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The Demography of La Junta de los Ríos del Norte y Conchos

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Introduction

Estimations of numbers of Amerindians before their contact with Europeans have interested historians, demographers, and geographers for many years. The most common methods of determining populations are either archaeological procedures (e.g., Zubrow, 1976) or comparison of documentary accounts. The accounts, written during or shortly after initial contact with Europeans, are used by Sauer (1935). This article concerns the area known as La Junta de los Ríos del Norte y Conchos. It has only a few, relatively unstudied, archaeological sites (see Kelley, 1939; 1949; 1951; 1952a, b; 1953). The few Spanish documents discovered dealing with the area provide meager data on population.

Castañeda (1936) has characterized the neglect of the La Junta area as follows:

> Most historians of Texas have consistently ignored the vast area that lies between the old Presidio of San Juan Bautista on the Rio Grande in the neighborhood of present-day Eagle Pass, and the Presidio del Paso del Norte, better known as Juárez. More than 500 miles separated the two outposts.

About halfway between those two outposts is the junction of the Rio Grande and Rio Conchos. The two communities at the junction today--Presidio (United States) and Ojinaga (México)--are outposts yet. A lack of adequate transportation facilities plus surrounding desert and mountains effectively isolate La Junta from the mainstreams of culture and technology of both countries. Although

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isolated, La Junta was a significant focus of trade, travel, and cultural contact in the past (Gregg, 1933; Madison and Stillwell, 1958; Raht, 1963; Madison, 1968; Applegate and Hanselka, 1974). In this, La Junta resembles the oases of North Africa.

In one of his many papers on La Junta, Kelley (1947) says that a local tribe, the Patarabueyes, were "influential in the late prehistoric and early historic times as the cultural filter through which Mexican and southwestern (and certainly European) traits passed eastward." Kelley also describes another tribe living at La Junta, the Jumanos, as cultural carriers of the highest order.

From about 1848 to 1875, La Junta was a major point along the famed Chihuahua Trail. This trail, in its busiest year, carried greater tonnage than did the Santa Fe Trail in its entire history (Applegate and Hanselka, 1974).

Travelers using the natural north-south route of the Río Conchos and the east-west route of the Rio Grande left scattered information about the crossroads of the two thoroughfares. The historical data is published by Applegate and Hanselka, 1974. This study will deal with the demography of La Junta in the late sixteenth and early seventeenth centuries.

The Physical Setting

The La Junta area is bounded by the village of Cuchillo Parado some 48 kilometers up the Río Conchos on the southwest; Ruidosa, about 56 kilometers up the Río Grande to the northwest; Shafter, some 32 kilometers to the north on Cíbolo Creek; and Redford, about 29 kilometers down the Río Grande to the southeast (Kelley, 1952b, 1953). This is the area discussed in this paper. Others selected different areas (Griffen, 1979; Jones, 1991).

These villages are sheltered by the Chinati Mountains (2,371 meters) to the north, the Torneros Mountains (1,520 meters) on the east, the Sierra Grande and Sierra Matasaques (2,128) on the south and the Sierra del Cañón de Navarrete (2,432 meters) on the west. At La Junta itself, the elevation is 800 meters (Hanselka, 1973). The La Junta Basin is sheltered on all sides, therefore, by mountains, and is much less exposed to cold winds than the surrounding high plains.

Chief drainages in the basin are the Río Grande and Río Conchos. Of the two, the Río Conchos is by far the larger stream. During the sixteenth and seventeenth centuries, both rivers meandered through alluvial flood plains about two kilometers wide. The low-lying, naturally irrigated flood plains are ideal for primitive farming. No Mexican creeks of any significance enter either the Río Conchos

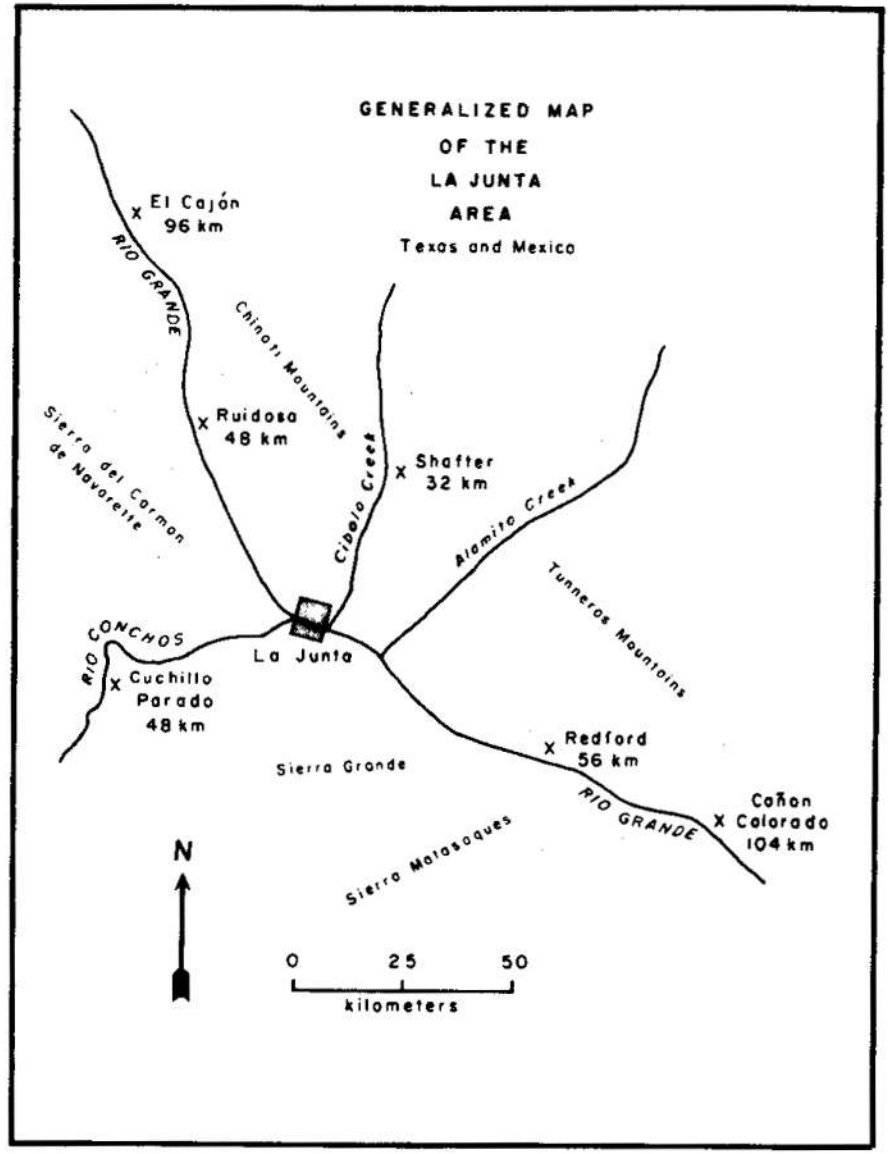

FIGURE 1. Generalized Map of the La Junta Area.

or the Río Grande at La Junta. On the United States side, however, two streams of moderate size enter the Río Grande: Cíbolo Creek draining about 725 square kilometers and Alamito Creek draining about 3,885 square kilometers (Hanselka, 1968). Indians used both the creeks and the rivers as sources of water for farming.

Adjoining the Río Grande flood plain and rising about six meters above it on the north side of the river is a gravel terrace ranging from a few meters to over a kilometer in width. Modern day Presidio, as well as several of the ruins of old Indian pueblos, are on this terrace. On a similar but higher terrace on the south side of the river is Ojinaga.

Between the river terrace and the Chinati Mountains are four pediments. The lowest, highly eroded pediment is near the Río Grande, and cut into long, narrow mesas. These mesas, next to the flood plain, were the preferred locations for the old Indian pueblos. The principal pueblos were all within 25 kilometers of the junction of the rivers.

Soil of the flood plain is classed by the United States Department of Agriculture as Pima Silty Clay (nearly level, deep, fine, and medium-textured, moderately permeable to slowly permeable bottomland soils). Pediments are classed as Pinal Gravelly Loam (gently sloping to steep, shallow to very shallow, medium-textured, gravelly soils).

Climate is classed according to the Thornwaite system as DB'd (semiarid, mesothermal, moisture deficiency in all seasons). Harris (1969) found that the mean annual maximum temperature from 1927 to 1968 was 30°C. The mean annual minimum was 12°C, while the mean annual rainfall was 20.8.

Gardinier (1989) sketches, with broad strokes, the geological history of La Junta from the Paleozoic (230-600 million years ago) to the present. He describes, in broad terms, the climate from about 8,000 B.C. A short section of his paper describes biota in the area. His paper ends with a section on the "Geostrategic Factors" of La Junta. Persons interested in overviews of La Junta's physical geology and climate should read his paper. Certainly, the section on "Geostrategic Factors" needs to be compared to the last portion of this paper.

The physical geology has not changed greatly for about 8,000 years. Climate is of greater interest for this paper. Gardinier (1989) used historical data from the Weather Bureau in his article. Tree-ring data is used here. The chief source for the climatic data is Fritts (1965). Zubrow (1974) examined the data of Fritts and concluded that both ethnohistorical and archaeological references substantiate the biological data. Three of the sites used by Fritts—No. 2, Big Bend, Texas; No. 3, Casas Grandes, Chihuahua; and No. 5, Cloudcroft, New Mexico—form a triangle with La Junta roughly in the center. It is reasonable to argue, therefore, that this data applies to the La Junta area. Weather in the Upper Río Grande Basin determined the harvest at La Junta since both temporal and riverine farming methods were in use there. Kelley's (1952a) argument that there was heavy migration from the Pueblo areas of the Upper Río Grande Basin to the La Junta area also contributes to the thesis that climate along the entire Upper Río Grande Basin had a bearing on the population of La Junta.

From about 1501 to 1510, the climate of the Río Grande Basin north of La Junta was cooler and more moist than normal. This period of good agricultural weather was followed by a drought that lasted until the mid-1500s. For a brief period of about ten years, the drought was broken by cool, moist weather, but from about 1560 until 1590 an extended drought covered the entire southwest. This period was followed by one of generally good moisture conditions that lasted during most of the 1600s. The first decade of the 1700s was dry, but the second decade brought moisture that later moved northward, leaving the Río Grande Basin to suffer from drought once more.

Population

Only meager population data of unknown accuracy is available for the years before 1715 at La Junta. All population data prior to 1750, of which I am aware, is listed in Table 1. From 1715 to 1750, population figures are probably as accurate as those gathered in "civilized" areas during the same period.

The highest population estimate reported by travelers to La Junta (10,000+) was made by Antonio de Espejo's *entrada* in 1582. Since Espejo's visit to La Junta occurred only five months after the first Spanish penetration of the area, European contact was minimal. Almost one hundred years later, in 1683, two out of thirteen tribes living there accounted for 2,500 persons. If the other eleven tribes were only half as large as the two cited, a population of 10,000+ would be plausible. Later data, from the 1850s, for the individual pueblos, suggest a disastrous decline to about 1,000 to 2,000 inhabitants.

Forbes (1963) reviews literature on antiquity, culture, and population of the Southern Athapascans to which the La Junta tribes belonged. He points out that pre-1600 population data is

lacking but concludes that the southern division was probably at least three times larger than during the post-1850 period for which data is available. He states, "Allowing for the decrease in population which occurred in the southern area between 1600 and 1850, it is possible that this group was formerly as large as the northern group."

Table 1. Pueblos and Populations at La Junta

Year	Pueblo	Population	
		Families	Persons
1535[a]	Unknown	"incredibly populous"	
1581[b]	Unknown		300+
1582[c]	Unknown		10,000+
1582[d]	Santo Tomás[1]		600
1683[e]	Unknown	more than 500 baptized	
		or	
1683[f]		more than 1000 baptized	
1683[g]	Unknown	2 nations of 2,500 persons plus 11 other nations	
1693[h]	Unknown	250 conscripted	
1693[i]	Unknown	300	
1715[j]	Nuestra Señora de Begonña		44
1715[j]	San Juan Bautista		115
1715[j]	San Francisco de la Junta		180
1715[j]	Nuestra Señora de Guadalupe		550
1715[j]	San Cristóbal		180
1715[j]	Nuestra Señora de Loreto		80
1715[j]	Nuestra Señora de Aranzazú		71
1715[j]	Indians working at San Bartolomé		80
1715[k]	Mescalero Apache near La Junta	60	250
1715	Total	60	1,729
1744[l]	All La Junta	Depopulated	
1747[m]	La Junta — 5 pueblos		1,124
1747[n]	La Junta — 6 pueblos		865
1747[o]	Nuestra Señora de Guadalupe		172
1747[p]	Santa María la Redonda		41
1747[q]	La Junta — 6 pueblos[2]		2,351

References:

a. C. Covey, *Cabeza de Vaca's Adventure in the Unknown Interior of America* (New York, 1961).

b. G. P. Hammond and A. Rey, *Expedition into New Mexico made by Antonio de Espejo, as Revealed in the Journal of Diego Pérez de Luxán, a Member of the Party* (Los Angeles, 1929).

c. H. E. Bolton, *Spanish Exploration in the Southwest, 1542-1706* (New York, 1916).

d. J. C. Kelley, "The Historic Indian Pueblos of La Junta de los Ríos," *New Mexico Historical Review* 27 (1952): 257-295.

e. A. F. A. Bandelier and F. R. Bandelier, *Historical Documents Relating to New Mexico, Nueva Vizcaya, and Approaches Thereto, to 1773*, III (Washington, 1937).

f. H. E. Bolton, *Spanish Exploration in the Southwest.*

g. A. F. A. Bandelier and F. R. Bandelier, *Historical Documents Relating to New Mexico, Nueva Vizcaya, and Approaches Thereto, to 1773*, II (Washington, 1937).

h. ibid.

i. J. M. Daniel, "La Junta de los Ríos and the Despoblada, 1680-1760," M.A. Thesis, University of Texas at Austin, 1948.

j. R. G. Reindorp, "The Founding of Missions at La Junta de los Ríos," *Supplementary Studies, Texas Catholic Historical Society*, I (1938); Kelley, "The Historical Indian Pueblos at La Junta de los Ríos," *New Mexico Historical Review* 27 (1952): 257-295; J. C. Kelley, "Jumano and Patarabueyes: Relations at La Junta de los Ríos," Ph.D. Dissertation, Harvard University, 1947.

k. J. C. Kelley, "Factors Involved in the Abandonment of Certain Peripheral Southwestern Settlements," *American Anthropologist* 54 (1952): 356-387.

l. A. F. A. Bandelier and F. R. Bandelier, *Historical Documents Relating to New Mexico, Nueva Vizcaya, and Approaches Thereto, to 1773*, III.

m. Daniel, "La Junta de los Ríos and the Despoblada, 1680-1760."

n. Kelley, "Factors Involved in the Abandonment of Certain Peripheral Southwestern Settlements," 356-387.

o. Kelley, "The Historic Indian Pueblos at La Junta de los Ríos," 257-295.

p. Kelley, "The Historic Indian Pueblos at La Junta de los Ríos," 257-295.

q. H. W. Kelly, "Franciscan Missions of New Mexico, 1740-1760," *New Mexico Historical Review* 15 (1940): 345-368.

1. In the 1715 listing this is San Francisco de la Junta

2. Only pueblos having missions are in this reference.

Sizes of families for which dates are available are a measure of the reliability of figures in Table 1. These figures are shown in Table 2. They strongly suggest the La Junta figures are low. Later population figures (1759-1822) are given by Jones (1991). This data is more a measure of *mestizaje* (Jones' word) and acculturation than population numbers or density. I must point out that *mestizaje* and acculturation are not the same.

Table 2. Size of Families at La Junta and Similar Areas

Site	Average Family Size	Per Cent Children	Date
Northwestern México[a]	6	66	Precontact
Central Desert[b]			
Baja California	2.63 to 5.75	23 to 65	1697-1773
La Junta[c]			
Mescalero Apaches	4.1	51	1715
San Juan Bautista &			
El Mesquite	4.6	56	1765
San Francisco de la Junta	4.2	52	1765
Nuestra Señora de Guadalupe	2.5	20	1765
San Cristóbal	3.4	41	1765
Presidio del Norte	2.6	23	1765
San Francisco de la Junta	4.2	52	1771

References:

a. C. Sauer, "Aboriginal Population of Northwestern Mexico," *Ibero-Americana 10* (1935): 1-95.

b. S. F. Cook, "The Extent and Significance of Disease Among the Indians of Baja California," *Ibero-Americana* 41 (1937): 1-43.

c. See Table 3.

Density

All historical reports about the population of La Junta are shown in Table 1. Specialists in demography are either unaware of the data or consider the sampling area too small to be of significance. Dobyns (1966), in his review of the literature on Indian populations of the New World, points out the wide range of densities given in the many papers dealing with the subject—0.04 persons per square kilometer to 2.4 persons per square kilometer. The La Junta area is identified in only two publications dealing with population densities. Mooney (1928) does not cover the Mexican portion of La Junta. Kroeber (1939) lists La Junta as the junction of three tribes (Conchos, Eastern and Western Apaches) and two cultural areas (Circum-Pueblo and Mexican Interior Plateau). The Circum-Pueblo aboriginal density was estimated as 0.01 persons per square kilometer and the northeastern, non-agricultural Mexican (part of the Mexican Interior Plateau Culture) as 0.1 persons per square

kilometer. Both estimates of density are obviously too low for the agricultural tribes at La Junta. Kroeber, oddly enough, classed these as non-agricultural!

Kelley (1952a, 1953) mapped the pueblos of La Junta in two publications and gives various boundaries for the La Junta area. These are given in Table 3, together with the data from Table 1. For this paper, area and farm hectarage for each of the four cases was calculated by multiplying the total river and creek distance from the river junction by two (both sides of the stream). The assumption is made that only half of the total linear kilometers was suitable for farming. It is further assumed that only land within a quarter kilometer of a stream was watered either naturally or artificially. Thus, the linear kilometers were multiplied by 0.25 to give an area potentially capable of being farmed. The densities are then calculated using figures from Table 1.

Case A and B in Table 3 give the same density figures. This is not too surprising when one compares the area figures. These two areas are composed essentially of the two rivers, their meanders, and a minimum amount of desert. A population using these areas would have to depend greatly on farming and/or trade as major sources of food. It is unlikely, of course, that the tribes were confined solely to the rivers. Cases A and B, therefore, may not be too realistic.

Case C, although covering the maximum area farmed, also includes the greatest desert-to-cultivated-land ratio. A population using this area would have access to a wider variety and greater supply of native foods than inhabitants of areas A or B. However, large areas of C were abandoned by 1400, and our population data starts in 1582. We have no data for the period 1200-1400 when La Junta may have had it greatest native population due to expansion of the Pueblos down the Río Grande. If the same density per hectare was maintained as in A and B, then multiplying by 4 or 5 the population figures of those areas should give a reasonable estimate for the 1200-1400 period.

Case D has the highest density of all. In order to maintain an adequate diet, these people would have to be proficient farmers and use every square meter of productive land. The densities, while high, are not unreasonable. Actually, they are much less than some reported for Central México, the Andes, and Central America. If case D is correct, then the densities reported here for case C would have to be multiplied by 10 to get an estimate for the 1200-1400 period. Perhaps the estimate of the Espejo *entrada* should not be dismissed so contemptuously (Mecham, 1927).

Table 3. Total Area, Farm Area, and Population Density at La Junta

Location	Area	Density/km Year 1582	1715	1747	1747	1749	1765
A							
All Major pueblos within 25.6 km of river junctions (circle of 25.6 radius)	2,075 km 5,120 ha of farms	4.8	0.8	1.0	0.6	0.9	0.4
B							
Area formed by Cuchillo Parado (48 km up the Río Conchos), Ruidosa (56 km up the Río Grande), and Redford (28.8 km down Río Grande) (triangle)	2,051 km 5,376 ha of farms	4.8	0.8	1.0	0.6	0.9	0.4
C							
Farming was from El Cajon (96 km up the Río Grande) to Cañón Colorado (48 km down the Río Grande), to Upper Cuchillo Parado (64 km up the Río Conchos) to 64 km up Alamito Creek; from A.D. 1200-1400 (assume a rhombus with diagonals of 128 km and 144 km)	9,288 km 10,720 ha of farms	1.0	0.1	0.2	0.1	0.2	0.1
D							
Farming survived only in the immediate vicinity of La Junta, i.e. from Cuchillo Parado (48 km up the Río Conchos) to Redford (28.8 km down the Río Grande); after A.D. 1400 (assume a triangle with a base of 288 km and an altitude of 48 km)	690 km 3,072 ha of farms	14.3	2.4	3.2	1.9	2.7	1.3

The Espejo *entrada* was the second to reach La Junta. If the usual European-influenced epidemic followed (Trewartha, 1969), later population figures would be 90 to 95 percent lower. This is indeed the case. Since a smaller area supported 10,000+ population in the 1500's, a larger area should support the Puebloan immigrants plus whatever the indigenous population was in 1200. Thus, it is reasonable to argue that the pre-conquest population estimate of Espejo of 10,000+ is perfectly plausible and that during the 1200-1400 period, La Junta population greatly exceed 10,000.

There is a general tendency to dismiss population figures gathered by the early Spanish explorers and fathers. Kroeber (1939), for example, says, "It is difficult to meet Sauer's citations of seventeenth century figures except with the genetic supposition that the Spaniards counted or estimated excessively." Sauer (1935) in a study cited by Kroeber (which he called outstanding though he criticized it severely) says:

> Modern students have been inclined to discount early opinions of native numbers but rarely specified their reasons for doing so. I have found no general reasons for suspecting that the first observers were given to exaggeration.

Dobyns (1966) quotes Sauer (above) and goes on to say:

> a characteristic methodology which had included depreciation of all historical population figures. They depreciate the departure of historical witnesses from the 'truth' for motives they intuitively impute, but which uniformly led said witnesses to overestimate, in their opinions, aboriginal populations. Thus Rozenblat claimed, 'The old estimates are always hyperbolic,' without offering sound evidence to support such a claim.

Part of the general reluctance to accept the early population estimates lies in the widespread idea, accepted even today, of an empty continent containing thousands of hectares of idle land needing only people to become productive. This idea is inherent in Kroeber's statement (without any supporting data) that the Conchos Indians farmed only a small part of the available land. Kelley's reconnaissance of the La Junta area for farming sites shows beyond a doubt that this statement was not true for the period from 1200-1400. There is no reason to suspect this period was unique. MacLeod (1928), in discussing Indian populations, makes the following statement:

> There is every reason to believe that the land was maintaining the maximum population consonant with the of development of Indian agriculture and industry. The Indians thoroughly and

painstakingly exploited their natural resources. Every bit of land which Indian methods made available was cultivated, where agriculture was understood, and hunting was no haphazard pleasure jaunting, but a careful and laborious systematic exploitation of the wild animals and wild vegetation products of each region.

Resources

What resources were available to support La Junta's population? Kelley (1947) emphasizes the role of the Patarabuey and Jumano tribes:

> Patarabuey and Jumano were linked in a great aboriginal trade network which was certainly responsible for the exchange of not only trade commodities but of ideas as well between widely separated peoples of diverse cultural affiliation. This trade network probably expedited the exchange of goods and ideas between the Southwest and the Southeast, and perhaps even between Mexico and the Southwest, the plains and the Southeast.

In his paper dealing with the noted Jumano Chief Juan Sabeata, Kelley (1955) says:

> The cultural process involved included the trading of actual artifacts between cultures, the diffusion of ideas and second-hand description of cultural behavior between groups, and the transfer of persons of one ethnic group and culture to another and often quite different one. Along with these foreigners, of course, went their characteristic behavior patterns, dress, artifactual equipment and conceptualizations.

Rábago y Terán reported that the Conjos, Cacalotes and Mesquites (tribes at the La Junta area) did little or no planting. They depended upon the hunt and trade for a living (Castañeda, 1938). Obviously, a large portion of the resources used at La Junta were obtained elsewhere.

In addition to the resources obtained by trade, local biota were also used. The knowledge of this biota in general and plants in particular as reliable and safe sources of food must have taken long millennia of trial and error to accumulate. If the trials were abject failures, or the errors involved poisonous plants, then death was the likely result. Plants had to be recognized and knowledge gained of how and when to harvest the various parts. After harvest, storage and preparation for use were of great importance.

Kelley (1951) found evidence of 12-row corn, mussel shells and animal bones in a site from the Bravo Valley Aspect dating between

A.D. 1200-1400. He also found 12-row corn and mesquite beans along with large animal bones, tortoise shells and mussel shells in a pit house dated about A.D. 1582 (Kelley, 1939). It is unlikely mesquite was cultivated; corn had to be cultivated. However, there is no way to tell if it was grown at La Junta or came via trade.

Cabeza de Vaca, the first European to travel through the region, reported that in 1536 the area suffered from a two-year drought and no corn was planted. Climatic data from Fritts supports the statement on drought. Nevertheless, de Vaca said, corn was being eaten. The Indians (Patarabueyes?) said the corn came from the north and west of La Junta. Along with the corn, beans, calabashes, and juniper "berries" were being eaten. The berries were not relished—so said de Vaca (Covey, 1961).

The Chamuscado-Rodrigues *entrada* passed through La Junta in 1581 while going to New Mexico. These visitors noted that very little corn was cultivated, but calabashes and beans were grown in great quantity. From native vegetation, Indians made a flour from mesquite beans and ate the pads and fruits of various prickly pears and "mushrooms" (Hammond and Rey, 1927). Mushrooms are not common at La Junta today, and there is no reason to suppose they were common in 1581. Perhaps the "mushrooms" were the juniper berries of Cabeza de Vaca.

The Espejo *entrada* of 1582 gives us our first detailed picture of food habits at La Junta. Luxn, usually cited as the best authority on the *entrada*, noted that maize, beans, mescal, dry calabashes, gourd vessels, and buffalo skins were much in evidence (Hammon and Rey, 1929). Buffalo skins had to be imported from elsewhere while the remaining items could have been produced locally. Espejo reported:

> We found that they live on rabbits, hares and deer, which they hunt and which are abundant, and on some crops of maize, gourds, Castilian melons, and watermelons which they plant and cultivate, and on fish, mescales, which are the leaves of lechuguilla, a plant half a vara in height the stalks of which have green leaves. They cook the stalks of this plant and make a preserve like quince jam. It is very sweet and they call it mescal (Bolton, 1916).

Daniel (1948), in reviewing La Junta and the *despoblada* in the late 1600s and early 1700s, reports that maize, beans, squash, watermelons and cantaloupes were widely grown. Wheat was raised after being introduced by the Spanish. Native foods were prickly pears, mescal, game, and fish. He also reports there was no irrigation during this period.

Kelley (1947), in a paper on Indian tribes living at La Junta, reported that in the 1500s the chief cultivated crops were maize, beans and calabashes. By 1715, the cultivated crops were wheat, maize, beans, string beans, watermelons, pumpkins and tobacco. Wild plants utilized were mesquite, beans, mescal, prickly pear and "mushrooms."

During the Dominguez de Mendoza-López *entrada* of 1683, Father López helped the Indians at La Junta plant wheat, beans, pumpkins, melons, watermelons, and tobacco (Hughes, 1914). Dominquez de Mendoza's description of La Junta must be taken with a grain of salt. He obviously lumped together everything he saw plus everything he wished to see plus everything he thought the viceroy wanted to hear: "abounds in grapes, nuts, acrons, berries, plums, buffalos, rivers with pearls, and mountains full of minerals" (Bandelier and Bandelier, 1937).

The most ambitious and by far the best organized *entrada* to La Junta was that of Trasviña y Retis in 1715. He reported that wheat, corn, and legumes were grown under irrigation and in quantity. After his return to San Francisco de Cuéllar he was asked to send "peas and butter beans" to La Junta since there were none there (Reindorp, 1938).

In 1744, Fray Juan Miguel de Menchero, Apostolic Preacher General, assessed the agriculture potential of La Junta:

> For agriculture it is the best and most fertile land among all those that have been discovered, for in one year, they gather two crops of rich wheat that they call 'seven ears,' the ears growing on one stalk which comes from one seed without branches. Maize, broad beans, vetch, pumpkins, and all crops that are grown in cold countries are produced in great abundance (Bandelier and Bandelier, 1937).

It must be remembered the holy father was promoting La Junta to the king.

Farming

Kelley (1952b), after intensively surveying the La Junta area, believes farming by the Indians fell into two broad classes– temporal and riverine. Temporal farming was practiced in areas where runoff of ephemeral streams spread over an alluvial flat following a heavy rain. The flat was located in a bend of a stream or where two streams intersected.

Riverine farming was only practiced on the two rivers– Río Grande and Río Conchos– and the two creeks– Cíbolo and Alamito. This farming was done on the flood plains of these overflowing streams. The cultivated areas received their irrigations when the waters left their usual channels and spread out over the flood plain. Successful use of such areas implies the Indians had some concept of the periodicity of flooding.

A more formal type of irrigation began to be practiced some time in the 1700's. To ensure a longer irrigation period, small brush-and-rock wing dams were constructed in the Río Grande and Río Conchos several kilometers above farm land. The dams created pools. These waters entered ditches and, following natural gradients, flowed onto fields. Ditches dating from the 1700's are still in use in small areas along the Río Conchos!

Kelley (1952b) advances the thesis that from 1200 to 1400 the La Junta area experienced a rapid increase in population. This led to an increase in farming activities. He further suggests that since the new farms were at temporal sites, there was ample moisture during this period. Farms extended at least 65 kilometers up the Río Conchos into México and a similar distance up Alamito Creek into the United States. Along the Río Grande, farming was practiced from El Cajón (about 100 kilometers up river from La Junta) to Cañón (about 50 kilometers down river from La Junta). Sometime after 1400, all villages and farms along the Río Grande above La Junta were abandoned. Kelley believes that a change in moisture conditions dried up the Río Grande. Only at La Junta and below, following the joining of the Río Conchos to the Río Grande, could farming be practiced.

Beals (1932) distinguished the Indians along the Río Conchos, Río Nazas, and Lake Parras as "Central Agriculturalists" as compared to the remainder of the Indians of the Northern Interior Plateau that he classed as "Non-agriculturists." Kroeber (1939) makes the point that this is questionable as a basic criterion of cultural cleavages in the area. He also says that even if the Conchos Indians occupied all the territory usually assigned them they would, unless "unusually skillful and addicted agriculturists," be able to farm only a small portion of the land. However, a constantly recurring theme in reports of various *entradas* as they worked their long, perilous ways either through or to La Junta was the extensive farming operations seen there. This certainly suggests that compared to other tribes along the Río Conchos and Río Grande the La Junta Indians were "unusually skillful" and "addicted agriculturists." It is interesting that in discussing land cultivated by the Pueblos, Kroeber (1939) says, "The Pueblos, then, resembled the Mexican in using [land] for his crops, if not every inch of productive

land, at any rate much of the best of it." Kelley shows that the La Junta Indians were the southeast-most extension of the Puebloan culture, or, later in time, a northern extension of the Mexican culture.

Emory (1859) comments on farming methods at La Junta as follows:

> One of the best examples of this system of cultivation is seen at Presidio del Norte, where the Concho[s] unites with the Rio Grande. As these two rivers have different periods of high water, the inhabitants are enabled to secure two crops from the same field in one season. In order to accomplish this, the first crop, depending upon the overflow of the Rio Grande, must be sown and harvested in time to permit the planting of the second crop, depending upon the rise of the Concho[s]. All this depends upon so many contingent circumstances that it is often attended by disappointment than by success, and, between, the extremes of flood and drought, the people frequently suffer from want of food.

Emory's description sounds very much like the methods practiced by the Indians some 600 years earlier.

Ranching

The question of raising livestock for food is moot. Outside of wild meat, there is no evidence of flesh being an important part of diet in pre-historic times. Griffen (1979) reports that by the 1690's Chisos at La Junta raided Mesquite pueblo for animals that they domesticated. Forbes (1963) points out that by 1570, Indians at La Junta probably had horses, mules, goats and other livestock stolen from the Spanish. The Chamuscado-Rodríguez *entrada* of 1581 passed through La Junta with 600 cattle, goats, sheep and hogs plus an unknown number of horses and mules (Hammond and Rey, 1927). In 1583, the Espejo *entrada* with 115 horses and mules plus an unknown number of livestock spent a few days at La Junta (Bolton, 1916). Certainly, some of the animals must have been spirited off by the Indians. No records of keeping livestock have been found, however.

The supposition that Indians at La Junta made off with some of the animals of each *entrada* is supported by the fate of livestock of the Coronado *entrada* of 1549 (Wentworth, 1948). Coronado started off with 5,000 sheep, 500 cattle and unnumbered swine and mules. Only 24 lambs and four wethers were left by the time the present-day boundary of the United States was reached. Here, allegedly, the famished army devoured the entire flock. However, much later, on the present day Colorado River, Captain Melchor Díaz lost his life trying to preserve some of the sheep belonging to the expedition. Indians reported to another of Coronado's leaders, Captain Tovar, who was off with an exploring party, that a group of strangers (the main expedition) were some distance away and had with them some black sheep.

There is some evidence that sheep did go into New Mexico with Coronado and that some were given to or stolen by Indians. Some members of the expedition vanished and crudely woven woolen relics, found on the Rio Blanco, have been linked to them and Indian sheep. During the Espejo *entrada* of 1582, women and children of the Moquis were "in the mountains with their flocks." These flocks (if they were sheep) had their origin forty years previously and 300 miles to the east from the Coronado *entrada*.

Fifteen years after the Espejo *entrada*, 7,000 head of cattle were driven from the Santa Bárbara-Parral area to New Mexico as part of the Oñate colonization. By 1680, some 9,000 cattle were in the El Paso del Norte area (Brand, 1961). In view of the great movement of people and goods between La Junta and El Paso, it is most improbable that some of the cattle did not get to the Junction of the rivers.

Fish

Kelley (1947), in his definitive study of Indians at La Junta, reports that Obregón and Luxán both say Indians there fished. He supports these reports by saying "one of the commonest artifacts in La Junta archaeological sites is a small pebble, notched at both ends and often showing wear of a string or thong between the notches. Such pebbles are usually identified as 'net sinkers', and identification is probably correct in this instance." Obregón's report on fishing is so vague as to be meaningless. Luxán does report that the Espejo *entrada*, on passing through La Junta on their return to Santa Brbara, were given catfish to eat.

A sand bar on the Rio Grande, just below the mouth of Alamito Creek, has produced numerous small arrow heads. Local tradition says these were used for shooting fish by Indians. Boys still stretch lines across the river at this point and catch many catfish. If the small arrow heads were used for shooting fish, it certainly implies the fish were eaten by Indians. It also implies the Rio Grande was much clearer than now!

Nutrition

We may, with caution, relate what data is available for La Junta to other populations in similar habitats. The historic Pima-Maricopa settlements along the Gila River in Arizona have been amply documented (Hackenberg, 1964). About 2,000 Pimas were scattered over 85 kilometers of the river, and about 1,000 Maricopas lived down river over a similar area. Approximately 50 to 60 percent of the total food supply came from cultivation while the remainder came from wild plants and animals. At this early period, irrigation was unknown. There is evidence that temporal and riverine methods of growing, as defined by Kelley, were in common use. Later, when irrigation become known, both tribes, having grown to about 5,000 persons, settled along the river in a strip about 16 kilometers long. The farms produced 50 to 60 percent of their food. No mention was found of extensive trade. We may assume the Pima-Maricopas were self-sufficient (or nearly so) in food. The remaining portion of food (40 to 50 percent) came from wild plants and animals. (For a different interpretation of the early Pima culture, see Ezell, 1961).

The population of the Gila River Indians were numerically similar to the La Junta population as were areas under cultivation and irrigation. It is possible, therefore, that at La Junta 50 to 60 percent of the food came from farming while the remainder came from hunting, fishing, wild plants, and trade.

Production from uncultivated lands can be surprisingly great. In México, production for 7,777,043 hectares of semiarid and arid lands, classified by Dirección de Economía Rural, Secretaría de Agricultura y Ganadería, as uncultivated but productive areas (esquilmos) was as follows:

Annual Production (Metric Tons)
(Xolocotzi, 1970)

Product	1950	1960
Candelilla	172,497	142,595
Ixtle	16,408	6,764
Guayule	10,587	none
Tuna	26,158	14,651
Lechuguilla	12,679	10,487

Yields of cultivated crops in pre-contact times are known but poorly. Maize yielded about 900 to 1500 liters per hectare in the Gila Valley. Spanish introduced wheat, chilies, watermelons, muskmelons, onions, cabbage, beets, string beans, peas, lima beans, chick peas, peaches, apples, plums, apricots, and cherries into the diets and farms of Indians. These, of course, were in addition to the traditional crops of maize, pumpkins, beans, squashes, and cotton (Officer, 1971).

The nutritional status of the inhabitants at La Junta can be inferred. Cabeza de Vaca, the first recorded European to visit the area, called the Indians there "the strongest and most energetic" he saw in the long trip from the Gulf of Mexico to Culiacán, México—and this after a two year drought. Chamuscado, leader of the first *entrada* through La Junta, said there were "many Indians, men and women; the men were very handsome and the women beautiful," and "the people were very clean, handsome and warlike, the best featured we had encountered thus far" (Covey, 1961; Bolton, 1916).

Starting in 1563 and continuing at least until 1585, slavers from the Santa Bárbara mines raided at La Junta. This implies a sedentary population large enough to make the raids profitable and healthy enough to withstand the rigors of slavery.

Price (1945) has compared the skeletal remains of precontact aborigines with their descendants. He divided the descendants into those with little or minimal contact with Euro-American culture and those assimilated into such a culture. In terms of the healing of bone fractures, limb amputations with subsequent healing, trephined skulls and dentistry, he concluded the pre-contact aborigines had better nutrition than their descendants. Price did not discuss the La Junta area but did cover Eskimos and Indians of Alaska and Canada, the Seminoles of Florida, and various tribes in the Andes Mountains. There is no reason to suppose conclusions drawn by Price do not apply to La Junta Indians.

Goldstein (1957) examined the skeletal remains of early (A.D. 800-1700) Indians in Texas for pathological-teratological defects. Most of the bones came from east and south Texas so some care must be used in extrapolating his data to the La Junta area in west Texas. Goldstein concluded that some "70 percent of the total adult crania and 60 percent of all the skeletons and by far most of the individual bones, showed no pathology or abnormality whatever." He further observed "some at least of the observed pathology could scarcely have been of a serious or long disabling nature." The time span covers both pre- and post-European contact. Even as late as 1700 A.D., however, very little acculturation occurred in Texas. We can conclude, therefore, that pathological-teratological skeletal defects were not common among Texas Indians.

Other indirect evidence of the health of the population at La Junta can be deduced from a paper presented by Crain (1966) on popula-

tion dynamics, disease and paleopathology. He proposes that large populations tend to have infectious diseases of an acute, intensive, short-term form while small, isolated populations have chronic, long-term forms. An acute form pathogen in a large population is able to infect more people because of its high rate of mobility. Therefore, only a minority of the population is available as hosts for the chronic-form pathogen. In a small population, the acute form pathogen will sweep though most of the susceptible persons and then disappear; the chronic variety would linger on until additional susceptible hosts become available.

The exact population size that is critical to the existence of various pathogens is not known with any degree of accuracy. This is due, in part, to the amount of geographic isolation and inter-population contact of the persons involved.

The population at La Junta may not have been large in a numerical sense but it was large in an "inter-population contact" sense. The constant flow of people to and from La Junta could very readily lead to sufficient polymorphism for resistance to most diseases in the Southwest and Northern México.

Jarcho (1964) has reviewed the question of disease in prehistoric North America. He concludes there is little evidence that malaria and yellow fever existed in the area in pre-Columbian days; probably, syphilis did exist. As far as nutritional diseases are concerned, he found no evidence of scurvy or rickets. Pellagra and generalized osteoporosis probably were present. Evidence for symmetrical osteoporosis is overwhelming.

Infant mortality is another measure of nutritional condition. Obviously, the poorer the nutritional status of the mother, the less chance the fetus has at both birth and subsequent suckling periods. Cook (1947) points out:

> It must be remembered that modern concepts regarding this matter (infant mortality) are derived largely from observations of (1) decadent aboriginal tribes which are heavily infected with disease and pushed beyond tolerance economically, and (2) vast and grossly overpopulated areas such as India and China where disease is rampant and where the inhabitants are living on the barest margin of subsistence. Truly aboriginal peoples were remarkably free from infections and epidemic disease (cf. Cook, S. F., *Hispanic American Historical Review*, 26: 320, 1964). Moreover, they were, barring invasions and cataclysms, in equilibrium with the food supply. The factors predisposing to infant mortality, therefore, exerted a relatively mild influence.

His table 1 is reproduced, modified:

Population Group	Percentage of Children
Indians in California Missions (ca. 1800)	39.3
Indians at Hupa Reservation (1887)	38.0
All Indians in California (1928)	40.0
México (1930)	44.3
United States (1880)	43.1

Compared to Table 2 (this paper), obviously out of seven pueblos at La Junta, only two fell markedly short of the percentage of children. These two, it must be pointed out, were the two pueblos most frequented by the Spaniards. One would expect any pathogens brought into the area by the Spanish would first affect these two pueblos. Children, being more susceptible than adults, would suffer the greatest mortality.

Griffen (1969) points out:

> One very general and obvious rule with regard to the disappearance of Indian groups is that those bands closest to Spanish settlements disappeared first and, conversely, those located further away persisted longer.

Actual nutrition is related to total caloric intake per day—a subject on which the La Junta archives are completely silent. Cook (1966) reports that the usual caloric intake of American Indians was about 1,800 calories per person per day. Utilizing worldwide data of today, there emerges a surprising coherent nutritional pattern depending upon the development status of the country involved. Figure 2 shows the pattern (adapted from Cepede, Houtart, and Grond, 1964). If Cook is correct, then the American Indians lived at a level similar to underdeveloped countries of today.

An estimate for the caloric requirements is shown in Table 4. The question is, could 743,296,950 calories be produced at La Junta?

Ford found that at San Juan, New Mexico each family had access to about four hectares while cultivating between 1.5 and 2 hectares. The fallow acreage served as pasturage and for crop rotation. This amount of land enabled the production of about a month's surplus food. If we assume four hectares per family at La Junta, then in case A, 1,422 families could be supported. In case B, 1,493 families could be supported. The number of families that could be supported in case C were 2,986 and in case D, 853 families. This is on cultivated land alone and does not include trade, hunting, fishing, or wild plant calories. If we assume a family size of four (surely a

modest assumption) then the population supported in case A is 5,688; in case B, 5,972; in case C, 11,944; and in case D, 3,412. These populations could be increased 40 to 50 percent if caloric intake from hunting, fishing, wild plants, and trade are included.

Table. 4. Populations and Energy Requirements of San Juan Pueblo and the La Junta Pueblos

Characteristics	San Juan	La Junta
Total population	203	935[a]
Number of families	49	286[a]
Average family size	4.2	3.2
Number of children	?	363[b]
Percent of children	42	39
Number of adults	?	286 male[c]
		286 female[c]

Age	Calories per person per year at San Juan[d]	La Junta[e]
0 - 12 (both sexes)	614,660	223,121,580
12 - 71+ males	1,062,513	303,121,580
13 - 71+ females	756,280	216,296,080
Total	2,433,453	743,296,950

References:

a. From Table 1

b. From Table 2

c. I assume two adults per family—one of either sex; adults, following Ford, are those 13 or older; children must have matured early those days.

d. From Ford (p. 79); his daily calories x 365

e. Calculated

Table 5 gives a comparison of various foods available to the population at La Junta. With the exception of corn, there are no stated values available for yield. Consistently, however, the various *entradas* used terms like "great quantities," "rich harvests," and "abundant" to describe the farms. Deer probably averaged 32 per section and javelina about ten per section. Catfish are still abundant in the Rio Grande and Rio Conchos. Certainly the potential for supporting a large population existed.

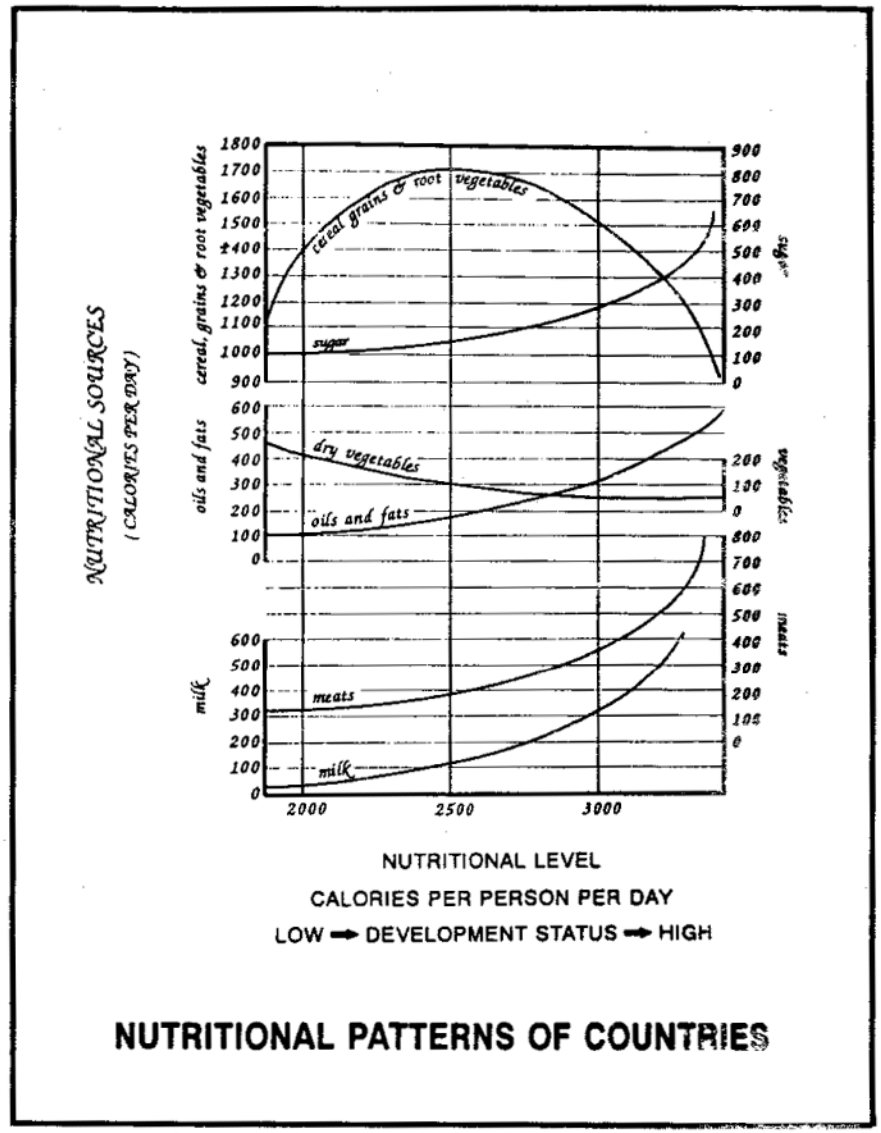

FIGURE 2. Nutritional Patterns of Countries.

Table 5. Composition of Foods

Food	Energy[b]	Protein[c]	Fat[c]
Opuntia	—	1.0	0.5
Barley	349	8.2	1.0
Beans	349	22.9	1.2
Mule deer	222	22.3	10.6
Corn	91	3.3	1.0
Catfish	103	17.3	3.1
Grapes	69	1.3	1.0
Lamb	245	16.8	19.4
Lambs-quarter	43	4.2	0.8
Chili pepper	37	1.3	0.2
Pork[a]	472	11.2	49.0
Purslane	21	1.7	0.4
Rabbit	135	21.0	5.0
Squash	19	1.1	0.1

References:

a. Represents javelina

b. Calories/100 grams

c. Grams/100 grams

From: B. K. Watt and A. L. Merrill, *Composition of Foods*, Handbook No. 8, Agricultural Research Service, U.S.D.A. (Washington, 1963); except for opuntia, which is from H. A. Spoher, *The Carbohydrate Economy of Cacti* (Carnegie Institute of Washington, 1919); and mule deer which is from R. A. Field, F. C. Smith, and W. G. Hepworth, *The Mule Deer Carcass*, Wyoming Agricultural Experiment Station *Bulletin* No. 589 (1973).

OPTIMUM POPULATION

The expression "optimum population" is now a common one, having found its way into the parlance of Chambers of Commerce, zero-population growth advocates, and other groups. A "non-optimum population," according to conventional usage, implies too many for too few resources—or more succinctly, hunger. In a demographic sense, however, a "non-optimum population" can mean too few, as well as too many. While too many people leads to hunger and starvation, too few people can bring about precisely the same outcome.

A population does not exist independent of space and time. An optimum population cannot be defined unless both space and time are defined. More importantly, all three must be defined as part of

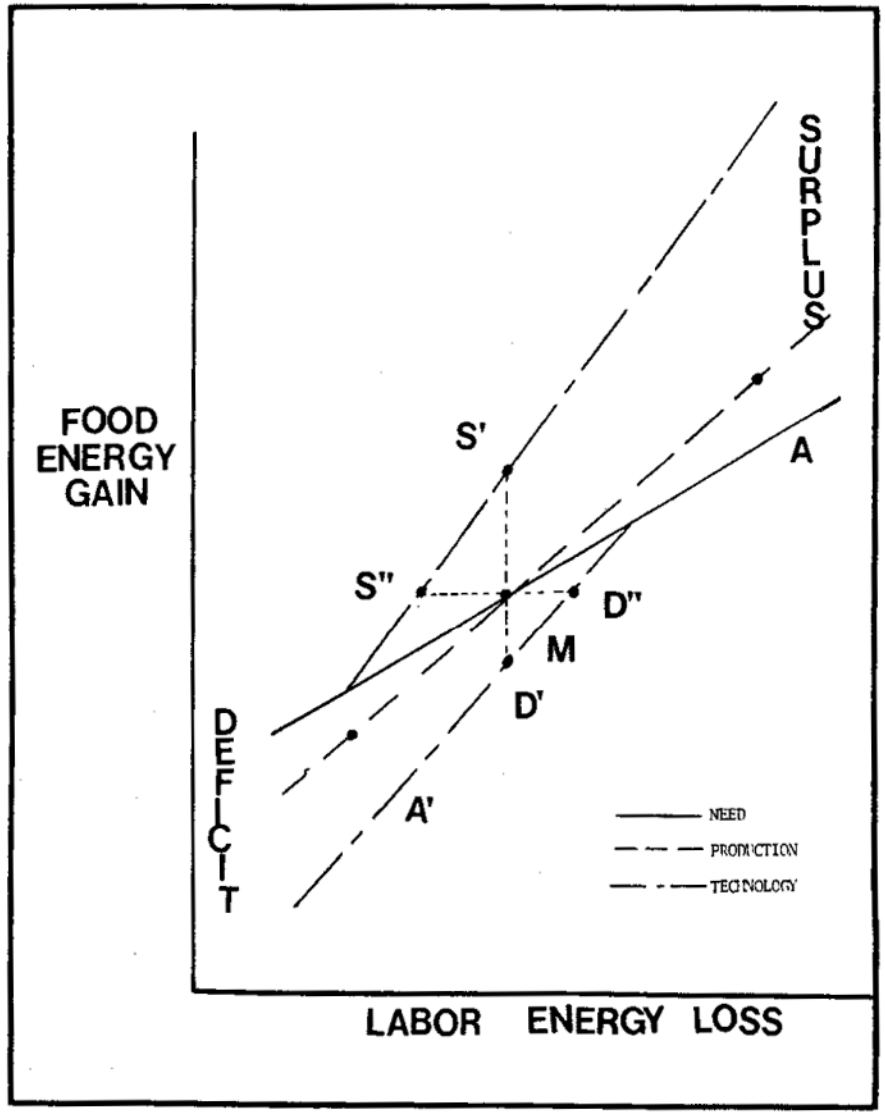

FIGURE 3. Labor Energy Loss.

a dynamic equilibrium, which, for want of a better term, can be called an ecosystem. In contemporary language, a population is an environment (space) with a technology (time).

If an inhabited area becomes larger or smaller due to conquest, earthquake, etc.; if a population lessens due to disease, emigration, etc.; or grows larger due to births, immigration, etc.; or if new technology is imported or old technology dies, the maintenance of a stable ecosystem requires that a new equilibrium be achieved. If a population within an environment (no matter how lush) has technological skills (no matter how high) but numbers too few to utilize either the environment and/or the technology, then hunger must inevitably ensue.

In Figure 3, labor (energy loss) is plotted against food (energy gain). When the amount of energy loss (labor) equals the amount of energy gain (food) then production balances need. At this point (M) an individual, family, village, etc. can maintain itself. There will be statistically insignificant fluctuations around the mean but no wide-scale permanent changes will occur causing a shift in M. It is obvious that any labor above M, i.e., A, will produce surplus food. This surplus food can lead to a greater population via birth, immigration, or invasion. This will shift the "need" line up until it crosses the "production line at A and thus A = M. The surplus food could also lead to greater trade for products not produced locally. This would shift the "production" line down until A overlaps the "need" line and thus M = A. In either case, stability is reestablished with energy loss equaling energy gain.

If, on the other hand, there is a food deficit, i.e., A', then to restore stability the "need" line will drop until it crosses the "production" line at A', i.e., M shifts downward to coincide with A'. This will be accomplished by death, emigration, or malnutrition. Alternatively, the "production" line could rise until A' overlaps the "need" line, i.e., A' = M. This last is unlikely to occur since it would require a new source of food or energy.

So far, we have considered area (food production) and population (labor). What happens if new technology is introduced? If the same input of labor occurs, then surplus food will result—S'. If, however, only needed food is produced then a labor surplus will result—S". In the first instance, either the population must increase to restore stability ("need" rises to S'—M shifts upward and M = S'), or a trading of food must occur (S'drops to "need" and S' = M). In the second case (S'), emigration must occur or labor must be spent in esthetics, religious or non-productive activities ("need" rises to S" and M shifts down for labor but remains constant for food).

There is also the possibility of a technological decline. This could occur due to depletion of raw materials, loss of space due to war, or (following disease or war), lack of labor to utilize raw materials or space. The first two would result in D'—labor surplus for available resources. The third would lead to D"—not enough labor to exploit available resources. To restore stability at D' the "need" must drop, i.e., population decrease. To restore stability at D" the population must increase.

As the Spanish advanced north from México City, they brought new technologies to La Junta: gunpowder in place of arrows; horses in place of walking; ranching in place of hunting. Less direct but more unbalancing were diseases introduced by the Europeans: no antibodies protected against these germs. Food surpluses which presumably came about with the introduction of new plants and technology were counteracted in part by the heavy toll of disease. This reduced the potential surplus by reducing the number of economically active individuals. Fluctuations of climate and cultural malaise certainly complicated the equilibrium. All contributed to the variations in population estimates reported by the *entradas*.

It is clear, however, that the La Junta area could have sustained the population of 10,000+ reported by Espejo. The much lower populations noted in later years were consequences of the increasing penetration of Europeans into the region. It is instructive to recall that with the exception of the Tarahumara in the rugged and inaccessible southwest corner of the state, European penetration brought about the rapid annihilation of native people everywhere in the state of Chihuahua, turning it into a singularly Iberian cultural enclave during colonial times.

La Junta was the only zone of sedentary native culture in the eastern half of Chihuahua. The favorable conditions that sprang from the joining of the two rivers provided the sort of habitat hospitable to the amalgam of native and European culture that took place in Central and Southern México. It is reasonable to assume that, prior to European penetration, the native people of La Junta effectively occupied and utilized their habitat. Thus, they had populations in equilibrium with their environment.

I equate the word "environment" to Gardinier's (1989) use of "location." He believes both intrinsic and extrinsic factors related to location played important roles in the development of La Junta. This paper is an attempt to graphically depict some of Gardinier's factors.

Kelley (1990) reviews his past work at La Junta, reports on new work in the upper Río Conchos drainage, and incorporates unpublished data of Mallouf. He believes all La Junta sites were

"procurement stations" supplying the needs of the redistribution center of Casas Grandes (Paquime) located in northwest Chihuahua. The putative age of the La Junta sites parallels that of Casas Grandes of ca. A.D. 1250/1300 - 1450/1500. The dissolution of the Casas Grandes interaction sphere and abandonment of Paquime led to the abandonment of settlements above the junction of the rivers. The drought of ca. A.D. 1510 to 1550 may have been a contributing factor to both abandonments.

La Junta has survived the numerous ecological interventions introduced by the Europeans. Today, it sustains over 60,000—no doubt due, in part, to its oasis-like location in a vast and barren region. In a large measure, however, the population exists because La Junta is a point of contact between two economic systems. By taking advantage of the economic dissimilarities and ignoring the laws on import and export of both countries, the population has once again adjusted and manipulated its time and space to fit today's times.

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