that time aboard the "Western Engineer" or in Long's quarters in the cantonment at Council Bluffs and were essential to the geographical work of the Expedition.

and scientific publications that would be of value to him and his colleagues.¹⁴

THE EXPLORING EXPEDITION: 1819-1820

The route and the composition of the area covered by the Expedition are rather well-known and have been described and discussed in several fundamental recent publications.¹⁵

On May 3, 1819, the Exploring Expedition commanded by Long departed Pittsburgh in Long's specially designed and constructed steam-boat, the "Western Engineer." Progress of the "Western Engineer" down the Ohio to its confluence with the Mississippi up the Mississippi to St. Louis and then up the Missouri to Council Bluffs proved to most authorities that the steamboat as a river craft in low water was definitely not the vehicle for the expedition's movement of cargo and troops.¹⁶ The scientists complained bitterly about the infrequency with which they were permitted to carry out land surveys and scientific exploration.¹⁷ Doctor William Baldwin, botanist on the Expedition, died on August 31 (or September 1).¹⁸

The Expedition reached the camp of the United States troops near Council Bluffs on September 19, and constructed a winter quarters nearby, which was named "Engineer Cantonment."¹⁹ On October 11, Major Long, Major Biddle, and Mr. Jessup

"...took leave of their friends at Engineer Cantonment, and, accompanied by several other persons, descended the Missouri in a canoe, on their way toward Washington and Philadelphia . . ."²⁰

Before his departure Long issued orders to the resident "scientific staff," covering the work that was to be accomplished during the winter.²¹ This resident staff was perhaps the first official United States Government professional corps to establish a scientific station and to conduct sys-

¹⁵ Official reports and letters were sent to his superiors in the War Department by Long during the course of his voyage to Council Bluffs, often as progress reports. See for example his letters to Secretary of War John C. Calhoun dated Pittsburgh April 20, 1819, June 25, 1819, July 19, 1819, and October 28, 1819 in *Letters Received*, RG107. For the official published account see Edwin James (comp.): *op. cit.* [see footnote 12]; the London edition 1823 is reprinted by Reuben G. Thwaites (ed.), *Early Western Travels . . . op. cit.* [see footnote 1].

¹⁶ See for example a copy of J. D. Graham's letter to S. H. Long dated Engineer Cantonment Nov. 20, 1819 with S. H. Long's letter to the Secretary of War dated Washington Jan. 22, 1820 in *Letters Received*, L-59 (13), RG107, 6 pp.

¹⁷ See in letter from W. Baldwin to William Darlington, dated Franklin (Missouri Territory) July 22, 1819, in William Darlington (comp.), *Reliquiae Baldwinianae: . . . , Phila., Pa., 346 pp.*, see pp. 320-321. This was Baldwin's last letter to Darlington.

¹⁸ *Ibid.*, p. 321.

¹⁹ Reuben G. Thwaites, *Early Western Travels . . . , op. cit.* [see footnote 1], Vol. 14, p. 221 for the official record by Edwin James.

²⁰ *Ibid.*, pp.249-250 for the official record by Edwin James.

²¹ I.e., Thomas Say, zoologist; Titian Ramsay Peale, assistant naturalist and artist; Samuel Seymour, landscape painter; and Lieutenant James D. Graham and Cadet William H. Swift, assistant topographers. *Ibid.*, pp. 248-249.

On January 3, 1820, Long sent a comprehensive report of the accomplishments of the Expedition to the Secretary of War.²³ In it he recognized the deficiencies of the steamboat, recommends its return to duty on the lower Missouri and the Ohio and Mississippi Rivers, described the scientific accomplishments of his professional staff, and proposes that the Expedition explore overland from Council Bluff to the Rocky Mountains in 1820.

During Long's stay in the East he conferred and corresponded with his superiors about the changes in the purpose and objectives of his Expedition, obtained new equipment and instruments, and requested and was given additional funds.²⁴ He was granted the services of Lieutenant John R. Bell of West Point to replace Major Biddle as official journalist, and Dr. Edwin James to take the place of the late Wililam Baldwin. He also devised various forms and texts to be used in recording Indian vocabularies and scientific data.

Long, Bell, and James left Washington early in the spring of 1820, passed through St. Louis in late April, travelled overland and arrived at Engineer Cantonment on May 28.²⁵ On June 6, the Expedition, with

tematic research west of the Mississippi River. Major Long went first to his home in Philadelphia and then to Engineer Headquarters in Washington to report.²²

additional personnel, left the Cantonment and headed west overland to ascend the Platte River to its source, to explore the plains and the headwaters of the rivers at the base of the Rocky Mountains, and to return to the Mississippi River at about Cape Girardeau (Missouri) by the Arkansas and Red Rivers. The details of the day-to-day accomplishments of the Expedition are given in the final publication by Edwin James,²⁶ and in the very recent publication of the long-lost journal of Captain Bell.²⁷

²² For this change of original plans see in letter from S. H. Long to the Secretary of War, dated St. Louis, October 28, 1819 in *Letters Received*, L139 (13), RG107, 2 pp.

²³ Report from Major Stephen H. Long to the Secretary of War, dated Washington, January 3, 1820 in *Letter Received*, L-55 (13), RG107, 10pp.

²⁴ See esp.:cially letter and enclosures from Major S. H. Long to the Secretary of War, dated Philadelphia, Feb. 8, 1820 in *Letter Received*, L-74 (13) and L-78 (13), RG107, and letter from the Secretary of War to Major S. H. Long, dated Washington, Feb. 29, 1820 in *Register of Letters Sent*, RG107, 2 pp. and July 22, 1820 in *Register of Letters Sent*, RG107, 1 p.

²⁵ For an account of his trip to and arrival at Council Bluffs and his plans for the expedition see letter from Major S. H. Long to the Secretary of War, dated Engineer Cantonment, June 2, 1820 in *Letter Received*, L-11, RG107.

²⁶ There are several editions of the work by James. For the first American edition in 1823 see *op. cit.* [see footnote 12]. A somewhat modified form in three volumes was published in London in 1823, and is the edition reproduced by Reuben G. Thwaites in his *Early Western Travels . . . , op. cit.* [see footnote 1].

²⁷ Harlin M. Fuller and LeRoy R. Hafen (ed.), "The Journal of Captain John R. Bell, Official Journalist for the Stephen H. Long Expedition to the Rocky Mountains, 1820," *The Far West and the Rockies Historical Series*, vol. 6, pp. 1-349, (Glendale, The A. H. Clark Co., Calif., 1957).

The professional members of the Expedition returned to Cape Gibardeau on October 12 with a variety of scientific information,²⁸ such as astronomical observations, topographical surveys, collections of and notes on a large number of specimens in natural science, information on the linguistics, manners, and customs of the Indians, and some rather severe and negative impressions of the terrain identified on Long's map as "Great Desert"²⁹ Unfortunately, three soldiers of Captain Bell's party deserted on the headwaters of the Verdigris River and took with them three horses and a variety of items including especially some of the official records of the professional staff.

Early in November the Expedition was disbanded, Major Long and Captain Bell went directly overland to Washington City; Say, Peale, Seymour and Lieutenant Graham departed down-river to New Orleans and then on to Philadelphia by boat; and Lieutenant Swift and Dr. James ascended the Ohio river a short distance in the "Western Engineer," James finally returning to the East from Golconda, Illinois, by horseback.

Following his return to Philadelphia and Washington, Long corresponded with and about his professional colleagues on the Expedition,³⁰ attended to the appropriate disposition of the "Western Engineer," ar-

²⁸ See especially appendices, tables, notes in Edwin James, *op. cit.* [see footnote 12].

²⁹ For an excellent scholarly account of the history of the geographical meaning of the reference "The Great Desert" and "The Great Plains" see G. Malcolm Lewis, "William Gilpin and the Concept of the Great Plains Region," *Annals Assoc. Amer. Geogr.*, Vol. 56, 1 (1966), pp. 33-51. See also his "Three Centuries of Desert Concepts of the Cis-Rocky Mountain West," *Journ. of the West*, Vol. 4, (1965), pp. 457-468, and "Changing Emphasis in the Description of the Natural Environment of the American Great Plains Area," *Trans. and Papers Inst. British Geogr.*, Vol. 30, (1962), pp. 75-90; and R. C. Morris, "The Notion of a Great American Desert East of the Rockies," *Miss. Valley Hist. Rev.*, Vol. 13, (1927), pp. 190-200. Neither Long nor James was favorably impressed with the so-called "Great Plains" as an environment for habitable settlement by man. Long noted that ". . . I do not hesitate in giving the opinion that it is almost wholly unfit for cultivation. . . . This region, however, viewed as a frontier, may prove of infinite importance to the United States, inasmuch as it is calculated to serve as a barrier to prevent too great an extension of our population westward. . . ." as quoted in Reuben G. Thwaites (ed.), *Early Western Travel*, . . . , *op. cit.* [see footnote 1], p. 20. James referred to the area and noted that ". . . The traveller who shall at any time have traversed its desolate sands, will, we think, join us in the wish that this region may for ever remain the unmolested haunt of the native hunter, the bison, and the jackall," as quoted in *ibid.*, p. 20.

³⁰ See for example from Major S. H. Long to Secretary of War dated Philadelphia, Feb. 18, 1821 in *Letters Received*, L-75 (13), RG107, 4 pp. Long commended the services of Captain Bell and Lieutenants Graham and Swift in his letters to the Secretary of War dated Philadelphia, Feb. 7, 1821, 2 pp., Feb. 9, 1821, 2 pp., and Feb. 18, 1821, 3 pp., in *Letters Received*, RG107. In his letter dated Department of War, Feb. 23, 1821, 1 p., in *Register of Letter Sent*, 164/119, RG107, the Secretary of War noted that "Bell, Graham, and Swift have been ordered to rejoin their units until June as is reported in the letter of S. H. Long to the Secretary of War, Dated June 5, 1821, 2 pp. in *Letters Received*, RG107.

ranged for the publication of the results,³¹ and accounted for expenditures of money and equipment. On February 20, 1821, Long sent to the Secretary of war his "Report of the Western River Expedition . . ."³²

James was appointed editor of the official narrative of the Expedition, that was published in Philadelphia by Carey and Lea in 1823 in two volumes and an atlas or portfolio.³³ Apparently the official records were given or loaned to James by Long and the several scientists comprising the professional staff of the Expedition for use in preparing the publication.³⁴ There is little question but that Long, Secretary of War John C. Calhoun, and other responsible officials considered them so valuable that they must be returned to and preserved in the archives of the War Department.³⁵ Yet, very few of these official records are in the archives of the War Department.³⁶

³¹ There was a good deal of correspondence between Major Long and his superiors regarding the publication of the narrative and results of his expedition. For his correspondence with the Secretary of War see his letters dated Philadelphia, Oct. 30, 1821, 3 pp., Nov. 3, 1821, 3 pp., Nov. 6, 1821, 4 pp., Dec. 21, 1822, 2 pp., Jan. 3, 1823, 2 pp., and Dec. 24, 1824, 2 pp. in *Letters Received*, RG107; and from the Secretary of War to Major Long dated Department of War, Nov. 17, 1821, 1 p., in *Register Letters Sent*, 449/313, 1p., RG107.

For his correspondence with Major General Alexander Macomb, Chief Engineer, see his letters dated Philadelphia, Sept. 22, 1821, 2 pp., Aug. 1, 1822, 2 pp., Oct. 1, 1822, 2 pp., Nov 1, 1822, 2 pp., Feb. 1, 1823, 2 pp., and Jan. 2, 1823 2 pp. in *Returns of Books and Instruments*, RG77.

For his correspondence with Col. Isaac Roberdeau in the Engineer Dept. in Washington see his letters dated Philadelphia, Oct. 16, 1822, 4 pp., Oct. 26, 1822, 3 pp., Nov. 1, 1822, 4 pp., June 22, 1824 2 pp., and Dec. 17, 1824, 4 pp., in *Miscellaneous Letters Sent and Received. Topographical Engineers, A. Misc. (Roberdeau)*, RG77.

³² The official manuscript "Report of the Western River Expedition by S. H. Long, T. Engr. to Hon. J. C. Calhoun, Secretary of War, dated Philadelphia, February 20th, 1821," is in *Bulky File, Case 1 Drawer 4, NA Box 13*, in RG77 in the National Archives. It is one red buckram bound volume of 109 pages manuscript and includes an early photograph of Long.

In his letter of July 31, 1821, the Secretary of War informed Long that the two reports by James that Long had sent to him were returned in order that James might have them published in the "Philosophical Society Transactions," but that ". . . when this is done the originals will be returned and be placed on files in the Topographical Office here . . ." in *Register of Letters Sent*, 295/178, RG107, 1 p. Apparently these two items were published as E. P. James, "Catalogue of Plants Collected during a Journey to and from the Rocky Mountains, during the Summer of 1820 . . .," *Trans., Amer. Philos. Soc.*, Vol. 2, (1825), pp. 172-190; and his "Remarks on the Sandstone and Floetz Trap Formations of the Western Part of the Valley of the Mississippi . . .," *ibid.*, pp. 191-215. Apparently these papers were prepared by James during his stopover in Smithland, Kentucky, April, 1821, and were transmitted to Long who communicated them to the Society with the permission of the Secretary of War, John C. Calhoun. They were read before the Society, possibly by Long, who was a member, on August 17, 1821.

³³ Edwin James, *op. cit.* [see footnote 12].

³⁴ *Op. cit.* [see footnote 32].

³⁵ See especially Long's official statement as relayed to the Secretary of War from Pittsburgh in his letter of April 20, 1819 in *Letter Received*, 9 pp., see p. 8, RG107. These instructions were issued as an order to members of the party on March 31.

³⁶ Nearly all, if not all, of the records of the concerned agencies of the War in RG107 and Long and Isaac Roberdeau in RG77.

We know from official records in the National Archives that one of Long's primary activities was the preparation for publication of an account of his Expedition into the West and that Dr. Edwin James had been made responsible for the editorial work.³⁷ In order to achieve this goal James apparently had been entrusted with as many of the official papers as were available and had the assistance of a number of the leading naturalists, such as Thomas Say and John Torrey.³⁸ It appears that Long assumed responsibility for the cartographic efforts, which included the compilation of a map of the United States between Washington City and the Rocky Mountains (Fig. 1). This map was to be compiled from a wide variety of sources and especially from the surveys of the Expedition.³⁹ We do not know precisely what cartographic records were made during the expedition, and we know of only a few that were made during the period thereafter to the date of publication.

In volume two of the Philadelphia, 1823 edition of the Edwin James publication is an appendix dated Philadelphia, 1822, entitled "Astronomical and Meteorological Records, . . . taken on the Expedition . . .," which was prepared by Lieutenant J. D. Graham.⁴⁰ In the preface by Graham dated Philadelphia, July, 1821, is a detailed description of the instruments carried and used in taking observations.⁴¹ Significantly, Graham remarks in his enumeration that the Expedition had

". . . A common surveyor's compass, with a needle six inches long. This instrument was used tracing the course of the Missouri, as laid down on the map of the Country taken by Major Long and Lieutenant Swift — Made by the same."⁴²

Graham also notes that

". . . Part second contains the observations which were made by Major Long and Lieutenant Swift after I separated from them at Engineer Cantonment, and which were afterwards calculated by me while those officers were engaged in projecting maps of the country explored by the Expedition."⁴³

Graham also records that

". . . It is hoped that the following astronomical computations will be found to correct many errors in the geography west of the Mississippi, as laid down even on some of the latest and most approved maps . . ."⁴⁴

Apparently no cartographic work was undertaken during the winter at Engineer Cantonment nor did Long in his assignment of duties so specify.⁴⁵ Thwaites mentions that Lieutenant William Henry Swift pre-

³⁸ *Ibid.*

³⁹ *Ibid.*

⁴⁰ Edwin James (comp.), *op. cit.* [see footnote 12], Vol. 2, pp. llxvii.

⁴¹ *Ibid.*, pp. iii-v.

⁴² *Ibid.*, p. iv.

⁴³ *Ibid.*, p. v. It will be recalled that Lieutenant Graham had been detached from the expedition as officer responsible for the "Western Engineer" in its surveys of the lower Missouri Rivers. The implication in the above quotation is that the maps were those prepared after the expedition returned East.

⁴⁴ *Ibid.*, p. vii. Graham refers especially to maps by John Melish and Dr. John H. Robinson (who had been on Zebulon Montgomery Pike's Expedition 1805-06).

⁴⁵ *Ibid.*, Vol. 1, pp. 164-166 and pp. 167-198.

pared "the map of the country explored by the expedition . . .,"⁴⁶ but this seems to be an inaccurate statement because in Long's official correspondence between 1820 and 1823 he states that he (Long) was preparing this map.⁴⁷

Long began the compilation of his map shortly after his return to Philadelphia in 1820, but a succession of bouts with poor health over several years prevented him from giving his continuous attention to the task.⁴⁸ In his letter July 18, 1821, to the Secretary of War he remarks that

"... In consequence [of my health¹], I have been able to do but very little towards the compilation of my map — No efforts that my health will permit shall be spared in the speedy accomplishment of this object — Under your approbation I should be glad to make arrangements for the publication of the Map which I shall be able to effect in connexion with Mr. Tanner,⁴⁹ the celebrated Map-Maker & Engraver of this place—Your instructions upon these points, will be thankfully received ..."⁵⁰

On July 31, 1821, the Secreary of War stated that

"The decision on the publication of your map is reserved for further consideration. When completed you will report it to this Department when a decision will be made on your request to publish ..."⁵¹

Major Isaac Roberdeau of the Topographical Bureau on October 6, 1821, did commission Long to construct "... a Gen'l Map of the U. States on a large scale . . . I thank you for mentioning me as an accomplice in the undertaking, and will be pleased with contributing my mite in enhancing the project ..."⁵² This apparently was to be a joint undertaking in addition to the map engraved for Long's book, and Long probably did most, if not all, of this work. Long indicated the errors in extant maps and suggested that since he had retained minutes of all of his reconnoitering he could

"Frame a sketch of the country on any scale that might be chosen. A Scale of six miles to one inch, would make a Map at least 25 feet square. Half that scale would be large enough to exhibit to advantage on one side of your [Roberdeau's] office, or in that of the Hon. Secretary ..."⁵³

⁴⁶ Reuben G. Thwaites (ed.), *Early Western Travels . . . , op. cit.* [see footnote 1], Vol. 14, p. 41, note.

⁴⁷ Lieutenant Swift had been reassigned to his regiment by June, 1821, as is stated in footnote 30.

⁴⁸ Letter from S. H. Long to Isaac Roberdeau, dated Philadelphia, August 24, 1821 in *Miscellaneous Letters Sent and Received, Topographical Engineers*, 3 pp., RG77.

⁴⁹ A good biographical sketch may be found in W. L. G. Joerg, "Henry Schenck Tanner (1786-1858)," *Dict. Amer. Biogr.*, Vol. 18, (1936), pp. 296-297; and his "Henry Schenck Tanner of Philadelphia: His place in American Cartography, 1815-1850," *Annals, Assoc. Amer. Geogr.*, Vol. 25, 1 (1935), p. 46.

⁵⁰ Letter from S. H. Long to the Secretary of War, dated Philadelphia, July 18, 1821 in *Miscellaneous Letters Sent and Received, By Secretary of War*, 3 pp., RG77.

⁵¹ Letter from the Secretary of War to S. H. Long, dated Department of War, July 31, 1821 in *Register of Letters Sent*, 295/178, 1 p., RG107.

⁵² In letter from S. H. Long to Isaac Roberdeau dated Philadelphia, October 7, 1821 in *Miscellaneous Letters Sent and Received (Roberdeau)*, 4 pp., in RG77.

⁵³ *Ibid.*, p. 3.

⁵⁴ *Ibid.*

During the next several years Long spent much of his time in Philadelphia working on a "large map" and with James on the compilation of the account of their Expedition. Long carried on rather extensive correspondence with Isaac Roberdeau in the Topographical Bureau and with Alexander Macomb about his work.⁵⁵ He borrowed cartographic and other records from the Bureau in Washington for use in compilation and complained about the inaccuracies of many of the unpublished sources, especially of the location of geographic features on a map in terms of latitude and longitude.

On July 5, 1822, Long informed Isaac Roberdeau in the Topographical Bureau that

"Having nearly completed all my Maps; and my other business connected with the publication of our Book, affording some leisure, I should be able to devote a small portion of my time, in replotting my surveys, on a Scale adapted to the Big Map, we have in contemplation . . ."⁵⁶

The atlas or folio of "Maps and Plates" accompanying the two text volumes of the Philadelphia edition is dated 1822. It appears from this that Long has completed a map or a map in two sheets specifically for this Philadelphia edition of his "Account . . ."⁵⁷

In 1822 Henry S. Tanner copyrighted "A map of North America constructed according to the latest authorities," on a scale of about 120 miles to an inch at latitude 45° N.⁵⁸ This map was included in his *A New American Atlas . . .*, published in Philadelphia in 1823. In the remarkably informative introduction entitled " A Geographical Memoir" Tanner described his several sources and in some detail recognizes the valuable assistance of Major Long, especially the topographical information from his 1819-1820 Expedition. Tanner, however, says that

⁵⁵ See especially the correspondence files in *Miscellaneous Letters Sent and Received, Topographical Engineers, A. Miscellaneous* (Roberdeau), March 1818 – Dec. 1826, RG77, *Letters Received by the Secretary of War, 1821-1825*, RG107, and *Monthly Personal Reports from Officers, 1820-1830*, RG77.

⁵⁶ Letter from S. H. Long to Isaac Roberdeau, dated Philadelphia, July 5, 1822 in *Monthly Personal Reports from Officers, 1820-1830*, 3 pp., RG77.

⁵⁷ This atlas bears the subtitle "Maps and Plates," and is dated Philadelphia, 1822. It includes eleven plates, the first two of which are the eastern and the western sheets, together comprising the map. These two sheets match at longitude 92°W. from Greenwich to form one map as reproduced in the London edition (1823). However, the two maps are not precisely the same, as for example the deletion of "Drawn by S. H. Long, Maj. T. Engineers" and the substitution of "Engrav'd by Young & Delleker." The serious student might well question why editors of recent editions of the Account . . . (i.e. in footnotes 1 and 27) have reproduced the London edition of the map rather than the Philadelphia, 1823 edition, which is substantially the first engraving of Long's "original." Careful comparison of each map further reveals rather significant differences in the title, the title block, placement of the Rocky Mountain front, the direction of river courses, and place names.

⁵⁸ *A New American Atlas Containing Maps of the Several States of the North American Union, Projected and Drawn on a Uniform Scale from Documents Found in the Public Offices of the United States and State Governments, and Other Original and Authentic Information*, (Philadelphia, 1823), 18 pp. of explanatory text "Geographical Memoir," and 22 plates of colored maps. This is one of the earliest atlases published in the United States and set high standards of scholarship and cartographic presentation. Tanner relied heavily on official Government sources, including S. H. Long.

"From the information collected, and observations later for latitude and longitude at frequent intervals during the progress of this expedition, Major Long constructed so much of his map as related to the region explored by him. The detail for the other parts was taken from my Atlas and other documents. This manuscript map was prepared for the use of the War Department on a scale of twenty-five miles to an inch, it occupies eight large sheets, and and is executed in a style of neatness seldom surpassed . . ."⁵⁹

Lieutenant Gouverneur K. Warren, in charge of the cartographic work in the Office of Surveys and Explorations in the War Department in the 1850's, and well acquainted with the map resources of the Topographical Bureau, compiled a "Memoir . . . giving a brief account of each of the Expeditions since A.D. 1800."⁶⁰ In his notice of the Long Expedition of 1819-1820 he refers to the maps in the Atlas accompanying the official "Account" (1832) by Edwin James and says that

" . . . accompanying the publication is a map, in two sheets, an a scale of 75 miles to an inch, . . . The original map in the Topographical Bureau is one sheet, on a scale of 36 miles to an inch."⁶¹

It becomes at once apparent upon careful examination of the contents, the form, and the technique of rendering the cartographic presentation of the Philadelphia edition of the map (Figure 1) and the large manuscript map (Figure 2) that they are very different and that indeed the former appears to be based on, but at best only bears a resemblance to, the latter.⁶² The former (Figure 1) may well be the engraver's revision or modification of a copy that was given to him by James or Long to engrave. If this is the case, where is the compilation (by Long?) that he used?

The manuscript map in the Office of the Chief of Engineers Headquarters Map Files in the National Archives is indeed on the scale of the manuscript map noted by Warren. It is a unique map and does not appear to have been published with an official Government or any other document. One may well conclude on the basis of internal evidence of this map, such as the lack of reference to Long's Expedition of 1823 and of other subsequent expeditions, that Long completed this map before he

⁵⁹ *Ibid.*, pp. 6-7. Tanner concludes this paragraph with a complimentary remark: "Whether we view this map as a work of art merely, or as a representation of an interesting and hitherto unknown part of our country, it cannot fail to augment the well-earned reputation of its accomplished author." Quotation is from p. 7.

⁶⁰ See in Gouverneur K. Warren, ". . . Memoir to Accompany the Map of the Territory of the United States from the Mississippi River to the Pacific Ocean; Giving Brief Account of Each of the Exploring Expeditions since A.D. 1800 . . ." in U.S. War Department: "Reports of Explorations and Surveys . . ." U.S. 33rd Congress, 2nd Session, Senate Document 78, Vol. 11, pp. 1-120, (Washington, D.C., Gov't Print. Office, 1859).

⁶¹ *Ibid.* This matches well with the facts noted in footnotes 57 and 60.

⁶² This manuscript map may be described as follows: "This Map of the Country situated between the Meridian of Washington City and the Rocky Mountains exhibiting the route of the late Exploring Expedition commanded by Maj. Long, together with recent surveys and explorations by himself & others is most respectfully inscribed, by his most obedient and humble servant S. H. Long, Major, U. S. Topl. Engineers . . . To the Hon. John C. Calhoun, Secretary of War . . . Scale of Miles; 36 miles to an inch." Dimensions 54½ x 48¾ inches (edge of map) and 52½ x 46 inches (between neat lines) Manuscript map in color and in ink on paper. Map No. U.S. 62, in *Records of the Office of the Chief of Engineers*, Headquarters Map Files, RG77 in the National Archives, Washington, D.C.

left the East in 1823 on his tour to explore the St. Peters or Minnesota River. Indeed, this may well be the proposed "big map" that was planned, because we have no record of any other and subsequent correspondence between Roberdeau and Long, that refers to the completion of the "big map" as originally planned. Certainly this manuscript map is one of the most valuable maps in the history of early American cartography. It is unfortunate that during these 144 years it has reposed in obscurity in favor of an inferior version.

WAGE LABOR AS A PRIMARY PLANTATION INDICATOR— THE CASE OF AMERICAN COTTON FARMS*

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Complex economic forms such as farming systems cannot be completely defined by only one or two characteristics. Rather it is a unique combination of several features, many of which are shared by numerous farming systems, that sets apart the particular economic organization. There is no doubt, however, that these combinations have keystones, characteristics that are more fundamental than others and yet reflect many of these other characteristics as well. These are the criteria one searches for when he wishes to discern at least approximate distributions of economic forms that are of continental scale but whose extensiveness makes comprehensive field examination impossible.

For plantation farming the most fundamental criterion is size, although there is much argument over what specific size minimum or minima should be accepted. Nor is there any uniform feeling on how the size qualification should be expressed. If a flat size delimitation is rejected as too arbitrary, then there is the bigger problem of selecting an indicator that ensures a farming operation large enough to guarantee a sizable acreage. The researcher who is interested in the plantation type of farm in the United States soon discovers that the few studies made of large farms deal principally with the scale of operations, something that is by no means always commensurate with large size, particularly when expressed monetarily, as in value of products sold.¹ Some of these studies do consider size specifically, but only as one criterion among several other equally-weighted criteria, not all of which need be included in order to have a small-sized farm classified as "large."² Furthermore, as intensification continues on American farms, the discrepancy between what the economist considers a large scale farm and what the geographer assumes to be a plantation will increase. As intensification proceeds, more and more farms will become "larger" in such

*Grateful acknowledgement is made to the University of California for financial support of this study and to the Department of Geography, University of Chicago, for permission to use map 210 of the Goode Base Map Series (Copyright by the University of Chicago).

**This article continues Professor Gregor's long-standing research interest in agricultural geography. His doctoral dissertation, *Changing Agricultural Patterns in the Oxnard Area of Southern California*, (Los Angeles, 1950), examined a topic and a field area that Professor Zierer investigated twenty or more years before.—Ed.

¹ As in the special report by the Census Bureau on *Large-Scale Farming in the United States*, Vol. V, Part 7, *U.S. Census of Agriculture: 1959*, (Wash., D.C.; U.S. Govt. Print. Off., 1963). Value of products both sold and used by the farm operators was the criterion used by R. D. Jennings in his study, *Large-Scale Farming in the United States, 1929, Fifteenth Census of the United States: 1930*. Census of Agriculture, (Wash., D.C.: U.S. Govt. Print. Off., 1933).

² Acreage, number of people employed, and capital invested were given equal emphasis by D. Curtis Mumford, *Large-Scale Farming in the United States*, U.S. Dept. of Agric., Bur. of Agric. Econ., (Wash., D.C.: U.S. Govt. Print. Off., 1938).

terms as investment in lands and buildings and in value of production, but not in acreage. To reduce such divergences and to give areal size the greater weight that a plantation designation demands, the following basic qualification of a plantation is proposed: a farm large enough to require an annual cash outlay for the equivalent of at least five resident workers with families.

This index was applied to American cotton farms, using published and unpublished data from the 1959 Census of Agriculture for labor expenditures³ and farm labor surveys of the Department of Agriculture for wage rates.⁴ The selection of cotton farms for a test application of the wage-labor criterion is a logical one. Of all farm types in the United States, large cotton farms have always been viewed as the most representative of the plantation. Yet their full extent has never been appreciated; in fact, they have been increasingly depreciated. Overemphasis of the tenant role, particularly that of the cropper, has figured strongly in this myopia.⁵ Tenants have been an inseparable part of the census definition of the cotton plantation, dating from the first report on plantations in 1910.⁶ Yet additional statistics compiled during this same period show the South already second only to the West in percentage increase of wage-labor expenditures.⁷ Since the last world war the shift from tenant to wage labor in the South has been revolutionary. Between 1954 and 1959 alone, tenants decreased by 46 per cent; for just croppers, it was 55 per cent.⁸

The reaction of the Census Bureau has been to discontinue its regular reports on "multiple units," its term for plantations. But the plantation has not declined, the operator merely substituting the wage hand for the tenant on an ever larger scale. Another adjustment by the operator in favor of cash payments has been the use of the "quasi-share labor" system of sharecropping. This is an arrangement by which the cropper is paid a day wage for pre-harvest work as a member of a crew and given a share of the crop on a patch of land. Furthermore, croppers and other tenants on southern plantations are also paid cash for a variety of non-agricultural jobs, a normal part of the plantation routine that has been going on for decades.⁹ Meanwhile large cotton farms have developed to the west of the traditional plantation area and have from their very beginning been heavily dependent on wage labor. An extensive pattern of cotton plantations therefore exists, one that is far larger than previous definitions and most conceptions would admit. It remains only to distinguish that pattern.

³ U.S. Bureau of the Census, *U.S. Census of Agriculture: 1959*, Vol. I, *Counties*, Table 18, and unpublished worksheets.

⁴ Crop Reporting Board and Agricultural Marketing Service, U.S. Dept. of Agric., *Farm Labor*, (January 11, 1960), p. 15.

⁵ For a treatment of the biases in the conception of the plantation in general, see H. F. Gregor, "The Changing Plantation," *Annals of the Association of American Geographers*, 55 (June, 1965), pp. 221-38.

⁶ U.S. Bureau of the Census, *Thirteenth Census of the United States: 1910*. Agriculture, Vol. V, Chap. XII.

⁷ U.S. Bureau of the Census, *Plantation Farming in the United States*, (Wash., D.C.: U.S. Govt. Print. Off., 1916), p. 31.

⁸ U.S. Bureau of the Census, *U.S. Census of Agriculture: 1959*. Vol. II, *General Report*, Chap. X, p. 1013.

⁹ Merle C. Prunty, "The Census on Multiple-Units and Plantations in the South," *The Professional Geographer*, VIII (Sept., 1956), p. 4.

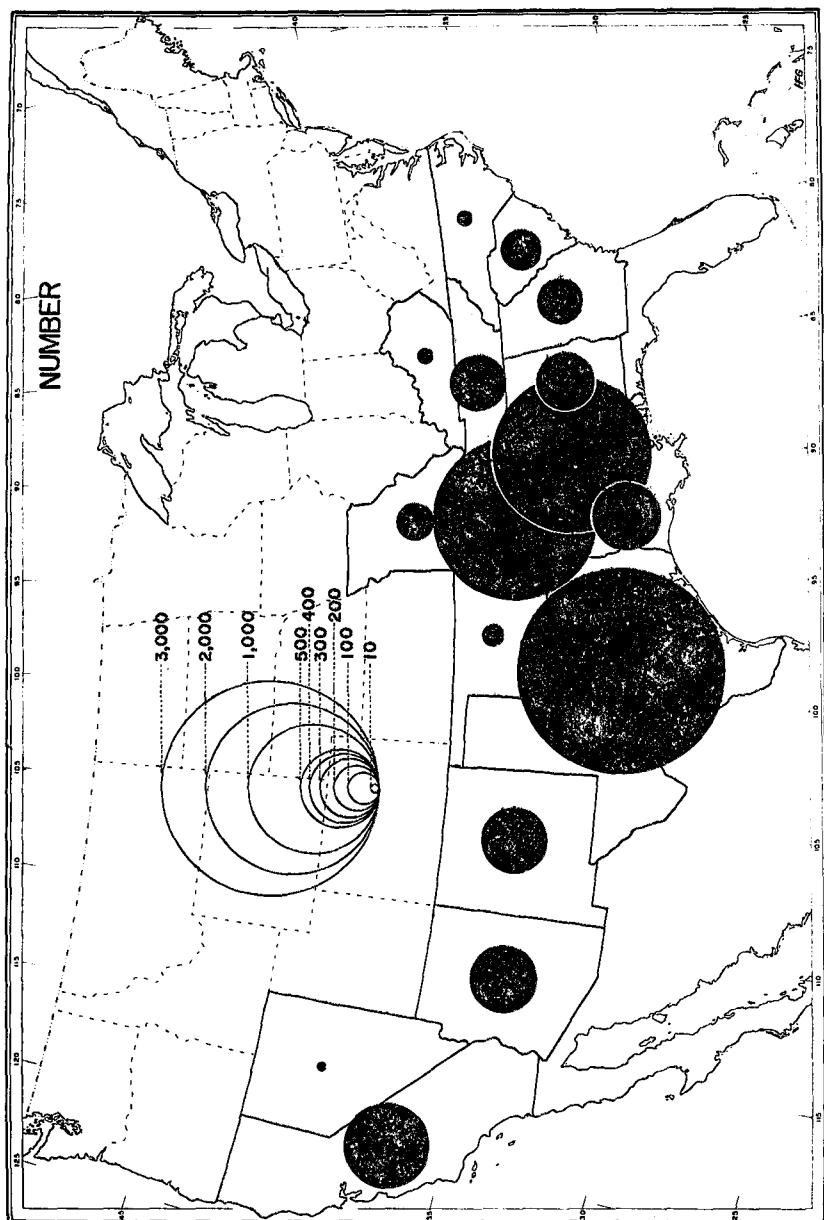
PLANTATION DISTRIBUTION

The overall distribution pattern of those cotton farms that paid wages for the equivalent of at least five resident workers is not only extensive but greatly unequal (Figure 1). More than 9,000 plantations were computed for sixteen states, stretching from coast to coast, but almost 70 per cent of those farms were in just three states—Texas, Arkansas, and Mississippi. Further, of this 70 per cent, Texas alone had 2,780 plantations or almost half. Other farm patterns may be detected on the basis of more geographic regions. About 90 per cent of the cotton plantations appeared to be roughly divided between the semiarid-to-arid areas of Texas, New Mexico, Arizona, Nevada, and California and the humid Mississippi "Delta" portions of Mississippi, Arkansas, Louisiana, Tennessee, Missouri, and Kentucky. The more degraded uplands of Alabama, Georgia, South Carolina, and North Carolina took up most of the remaining plantations.

Lower yields and lesser mechanization account in good part for the rapid falling off in plantations from the Delta area to the east. To the west, yields are even bigger and mechanization still more advanced than in the Delta, but the number of plantations, once beyond the Texas Panhandle, again declines. One reason for this paradox is that greater mechanization, while helping to make short-season (i.e., wage-labor) workers more numerous on western than on southeastern cotton farms, also makes wage labor less important for a greater proportion of the large cotton farms in the West than it does for those in the middle South where mechanization is still not quite so advanced. Another reason is the smaller number of western cotton farms to begin with. Total cotton farms in the four westernmost states were only one-fifth the number of all cotton farms (excluding cropper units) in the four easternmost states. However, plantations were twice as numerous in the western segment as they were in the eastern (1,312 to 651). None of the old cotton plantation states, in fact, equalled the number of plantations in any of the three states of California, Arizona, and New Mexico. Another east-west contrast is in the interstate pattern of plantations. Plantations diminish eastward, from Alabama to North Carolina, without a break; in the west, they increase westward, California having almost twice as many plantations (600) as New Mexico (344).

The overwhelming superiority of the southern midlands in plantation numbers is not without its qualifications from the standpoint of the plantation definition used here. It is difficult to say, however, whether these qualifications would really affect this leadership in any significant way. This regional leadership would undoubtedly be increased if cotton farms that employed a sizable amount of non-wage labor were given plantation status. Such farms, which employ five or more laborers but do not expend cash sufficient to pay for five laborers at current farm wage rates, are especially numerous in the Delta. Nevertheless, they are a distinct minority compared with those farms classified as plantation here. It is also undoubtedly true that the plantation criterion of a cash equivalent of a year-round work force discriminates more against southern cotton farms because their work season is shorter and less intensive than in the West. Still this bias would seem to

Figure 1



be at least considerably modified by the fact that Delta farms hire more than twice as much labor per farm as western farms.¹⁰

Another bias in the plantation definition, but one that enhances rather than minimizes delta leadership, is the consideration of farms as supervisory, rather than ownership, units. But, without minimizing the handicap of being unable to obtain from the census information on farm size in terms of ownership, a case for the supervisory unit may also be argued on increasingly stronger grounds. The supervisory unit is becoming more and more a highly individualized economic unit as a growing number of large landowners al-

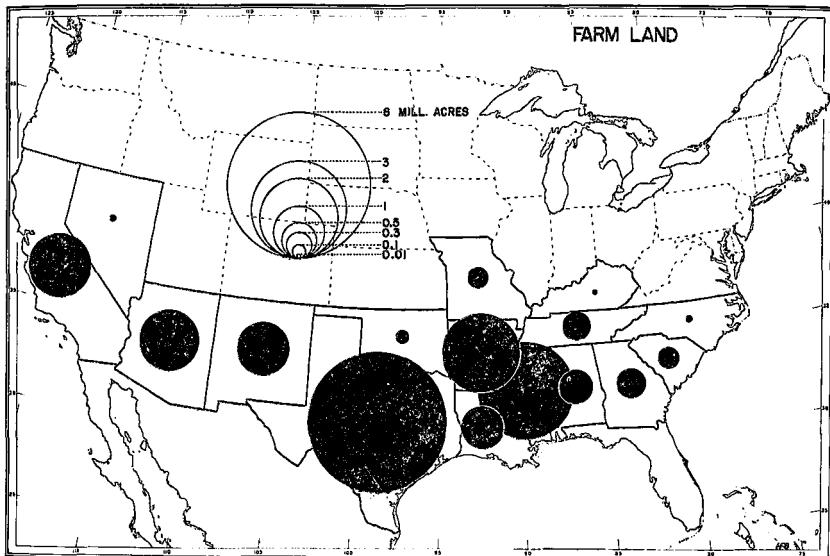


Figure 2

locate different farming operations among their various land units. Moreover, as cropper and other tenants leave the plantations, the supervisory unit comes closer to being the ownership unit as well. Of course owners have also purchased more land, and, in the process, have often acquired far-flung networks of properties. But this raises the more practical question of where one should draw the line in delimiting the plantation as a spatial unit. Fragmentation is certainly not unusual to plantations, but there would also seem to be a need for some boundary, beyond which a collection of spatial entities could no longer be logically called a plantation but a collection of plantations.¹¹ Nor does the pattern of a fragmented ownership neces-

¹⁰ And more than three times as much labor per farm as farms in the Southeast. James H. Street, *The New Revolution in the Cotton Economy*, (Chapel Hill: Univ. of North Carolina Press, 1957), p. 202.

¹¹ Prunty would consider fragmented holdings part of one plantation if (1) they were close enough together so that a central machinery pool could service them, and (2) their management were clearly centralized. He also notes that such fragmented complexes in the South, although "occurring often enough to be disturbing," are in the minority. Merle C. Prunty, "Some Problems in Classification of Contemporary Plantation Occupance Types." *Memorandum Folio, S. E. Division, A.A.G.*, IX (1957), p. 84.

sarily correspond to the pattern of operational control by the owner, as leasing becomes more common. From these standpoints, at least, the plantation as defined by the immediate supervisor would appear to be closer to spatial reality than that based on ownership. Plantations, as presented here, were operated almost completely by owners, part owners, or managers.

To determine the number of plantations, the daily wage rate of a farm worker supplied with a house was multiplied consecutively by 26 (days), 12 (months), and 5 (workers) to obtain the annual amount paid five workers. This figure was then interpolated within wage-expenditure classes of farms, as provided by the agricultural census, to secure the total number of farms that were paying at least that amount.

PLANTATION ACREAGE

The 14,676,000 acres of farm land in cotton plantations were distributed about the same as the plantations (Figure 2). Some important nuances may be seen, however. Those states sharing the Delta area had only 31 per cent of all the farm land in plantations, compared with 55 percent of all the plantations. Texas, however, was again the state leader, and with a higher percentage of farm land than it had for plantations (38 vs. 31). This improvement, combined with the equally-improved status of California, Arizona, and New Mexico, gave the plantations in the drier West a heavy edge over the Delta states in acreage.

Acreage in plantations was obtained by assuming that plantations were the largest farms and then interpolating their position among the farm-size classes provided by the census for all cotton farms. To avoid the open-end acreage class for the largest farms, means of acreage classes for non-plantation farms were multiplied by the number of farms corresponding to each farm-size class, totaled, and then deducted from the total acreage in cotton farms.

Much plantation land is not cropland (Figure 3). The nadir is reached in Nevada and New Mexico, where lack of water was undoubtedly the main reason for only 10 to 15 per cent of the farm land being in cropland. Proportions were also low in the Southeast, ranging from 25 to 50 per cent. Even in Texas and the delta states, with the exception of Missouri and Kentucky whose share of delta plantations is quite small, cropland proportions were no more than 50 per cent. But not all non-cropland can be considered idle land, particularly on the cotton plantations in the humid eastern sections where additional income is obtained by pasturing woodland and cutting timber. The only state that had both a respectable number of plantations and well over half of its plantation land in cropland was California (66 per cent). Larger blocks of land suitable for cotton growing and an abundance of irrigation water are the main explanations for this high cultivation intensity.

Cropland acreage for cotton plantations was obtained in the same way as farm land acreage, except that plantations were matched with cropland-acreage classes instead of farm-size classes.

VALUE OF PRODUCTS SOLD BY PLANTATIONS

California has shown a considerably improved position in the distri-

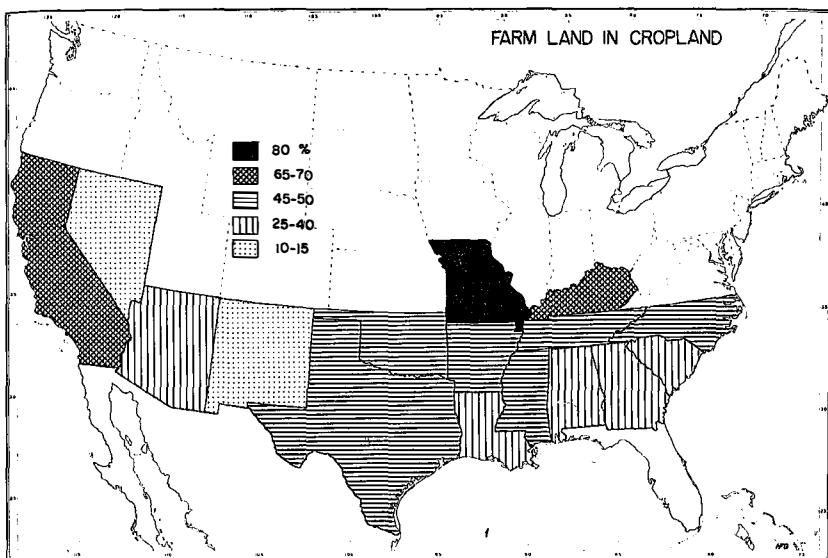


Figure 3

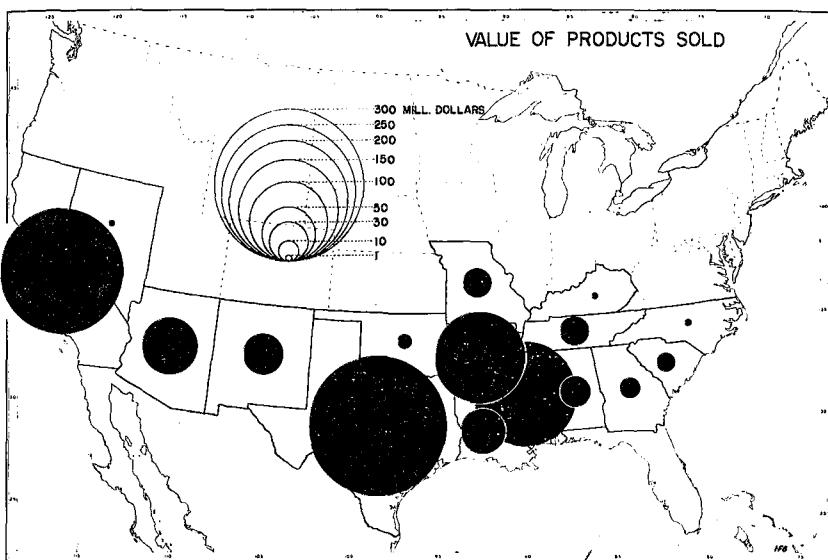


Figure 4

bution of value of products sold by cotton plantations (Figure 4). Texas again led all states with 255 million dollars, but California was a respectable second with 207 million. Together, they yielded slightly more than half of the 901 million dollars worth of products sold by all cotton plantations. If Mississippi and Arkansas, two other outstanding producers, are added, the proportion of the 901 million increases to almost 80 per cent. On a more geographic basis, the huge totals of Texas and California, when compared with the respectable ones of New Mexico and Arizona, give the plantations of the arid and semiarid areas a definite margin over the Delta states. When the value of products sold is related to individual plantations, the Far Southwest stands out even more prominently, with California again the most conspicuous (Figure 5). Unlike the distribution pattern previously described, that of production value describes an uninterrupted gradient from the Pacific to the Atlantic. The gradient is steepest in the West, where production value per California plantation (\$346,000) was more than twice that of the second-ranking state, Arizona (\$155,000); it is at its shallowest in the three easternmost states of Georgia, South Carolina, and North Carolina, with values per farm ranging from \$41,000 to \$45,000.

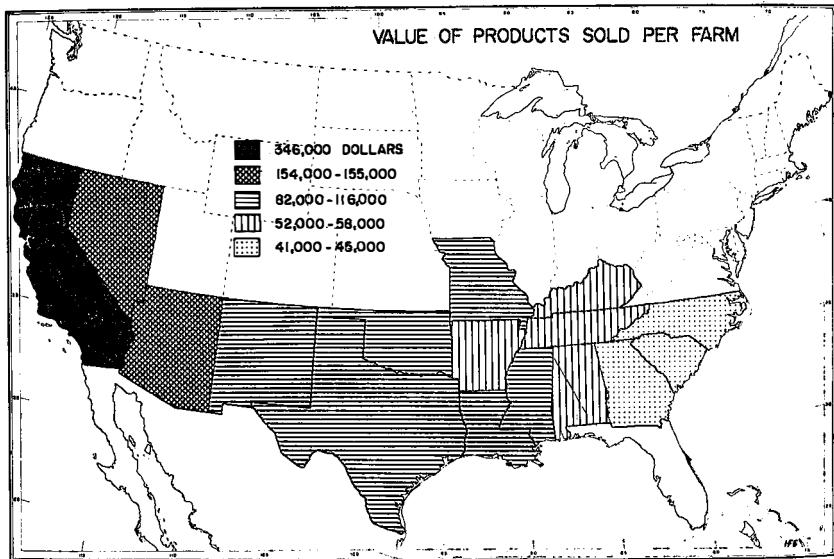


Figure 5

Value of products sold by cotton plantations was computed on the basis of the ratio of cropland on cotton plantations to cropland on all cotton farms. All cotton farms that sold less than \$10,000 worth of products were excluded from the computations, as they were throughout the study. Their number, in any case, was negligible.

PLANTATION SIZE

An east-west progression similar to that for plantation production value may be seen in plantation farm sizes, but with two major exceptions, Cali-

fornia and Mississippi (Figure 6). Mean size of plantations in California (2,266 acres) was anywhere from one-fifth to one-half that of Nevada, Arizona, or New Mexico. Mississippi had a plantation mean of 850 acres, the smallest size of any of the states except Kentucky. Also like the average value of products sold per plantation, mean sizes show a large range, from the 4,200 acres of Nevada to the 830 acres of Kentucky. However, only two of the sixteen states with cotton plantations had a mean of less than 1,000 acres.

Since only a few large plantations can distort the average, a more realistic picture of plantation size can be obtained by securing the median (Figure 7). Median sizes were derived by interpolating the median number of plantations in each state within the proper farm-size classes. The result was considerably smaller sizes for most states, ranging from 2,000-acre median for Nevada to 600 acres for Kentucky. With a greater proportion of their plantations in the "exceptionally large" category, the four western states show the greatest variances between mean and median sizes. The median size of cotton plantations in California, 653 acres, and the smallest median for any state except Kentucky, was 75 per cent smaller than the mean. In Georgia, South Carolina, and North Carolina, on the other hand,

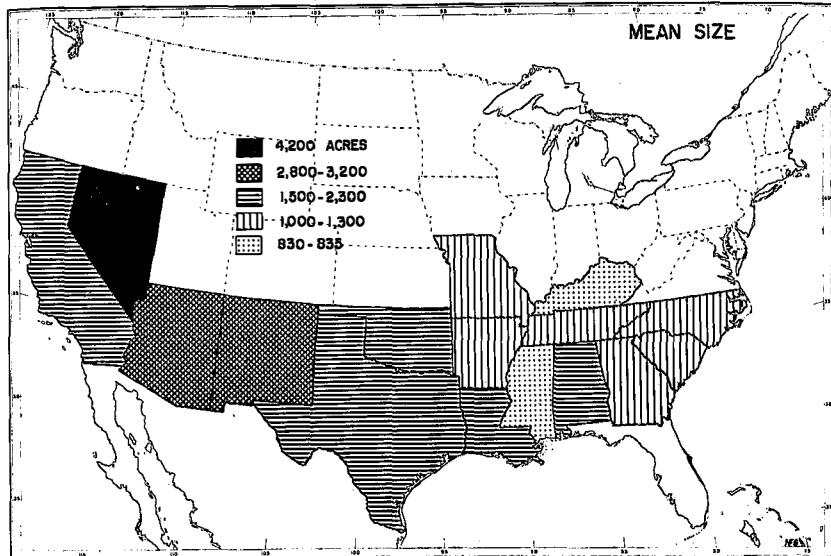


Figure 6

the very large farms were apparently minor enough to allow median sizes to be slightly larger than means. Thus, contrary to the usual belief, the major cotton-producing states of California, Mississippi, and Arkansas have generally smaller plantations than those of the less important cotton states of Louisiana, Georgia, Oklahoma, Missouri, and the Carolinas.

CONCLUSION: PLANTATIONS AND THE COTTON INDUSTRY

When plantation data are related to those for all cotton farms, they show plantations to be an impressive part of the cotton economy, especially

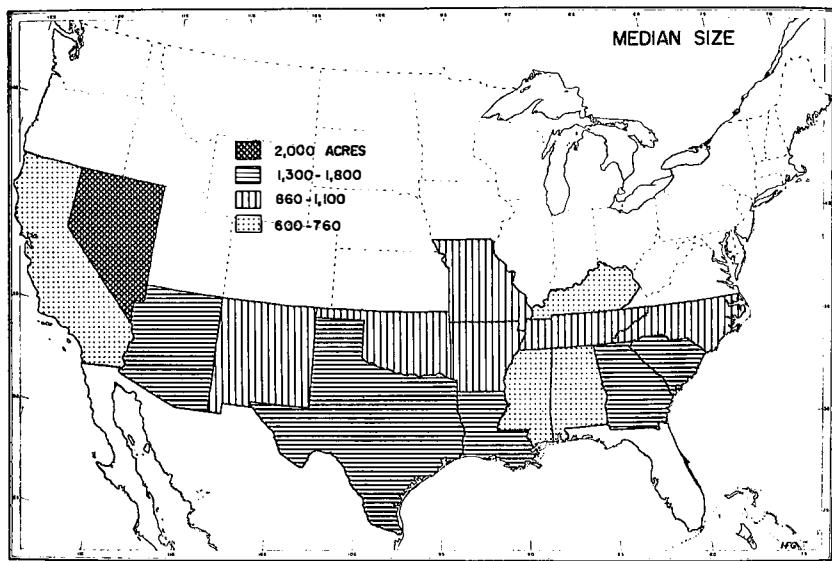


Figure 7

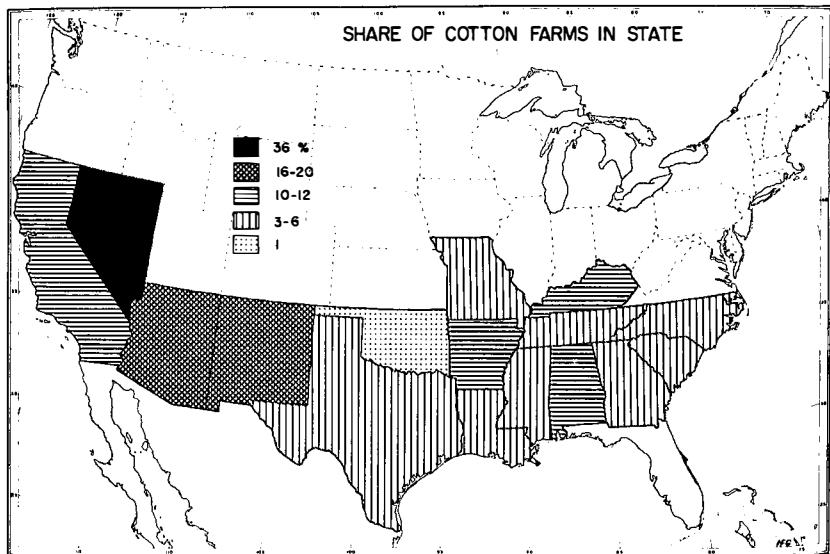


Figure 8

in light of their minority position in numbers. Plantations in 1959 comprised less than 5 per cent of all cotton farms (and excluding cropper units). By states, the share was greater but still fairly small. In fifteen of the sixteen cotton states, plantations formed no more than 10 to 12 per cent of the farms (Figure 8). Moreover, the smallest shares were in the more traditional southern cotton areas, and this applied almost as much to the highly productive delta area as it did to the marginal Southeast. Plantations were relatively most important in the newer cotton areas of Arizona, New Mexico, and Nevada, but their combined number formed only 8 per cent of all the cotton plantations in the nation. Even in California, where much publicity has been given to its large cotton farms, plantations were but 12 per cent of the farms specializing in cotton.

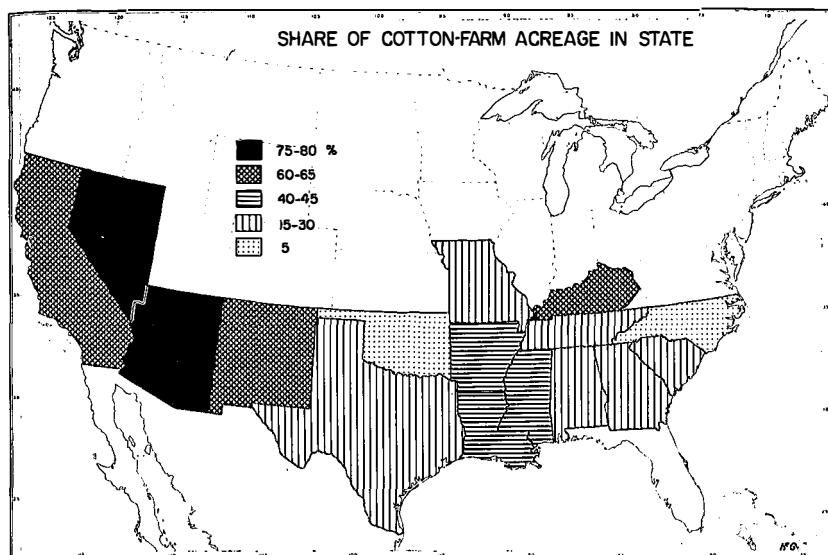


Figure 9

In contrast are the positions of the plantation in total cotton-farm acreage and value of products sold by cotton farms. About a third of both were accounted for by plantations. By states, these proportions increase still more, with plantations in some states accounting for as much as 60 to 80 per cent of the acreage and 45 to 75 percent of the value of products sold (Figures 9-10). And although, like plantation numbers, the smallest shares for these two categories were in the Southeast, the shares in the Delta area were considerably higher. However, the relative importance of plantations was again greatest in the states from New Mexico westward. In California, plantation production was so intensive that it accounted for two-thirds of all the value of products sold by cotton farms in the state. In no other state was the disparity between plantation numbers and productivity so great.

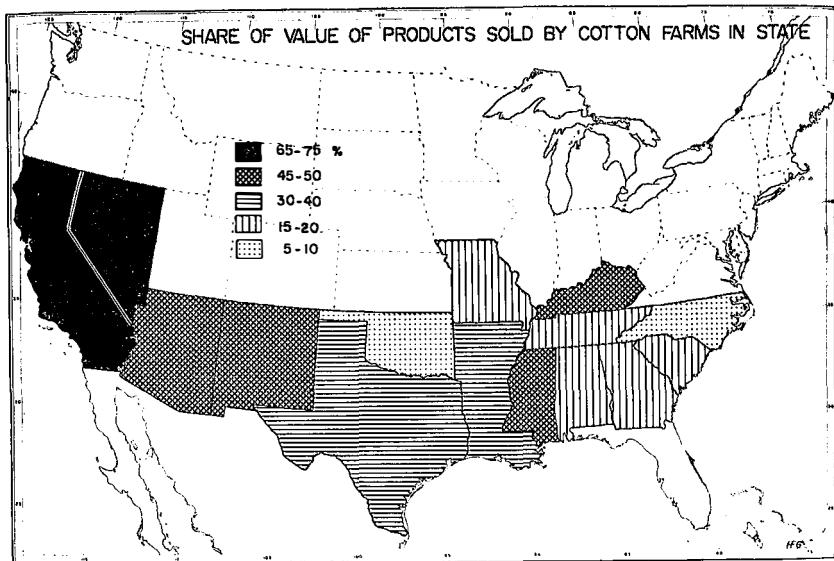


Figure 10

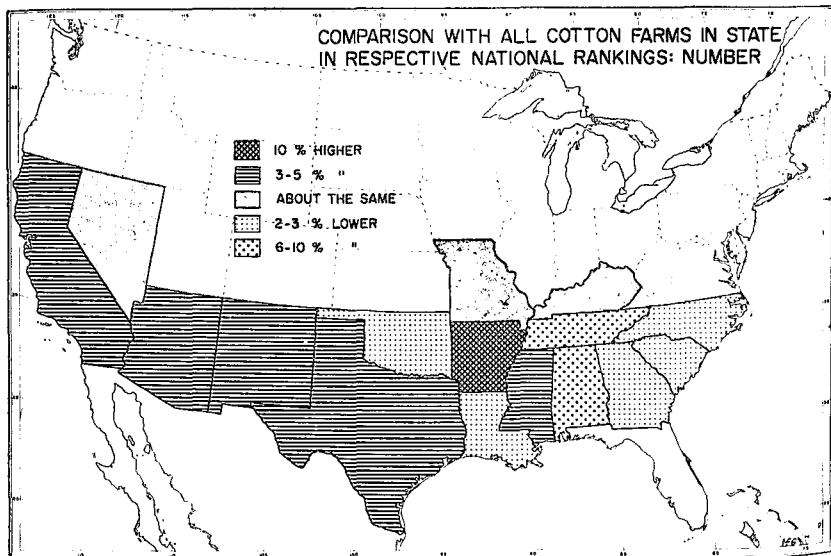


Figure 11

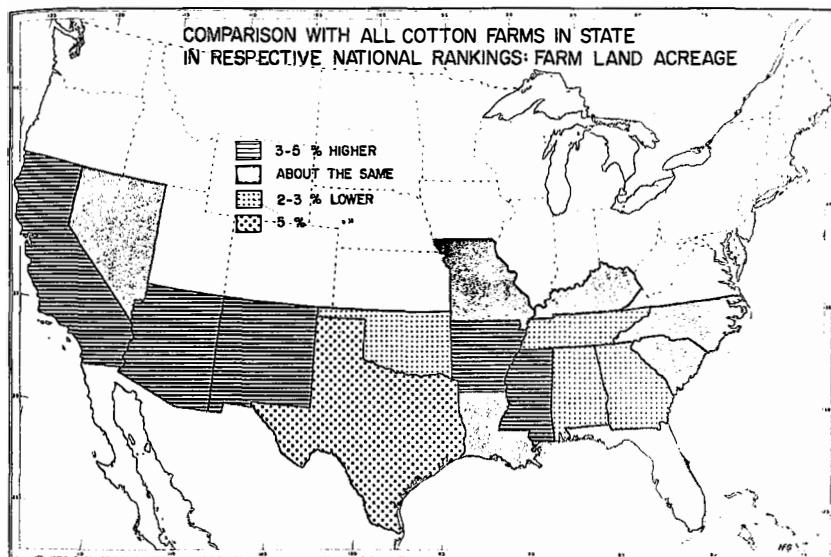


Figure 12

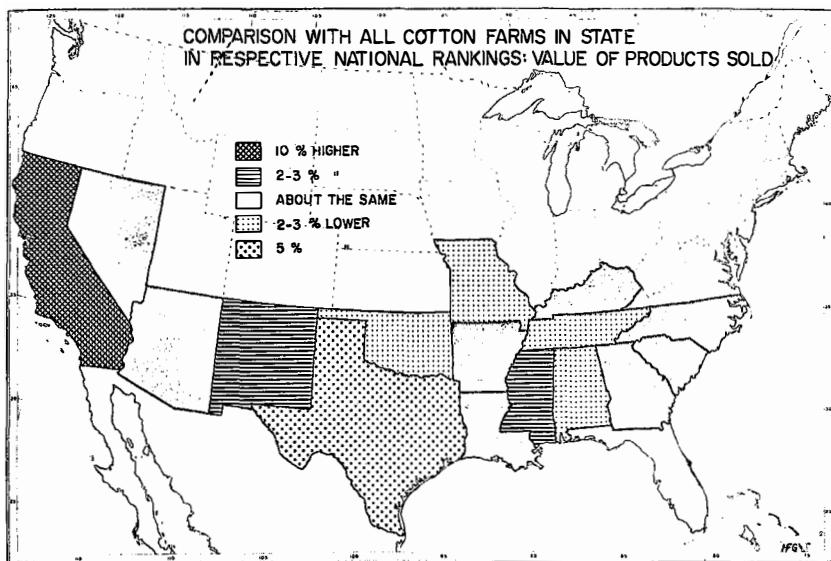


Figure 13

A comparison of the national rankings of cotton plantations and all cotton farms also illustrates the significance of the larger farms. This is represented (Figures 11-13) as the differences between the shares which each farm group had of its national total.

Plantations in the leading cotton states were generally more dominant among all plantations than were all cotton farms in those states among the nation's cotton farms. Conversely, plantations in the less important cotton states were generally inferior to all cotton farms in national rankings. Disparities between the two farm groups, however, were less in acreage and value of products sold than they were in number of farms, reflecting both the greater number and intensity of production on small farms. These two characteristics were emphatic enough to assign to Texas plantations a negative disparity which exceeded that of any other state.

THE EVOLUTION OF THE AMERICAN LEMON-GROWING INDUSTRY*

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Nearly one-third of all the lemons grown in the world come from a few fruit-growing districts in Southern California. Average annual production over the past ten years has been about 15,000,000 boxes per year.¹ The only other major producing area in the world, Italy, has averaged around 14,000,000 boxes per year.² The production of the principal lemon-growing areas of the world is shown in Table 1.

TABLE 1
LEMON PRODUCTION — PRINCIPAL COUNTRIES (Millions of Boxes)

	1961-62	62-63	63-64	64-65	(est.) 65-66
United States	16.7	13.9	19.0	14.2	17.0
Italy	14.3	10.4	14.1	16.4	15.7
Greece	2.5	2.6	2.4	2.6	3.1
Spain	2.7	1.6	1.7	3.2	2.7
Turkey	1.5	1.6	1.7	1.1	1.6

Source: U.S. Department of Agriculture, Foreign Agricultural Service, *The Marketing Situation for Winter Citrus in Europe*. (Washington, February, 1966), p. 18.

On the basis of value of production lemons rank fifteenth among the agricultural commodities in the State of California. In the eight most important lemon-producing counties lemons usually account for ten per cent or more of the total value of agricultural production (Figure 1). In Ventura County (Figure 2) the lemon is the most important commodity produced and generally accounts for over one-third of the total value of all agricultural products grown within the county.³ (Table 2)

This impressive position in the production of lemons is the result of a remarkable growth of the industry over the past one hundred years. During the 19th century and in the first decade of the 20th century Italian fruit-growers held a virtual monopoly on the sale of lemons in the United States. Fruit grown in Florida and in California was considered to be of poor quality and could not compete with Sicilian fruit.⁴

Very gradually California growers overcame their production and marketing problems and captured a larger and larger share of the world

*This study expands certain aspects of Prof. Durrenberger's doctoral dissertation, which was supervised by Prof. Zierer [*Climate as a Factor in the Production of Lemons in California* (Los Angeles, University of California, 1955) 350 pp.].

¹ U. S. Department of Agriculture, Statistical Reporting Service, *California Fruits*. (Sacramento, August 10, 1966).

² U. S. Department of Agriculture, Foreign Agricultural Service, *The Marketing Situation for Winter Citrus in Europe*. Foreign Agriculture Circular Citrus FCF 2-66. (Washington, February, 1966), p. 18.

³ Country Agricultural Commissioners Reports for 1965.

⁴ Frank M. White, "Orange, Lemon and Grape Trade," *Harpers Weekly*, 33 (January 26, 1889), pp. 64-66.

LEMON-PRODUCING DISTRICTS

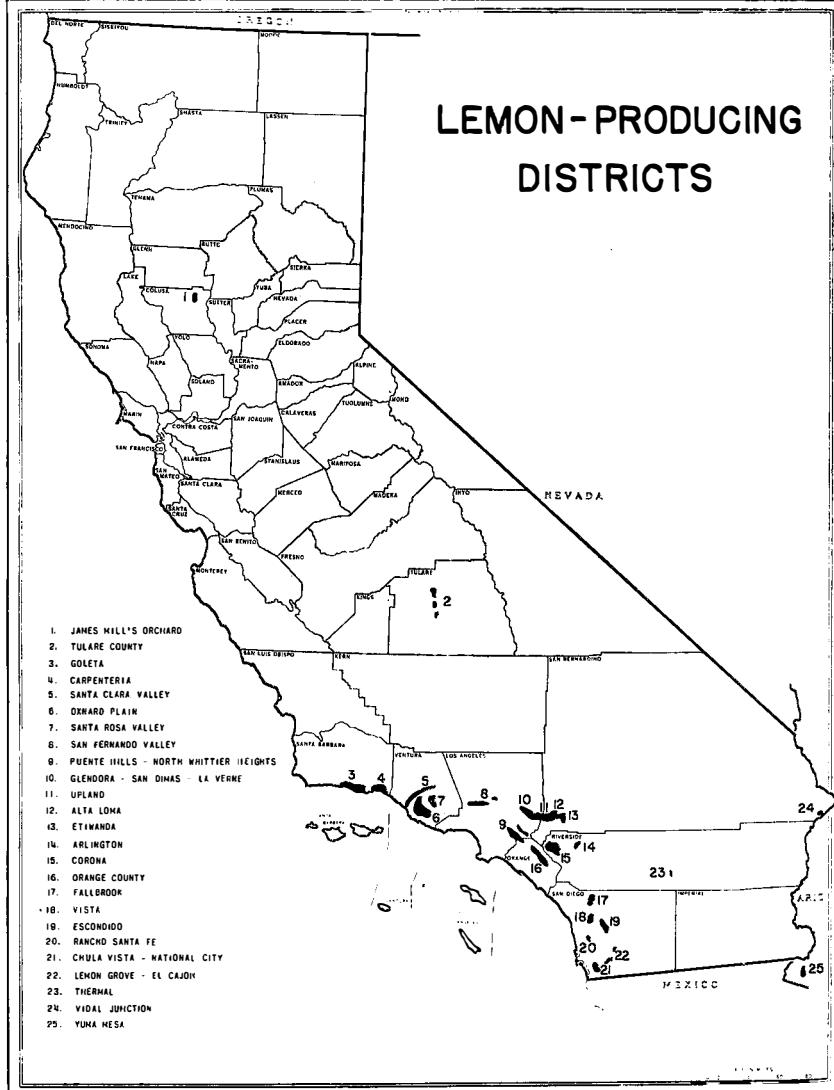


Figure 1

TABLE 2
CALIFORNIA LEMON PRODUCTION — 1965 (Acres)

Alameda	1	—	1
Butte	7	—	7
Fresno	146	31	177
Imperial	146	116	262
Los Angeles	2,760	15	2,775
Orange	1,040	131	1,171
Riverside	3,198	520	3,718
San Bernardino	3,949	37	3,986
San Diego	1,946	137	2,083
San Luis Obispo	2	—	2
Santa Barbara	5,564	200	5,764
Santa Clara	6	—	6
Santa Cruz	1	—	1
Sonoma	24	18	42
Tulare	1,697	430	2,127
Ventura	21,272	1,513	22,785
	41,759	3,148	44,907

Source: California Crop and Livestock Reporting Service. *California Fruit & Nut Acreage*, (Sacramento, 1966), p. 12.

lemon market. Their share of lemon sales in the United States rose from a few per cent in the 1880's to 18 per cent in 1900. By 1920 their share had increased to 75 per cent. After 1930 only small numbers of foreign lemons were being imported and American lemons were entering West European markets in large numbers.⁵

How did the lemon-growing industry become established in the United States, and what factors have led to the dominant position of Southern California in the industry?

ATTEMPTS TO GROW LEMONS IN SOUTHEASTERN UNITED STATES

It appears almost certain that the lemon (*Citrus limon*) is a native of northeastern India or Burma. The earliest references to the lemon are to be found in Sanskrit and Chinese literature while the Greeks and Romans seem to have had no knowledge of the tree or its fruit.⁶ The Moors carried the plant into Spain, and Crusaders brought the plant back to Italy from Palestine and Turkey.

From Spain Columbus carried lemon seeds on his second journey to the New World. From the West Indies the lemon migrated to the mainland area where, in a climate somewhat like that of southeast Asia, it grew wild. The Spanish *Conquistadores* and mission fathers furthered the spread of this and other varieties of citrus wherever they went in the Americas. In Florida the Indians are said to have used citrus and aided in its dissemination.⁷

Citrus fruits were carried northward through Florida into the Cape

⁵ Data obtained from various issues of the *California Citrograph* and the annual reports of *Sunkist Growers*.

⁶ Harold W. Glidden, *The Lemon in Asia and Europe*, (Princeton: The Institute for Advanced Study, n. d.), p. 395.

⁷ Herbert John Webber and others, *The Citrus Industry*, (Berkeley: University of California Press, 1943: 1st ed.), I, pp. 7-8.



Figure 2. A view of the Santa Clara Valley looking west; the town at the right is Santa Paula.

Fear settlement in the Carolinas in 1664 and westward along the Gulf Coast as far as Texas. In Florida most of the early plantings were along the northeast coast in the Indian River country and around the principal settlements.⁸ According to accounts of English visitors to St. Augustine, Florida, in 1763, oranges and lemons grew in the city without cultivation and produced fruit better than that of Spain and Portugal.⁹ Plantings along the Gulf of Mexico in Alabama and Mississippi were near the coast on the high bluffs of the salt water bayous while in Louisiana, "the infallible orange region," as it was called, extended for about fifty miles along the lower reaches of the Mississippi River.¹⁰

However, commercial production of citrus in the Southeast was not significant until after the American annexation of Spanish territory in 1821. Settlers from the United States took over Spanish plantings and the groves of trees which grew wild and began to ship citrus to other parts of the United States.¹¹

Prior to the 1860's the commercial citrus crop of Florida was limited to the output of a few small groves in the northern part of the state. Most of the groves were located along the banks of the St. Johns and other rivers, since practically the only means of transportation was by river boats. The methods of culture, harvesting, and shipping were very crude, but in spite of the many handicaps the pioneer growers prospered. The building of railroad lines into the area in the early sixties brought about a rapid growth of the industry. A U. S. Department of Agriculture report published in 1887 describes this development:

Lemon culture in south Florida is making rapid strides of progress. Well informed cultivators know that the lemon is a necessity to the people of the United States: that there is a market for every first class lemon, that can be produced, and more too

The time was, and not so very long ago, either that the most of the people in Florida believed that a marketable lemon, within sweet rind, first class acid, and medium size, could not be produced on Florida soil. The only lemons known in Florida were coarse, overgrown seedlings of the Messina and Sicily lemons, the little bush 'everbearing' variety, and the venerable 'French,' or 'Florida Rough' lemon. Strange as it may seem, there are still persons in South Florida who cling, like the dog to the proverbial bone, to the belief that marketable lemons cannot be produced in Florida, but they are within the last ten years comparatively scarce, and there are few now, except the veriest of backwood's 'crackers,' who do not have at least one or two pet Fenvas or Villa Francas in the yard, and still others set out twenty trees, and this man one hundred, and that man five hundred, and so on.

Lemon culture has thus far received the most attention among the progressive fruit growers of the 'lake region' of Florida, though lemons are cultivated to a certain extent all over the peninsula of Florida, and to a slight extent in lower Louisiana, especially in the parish of Plaquemines, where the commercial lemons are now receiving some attention. Florida is indebted to Mr. Bidwell and General Sanford for the first importation of the five varieties of commercial lemons now attracting so much attention. A

⁸ U. P. Hedrick, *A History of Horticulture in America to 1860*, (New York, Oxford University Press, 1950), p. 121.

⁹ *Ibid.*, p. 120.

¹⁰ Louisiana Agricultural Experiment Station, *Horticulture, Results of the Year 1893*. (Baton Rouge, 1894), pp. 878-79.

¹¹ Hedrick, *op. cit.*, p. 297.

great part of General Sanford's large grove at Belair is planted to those lemons, and although it has several times suffered severely from cold, the trees are very healthy and thrifty. On the lower range of keys, so many of which are adapted to the culture of the lime and lemon, none of the fine varieties are yet known, but the knottiest, smallest Florida lemons and limes are grown for the Key West market.

One cause, and a just one, of the bad name which Florida lemons have had in the Northern markets, has been the indiscriminate shipment in years past (and in some cases it is still continued) of the inferior lemons so abundant in Florida.¹²

The same report listed no less than thirty-one varieties of lemons growing in Florida at this time. This, in part, accounts for some of the difficulties encountered in marketing the crop. In addition, many of these were seedling plants which added to the heterogeneous quality of the crop. The major advantage enjoyed by the Florida lemon industry was that most of the fruit was picked and marketed in the latter part of August and during September and October when shipments from overseas were light.¹³

The great freezes of the winter season in 1894-1895 eliminated Florida as a major lemon-producing area. From a peak production of 57,219 boxes in the 1893-1894 season, lemon production fell to 713 boxes in the 1894-1895 season and to zero in the 1895-1896 season. In the years following, the highest production attained was a meager 2,200 boxes during the 1898-1899 season.¹⁴

Severe freezes had previously affected the Florida citrus industry in 1879-1880, 1883-1884 and 1885-1886.¹⁵ Most growers became convinced of the inadvisability of trying to grow lemons under such conditions.

In addition, other problems existed which operated to prevent the re-establishment of the industry in Florida. Citrus scab had disfigured much of the fruit, making it unmarketable. Curing the fruit was difficult under the hot and humid climatic conditions in Florida. Various fungus growths resulted in great loss because of fruit rot.¹⁶ For these reasons, Florida and other areas in the Gulf Coast region passed out of the picture as centers of commercial production of lemons after 1895.

BEGINNINGS OF COMMERCIAL PRODUCTION IN CALIFORNIA

The first plantings of citrus in the American Southwest were at the Spanish missions in Arizona between 1707 and 1710, and it is known that the lemon was growing in Baja California as early as 1739.¹⁷

It is possible that lemons were first grown in Alta California at the

¹² Report on the Condition of Tropical and Semi-Tropical Fruits in the United States in 1887 (Washington, Government Printing Office, 1891), pp. 80-81.

¹³ T. W. Moore, *Treatise and Handbook of Orange Culture in Florida, Louisiana and California* (New York, E. R. Pelton and Co., 1892), p. 116.

¹⁴ Report of the California State Board of Agriculture. 1911, (Sacramento, 1912), p. 140.

¹⁵ Herbert J. Webber, "The Two Freezes of 1894-95 in Florida and What They Teach," in *Yearbook of the U. S. Department of Agriculture—1895*, (Washington, Government Printing Office, 1896), p. 159.

¹⁶ Herbert J. Webber and others, *The Citrus Industry*, op. cit., I, pp. 590-591.

¹⁷ *Ibid.*, p. 32.

San Diego Mission. Evans, writing in 1874, made the following statement concerning the planting of citrus at some of the other missions:

Although the only living orange-trees planted by Father Junipero and his associates, or their immediate successors, are to be found in the mission gardens at San Gabriel, in Los Angeles County, and at Old San Bernardino, in San Bernardino County, there are traditional evidences of orange groves having been planted by them and flourishing at the mission settlements of San Luis Rey and San Buenaventura, which disappeared with the decay of those venerable institutions.¹⁸

General Vallejo is quoted as saying that he remembered lemons growing at Monterey and at San Gabriel in 1822.¹⁹ In 1849 Bryant observed lemons growing at the San Fernando Mission.²⁰ The California State Agricultural Society reported, in 1858, lemons growing at San Gabriel and San Luis Rey²¹ and Brewer bought lemons at Mission San Gabriel in December, 1861.²² Some of the other missions undoubtedly had plantings of lemons. Seeds and plants were carried from these mission plantings by a relatively small number of the early ranchers and farmers.

Following the discovery of gold in California the influx of population resulted in a greatly increased demand for food of all kinds. The demand for an acid fruit was met by imports of lemons and limes from Europe and by an increased production of both these fruits within the state.

Prior to 1848 there had been little planting of citrus in the northern counties since most of the Spanish settlement had occurred to the south of the San Francisco Bay area. During the 1850's and early 1860's commercial plantings in these northern counties remained few in number for several obvious reasons. First of all, most of the people were engaged in a search for gold and were not interested in agriculture. Secondly, a large percentage of the gold miners came from the eastern part of the United States and from Western Europe and had no background in citriculture.

However, many people planted the seeds of fruit purchased for home consumption, and, as a result, citrus plantings were eventually made in many parts of the state. An example of how this was accomplished is found in an article on orange culture in California which appeared in *The Overland Monthly*. It quoted Dr. F. Strentzel of Martinez as follows:

My efforts in orange culture date from the year 1853, when I bought some large and fine-flavored oranges and a few Sicily lemons in San Francisco, planted the seed in boxes, and raised them in my tent home. They grew luxuriantly, more so indeed than any I have planted since. The young trees transplanted to the orchard nursery, even with the best shelter and

¹⁸ Taliesen Evans, "Orange Culture in California," *The Overland Monthly*, 12 (March, 1874), p. 236. Most of the early writers used the term "orange grove" to refer to any citrus planting. Most orange groves included oranges, limes and lemons.

¹⁹ Byron M. Lelong, *A Treatise on Citrus Culture in California* (Sacramento, State Printing Office, 1888), p. 77.

²⁰ Edwin Bryant, *What I Saw in California*, (New York, D. Appleton & Co., 1849), p. 390.

²¹ *Transactions of the California State Agricultural Society*, 1858, (Sacramento, 1859), p. 293.

²² Wm. H. Brewer, *Up and Down California in 1860-64*, edited by F. P. Farquhar (Berkeley, University of California Press, 1949; 2nd ed.), p. 22.

care I could afford, were nipped by the frost for several winters, and thus retarded in their growth.²³

Most of these early citrus plantings in northern California were incidental to home adornment and ornamentation. So far as there was a home or local demand there was production, but not much more.²⁴

Even Southern California with its Spanish heritage and its mission plantings of citrus had only a small commercial industry. Governor John Downey, writing in 1874, explained this fact as follows:

It was a difficult undertaking for the ranchero to build a fence to protect his orchard from the multitude of wild stock that surrounded him, even to the door of his pueblo home.²⁵

This first citrus planting or any size was at Mission San Gabriel about 1805.²⁶ A few other plantings followed several decades later. The orchard at San Gabriel was fairly mature when Luis Vignes made his first plantings in the early 1830's.²⁷ Shortly thereafter plantings were made within the city limits of Los Angeles by Alonzo Wolfskill and Manuel Requena.²⁸

The groves of Vignes, Wolfskill, Requena and other early orchardists of Southern California in no way resembled a present-day horticultural enterprise. These men were interested in determining precisely which species and varieties of fruit would do best in a given locality. As a result, their orchards contained a little of everything. During this early period the grape appeared to be the most profitable fruit crop. Wine could be easily shipped to the gold fields and around the Horn to the East Coast.

Some idea of the composition of these orchards can be gained from the descriptions found in the book, *Semi-Tropical California*. The number of trees contained in several of the orchards are given below:

Mrs. H. Shaw's holdings on San Pedro Street in Los Angeles consisted of thirty-five acres on which were planted the following:²⁹

2,500	young orange and lemon trees	200	apple trees
1,000	young lime trees	20	walnut trees
200	bearing orange trees	20	peach trees
20	lime trees	20	almond trees
20	Sicily lemon trees	200	grape vines
300	apricot trees	4	acres of strawberries and small fruits.

²³ Evans, *op. cit.*, p. 238.

²⁴ H. Latham, "Fruit Growing in California," in *Transactions of the California State Agricultural Society During the Year 1885* (Sacramento, 1886), p. 185.

²⁵ John G. Downey, "More About Orange Culture," *The Overland Monthly*, 12 (June, 1874), p. 560.

²⁶ William A. Spalding, *The Orange: Its Culture in California*, Riverside Press and Horticulturalist Steam Print, 1885), p. 7.

²⁷ Spalding says that this grove was planted in 1834. Newmark indicates that Vignes came to Los Angeles in 1829 and planted his first orchard shortly thereafter. Davis reported that Vignes was the first man to raise oranges in Los Angeles and that Vignes was well established by 1833. [Spalding, *op. cit.*, p. 7; William H. Davis, *Sixty Years in California* (San Francisco, A. J. Leary, Publisher, 1889), p. 169; Maurice Newmark and Mareo R. Newmark, *Sixty Years in Southern California* (Boston, Houghton Mifflin Company, 1930), p. 197.]

²⁸ Downey, *op. cit.*, p. 560.

²⁹ Ben C. Truman, *Semi-Tropical California* (San Francisco, A. L. Bancroft & Co., 1874), p. 49.

An orchard of fifty acres lying on the south side of Main Street in Los Angeles had:³⁰

300 bearing orange trees	50 apricot trees
100 bearing lemon trees	50 nectarine trees
300 lime trees	1,000 apple trees
500 young orange, lemon and lime trees	300 pear trees
100 Italian chestnut trees	200 peach trees
300 walnut trees	500 almond trees
25 fig trees	10,000 grape vines.

Most of the land holdings within the City of Los Angeles were of less than fifty acres in extent and contained just such a variety of crops as indicated by the preceding examples. However, along the foothills to the east of the city lay the San Gabriel fruit belt, an area about two miles wide and ten miles long. Here were a number of large land holdings. Among these, that of Don Benito Wilson was the largest. The original estate contained 1,800 acres, and at the time that Truman visited the orchard it had the following:

231,000 grape vines	600 lime trees
2,050 bearing orange trees	500 olive trees
1,950 young orange trees	450 walnut trees
500 lemon trees	

In the 1870's the bulk of California's citrus production was from Los Angeles County, but plantings were being made in outlying districts. Frank A. Kimball had planted a grove of oranges and lemons at National City, San Diego County, 1869.³¹ Lemon trees were imported from Australia in 1875 and were planted by Judge J. W. North in the Riverside area.³² Lemon trees of the Lisbon variety were first planted on the La Patera Ranch near Goleta, Santa Barbara County, in 1875.³³ In addition, lemon plantings were being made in many other parts of California at this time. However, before any large-scale commercial development occurred, a number of production and marketing problems had to be overcome.

FACTORS IN THE GROWTH OF THE CALIFORNIA INDUSTRY

While the discovery of gold and the ensuing rapid increase in population had created a demand for citrus fruit in the state, the California lemon-growing industry had remained relatively small. This has generally been attributed to competition from foreign fruit and the limited size of the West Coast market. During the early days of the industry, foreign lemons often

³⁰ *Ibid.*, p. 52.

³¹ *Ibid.*, p. 125.

³² "Colorful Early Days of California Citrus Industry," *The California Citrograph*, 17 (June, 1932), p. 317.

³³ *Citrus-Fruit Improvements: A Study of Bud Variation in the Lisbon Lemon*, by A. D. Shamel, L. H. Scott, C. S. Pomeroy and C. L. Dyer, U. S. Department of Agriculture, Bureau of Plant Industry, Bulletin No. 815 (Washington, 1920), p. 3.

³⁴ D. M. Rutherford, "Citrus Progress in Santa Barbara County," *The California Citrograph*, 38 (October, 1952), pp. 488-490.

sold for five to six dollars a box while California lemons for one dollar a box.³⁵

Most of the lemon trees planted in California at this time were seedlings of local and inferior varieties. The fruit was allowed to remain on the trees until ripe with the result that the lemons became large and coarse textured. The fruit produced only small quantities of a bitter juice with a low acid content.

Some of the pioneer lemon growers reasoned that greater uniformity in fruit was needed. This was achieved with the importation of Lisbon lemon trees in the 1870's and the development of the Eureka variety about the same time. By 1880 it was generally accepted that these two varieties were the ones best suited for California.³⁶ Better cultural practices including grafting methods ensured the propagation of trees capable of producing high quality fruit.

Important, also, in this matter of producing and marketing a high quality product was the development of marketing associations which picked, packed and sold the fruit. The first such group was the Lemon Growers Exchange of Upland formed in 1893.³⁷ Other groups formed soon thereafter, and by 1897 an organization known as the Lemon Growers Advisory Board began operating in the Southern California Fruit Exchange.³⁸ Eventually these grower associations were able to standardize the California product and to control the number of lemons made available for sale as fresh fruit. Thus, they have been able to regulate the selling price of lemons in the grocery stores of the nation.

Completion of the transcontinental railroads in the 1880's had opened eastern markets to California fruit, but even this was not enough to permit California lemon-growers to capture a significant portion of the market.³⁹ However, competition among the railroads led to lower freight and passenger rates to and from California. Prior to 1885 it cost as much as \$1000 to ship a carload of produce to Chicago. Early in 1885 this dropped to \$400 a car. With the completion of the Santa Fe the freight rate between Los Angeles and Chicago fell to \$200 a car.⁴⁰

In spite of the lower freight rates foreign fruit could be delivered to the major eastern cities at a lower cost than could California fruit. Table 3 shows the freight rate advantage enjoyed by imported fruit in the eastern markets.

To combat this economic advantage the California growers fought successfully for tariff protection, and import duties of varying amounts have been placed on lemons. The Act of July 24, 1897 increased the rate on lemons from about one-half cent a pound to one cent a pound. Further increases in the tariff occurred in 1913 and 1930 with the rate on lemons

³⁵ G. W. Garcelon and B. M. Lelong, *Citrus Fruits* (Sacramento, 1891), p. 6.

³⁶ Lelong, *op. cit.*, pp. 73-77.

³⁷ R. O. Price, "History of Upland's Lemon Association," *The California Citrograph*, 2 (April, 1916), p. 11.

³⁸ *The California Citrograph*, 2 (March, 1916), p. 1.

³⁹ The Central Pacific route was completed in 1869 and extended south to Los Angeles in 1876. In 1881 the Southern Pacific was completed from Los Angeles to New Orleans. In 1885 the Santa Fe route to the East was finished.

⁴⁰ Latham, *op. cit.*, p. 185.

reaching two and a half cents a pound in the latter year.⁴¹

TABLE 3

Rates on California and Italian Lemons to New York, Pittsburgh, Cincinnati, and Chicago. (Carload lots—1911)

DESTINATION	Per Cwt.		Difference in favor of Italy	Per Box		Difference in favor of Italy
	Calif.	Italy		Calif.	Italy	
New York, N.Y.	\$1.00	*\$0.358	\$0.642	\$0.84	\$0.304	\$0.536
Pittsburgh, Pa.	1.00	* 0.658	0.342	0.84	0.559	0.281
Cincinnati, O.	1.00	* 0.758	0.242	0.84	0.644	0.196
Chicago, Ill.	1.00	* 0.758	0.242	0.84	0.644	0.196

Source: G. Harold Powell, *The California Lemon Industry*, p. 21.

* Based on rate of 30.4 cents per box of 85 pounds to New York and not including transfer charge in New York of 3 cents per box. From the 30.4 cents rate a rebate of 6 cents should be deducted on all lots of Italian lemons of 1,000 boxes or over.

With a superior product, an able marketing organization, and with tariff protection the California lemon-growing industry has been able to control the American market since 1930 and now sells about five per cent of its crops to foreign countries. The only threat to its preeminent position is the never-ending spread of the city, as factories, sub-divisions and shopping centers consume more and more prime agricultural land around the Southern California megalopolis.

⁴¹ G. Harold Powell, *The California Lemon Industry* (Los Angeles, The Citrus Protective League, 1913), p. 13. For small lemons \$1.50 a thousand would mean a tariff of about one cent a pound. However, for the average lemon this tariff averaged about one-half cent a pound.

LARGE LANDHOLDINGS IN THE ENVIRONS OF LOS ANGELES*

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The countryside around the nation's second-ranking conurbation is a mélange of physical settings and kinds of occupancy undergoing widespread but erratic rural-to-urban metamorphosis. A neglected aspect, but one promising better understanding, of the oft-bewildering Los Angeles hinterland is its framework of property ownership, a sometimes influential ingredient of both rural settlement and emergent urbanization.¹ Pursuing this prospect, the present article offers an exploratory picture of large private rural properties adjacent to Los Angeles, suggesting avenues of more intensive investigation and providing data for comparison with other circum-metropolitan areas. Due to the breadth of its subject, the study is arbitrarily confined to landholdings having a continuous extent of at least two square miles and situated within seventy miles of the Los Angeles civic center. Such properties were identified from public tax assessment records in summer 1964, and the accompanying account stressing ownership and utilization was subsequently compiled from a variety of sources.²

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**Dr. Steiner, who took his doctorate at the University of Washington, prepared his master's thesis, *Recreation and Watershed Problems in the Southwestern San Gabriel Mountains, California*, (Unpublished thesis, University of California, Los Angeles, 1951), partially under the guidance of Professor Zierer.

¹ As one regional planner puts it, for example, "Whether property is urbanized depends in a very real way on the desire of the owners . . ." [Willis Miller in Ernest A. Engelbert, ed., *The Nature and Control of Urban Dispersal*. (Los Angeles: American Institute of Planners, 1960), p. 95]. It is also noteworthy that while Jean Brunhes omitted land ownership from his classic list of the "essential facts" of geography [*Human Geography*. (Chicago: Rand McNally, abridged and translated 1952 ed.), pp. 35-39], the subject figured prominently in an exemplary case study in the same book [pp. 104-106], as noted by Richard Hartshorne while defending inclusion of non-material cultural features in geographic research [*The Nature of Geography*, (Lancaster, Pa.: Association of American Geographers, 1939), pp. 206 and 210].

² These consisted of published and unpublished materials, field observations, and interviews too numerous and fragmentary for complete citation. A preliminary listing of properties was obtained from cadastral maps published by Blackburn Map Co., Los Angeles (1954). Orange County Planning Department (1959), and Los Angeles City Planning Commission (1962). Helpful records were made available by the Bakersfield and Riverside offices of Title Insurance & Trust Co., by Pioneer Title Insurance & Trust Co. San Bernardino, by field offices of the U.S. Agricultural Stabilization & Conservation Service, and by the U.S. Bureau of Land Management. Gratitude for extended interviews is expressed particularly to William R. Barnes, C. J. Barrett, R. A. Brendler, Eursell Cordell, Robert Erro, Richard Hathaway, Blake McCartney, N. L. McFarlane, C. E. Parker, R. G. Percy, and William Snow.

DISTRIBUTION AND LINKAGES

Properties of the prescribed size and location number 120 and occupy nearly one-fourth of the privately-held non-urban hinterland of Los Angeles. Large holdings are generally fewer than small ones and cover less total area (Table 1). The size-frequency distribution of holdings reveals no peculiarities that might be ascribed to minimum land needs for agriculture or to optimum size of units intended for urban subdivision. However, one major irregularity occurs in the form of five outstanding properties that are nearly as extensive as all other holdings combined

Table 1. Data on Properties by Size Groups

Size in Sq. Mi.	Number	Total Sq. Mi.	Ownership Frequency ^a
2-5	69	230	2.1 ^b
5-10	28	200	2.6
10-15	12	137	2.2
15-20	6	102	1.8
61-300	5	688 ^c	1.4
Total	120	1,357	

^aAverage number of owner changes per property since 1900.

^bBased on a sample of fifty properties that give an under-estimate of the true figure.

^cExcluding acreage beyond the 70-mile study area.

(Figure 1). The smallest encompasses sixty-one square miles and the largest 300 square miles, and two of the five contain more acreage beyond the seventy-mile zone.

The location of all properties together and separately by size groups appears unrelated to distance from central Los Angeles.³ More relevant are kinds of physical settings and modes of occupancy. Having originated as agricultural units, most holdings are identified with terrain that is smooth to hilly, rather than mountainous, and with climate that is subhumid or semiarid, rather than desert. Such settings are most plentiful in a sector immediately northwest of Los Angeles, where half of the 120 properties are located.⁴ Mountain and desert zones contain fewer holdings, due to unpro-

³This condition may arise from the physical variety of the present hinterland, but it might also occur even on a fairly uniform surface as in the outskirts of Chicago, where a singular size distribution of rural property persists irrespective of distance from the city until the time of urban subdivision, according to John J. B. Miller, *Open Land in Metropolitan Chicago*, (Chicago: Midwest Open Land Association, 1962), pp. 102-103.

⁴As noted later, this concentration is augmented by oil-producing holdings. On the other hand, no special political conditions seem to contribute, since large holdings are frequent on both sides of the county boundary involved, and several properties, in fact, overlap the boundary. Neither is proximity to Hollywood as influential as might be imagined. Only one large landholding is identified with a motion picture personality, and only two serve as regular movie production properties, though several working ranches are employed sporadically as film settings.

ductivity and perhaps to widespread presence of public lands.⁵ Most major lowlands with historically adequate water supply also lack large properties, having earlier been partitioned into small farming units or urbanized.

Only a modest degree of owner linkage seems to exist among large holdings. Out of 120 properties, 105 appear to have distinct ownership after deductions are made for kinship affiliations and multiple holdings.⁶ Ten owners have more than one large property within the area studied, and one owner has four. Multiple properties of an owner are usually situated close together, however, and sometimes they were once part of a single holding. Many larger owners also have numerous parcels too small to be considered in this study, but commonly located in close proximity to the

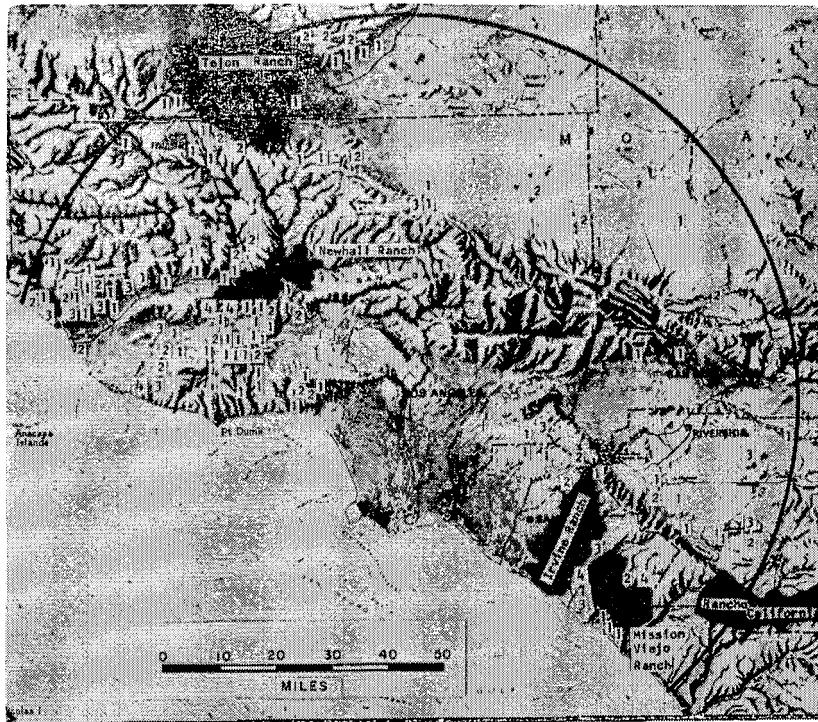


Figure 1

master holding. Operating ties were not considered here, other than leasing arrangements noted in the later discussion on agriculture.

⁵ Rodney Steiner, "Reserved Lands and the Supply of Space for the Southern California Metropolis," *Geographical Review*, vol. 56, (1966), p. 346.

⁶ Fragmentation of ownership appears greater here than in some areas that are more purely agricultural; cf. "contiguous kinship" parcels of the Midwest cited by Miller, *loc. cit.*, and integrated family corporations reported by W. H. Wills, *Large-Scale Farm Operations in the Upper San Joaquin Valley, California*, (Unpub. master's thesis, University of California, Los Angeles, 1953), p. 102.

ORIGINS, FUNCTIONS, AND STABILITY

A slight majority of properties are pieces of once larger Hispanic land grants. Accordingly, their present boundaries are generally straight but not compass-oriented, following metes-and-bounds lines in a manner frequent for property, roads, and political limits in rural and even in urban coastal Southern California.⁷ Land grant properties are often notably unsymmetrical, though it remains to be tested whether they tend to be more or less compact than holdings having public domain origins. Another small group of properties are derived from combinations of land grants or of parts of grants, or from mixtures of land grants with public domain units. Remaining properties occur entirely within public domain sectors of the Los Angeles hinterland. Coinciding closely with areas shunned by Hispanic ranchers because of low grazing value, most large properties on the public domain originated later than land grant holdings. Some were established "whole" directly out of public domain or railroad lands thereupon, while many others were developed by consolidation of homestead and other small patented units, often by one of the original settlers. Public domain properties tend to be smaller and less often agricultural than land grant holdings, due more to natural handicaps, however, than to method of property origin.⁸ Properties in the public domain sector are further distinguished by their right-angle, compass-oriented, devious boundaries, and by frequent penetration from enclaves and peninsulas of alien land. In a dozen extreme cases, holdings from the public domain have complete or partial checkerboard dimensions.

Table 2. Number of Properties by Ownership and Productive Use

Owner	Agric.	Agric. and Min.	Agric. and Urban ^a	Min.	Idle and Other	Total
Investors	24	3	2 ^b	0	10	39
Mineral Companies	1	7	0	10	2	20
Basic Ranchers	15	2	1	0	0	18
Absentee Heirs	10	3	2	0	0	15
Developers	4	0	7	0	1	12
Estate Ranchers	8	0	1	0	1	10
Others	0	1	1 ^b	0	4	6
Total	62	16	14	10	18	120

^aIncome accrues from partial urban development of property.

^bAlso supported by oil production.

Agriculture and mineral extraction are the primary productive uses of large properties (Table 2). However, visible productive use is by no means synonymous with property function in this region. Probably not over half of all properties are supported chiefly by agriculture or minerals. Many

⁷ Howard Nelson and associates, "Remnants of the Rancho in the Urban Pattern of the Los Angeles Area," *The California Geographer*, Vol. V, (1964), p. 4.

⁸ The prevalence of large ranches throughout western United States bespeaks the ease with which such units were historically established out of public domain land when warranted by forage quality. In the study area, also, several extensive ranches occur on areas of former public domain having relatively high grazing capacities.

properties stand idle, and idle or not, many holdings serve primarily as investments. A few may consist of genuine residential estates that temporarily are economic liabilities. Others are supported in varying degrees by piecemeal sale or lease for urban developments, and a number may be held for their favorable effect on the taxation accounts of owners who have outside income.⁹ Some properties are in transitional categories in which purposeful management may momentarily be at a minimum. Such variables and intangibles resist full inquiry and easy categorization, but kinds of ownership enumerated in Table 2 are at least suggestive of actual property functions beyond visible use alone, if somewhat dependent on subjective judgment. Functions and uses of landholdings are discussed more fully in later paragraphs.

Ownership and dimensions of large properties have been historically resistant to change. Most holdings achieved their maximum extent early, and their area subsequently has tended to remain fixed or only slightly diminished. Few present owners are descendants of Hispanic settlers, but the fifty-one properties larger than five square miles have averaged only slightly more than two owners each since 1900, and about one-fourth of all properties have seen no ownership change at all in the twentieth century. In general, the larger the property the less frequent its ownership change has been in the past (Table 1), though this relationship has not held in the last few years. Mineral-bearing properties have also tended to have a minimum of ownership fluctuation. Complete ownership history was not obtained for properties smaller than five square miles, but partial data suggest there is more stability in this size group than would be assumed from the economic ease of transferring smaller holdings. At least thirteen properties of two to five square miles have had no ownership change since 1930. Ownership change for properties of five square miles and larger occurred at a fairly steady rate between 1900 and 1960, though somewhat slow in the 1920's and 1950's, and rapid in the 1930's. Between 1960 and 1965, however, one-quarter of the properties larger than five square miles experienced owner turnover as part of the original trend toward urban development. As might be expected, sale of a property appears to be especially likely following the death of its long-time owner.¹⁰

AGRICULTURAL USAGE

Agriculture, chief motive in formation of the properties, remains their most important productive use. In general, the larger the property the more apt it is to have some agricultural activity and a greater variety of agriculture (Table 3). A majority of present agricultural properties are essentially limited to grazing or to dry farming of grains and beans, while a small number of holdings are devoted chiefly to irrigated crops, primarily orchards,

⁹ This allegation is made frequently with respect to smaller rural properties in Southern California and probably also applies to some holdings considered here, though such cases are not readily documented.

¹⁰ One possible contributing factor is the tendency for lower taxation of property sold by heirs of a deceased owner than of property sold directly by the owner during his lifetime. See William H. Scofield, "Values and Competition for Land," *A Place to Live, The Yearbook of Agriculture* (Washington, D.C.: Government Printing Office, 1963), p. 69.

vegetables, and alfalfa, and about one-quarter of all agricultural properties combine significant amounts of irrigation with grazing, dry farming, or both. Cattle feedlots are co-dominant with other activities on several holdings.

An estimated 188 square miles of the 120 landholdings are cultivated, apportioned about 139 square miles to dry farming, twenty-eight to orchards, sixteen to vegetables, and five to alfalfa. The remaining eighty-six per cent of the area studied is agriculturally employed strictly for grazing at most, with probably less than half of this acreage having forage quality. All properties together account for roughly one-tenth of orchard and vegetable acreage in the seventy-mile zone, and probably a much greater share of

Table 3. Number of Properties by Agricultural System and Size Group

Dominant Agricultural System	2 to 5 Sq. Mi.	5 to 10 Sq. Mi.	Over 10 Sq. Mi.	Total
Grazing and/or Dry Farming	31	14*	12*	57
Irrigation, with Grazing and/or Dry Farming	4*	7	10**	21
Irrigation	8	2	0	10
Total	43	23	22	88

*Indicates one property having an important feedlot operation.

dry-farmed and grazing land.¹¹ The group of large properties therefore seems to be agriculturally less intensively used than is normal for the region, a trait related in part to prevailingly unirrigable settings. Further, it is the writer's impression¹² that irrigated crops more often occur on small properties and stop at the boundaries of large holdings, than vice-versa. Since property limits seldom coincide with sharp changes in physical environment, it therefore appears that large properties in this region may tend to make less intensive use of equivalent land and water resources than do small holdings.

Farming on most properties studied is not a simple resident-owner operation. Fewer than a score of owners are solely dependent on agricultural production from their single holding, and only thirty owners use their property as a mailing address. A number of holdings have ranchsteads named on topographic maps, and many more are popularly called "ranch" or "rancho," but these appellations do not prove to be reliable indicators of owner residence or degree of attachment. Properties having cultivation tend to resident ownership more than holdings restricted to grazing or non-agricultural uses, and partly because they are more apt to possess agriculture, so do properties of larger size. About two dozen holdings are leased

¹¹ Based on 1959 Census of Agriculture data for three counties most coincident with the study area, compared to the writer's data for large properties in the same counties.

¹² Derived from inspection of air photos and of topographic maps having orchard symbols.

in whole or in part to others, mostly for grazing and grain farming,¹³ while three owners themselves lease additional property nearby, and four owners possess grazing permits on adjacent public lands.

The five leading properties provide specific, if imperfectly representative, examples of the variegated and complex agricultural ownership patterns prevailing in the area.¹⁴ Their owners consist of an open-stock corporation identified particularly with Los Angeles business interests, a subsidiary of an Eastern railroad with a California metals manufacturer, a largely local family-owner corporation controlled by a non-profit foundation, a closed family corporation based in San Francisco, and a trusteeship for descendants of an early-day rancher. Present owners date, respectively, from 1912, 1964, 1864, 1875, and 1883. Three owners have other large rural holdings in California, and only one of the five properties has a traditional owner's home, though all possess operating structures and employee residences. Each holding is at least partly owner-operated, three also include tenant cultivators, and one controls extensive adjacent property under grazing lease.

MINERAL PRODUCTION

Extraction of minerals (petroleum, clay, borax, cement, and water) is second in frequency to agriculture as a productive use of large properties. Some one-third of these mineral holdings occur in the northern and eastern portions of the study area, where climate or terrain are unsuited for agriculture; they tend to small sizes, with none exceeding six square miles. A second group of mineral properties, however, lies immediately northwest of Los Angeles, where petroleum deposits and agricultural settings coincide. Oil revenue usually takes precedence on them, but half are owned by "ranchers" rather than by oil companies. Many therefore also have significant irrigation or feedlot production, although on oil company properties agriculture is usually confined to grazing and dry farming by lease operators. Some properties in the oil-agriculture group, which includes two of the five largest landholdings, would probably be equally large and enduring on a basis of agriculture alone, but oil income may well account for persistence of others in urban-exposed locations. Altogether, petroleum-related properties in the study zone number thirty-one and encompass over 500 square miles. Included are more than a dozen holdings without oil production themselves but held by owners having income from oil. These consist mostly of estate ranches or simple investments rather than potential oil fields.

INVESTMENT-RELATED FUNCTIONS

It appears that investment is by far the leading motive for ownership of large rural properties around Los Angeles. Consisting of both individuals

¹³ This figure yields a tenancy rate of at least twenty-six per cent, and if each tenant were considered a separate operating unit, the value perhaps would be comparable to the fifty per cent figure reported for one sector of the study area by Howard Gregor, "A Sample Study of the California Ranch," *Annals Association of American Geographers*, Vol. 41, (1951), p. 292.

¹⁴ For contemporary accounts on four of the five leading properties, see *Annual Report of the Tejon Ranch Co.; Rancho California News*, (Bergen & Lee, Los Angeles), vol. 1, 1965; Ray Herbert, "Fabulous Irvine Ranch," *Los Angeles Times*, July 26-30, 1959 (five parts); and Ruth Waldo Newhall, *The Newhall Ranch*, (San Marino: Huntington Library, 1958).

and organizations, most investors maintain offices in the Los Angeles urban area. Only a few have long-standing affiliation with agriculture, but many have operated in Southern California for several decades. Investor properties understandably have tended to experience frequent transaction; more than half have changed hands since 1950 and only one investor-owner is known to pre-date 1900. There have been few instances of property consolidation by investors (or developers) in recent decades. Rather, the rule has been either no major alteration of pre-existing boundaries following acquisition by an investor, or early partition. Some investor properties, located mainly in mountains or desert, have long stood idle. The majority, however, are in active agricultural use, usually grazing and dry farming. Many were once basic ranches subsequently acquired by investors, possibly indicating that an increasing share of productive rural properties are operated with investment as their prime function.¹⁵ Nearly all purchasers of large properties in the last decade have been investors or developers.

Investment and agriculture are often virtually inseparable, some investors, for example, operating their properties with added motives such as agricultural hobbies.¹⁶ Also, many investor holdings are considered as working properties for immediate, as well as speculative, income. Possibly the intertwining of investment and agriculture has even prolonged the rural status of large properties in Southern California as much as it has led to their subdivision, by giving an added economic buffer against early urbanization not afforded the smaller-scale, narrowly agricultural owner. When viewing the accretion of wealth and population in Southern California, it may seem remarkable that any ranches at all would have escaped the hands of investors. In part this may testify to the power of tradition and sentiment as factors in land tenure¹⁷ but it might also be suggested that even the purest of ranchers nowadays necessarily finds himself a conscious investor merely through the circumstances of rising land values. Many pioneer ranchers of Southern California even in the previous century, in fact, had the reputation of being speculators as well as agriculturalists.

In addition to properties clearly identified with investors are those held by absentee heirs and estate ranchers, as recognized in Table 2, and considered here as somewhat special forms of investment orientation. Descendants of pioneer ranchers who live away from the property and have economic interests elsewhere are a common category of owner, and their holdings include some of the largest properties, including six that exceed

¹⁵ Investor ownership may also be characteristic in regions further removed from urban influence, as in the situation described by Walter F. Kollmorgen and David S. Simonett, "Grazing Operations in the Flint Hills-Bluestem Pastures of Chase County, Kansas," *Annals, Association of American Geographers*, Vol. 55, (1965), pp. 274 and 288-90. Circumstances stimulating nationwide rural land investment are discussed by Scofield, *op. cit.*, pp. 66-69.

¹⁶ For an example of investment combined with other motives of ranch ownership in the present study area, see L. F. and L. M. Cooley, *The Simple Truth about Western Land Investment*, (New York: Doubleday, 1964), pp. 147-148.

¹⁷ Personal motives for continuing to farm on the urban fringe of Los Angeles, some of them seemingly applicable to landholdings considered here, were investigated by Herbert Eder, *Some Aspects of the Persistence of Agriculture in the San Fernando Valley*, (Unpublished master's thesis, University of California, Los Angeles, 1960), pp. 68-70 and 91-98.

ten square miles. Agriculture, mainly of a casual nature, normally occurs on holdings of absentee heirs, and three have important oil output, one is experiencing initial urbanization, and one is being sold a parcel at a time to developers. Estate ranches, on the other hand, serve foremost as temporary or permanent places of residence for their owners, who in turn have outside sources of income. These properties tend to be active and well-managed, with considerable agricultural production, even if seldom self-supporting. Like properties of absentee heirs, estates range widely in size and location, though both groups are absent from desert settings. All estate owners have been present for more than a decade and at least half date back to World War II or before. Their fortunes stem from Eastern manufacturing, Southern California petroleum (not, however, on the estate itself), or from various activities in Los Angeles.

URBAN DEVELOPMENT

Continuing a traditional process, present-day properties are one by one becoming candidates for urbanization. Within the past few years, a dozen of the 120 "rural" holdings have experienced partial subdivision, and population on these lands alone in the next two decades is projected at upwards of one-half million. Another twenty properties are expected to begin urbanizing shortly, so that in the near future at least one out of four present large rural holdings within seventy miles of Los Angeles will probably contain housing tracts.¹⁸ Timing of urbanization is related partly to nature of ownership, since holdings purchased by developers in recent years have usually been those held lightly—that is, by heirs or investors rather than by basic or estate ranchers. Subdivision, however, is occurring on properties varying greatly in size, setting, use, and ownership, suggesting that most landholdings may ultimately undergo at least partial urbanization.

None of the 120 properties is fully urbanized as yet, and plans for some holdings call for continued rural use where terrain is difficult for construction or where intensive agriculture or oil production already exist. On larger properties, complete urbanization also may be long in coming simply due to market limitations, so that it is often to the owner's advantage to maintain maximum agricultural income for the present.¹⁹ There is only a very rough parallel between proximity to Los Angeles and proportion of holdings experiencing urbanization, even making allowance for mineral and other properties unattractive for early subdivision. A closer relationship might well occur were it not for such local variables as site quality, availability of imported water, access, and size of holding. The larger the property,

¹⁸ Available data when projected indicate that the 120 properties will accommodate between one-tenth and one-third of the anticipated new population in the next two decades; in other words a notably smaller proportion than is their present share of privately-owned open space in the seventy-mile zone.

¹⁹ An additional motive for delaying urban development arises out of recent state legislation providing incentive payments to farmers who wish to postpone subdivision of their property. Provisions of the new law, the effects of which are not yet locally apparent, are described in J. Herbert Snyder, "A New Program for Agricultural Land Use Stabilization: The California Land Conservation Act of 1965," *Land Economics*, XLII (February, 1966), pp. 29-42.

the more likely is development to be occurring or imminent,²⁰ though the reverse may be true with respect to the average urbanized share of a given holding. Either way, large properties that happen to lag behind the pace of urbanization in their particular locality appear to stand out more conspicuously on the local landscape, and with possibly further-reaching effects,²¹ than holdings equally persistent but smaller and more dispersed.

EVALUATION AND APPLICATIONS

Large landholdings not only occupy an impressive extent of rural Southern California, but they may also be commended as type examples for some characteristics of the region, since they involve a wide range of physical sites, land uses, general locations, and kinds of ownership. More specifically, the group of properties two to five square miles in size appear to be regionally normal in the proportion of their cultivated land that is irrigated. Large properties are perhaps also representative in regard to frequency of holdings having mineral production and broad tendency for urbanization to increase with proximity to Los Angeles, since in both respects few differences were found among various property size groups, raising the possibility of equivalency also with properties of more normal size. In other ways, however, large landholdings seem to form a unique component of Southern California. Evidence from this study suggests that size of property may correlate positively with: (1) land grant origins and historic stability of ownership, (2) variety of natural and man-made landscapes and productive activities, (3) dominance of extensive over intensive agriculture for a given quality of land resource, (5) presence of urbanization, and (6) degree of agricultural persistence on properties where urbanization is commencing.

Because agriculture is the primary productive use of large properties, their study inevitably touches upon this segment of the Southern California economy and landscape. Some representative and some unique qualities of large holdings, agriculturally speaking, have already been suggested. Additionally, major properties may also deserve further attention because they frequently involve multiple operations based on having both irrigable and unirrigable segments, in contrast to the prevailing single-setting, single-system type of farm enterprise. Future studies of detailed agricultural operations on large ranches could profitably be done on a case basis; or

²⁰ The reasons, though unclear, seem unrelated to distance from Los Angeles, internal site qualities, or class of ownership. Superior access or various economic attributes of large units may be involved. In any event, the present observation counters an earlier implication (Steiner, *op. cit.*, p. 359) that larger rural holdings may inherently have more effective qualities of self-preservation than smaller properties. The opposite, in fact, can be true to the extent large holdings offer greater efficiencies to the developer or easier acquisition by him. The latter is suggested as a historically significant process by R. H. Allen, "The Spanish Land Grant System as an Influence in the Agricultural Development of California," *Agricultural History*, Vol. 9, (1935), p. 136.

²¹ The importance of persistent large rural landholdings goes beyond the immediate locale, in that would-be urbanization may thereby be directed into some distant sectors and precluded from others, as in the major case described by Richard Bigger et. al., *Metropolitan Coast*, (Los Angeles: Bureau of Governmental Research, University of California, 1958), pp. 68-69.

organized topically, they could clarify questions such as the difference between ownership units and operating units in this region.

The present study also sought to detect influences of the city upon its rural hinterland by comparing properties grouped according to location in successive ten-mile rings outward from Los Angeles, but no consistent gradients of property size, kinds of ownership, or agricultural land uses were observed. Partly, the locale was less than ideal for the purpose, due to its physical diversity. Also, a study area extending more than seventy miles out might have been more revealing, in spite of complications from overlapping hinterlands. On the other hand, many aspects of rural ownership and use may not usually be gradational outward from American cities, and thus the present study may have demonstrated some normative, rather than unique, qualities of rural Southern California, though adequate confirmation awaits inspection of other metropolitan hinterlands.

THE SOUTHERN LIMITS OF THE MOHAVE DESERT, CALIFORNIA

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Most geographers can locate the Mohave Desert with little or no difficulty; however, if asked to define its limits, particularly in relationship to the Colorado Desert on the south, most would find it difficult to do so. The purposes of this brief paper are to reassess the varying arguments for the southern limits of the Mohave Desert, to clarify the relationships between certain place names — e.g., the Great Basin, the Sonoran Desert, the Colorado Desert — and the Mohave, and to delimit in a series of maps the desert regions under discussion.

Brewer,¹ writing in 1889, included most of Southern California, with the exception of the Transverse and Peninsular Ranges and of that area immediate to the Colorado River, within what he designated as the "Great Basin" (Figure 1, Plate A). He described the area in these terms:

The Great Basin is the name popularly applied to a region of the Western United States lying between the Sierra Nevada and the Wasatch Mountains. It has no one single character which does not belong to some other portion of the globe, yet it constitutes the most distinctive geographical feature of the North American continent. It is an area of interior drainage, that is, none of the streams flow to the sea.

Fenneman,² in his organization of the physiographic divisions of the United States (Figure 1, Plate B), included Brewer's "Great Basin" within the "Basin and Range Province," which he described in 1931 as follows:

Topographically it [the Basin and Range Province] is distinguished by isolated, roughly parallel mountain ranges separated by desert basins, generally almost level. . . . Much of the area there has slopes on which water runs directly to the sea but it is too arid to supply continuous flow and considerable areas have no run-off at all.

The ostensible anomaly of Brewer's argument for internal drainage and Fenneman's for external drainage is more apparent than real; it is actually a function of the areas included in either delimitation.

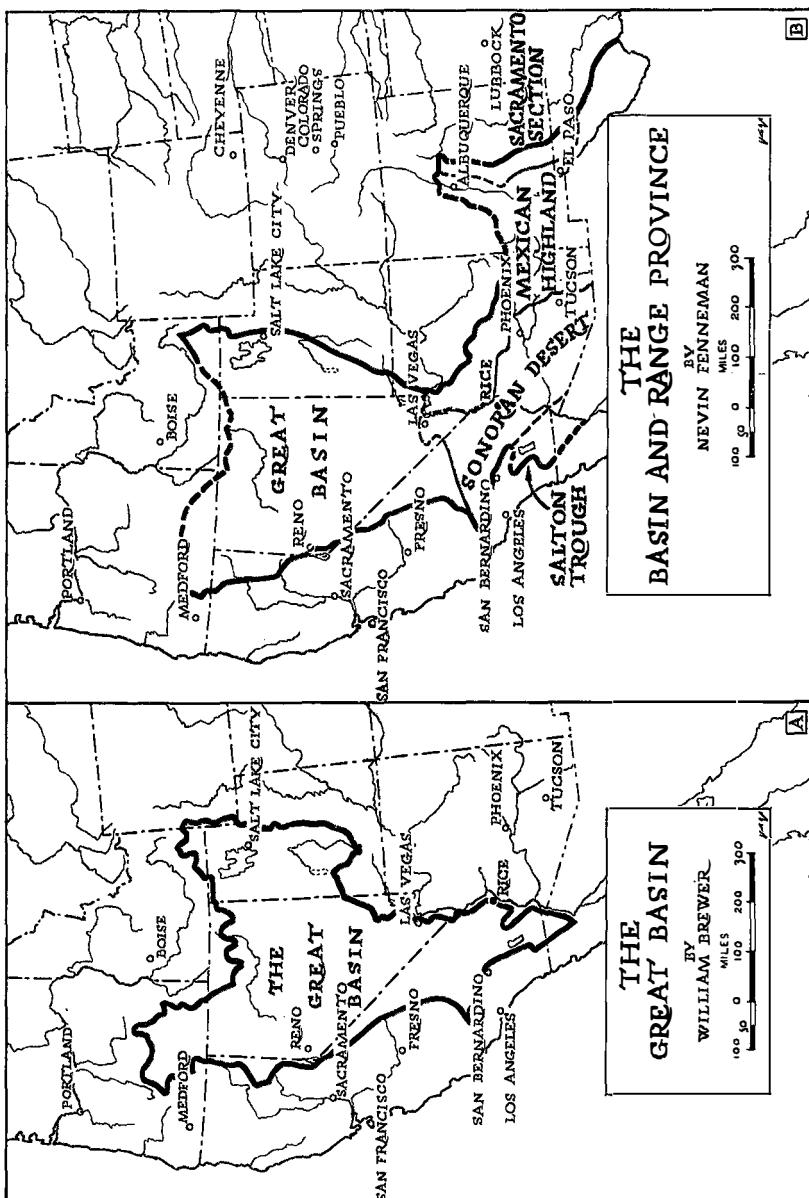
Fenneman's organization, later in time than that of Brewer, was based on a considerably greater body of geologic knowledge of the area and is, consequently, sharper in detail. He divided the Basin and Range Province into five sections (Figure 1, Plate B): the Great Basin, the Sonoran Desert, the Salton Trough, the Mexican Highland, and the Sacramento Section. Our discussion shall be limited to the Sonoran Desert section, which Fenneman³ defined as including the Gila Desert of southwestern Arizona and the

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¹ Wm. H. Brewer, "The Great Basin," *Bulletin of the American Geographical Society*, Vol. 21 (1889), p. 197.

² N. M. Fenneman, *Physiography of Western United States*, (New York, 1931), p. 326.

³ *Ibid.*, p. 367.



Mohave Desert of southeastern California, and which he distinguished from the other four sections of the province on the basis of the following criteria

In common with the Great Basin, this extensive area is characterized by basin ranges and intervening desert plains. In contrast, however, the altitude is lower, the ranges are smaller and occupy not more than a fifth of the area. Rock pediments are much more prevalent and undrained basins are less general.

An insignificant portion of the plain surface lies above 3,000 ft. and more than half of it is below 2,000. A large fraction lies between sea-level and the 1,000-ft. contour. In a very general way the level declines from all directions toward the Gulf of California.

At this point it is well to note that Fenneman's Salton Trough section has been variously described (Figure 2) by other scholars as the Colorado Desert. Blake,⁴ in a report to the Congress in the early 1850's, noted that the Colorado Desert

... extends from the base of Mount San Bernardino to the head of the Gulf of California and is separated from the coast-slope by the Peninsula Mountains. The limits of the plain on the north and northeast are determined by ranges of mountains which extend from San Bernardino Mountain to the mount of the Gila and beyond into Sonora.

This view was restated by Orcutt⁵ in 1890, Barrows⁶ in 1900, Cecil-Stephens⁷ in 1901, and Cockerell⁸ in 1945. Cecil-Stephens' delimitation of the eastern boundary of the Colorado Desert is somewhat more sharply drawn⁹ than those of other scholars; he delimits it from "... a spur of the Sierra Madre, which runs south-easterly about 180 miles to the Colorado River, at an average altitude of 4,000 feet." Jaeger¹⁰ suggested that the Colorado Desert encompasses not only the Salton Trough (of Fenneman's classification) but also that segment of the Sonoran Desert which Fenneman refers to as the Mohave Desert sub-section of the Sonoran Desert. He further argued that

The Colorado Desert includes not only the area immediately contiguous to the Colorado River but also the Salton Basin and the rather low-lying bordering areas which drain into the Salton Sink. This agrees well with the conception of W. P. Blake, who first gave the Colorado Desert its name in 1853. From the biological standpoint the northern limit of the Colorado Desert may be arbitrarily placed as far north as a line drawn from the Morongo Pass [i.e., between the San Bernardino and the Little San Bernardino mountains] easterly to the Colorado River.

Thus far we have shown that Fenneman's Salton Trough may be termed the Colorado Desert and that, whatever the name, this area is used

⁴ Wm. P. Blake, in *Exploration and Surveys for Pacific Railroads in 1853-54*, House Exec. Doc. 91, 33rd Congress, 2nd Session, (Washington, D. C., 1855), Vol. 5, Pt. 2, California Route, p. 228.

⁵ Charles R. Orcutt, "The Colorado Desert," *Annual Report of the Calif. Mining Bureau*, Vol. 10 (1890), p. 899.

⁶ David P. Barrows, "The Colorado Desert," *National Geographic Magazine*, Vol. 11 (1900), p. 340.

⁷ B. A. Cecil-Stephens, "The Colorado Desert and Its Recent Flooding," *Bulletin of the American Geographical Society*, Vol. 23 (1901), p. 367.

⁸ Theodore D. A. Cockerell, "The Colorado Desert, Its Origin and Biota," *Transactions of the Kansas Academy of Science*, Vol. 48 (1945), p. 3.

⁹ Cecil-Stephens, *op. cit.*, p. 367.

¹⁰ Edmond C. Jaeger, *The California Deserts*, (Stanford, 1955), pp. 3-4.

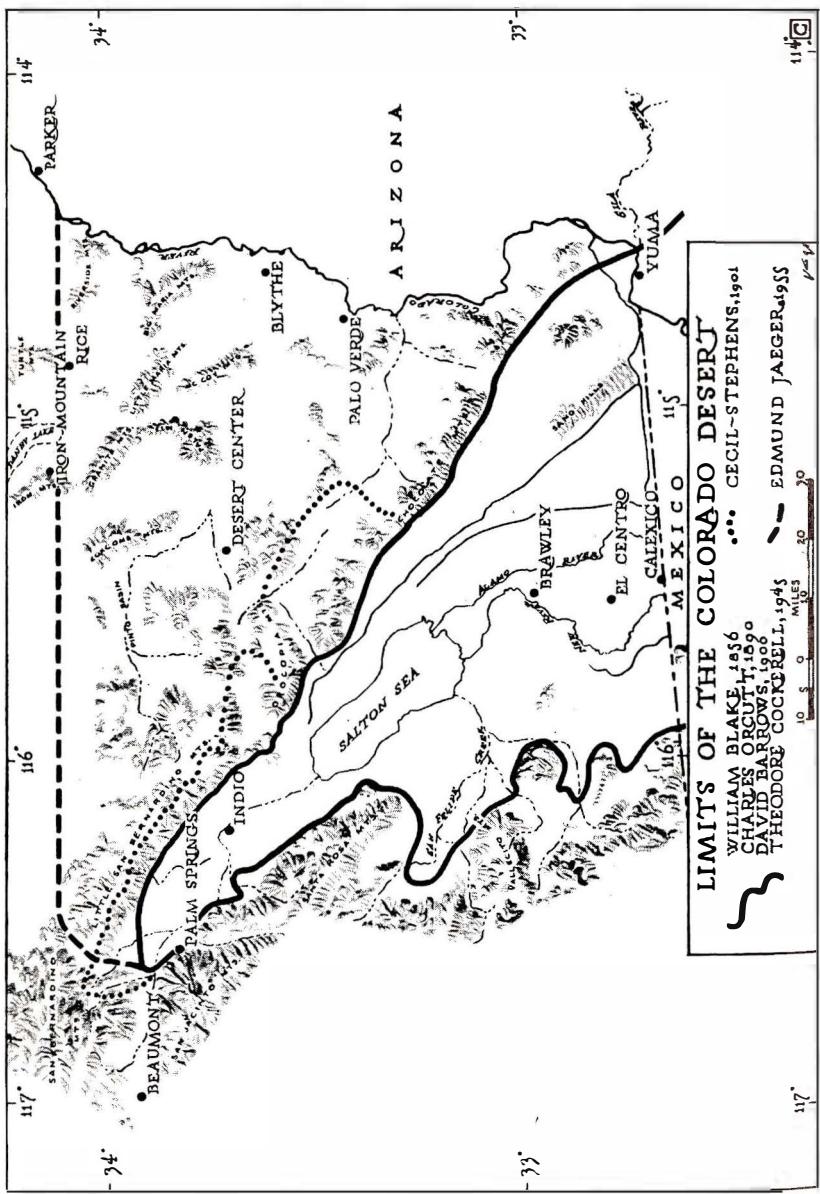


Figure 2

by Fenneman to represent the southwestern boundary of the Sonoran Desert section.

Other scholars, however, have not been able to clearly define the southwestern boundary of the Sonoran Desert (*i.e.*, Mohave Desert) (Figure 3). For example, Loew,¹¹ in 1876, delimited the Mohave Desert as "... comprising southeastern California and the southwestern corner of Mexico. Lower California, although a portion of Mexico, belongs geographically to the Mohave Desert." He included to the Salton Trough (or Colorado Desert) within the Mohave Desert. Baker,¹² writing in 1911, asserted that

The Mohave Desert Region comprises the extreme southwestern portion of the Great Basin. It lies entirely within the State of California and includes within its limits portions of the four counties of San Bernardino, Inyo, Kern and Los Angeles. Its boundaries on the northwest are the Tehachapi Range; on the southwest are Sawmill Mountain, Liebre Mountain, the Sierra Pelona, with their southeastern continuation to the head of the Santa Clara River, and the San Gabriel Range; on the south are the San Bernardino Range and the Colorado Desert; on the southeast the natural boundary is the divide between the drainage tributary of the Gulf of California and interior drainage of the Great Basin.

Another delimitation of the Mohave Desert was provided by Abrams¹³ who noted that it

... extends from the eastern base of the Sierra Nevada eastward through the Death valley region to the Virgin River Valley, in the extreme southwestern part of Utah and the northwest corner of Arizona. To the southward it spreads over the great barren wastes of the desert slopes of the San Bernardino Mountains and their eastern spur, the Chuckawalla Mountains.

In 1929, Thompson¹⁴ expanded upon Abrams' nomenclature, to wit:

It is desirable ... to have a term by which the entire region ... can be designated. For convenience, therefore, the term "Mohave Desert Region" is used as applying to the entire region [*i.e.*, as far south as the 34th parallel] ... except the settled region south of the San Gabriel and San Bernardino Mountains.

A few years later Gale¹⁵ produced a relief map on which physiographic regions of California were shown. Therein the Mohave Desert included that portion of California south of the Garlock fault, north of the San Andreas fault, and north of the East Mesa of the Imperial Valley (southern edge of the Little San Bernardino and Chocolate Mountains):

¹¹ Oscar Loew, "Report of the Physical and Agricultural Features of Southern California and Especially of the Mohave Desert," *U. S. Geographical Surveys West of the 100th Meridian*, (Wheeler), *Annual Report for 1876* (Washington, D. C. 1876), Appendix H, pp. 216-218.

¹² Charles L. Baker, "Notes on the Later Cenozoic History of the Mojave Desert Region in Southeastern California," *University of California Bulletin of the Department of Geological Science*, Vol. 6 (1911), p. 335.

¹³ Leroy Abrams, *The Deserts and Desert Floras of the West: Nature and Science of the Pacific Coast*, Pacific Coast Committee of the AAAS (1915), p. 172 as quoted by David G. Thompson, *The Mohave Desert Region, California; Geographic, Geologic, and Hydrologic Reconnaissance*, U. S. G. S. Water-Supply Paper 578 (Washington, 1929), p. 5.

¹⁴ Thompson, *op. cit.*, p. 6.

¹⁵ Hoyt S. Gale, "Southern California," *15th Guidebook*, 16th International Geological Congress, (1933), p. 1.

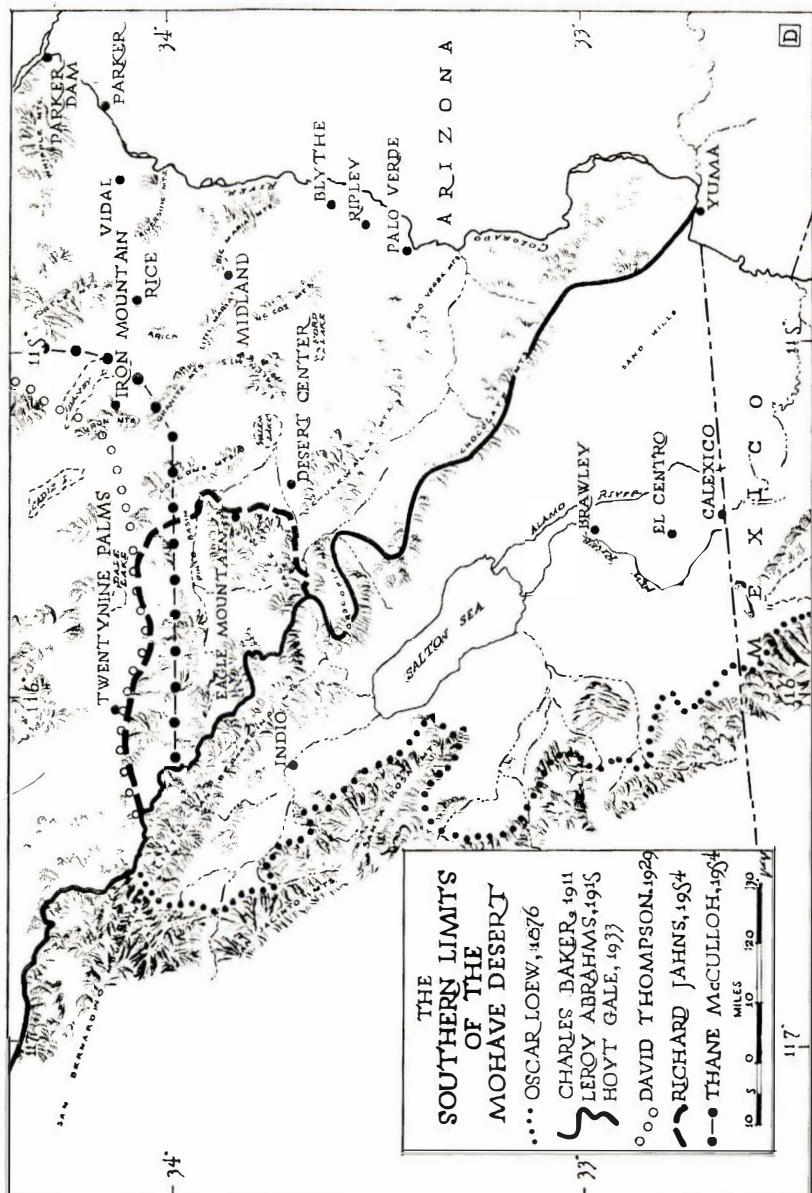


Figure 3

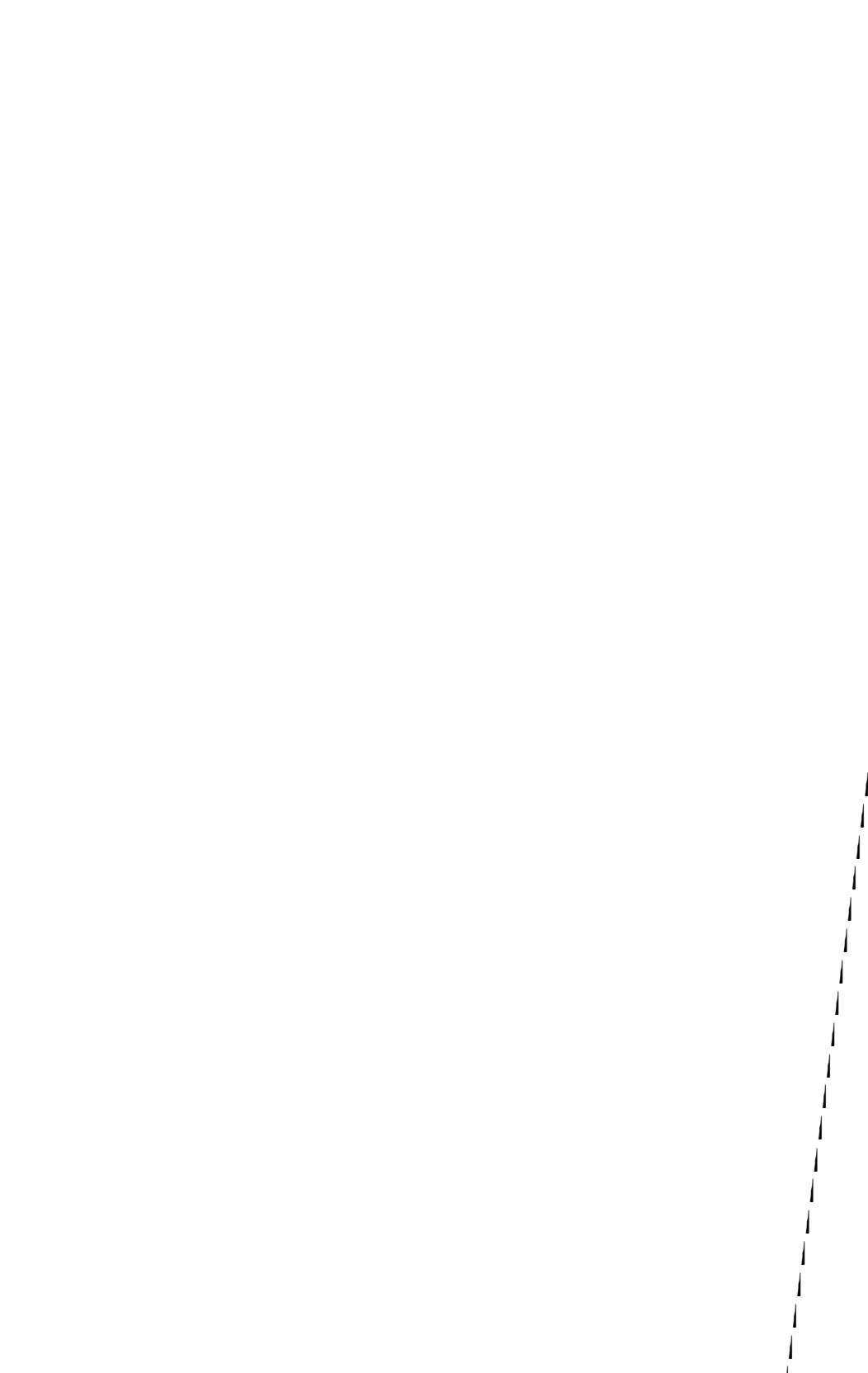
In more recent years three scholars in a symposium study of Southern California attempted delimitations of the desert region. Hewett¹⁶ delimited the Mohave in its southwestern portion by the San Andreas fault, but did not attempt to define the southeastern boundary. Jahns,¹⁷ in the fashion of Gale, distinguished between the Colorado Desert and the Mohave on the basis of the southern edge of the Little San Bernardino-Chocolate Mountains line. By means of a line roughly corresponding to the 115th meridian and the 34th parallel, McCulloch¹⁸ delimited, respectively, the eastern and southern bounds of the Mohave Desert.

After nearly a century of inquiry there is still little unanimity of opinion. Two boundary lines continue to be argued as representing the southern extent of the Mohave Desert subsection of Fenneman's Sonoran Desert section: 1) along the 34th parallel, and 2) along the southern face of the Little San Bernardino and Chocolate Mountains. In contrast, there seems to be more agreement that the Little San Bernardino-Chocolate Mountains line sets the northern limit of the Colorado Desert.

¹⁶ D. F. Hewett, "General Geology of the Mohave Desert Region, California," in *Geology of Southern California*, edited by R. H. Jahns, Division of Mines, Bulletin 170 (Sacramento, 1954), Chapter II, p. 5.

¹⁷ R. H. Jahns, "Investigations and Problems of Southern California Geology," *Ibid.*, Chapter I, pp. 10-11.

¹⁸ T. H. McCulloch, "Problems of the Metamorphic and Igneous Rocks of the Mohave Desert," *Ibid.*, Chapter VII, p. 6.



THE ROLE OF THE STATE IN THE MODERNIZATION OF RURAL AREAS: A Case Study From New Zealand's Northern Province*

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In all nations surrounding the Pacific Basin there are areas in which the levels of living lag significantly behind the nation as a whole. Such areas are not restricted to developing nations. In fact, the level of living is more disparate and the people psychologically more frustrated in developed nations. Normally, they are agricultural regions, although there are instances where the decline of mineral exploitation is partially responsible for the mal-adjustment between population and resources. In these stranded areas, the people are incapable or unwilling to adjust to changing economic conditions. A sense of hopelessness pervades, which blights the progress of all. Changes must be motivated from beyond the region, and in democratic societies it is the state which generally accepts this role.

The state recognizes that the market process is biased; it rewards the proficient at the expense of the inefficient. Yet people are equal, and for this reason, people in economically stranded regions warrant special assistance programs so as to enable them to raise their level of productivity and to participate as equals in the nation's economy. The state, therefore, acts as an intermediary between the inequality of the market process and the principle of personal equality.

A wide range of direct and indirect political programs are used to assist development of economically stranded, or what I prefer to call marginal, areas. Some programs are nation-wide, whereas others apply specifically to the marginal area.

This article examines the contribution of the state to the modernization of a rural area in northern New Zealand. Principal programs are analyzed

*This paper was read as part of the symposium: "Modernization of Rural Areas," Eleventh Pacific Science Congress, Tokyo, Japan, August 25, 1966.

**It is appropriate that I should contribute thoughts on political influence in geographical change in a *Festschrift* in honor of Clifford M. Zierer, as it was Dr. Zierer who first drew my attention to the influence of politics on the process of environmental change. I well remember that day in the hallway of Haines Hall when he commented upon my field project for my doctoral qualifying examination by saying "Sound techniques and description, but you failed to appreciate the influence of the political boundary between Los Angeles City and Los Angeles County." This boundary passed through the center of the study area in the San Fernando Valley and explained much of the variation in the agricultural landscape. It was a valuable lesson, for, with subsequent nurture about the coffee-pot-cultural-center at UCLA, I have become increasingly interested in political influences as a process of environmental change. [Dr. Fielding's dissertation dealt with *Dairying in the Los Angeles Milkshed: Factors Affecting Character and Location*, (U.C.L.A., 1961)]. Clifford Zierer's pioneer contributions to the geography of cities in this region, his years of teaching Pacific courses and his efforts to ensure that the UCLA Library become a repository for South Pacific publications, have provided fellow geographers and students with a better appreciation of this region.

LAND DEVELOPMENT 1965

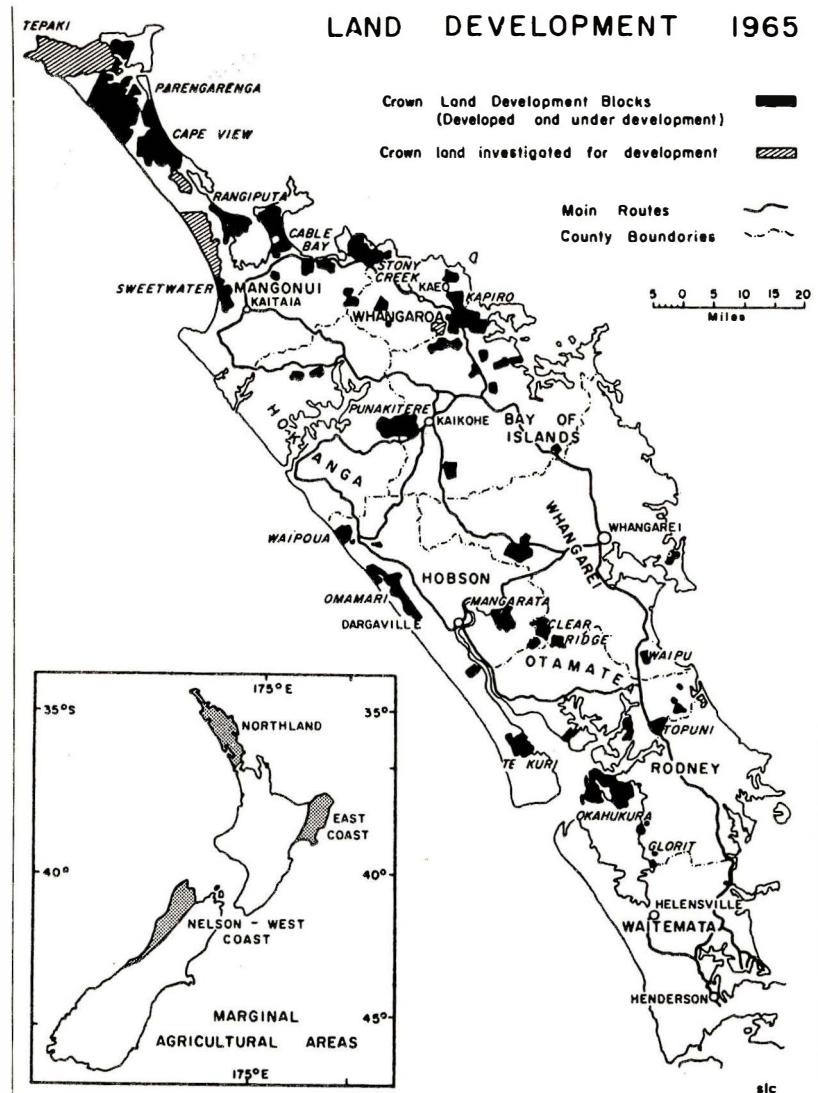


Figure 1. Study Case from New Zealand, Northern Province

and a hypothesis is advanced which outlines a preferred organization for regional planning and development.

Analyzing the role of the state in agricultural change is complicated by the varying motives involved. Superficially it is an economic problem: that is, improving the level of living of farm operators and increasing regional and national output. However, political action is frequently motivated by the prospect of increased political influence in economically marginal but politically influential areas. For this reason political, rather than economic, solutions are sought, although in the public presentation of policy, economic values are emphasized. Failure to accomplish economic goals is not uncommon nor unexpected, for the state is both operating in areas where private investors are unwilling to participate, and with objectives which are not exclusively economic. For this reason, it behoves social scientists concerned with the role of the state in economic development to evaluate programs so as to provide society with reliable assessments of the alternatives.

Recognition of the political motive in programs for the redevelopment of marginal farming regions is essential. Most uneconomic farms are in marginal regions, for in the more productive regions, normal market procedures result in the absorption of uneconomic units by more efficient operators. But, in the short run and from a national point of view, greater return from capital could be achieved on investment for the further improvement of farms in the most productive districts, rather than in marginal areas. In the long run, capital improvements ancillary to, yet necessary for, the development of agriculture in marginal areas can be amortized. The time period is not short. For this reason, investment in redevelopment of marginal areas must be recognized as a social, as well as an economic, investment. This complicates the use of rational methods of economic evaluation unless the social necessity for assisting these regions is recognized.

NORTHLAND EXAMPLE

There are three marginal agricultural regions in New Zealand: Northland, East Coast and the Nelson-West Coast (Figure 1). Each is somewhat isolated, both physically and in terms of communication from the centers of economic activity. Out-migration has been a feature of each, and all three have had special programs of economic assistance developed for them. For our present purposes either Northland or the East Coast would provide a suitable example. In both, farmers operate within the constraints of a difficult physical environment, both have a long history of agricultural development which has known more prosperous periods, and both have a higher proportion of Maori land and Maori farmers than the national average.

Northland was chosen because of the writers better acquaintance with the area and because of the promise it holds as a pastoral farming region. A promise which has begun to be realized, due in part to the assistance provided by the state.

Farming in Northland is a difficult, frequently frustrating enterprise. Each farmer has to manage a range of problem soils, frequently of low inherent fertility. Summer droughts are common, and in plagues of crickets, army worms, and grass grubs ravage pastures. In addition to the physical and biological burdens, there are economic and social problems. Distance

and poor access, especially in the far northern counties, increase the cost of marketing produce. Relative isolation has also retarded the diffusion of progressive farm management techniques common in other farming areas. For example, only sixty per cent of the cultivated area is top-dressed and a much smaller proportion receives an annual application. Even in the latter case, the amount applied is seldom sufficient.

Lack of capital is the primary obstacle to a more effective utilization of land resources. The change from farming as a way of life to farming as a business operation can only be achieved through the adoption of new techniques and the use of mechanical aids in the place of labor. Capital reserves, so essential for such change, are seldom accumulated in the semi-subsistence way of farm life which prevails. Normal lending institutions are unwilling to loan money to farmers without considerable collateral, because of the uncertainty of agricultural returns. In addition, some of the most ambitious farmers are inexperienced. Many have come to farming from other employment and with little capital. They have chosen land in Northland because of its lower cost and with no foresight of the difficulties involved in local land development. They are willing workers but need constant supervision and budget advice if they are to complete a development plan successfully. Banks, insurance companies, stock and station agents and even the State Advances Corporation are unwilling to provide either the capital or the supervision required.

A measure of the agricultural problems in Northland is provided by the number of uneconomic farming units. The Department of Agriculture's Survey of *North Auckland Dairy Farms* in 1962 showed that 40 per cent of the 5400 farms supplying factories produced less than 10,000 pounds of butter-fat. As the average net income of farms producing from 10,000 to 12,000 pounds butter-fat was estimated at \$2,000, it is clear that several hundred Northland farms are yielding their owners incomes far below that acceptable to most New Zealanders. A study is currently in progress (1966) surveying sheep farms in Northland and provisional results indicate that approximately one-fourth of these farms are also uneconomic. As a conservative estimate, then, it is probable that one-third of the 10,000 farms in the region are uneconomic.

Northland's economic lag is due to a paucity of social and economic investment rather than the result of the niggardly physical environment. True, problem soils and insect and fungal pest create seasonal depredations, but the scientific knowledge and the mechanical and managerial methods to overcome practically all of these problems are available. The critical deficit is the low level of managerial ability displayed by most farmers. They cannot effectively utilize the techniques available to them, and because of the low level of achievement they do not possess the financial resources to provide security for farm redevelopment borrowing once they recognize the advantage of new methods.

The climate with its regular rain, humidity, warmth and minimum of frost, is ideally suited for pasture production given the knowledge to combat environmental problems. It, is, in fact, possible to produce a greater volume of dry matter per acre from pasture in this region than elsewhere in the nation. And since New Zealand's agriculture in the foreseeable future will con-

tinue to rest on the productivity of pasture grasses, this is a resource of paramount importance for regional development.

In addition to pastureland capable of improvement there are extensive areas of idle, scrub-covered land suited to development on adjoining and within existing farms. The *National Resources Survey* estimates that there are more than one million acres capable of development north of Rodney County.¹ In a more detailed study of Mangonui County, Murray indicates that 173,000 acres presently idle could be developed.² More than half this acreage is within existing holdings. On the average, the grassed area of holdings constitutes only one-half of the total area.

For a century the agricultural advantages of Northland have been largely ignored. Early pioneers lacked the knowledge to cope with the difficult environment. Many enterprises failed, and the undeserved reputation of a poor agricultural region has persisted. Despite this history, agriculture is the basic resource of the region, and the whole economy reflects the state of agricultural development — marginal with considerable untapped resources.

Out-migration of people and comparatively low per capita incomes have resulted from the failure to develop regional resources. Local commercial leaders recognized the influence of this condition upon their investments and have on various occasions petitioned the government for assistance to agriculture. The government faced three alternatives: 1) they could do nothing and aid the resettlement of migrants in areas of rapid economic development, 2) they could encourage economic activities other than agriculture, or 3) they could assist the development of agriculture. All three alternatives have been practiced, but in this discussion we are concerned with only the latter.

The government's participation in agricultural development has been justified on economic grounds. However, its intervention has been precipitated by the wish to placate local leaders and to strengthen electoral power rather than to merely improve the regional and national economy. Any evaluation of the program needs to be mindful of this motive.

For this reason no comprehensive program of regional agricultural development in Northland has been introduced although such programs have been proposed.³ Instead of a rational program, the state has preferred to modify well tested programs of direct and indirect assistance to land development and to encourage their application in Northland through budgetary control. They have followed an incremental approach to policy making and planning as outlined by Lindblom rather than the rational approach presented by Banfield.⁴ And because the motives were more political

¹ Ministry of Works, Town and Country Planning Branch, *National Resources Survey, Part III, Northland Region*, (Wellington, 1964), p. 71.

² I. D. Murray, *State Impact on Land Development in Mangonui County*, (Unpublished M. A. thesis, University of Auckland, 1964). The calculations exclude land within state development blocks.

³ Wilfred Candler, "Can We Avoid Rural Slums in Northland?" *New Zealand Farmer*, July 5, 1962, p. 5.

⁴ Charles E. Lindblom, "The Science of 'Muddling Through,'" *Public Admin. Rev.*, Vol. 29, No. 2, (1959), pp. 78-88; E. C. Banfield, "Ends and Means in Planning," in S. Mailick and E. H. Van Ness (Eds.) *Concepts and Issues in Administrative Behavior*, (Englewood Cliffs: Prentice-Hall, 1962), pp. 70-80.

than economic the state has preferred indirect rather than direct programs of agricultural development; that is, through financial incentives they have preferred to encourage farmers to carry out development programs rather than allow state agencies to participate. The one exception is in the development of problem land where the costs of development and the length of time before satisfactory returns can be achieved precluded most individual investors.⁵

It is the writer's belief that it matters little whether direct or indirect assistance is used. The critical factor underlying the relative success of programs for improving the agricultural economy is whether or not the program is controlled within the marginal region. Centralized control of economic development, at least in the New Zealand experience is unsatisfactory.

Accordingly, this paper advances the thesis that *the most efficient way for the state to revitalize the economy of a marginal area is to organize assistance through a local redevelopment authority.* The various programs utilized in Northland will be considered in relation to this statement.

A regional authority for rural development requires a nominated board and a permanent technical advisory staff. Its purpose should be to coordinate the resources provided by the state and utilize them in a flexible manner to encourage individuals to improve their level of attainment. Such an organization should be controlled by persons appointed because of their familiarity with local problems and staffed by those capable of evaluating the costs and benefits of alternative approaches, as well as feasibility of an individual benefitting from state assistance.

The key to the modernization of rural areas is to obtain the cooperation of the man operating the land. Unless he is willing to cooperate, no amount of incentive the state provides will be effective in inducing farmers to increase output and raise levels of living. And farmers, as diffusion theory has demonstrated, are unwilling innovators. They seldom take the advice freely given by specialists. Local opinion leaders among the farmers are much more influential in implementing change. Therefore, it is a wise strategy which involves local opinion leaders in the policy-making structure. Also, there are some farmers who are not capable of raising levels of output. They are frequently trapped on their farms by overwhelmingly burden of debt but without the skill to engage in any other enterprise. They are equipped neither socially nor psychologically for the responsibilities of independent management. A local development authority can usually identify such persons, and if a flexible approach to problem-solving is allowed, subsidized migration and vocational redirection is probably the best solution. Centralized planning tends to overlook the individual. When he is inefficient he is kept on the land with costly subsidies. When he is efficient he is frustrated by regulations and an inflexible approach to his particular requirements.

A development authority of the type here outlined does not exist in Northland. However, some of the assistance programs introduced do pro-

⁵ An alternative would have been to encourage land companies to undertake development. However, the philosophy of 'one man, one farm' has been strong in New Zealand, and progressive land and income taxes discriminate against large holdings. Contemporary opinion is more favorable to such land enterprises although the deterrent taxes remain.

vide for a measure of local control, and it is upon the writer's evaluation of these programs that the thesis is based. They appear to have been more successful in remedying agricultural problems, and they probably would have been even more so had a multiple aid strategy been possible, involving all, or part of, the wide range of state assistance programs available.

The various state assistance programs are discussed under two headings: those which are coordinated at the local level and those which are not. They are presented more from the point of view of clarifying the thesis rather than of documentation.

DECENTRALIZED ASSISTANCE PROGRAMS

Decentralized programs operate with funds allocated on an areal basis by the state treasury. Use of the funds within a particular area is left to local administrators who function within broad constraints set by the state. Three programs are operated in this manner: marginal lands assistance, development of problem lands, and agricultural research. Only marginal land assistance has an appointed regional board of control of the type outlined in the thesis statement. The other two are directed by state departments. However, in both instances a higher degree of regional autonomy exists.

Under the Marginal Land Act of 1950 the state introduced the principle of lending capital to farmers willing to further develop their properties, but who had hitherto been handicapped by lack of finance.⁶ Interest is slightly below the prevailing rate. The principal advantage is that loans are granted to those who have the physical and human capacity for increasing production but lack the financial collateral. It is a condition that applicants must have previously refused assistance from normal lending institutions. Their application is carefully examined by an appointed board consisting of local farmers and financial and agricultural advisors. The board is primarily concerned with the ability of the individual and the feasibility of the development proposal. Their primary purpose is to ascertain whether the applicant, aside from current mortgage commitments, is capable of successfully completing the development plan. Emphasis is upon an evaluation of the personal capability of the applicant by a committee conversant with local conditions. In economic planning usually the personal factor is overlooked by political agencies, yet it is the key to infusing vitality into a depressed agricultural region. And for an area like Northland, where lending institutions have been cautious in farm investment because of the many local problems associated with agriculture, the shift of emphasis from land to man is significant.

The results of the program in Northland have been commendable. Between 1951 and 1963, 4.75 million dollars have been loaned to 325 farmers. In addition to the buildings constructed, loans have enabled the sowing of 30,000 acres of new grass and the rotation of 19,000 acres. In numerous instances carrying capacities of properties assisted have doubled and production trebled. And what is more important, the social fabric has been transformed in those areas where farmers have taken advantage of the

⁶ Gordon J. Fielding, "State Assisted Private Land Development in Northland," *Proceedings Fourth New Zealand Geographers Conference*, (Dunedin, 1965), pp. 113-120.

scheme. Faith in a profitable agricultural enterprise has been restored in areas where many had come to accept a semi-subsistence way of life. As agriculture is the primary economic base of the region, this spirit has been infused into the whole society.

The Northland region is organized into three districts for supervision of the Act. Each district has its advisory committee consisting of experienced farmers from the area together with agricultural specialists. Members selected from each district committee constitute the regional advisory board. Before considering a loan application the district committee visits the applicant's farm and assesses the feasibility of the development program and the likelihood of the applicant completing the program. The committees realize that, although the physical elements present many difficulties in this region, it is the human element which currently obstructs optimum development. Whenever they discover individuals who have the necessary capacity and energy to complete a development scheme, then they have the power to recommend loans which were not available from normal lending institutions at comparable rates of interest.

In many cases committees have found the farmer requesting assistance incapable of completing the development proposal. Either the farm unit is too small to be efficient or the land is unsuited to more intensive pastoral farming. In other instances the individual has been incompetent. Unfortunately the committee can do little to assist men in such plight. For this reason it is recommended that regional authorities should be established on a basis similar to those constituted for marginal lands assistance, but they should be able to coordinate the various state assistance programs rather than be restricted to a single program. They could then recommend a wider range of alternatives: use of the land for forestry rather than farming, enlargement of the property through purchase of additional land, or the subsidization of the farmer out of agricultural enterprise all warrant consideration for specific cases.

A recommendation of this nature recognizes the limited scope of a government in a democratic society to strengthen the economy of a marginal area through direct action. The government must work through the existing landowners by providing incentives for them to effect the necessary changes. Its approach must be indirect. Subsidies could be used to supplement rural income. However, this does not solve the problem of incorporating the region as a viable element in the national economy. Direct intervention is, of course, necessary where private enterprise will not or cannot undertake the task of development. The development of problem land is one such instance.

DEVELOPMENT OF PROBLEM AREAS

By the early 1930's most of the attractive land in New Zealand had been alienated. Only the difficult land remained unoccupied, and most of this was either Crown or Maori land. And yet, as a comparatively young, post-colonial nation, the pioneer spirit was strong. Men wanted land, but as Bowman stated in his classic work, "Men hunger for land only when they can get it under favorable conditions."⁷ The state recognized the desire, for

⁷ I. Bowman, *The Pioneer Fringe*, Special Publication No. 13, (New York: American Geographical Society, 1931), p. 33.

it enacted, in 1929, the Land Laws Amendment Act which provided for expenditure of funds in order to develop Crown Land for settlement. Development of Maori Land was authorized by a separate act, and until recently this development has proceeded in similar manner although under different departmental control. Both programs are now controlled by the Lands and Survey Department.

Because the costs involved in the development of the problem land and the length of time before satisfactory returns could be achieved, individuals were unwilling to undertake development. The state recognized the need for developing the land and was willing to sustain the cost. However, through economies achieved by a large-scale operation, the application of the most recent scientific achievements, and sound management of the program at the district level, the state has been able to develop and settle such land at no cost to the taxpayer.

Although the program is administered by the Lands and Survey Department, the principle of regional independence is fostered. Each district supervisor of land development is encouraged to use financial resources in a flexible manner so as to overcome the special development of each block of land. Four categories of land in Northland resisted earlier attempts at settlement: 1) the dug-over gumlands 2) the ironstone lands with impermeable soils 3) the steep hill country, and 4) the recently stabilized sand dunes. These land types differ from the land developed under the same program in central North Island and in Southland. In addition, each type exhibits considerable variety within the region. Without regional independence and encouragement of a flexible development program on each block, the program would not have been as successful. The development of Maori Land, which until recently was controlled by the Maori Affairs Department, suffered as a result of inflexible management policies. Its achievements were limited. Admittedly, in the development of Maori Land special tenure problems were encountered which have not bothered developers of Crown Land.

Although the state land development program was authorized in 1929, little was achieved between 1930 and 1950 in Northland and, in fact, in the entire dominion. The Great Depression curtailed developmental finance, and essential material was not available during the war. Available finance was used for the subdivision and improvement of estates for closer settlement. Development of unimproved and seriously reverted land in Northland was delayed until after 1950. Including the land settled through the subdivision of estates, 435 farmers were settled on 104,579 acres of land between 1941 and 1965. Some 236,521 acres are currently under development, of which 185,885 are for general settlement and 50,636 are being developed for the Maori Affairs Department. The current policy is to grass an additional 10,000 acres annually in Northland. Development areas are scattered in relatively small blocks throughout the entire peninsula (Figure 1). The exception is the 72,000 acres under development in the northernmost peninsulas of Mangonui County.

Large-scale and capital-intensive methods are used to develop the problem land. Development begins with the clearing of secondary growth

by fire and/or mechanical means. Where feasible the land is cultivated before sowing, but where the land is steep, fertilizer and grass seed are spread by aeroplane onto an ash seed-bed. Intensive stocking with beef cattle for short periods is practiced in the initial stages of pasture establishment. As the pasture is consolidated, the vestiges of secondary growth are removed by hungry animals.

The initial stages of development — clearing, pasture sowing, and elimination of undesired vegetation — can be accomplished within two years. The gradual build-up of fertility by annual applications of fertilizer and skilled stock and pasture management is a longer operation. Five to eight years may be necessary. Only when the land is capable of supporting a high level of production are the blocks subdivided and buildings erected for settlement of individual farmers.

The costs of development are not low, although the state is able to develop and sell the land without a loss. In Northland the estimated gross development cost per acre is \$115 for sheep farms and \$180 for dairy.⁸ Disposal price of farms is \$84 per acre for sheep properties and \$160 for dairy. The difference, together with interest at the rate of four per cent on the capital invested, is recovered from farming profits during the development stage.

By converting idle land into farms the state is able to increase the productive capacity of the region and the costs amortized by the project itself. In addition, land is available for those who desire it and have the necessary skill to utilize it profitably. Agricultural contractors share in the development project, and the local community benefits from increased demands for farm inputs and services.

The program for the development of Maori Land closely resembles that already described. In the development stage a longer period of operation by the state is usual. This further reduces the disposal cost, so that Maori farmers, who in general have less capital, are able to enter farming without undue financial burden. Occupiers are generally selected from the tribe owning the land, but, as Ishida has shown, the level of achievement is higher where occupiers are selected from a wider area.⁹

In general, land development by the state in Northland has been successful. This success has in no small measure been due to the flexible management policy under which the program has operated. The program was neither new nor specifically adapted to Northland. It has utilized a long established state function which has proved successful in other areas.¹⁰

Stock and equipment losses have at times been embarrassing, for they are publically linked with the likelihood of lax management in state operated enterprise, although similar losses are not unknown, albeit seldom advertised, in company operations.

⁸ V. P. McGlone, "The Cost of Bringing in Land," *Industrial Development Conference, Background Paper II*, (Wellington, 1966).

⁹ Hiroshi Ishida, *A Geography of Contemporary Maori Agriculture*, (Unpublished Ph.D. dissertation, University of Auckland, 1966).

¹⁰ R. G. Ward, "Land Development in the Taupo Country," *New Zealand Geographer*, Vol. 12, No. 2 (1956), pp. 115-132; L. Symons, "Land Development in Southland," *Ibid.*, Vol. 17, No. 1, (1961), pp. 87-93.

One failure has been the shortsightedness of the settlement policy. Because of the government's desire to involve as many settlers as possible in the benefits of the developments, blocks have been subdivided into minimum-sized family units. As farming techniques have improved farmers have not had sufficient land to fully benefit from labor-saving devices. Faced with stable returns, but increasing costs, many farmers have unwise-ly increased their indebtedness through borrowing. Properties become hopelessly encumbered and their owners disillusioned and stranded without full-time productive employment on their properties.

Apart for some noticeable exceptions, productivity per acre on settled areas is lower than that on adjoining development blocks. The primary reason is the failure of settlers to apply adequate annual dressings of artificial fertilizer — the key to grassland farming on the impoverished Northland soils. Fertilizers and pesticides tend to be the first items of the farm budget curtailed, when they ought to be the last. And if they should apply the fertilizer and the season is favorable, new settlers seldom have the re-sources to enable them to increase stock capacity in order to capitalize on the grass growth before it is wasted. Capital and superior management ability are scarce resources in Northland. The state development blocks have them, but few settlers possess either and many lack both.

Recognition of the paucity of managerial ability and of its primary role in a difficult-to-farm sub-tropical environment has resulted in the recommendation that the blocks be operated as large-scale company farms. Individuals would contract to perform certain services, but capital and management could be coordinated by central decision-making. Such recommendations come from those primarily concerned with the urgent need to increase agricultural production in New Zealand. The evidence tends to support their assertions. However, it is necessary to recognize the motive for government participation in land development: that is, to meet the demand for land for settlement at a reasonable cost and to stabilize the population in marginal areas. These motives could be satisfied by company operation, although it would necessitate a change of social and political opinion before it would be recognized by a wise politician.

In a sense I am asserting that votes count more than butter and mutton to the politician. This is a contentious argument in political economy and relates to the question as to whether governments should or should not participate in economic transactions when their decisions are made on a political rather than exclusively economic basis.

Another criticism of the land development policy stems from the claim that the funds allocated to the development of problem land could have been more profitably utilized in established districts: that there is an opportunity cost involved. Even in the most productive areas, farms are operated at well below their productive capacity. There is considerable lag in the diffusion of recent innovations, and farmers as entrepreneurs aim for satisfactory rather than optimal returns. It is asserted that capital allocated to fostering the adoption of improved techniques and more intensive use of the re-sources in established agricultural regions would have produced higher returns than are achieved through allocating similar amounts to the de-velopment of problem land. At least fifty per cent of the development cost

in new areas is for housing and road construction. A much lower proportion would be required in an established region.

Comprehensive regional development planning could permit flexible allocation of resources between developing and developed areas. As it is, substitution is virtually impossible because of the different organizational control. Frequently redevelopment assistance under marginal lands assistance is refused solely on the basis of the small size of the enterprise. The individual applicant would be ideally suited for a state developed farm. However, because of institution controls, he is seldom eligible. Another problem is the uncritical allocation of finances by the state treasury to different programs in terms of short run benefits rather than long term regional improvement policy. Obstacles to development of this kind need to be overcome if marginal areas are to be integrated as self-reliant contributors to the national economy.

RESEARCH

Agricultural research is another area where conspicuous success has been achieved through allowing a regional program to evolve. To the pastoralist the sub-tropical environment of Northland presents problems somewhat different from those occurring elsewhere in the dominion. Research into such problems has not only been more fruitful when undertaken within the region, but also has aided in the diffusion of findings.

Nevertheless, most of the research which is relevant to Northland is conducted at research stations outside the region. The results are diffused through extension agencies and demonstration farms. Only the Grassland Division of the Department of Scientific and Industrial Research has a research station in the area, and it is significant to this appraisal of policy alternatives that the re-evaluation of the region's potential for pastoral farming followed the demonstrated effectiveness of fertilizer trials on tropical grasses at this station and on the state land development blocks. Local research achievements also have other benefits. Farmers are more willing to adopt agricultural innovations demonstrated by successful neighbors than they are from perusal of magazine articles describing success in another region.

The real problem of agricultural research in a marginal area is not in discovering new techniques, but in getting farmers to adopt what is already well known. The provision of small local experimental stations and demonstration farms concerned with regional problems can do much more to diffuse the results of their findings than isolated research institutes. As with the Marginal Assistance loans, the principle of local control of research and assistance would appear to carry special benefits. Where this principle has applied, albeit through chance, such programs have been more successful in meeting the needs of Northland farmers.

CENTRALIZED ASSISTANCE PROGRAMS

Centralized programs operate uniformly throughout the nation. Although they may have been originally designed to assist land development in marginal areas, they tend to be utilized primarily by farmers in the more

prosperous agricultural districts. These programs are generally constrained by regulations and tend to be impermanent.

Many different programs which could legitimately be included under this heading have been introduced at different periods. Most have been political solutions to perceived economic needs. Usually they are of short duration or are modified as the political needs change. Others lapse subsequently, through lack of financial support. A discussion of three programs should suffice to illustrate the nature of centralized assistance and to indicate their inadequacy in solving the problems of marginal agricultural areas. These programs are: 1) state loans, 2) taxation subsidies, and 3) farm income supplements.

The states offers normal and special loan privileges to farmers. Normal loans are granted through the State Advances Corporation and represent state competition with established lending institutions. Whenever the state grants developmental loans that have been refused by existing loan institutions because of their high risk, such are special loans. The State Advances Corporation was originally established to assist agricultural land development, although since 1945 it has become increasingly associated with urban housing loans. This latter aspect now represents their major interest. As a result, the capital available for farm loans is limited; those loans granted are low in risk and unrealistic in constraints. The program enables the government to influence the activities of private lending institutions, although it is of little aid to agricultural development in problem areas. Its principal concern is to grant funds to those who have never owned their own farm, but who have the necessary experience.

Some six million dollars are loaned annually to farmers in Northland by the State Advances Corporation. This is ten times the amount made available under special loan privileges by the Marginal Lands Assistance Board. However, the State Advances capital has little beneficial effect on marginal land where farming is well established. The advantage of the loan is that it makes funds available to those who have heretofore not owned farms at rates of interest which are slightly more favorable than those available from normal lending institutions. Largely because of the inflexible operational procedure it has ceased to serve this purpose. An exception is where funds are used to settle occupiers on state developed farms.

TAXATION SUBSIDY

Farm taxation is structured so as to provide special benefits to those who reinvest capital gains in improving farm enterprise. For the financially successful farmer such taxation benefits hold an advantage over comparative benefits available to non-farm investors. However, they are of no use to low income farmers in marginal areas. Their earnings are so low that normal family deductions cover returns from farm operations. Frequently tax subsidies are introduced in budget statements and justified on the basis of the need to aid farm development. They are political solutions to economic problems, and in the New Zealand experience their impermanence obstructs their possible value. The case of the fertilizer subsidy provides an illustration. In order to increase the carrying capacity of grasslands the government, in 1964, introduced a measure that allows farmers to deduct ex-

penditures on fertilizer at the rate of 150 per cent. Farmers took advantage of the incentive and increased the application of fertilizer. The following year the government did not renew the measure but replaced it by a transportation subsidy for farmers in marginal districts. However, most operators in marginal districts lacked the funds to enable them to increase their rate of fertilizer application despite either the tax incentive or the transportation subsidy. Operators in the more productive districts in which fertilizer is manufactured lost the incentive and many reverted to their original rate of fertilizer application designed to maintain pastures rather than increase carrying capacity.

This is but one of the many spasmodic attempts at indirect assistance for agriculture that study reveals. Little understanding of the state's positive role in the development of uneconomic farming is gained from individual discussion. All that is attained is a sense of the frustration created in attempting to solve economic problems by political means.

FARM INCOME AND CROP SUPPLEMENTS

Despite the well established principle of agricultural socialism in New Zealand, the state has been unwilling to award special income benefits for farmers with low incomes in marginal districts, although this would probably have been the most economic alternative. Indirect-production subsidies have had a somewhat more checkered political history, as demonstrated by the transportation subsidy on fertilizers, but they have had little consequence for agricultural development.

Product-inducement subsidies are established only for minor, domestically-oriented crops such as wheat, which is not present in Northland, and milk for urban use. Otherwise prices are established seasonally in anticipation of receipts. Occasionally anticipated export returns are lower, and state funds may be called upon to meet the politically approved basic price. In such instances, the state does play a role in stabilizing prices — i.e., guaranteeing prices — but the price level is not held at an artificially inflated level so as to induce production and bolster farm incomes.

Subsidies which exist are consumer subsidies on butter, milk, eggs, bread and flour. By increasing demand they do influence production. They were introduced during the Second World War so as to offset the rise in the cost of food. For political reasons, they have never been removed. They have had little or no effect upon agricultural development in marginal areas, as there would be little change in consumption patterns if they were removed. Nevertheless they persist and cost the state between thirty-five and forty million dollars annually.

CONCLUSION

In this essay, Northland has been portrayed as a marginal agricultural area in which those concerned with the region's economic development have recently realized the area's potential. Techniques are now available to handle the special environmental problems which had caused so many failures and much disillusionment in agriculture and which had permeated the entire economy. However, it is one thing to isolate the problems and another to obtain support of farmers to overcome them when many of them

have faced so many years of disillusionment. The potential is there, although many individuals lack the financial and managerial ability to realize the potential.

As an essay by a geographer, little attention has been paid to the impact of specific programs on the farm landscape. Instead, attention is focused upon a process of environmental change. However, it is hoped that the annotated illustrations of extent and nature of the state's direct efforts in land development will provide some appreciation of the impact upon the landscape for those unfamiliar with New Zealand.

The political success of the programs is difficult to gauge. Electoral results indicate no shifts which can be reliably correlated with different programs. Existing programs have been cited when the party holding power has been challenged. In this respect they have assisted in the maintenance of the two major parties, which have faced a greater challenge in Northland than elsewhere in the nation from their only serious competitor, the Social Credit Party.

The substantive conclusion to be derived from this survey is that effective modernization of rural areas achieved primarily through programs controlled within the development region itself. Some form of regional development agency is required, one which has power to allocate state funds to these projects appearing to hold the most promise for improving the regional economy. Such an agency is best governed by local residents conversant with the basic elements of the regional economy and not by central planners. Modern tools of analysis, like cost-benefit analysis and linear programming, should be employed to decide between alternative programs, but implementation ought to be guided by those fully conversant with the social and economic character of those whose cooperation the program requires.

The evaluation of alternatives by such a regional authority should not be restricted to agriculture. The use of the land for forestry or for the employment of farmers in non-farm occupations might offer more realistic alternatives for raising income levels. These alternatives should be considered in the analysis.

Planning for the improvement of rural areas should always be people-oriented rather than program-oriented. Decentralization of decision-making has been achieved with the Marginal Lands Assistance program, and this program more than any other has maintained people as its central focus. When the planning is centralized, programs tend to be designed for all farmers. They utilize the incentive approach to development which is attractive to the already successful farmer, but holds little immediate attraction to the uneconomic farmer in a marginal area. This is not to reason that such incentive programs should not exist, but that a more flexible approach to economic development is desired with programs tailored to the needs of individuals in the various regions.

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