Simonelli, Jeanne Marie

MARKETS, MOTHERHOOD AND MODERNIZATION: FERTILITY AND ECONOMIC CHANGE IN A RURAL MEXICAN 'MUNICIPIO'

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JEANNE M. SIMONELLI

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MARKETS, MOTHERHOOD AND MODERNIZATION:

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A DISSERTATION

APPROVED FOR THE DEPARTMENT OF ANTHROPOLOGY

APPROVED BY

Joseph W Whitecotton

Jane B. Lancaster

R. A. Hinde

Robert A. Hahn

J. D. Brown Jr.

DISSERTATION COMMITTEE

ACKNOWLEDGEMENTS

Choosing a fieldwork location involves two considerations. First, the site must be one which meets all of your specific research requirements. Second, it must be one where the researcher will be able to function alone for periods of up to one or two years. While many locations in Mexico might have satisfied the first requirement, the Municipio of Baviácora satisfied the second for me. The six months that I spent in the upper Rio Sonora Valley as part of the University of Oklahoma's Rio Sonora Archeological Project (Richard A. Pailes, Principle Investigator) during 1977 and 1978 left a legacy of good friends and good memories. From the moment that my daughter and I returned to Baviácora in 1984 these old friends and many new ones made our stay a comfortable and fascinating experience.

My fieldwork in Baviácora received material support from the following sources: The Organization of American States (Fellowship # BEGES 88786); Sigma Xi Grant-in-Aid; The University of Oklahoma Associates Fund Dissertation Enrichment Grant; and The University of Oklahoma Graduate Student Association Research Grant. I give my sincere thanks to these organizations. My parents, Marie and Anthony Simonelli, also provided their own special "Grants", in addition to other support which cannot be enumerated.

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provided me with opportunities for publications, presentations and employment. Finally, special thanks are owed to Dr. Joseph Whitecotton, who took over as chair in the eleventh hour. His time and concern are greatly appreciated.

There is no way to truly thank the people of Baviácora and the other Rio Sonora communities for their cooperation and understanding. At the Palacio Municipal de Baviácora, Presidente H. Yanez-Lopez, Secretario Manual Rogel, and Juez de Registro Civil Juanita Andrade provided assistence, information and access to their archives, as did Sra. Beatriz Corella in Banamichi. The staff of the Centro Noroeste of the Instituto Nacional de Antropologia e Historia provided me with an institutional affiliation for my work. The Centro's director during most of my research, Cynthia Radding de Murrieta, went beyond the call of duty by sharing both her research and her home. Members of SARH in Baviácora and Ures, and SRA in Baviácora and Hermosillo also provided assistence, as did Dr. Enrique Lopez-Ramos. My fieldwork would not have been tolerable without the friendship of so many Baviácorans. Ricardo and Aurora Loera, and their children "J.R." and Orlando, were always there to talk to and laugh with. J.M. and Belen Loera shared many fishing trips with us. Ramona Tanori and her family welcomed us into their home, and let me see what life in Baviácora was really about.

Many other people at the University of Oklahoma and in the field gave me support, advice and criticism. Geographer Bill Doolittle showed me the relationship between ethnographic observation and the written page. Dr. Robert Nespor displayed continual patience both with my idiosyncracies and those of the VAX computing system and the SAS statistical package. Dr. Stephen Thompson was always there as back-up. My fellow graduate students and the secretaries at the Department of Anthropology listened to countless gripe sessions and shared many a beer throughout the years.

Special thanks are owed to my children. My older daughter Elanor accompanied me to Sonora in 1977 and 1978, and visited during 1984. My younger daughter Rachel was my constant companion in 1984, and in a sense, my entre into the community. It was a delight to watch her

learn to speak Spanish, play, and even attend kindergarten in Baviácora. During those months, she experienced life (and death) with a closeness not found in urban America.

Finally, I would like to dedicate this dissertation to the children of Baviácora: those who will become its future, and those, like José Octavio and Karina, who did not live to be a part of it.

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ABSTRACT

This study is an ethnography of women in a rapidly modernizing, rural municipio in northwest Mexico. It focuses on the individual decision-making processes which lie behind women's reproductive strategies, and how these are motivated by a two-way relationship between economic and biosocial factors. Set against the backdrop of Mexico's economic problems, it examines the ways in which the interaction of modernization and economic crisis lead to a restructuring of the allocation of time, energy, and resources for the women of Baviácora, Sonora.

The last decade has seen a burgeoning of new work on population growth and decline. The widely cited notion of a "demographic transition", which correlates population change with industrialization, has not explained demographic trends in non-western countries. Early assumptions that improved survivorship of children would lead fertility to replacement levels have not proved accurate. Further, much of this work proceeds on the assumption that couples make joint decisions to regulate fertility. They neglect to consider how the woman, as a critical participant in the act of reproduction, influences such decisions.

This work uses ethnography, primary, and secondary sources to describe the changing role of women in fertility decision-making. It relates their choices to the internal economic structure of the municipio, and to the overall economic climate in Mexico, as constrained by that nation's place in the world-economy. It considers the impact of modernization on the municipio and analyzes the historical antecedents of present-day adaptations. Finally, it

contributes to the general theory of fertility change through the analysis of data concerning these areas.

For the women of Baviácora, Sonora, the interaction of modernization and economic crisis leads to changing fertility decisions. In the absence of wage labor or favorable market conditions they cannot increase their contribution to family income by postponing childbearing. The are faced with the day to day task of delegating dwindling household assets to escalating family needs. As the economic, physical and emotional costs of parenting rise rapidly, the only rational strategy for them is to quickly limit family size through fertility regulation. As their roles within the household take on more responsibility, their reproductive strategies become more autonomous. In this instance, women, not couples play the critical role in fertility decisions.

CHAPTER 1

INTRODUCTION

It was late August in Baviácora. The usual afternoon cloud burst continued through the night and into the next morning. I was seated with Concha, who ran a small, sporadically used restaurant out of her home. As she cleaned up the remains of the tortillas and eggs which she prepared for two federal employees working in the area, I commented on the continual rains which soaked the Valley since my arrival in May. The desert terrain was cloaked in green, the corn tall and healthy; the *chiles verdes* heavy with fruit. Surely, it was a good year for the *ejidatarios* and *pequeños propietarios*?

Concha sighed. "What good does it do us?" she asked. "Once, we grew wheat, and we took it to the mill at El Bagote, where they ground it for us. The flour was fresh, and wholesome; it came from our fields; there was enough for everybody. Now, we have no mill. If we grow wheat, the *Conasupo* buys it all. In return, they send us last year's flour, full of bugs and costing sixty five *pesos* a kilo. We can barely afford to buy it. I have six children to feed. There's no work for the men. We might as well have drought (Field Report # 18: 8/30/84)."

Concha echoed the sentiments of many of the women in the municipio of Baviácora. The way of life was changing. Prices were steadily rising; the peso's value steadily falling. Baviácorans still rose at dawn, as they had in the Río Sonora Valley from "time immemorial", to take advantage of the first cool hours before the full heat of summer descended. Women still prepared *tortillas grandes* on a wood fired *comal* outside the house each day. But fewer men left for the fields each morning, and no one rode the trucks up to the now silent mines nearby. Those men who were able caught the early bus to work in the city each Monday, returning the following Friday night. Women remained at home as household heads trying to keep the family afloat. Often, they earned what little they could, selling tortillas, cheese or *pan dulce*.

The life of a rural family has never been easy, whether in Mexico, the United States, Europe, or the rest of the world. It has always been characterized by a struggle with, and for the land; with, and for the water; with, or for the children. Though these struggles remain today, they have been altered and complicated by the changing socioeconomic and biosocial processes of modernization. This is a study of how these processes influence the women of a municipio in the Mexican state of Sonora. It focuses on the role of women in fertility decision-making , and the ways in which both women's roles and their decisions are related not just to economy, but to changing patterns of child care as well.

General Goals of the Dissertation

The last decade has seen a burgeoning of new work on population growth and decline (see Bulatao and Lee 1983). The widely cited notion of a "demographic transition", which correlates population change with industrialization, has not explained demographic trends in non- western countries. Early assumptions that improved survivorship of children would lead fertility to replacement levels have not proved accurate (Zubrow 1976:17-18) . Further, the three stage transition model lost utility for even the industrialized countries, as birth rates in some of these dropped below replacement (Coale 1973). As a result, scholars and policy makers began to reconsider the complex mechanisms influencing fertility. The majority of this recent work uses the fertility decisions of the family or household as a unit of analysis (Beckman 1983; Hollerbach 1983). They neglect to consider how the woman, as a critical participant in the act of reproduction, influences such decisions. In addition, by concentrating on socio-economic factors, they also fail to consider the interface between biology and social influences, and how this acts on the individual. To fill this gap, this work focuses on the individual decision-making processes which lie behind women's reproductive strategies, and how these are linked to a two-way interaction between biosocial and economic considerations.

Background

Fertility changes related to modernization occur most quickly in urban areas, but the complexity of city living makes research there difficult. Thus, the ideal study site is one in which critical characteristics of urban life are just becoming available. The municipio of Baviácora provided just such an opportunity (Figure 1.1). Located on the Rio Sonora, just 150 miles south of Douglas, Arizona, it is an area where I lived seven years previously while doing archeological work. When I returned to the community in May, 1984, it was clear that the intervening time had accelerated modernization and change. A paved road was completed from the south to the American border, and television, telephones and supermarkets arrived. Subsistence cropping was threatened by a changing loan policy, which made critical funds available only to those cultivating wheat for sale to the government. In addition, world market conditions paralyzed local mining, reducing the availability of jobs. As in much of the rural Third World, where migrant labor is becoming a feature of modernization, many men were forced to leave their families and commute to distant places. Faced with runaway inflation and the severely devalued peso, Baviácoran women attempted to manipulate time and resources to meet changing economic and social demands. Concurrently, improved sanitary conditions and increased hospital births lowered infant mortality, and the government began to actively promote family planning. Together, modernization and economic crisis forced women to begin to reconsider their reproductive strategies.

The dissertation which follows is an ethnography of women in a changing rural municipio. The force of change is a modernization process which always seems to fall short of the ideal. The focus is on motherhood, or specifically, fertility , because its rate of change is critical to the survival of many Third World countries. A key to understanding such change is the market economy. By placing new demands upon women and their households, it causes both economically and biosocially motivated restructuring of the allocation of time, energy and resources. As Orlove (1980:257) noted: "...there is an interaction between the choices which actors make, behaviors

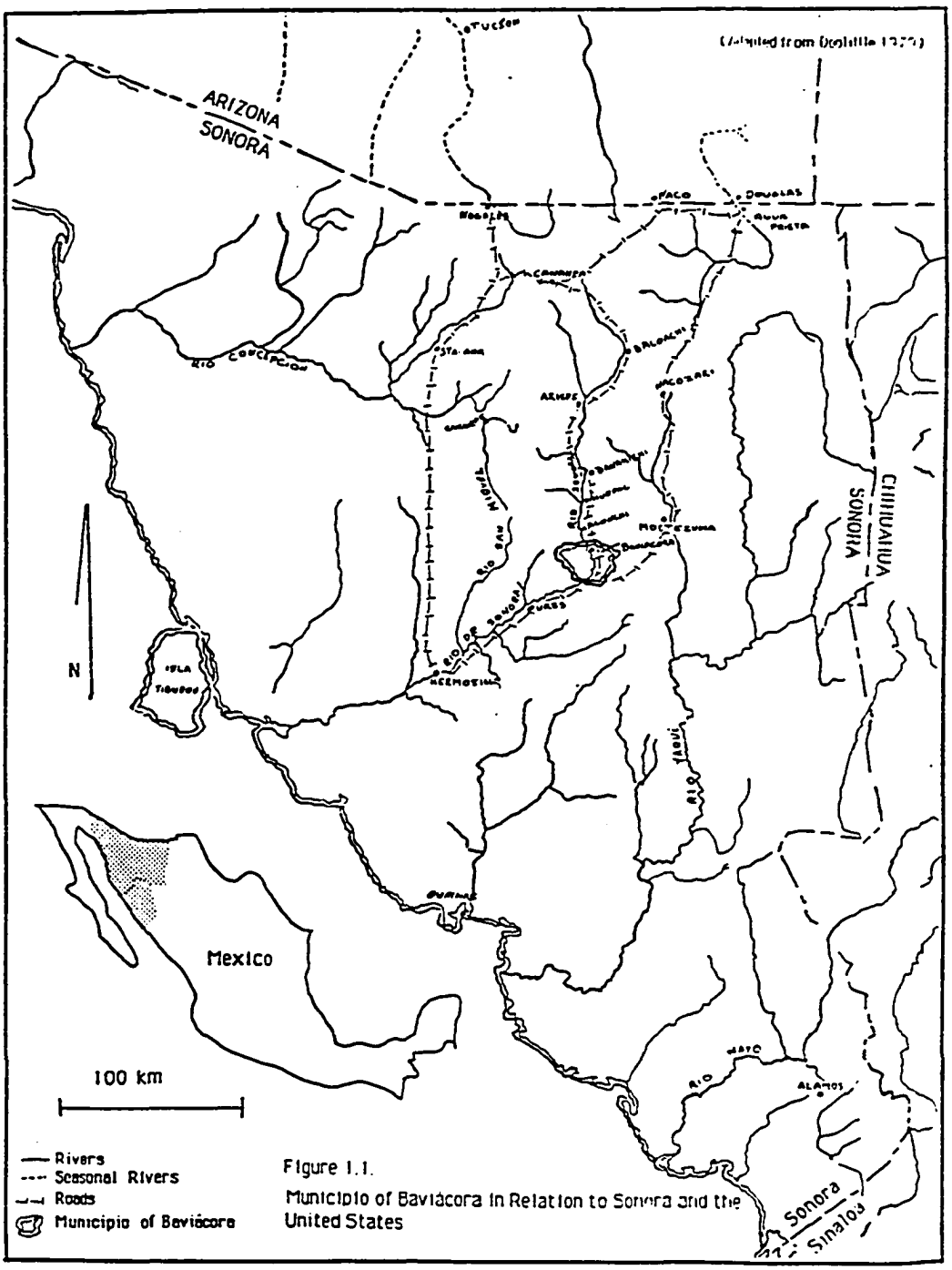


Figure 1.1.
Municipio of Baviácora in Relation to Sonora and the United States

on the individual and group level, and the biological, social and cultural systems which influence the distribution of resources, constrain the possible adaptive strategies, and provide some of the goals which actors attempt to meet". The overall goal of this work is to illustrate the interrelationships between these factors.

Assumptions

In research, the information gathering process is a function of the questions to be answered and the assumptions which underlie these questions. Decisions concerning the geographical scope of the study, time depth, utilization of data sources, and the implications of the study for the host community cannot be made arbitrarily. Therefore, this study was designed with several considerations in mind. First, I have chosen the municipio as the geographical unit of analysis because, in spite of changes in territory or title, this county-like entity has always constituted the administrative unit in Sonora. Since the time of the Jesuit missions, the tiny *congregaciónes* (enclaves) along the margins of the Río Sonora looked to the " head" pueblo (*cabecera*) for leadership and aid. Most government and mission records were kept according to this grouping. Since many aggregate statistics are available only for the municipio as a whole, it becomes a logical focus for a study using multiple sources of data. Further, by including both the "urban" pueblo of Baviácora and its surrounding "rural" hamlets, a more representative sample of women is achieved. Second, it is clear that Baviacoran women are a product of the historical processes which influenced the epidemiology, ethnicity, and economy of the region. Changes in the frequency and distribution of disease were both a positive and negative product of modernization, while access to resources and social stratification derived in part from ethnicity. The local economy can be linked to changing national needs which were often a response to world market conditions. To consider the impact of these factors, this study pays considerable attention to the history of the municipio from the time of missionization, especially the years between 1895 and the present.

A further consideration in formulating and completing this research was the potential application of the results on both a theoretical and practical level. It is important that the findings contribute to the general theory of fertility change. It is equally crucial however, to understand recent trends concerning fertility, health, education, migration and economy in light of the long term policy implications of alternative choices. Decisions made in this border region of the Greater Southwest impact not only on the demography and economy of the Sonoran villages, but their U.S. neighbors as well. Finally, I believe it critical that the findings of the study be made available to the host community in their own language. Too many anthropological studies are reported only to the academic world, leaving those who were the subject wondering what it was all about. In the case of Baviácora, it is important to return something to those who often asked "how will we benefit from your work?". Without the help of those in charge of the historical archives and the civil registry, and the cooperation of the community, a study such as this could not take place.

Research Design

It is possible to divide the modernization process in the upper Ric Sonora Valley into three broad categories of infrastructural, agricultural and demographic change. Though their effects are interrelated, I will deal with specific propositions within each category separately.

Effects of Infrastructural Modernization

During the 1970's, a paved road was completed from the south through the Rio Sonora Valley to the American border, ending the area's long standing isolation. At the same time, television reception was extended into the Valley, and a comprehensive bus service was begun. Electrification and clean water systems were completed in the small villages of the municipio, and a supermarket was opened in the pueblo of Baviácora. For the municipio inhabitants, each of these infrastructural improvements provided access to the imported values and culture often associated with urbanization (see Belshaw 1976:65-82). However, though these changes might help to modernize the area by increasing the availibility of mass communication, education, income

sources and commodities, it seemed likely that they would do little to further the autonomous development of the region (see Schneider, Schneider and Hansen 1970:340). Though they could enlarge the number of alternative life strategies for inhabitants (cf Barlett 1980a; 1980b; DeWalt 1979), they might do so in a fashion which would not decrease the dependency of the region on outside economic inputs. Indeed, I expected that certain of these changes would actually have a negative impact in the pueblos, because they were keyed to a premature increase in the role of the cash economy in Valley transactions (Doolittle 1983: 312-313). Further, because of the shortage of cash, I suspected that infrastructural changes keyed to impact on health might have been underfinanced. In these instances, it was possible that modernization might become the cause rather than the remedy for some health problems.

Agricultural Change

Following the Mexican Revolution of 1910, large privately held estates were broken up and a system of usufructured land holdings was developed. Landowners in the upper Rio Sonora Valley were allowed to keep a maximum of ten hectares of cropland, and the landless were given the right to a three hectare plot. Because of the limited quantity of flood plain land in the area, people produced largely for themselves. Further, the isolated location of the Río Sonora pueblos made market production unfeasible. According to those studying Sonora, a critical deficiency of agricultural activity in the state's interior has been the seeming lack of both a market and the market mechanism, and the economic and social relationships that these foster (Sanderson 1981).

It has been noted that the market orientation can be a strategic option in upholding the delicate balance of livelihood in relation to national, political and economic environments (Galeski 1971). For the peasant-farmer (see Chibnik 1978: 561), this dual strategy of subsistence-market production provides a flexibility that can ultimately be translated into power. According to Wolf (1966), the problem is one of balancing the demands of the external world against the need to provision the household. The ability to survive depends largely on "how easy it is...to mobilize the

needed factors of production...land, labor, and capital- and of course, on the general conditions of the market "(Wolf 1966:15).

For the peasant-farmer in Sonora, these vital constituents were frequently absent. In some areas of the state, up to eighty percent of *ejidatarios* (collective farmers) were illegally renting their land. *Pequeño propietarios* (individual farmers) were forced to expand into the least desirable areas (Doolittle 1983). The availability of capital, in the form of government loans, was restricted to those involved in cash cropping rather than subsistence farming (Doolittle 1983; Mares 1982). Rural labor looked to industry as a means to supplement farm production, but such employment was generally unavailable.

Until the 1970's, the Sonoran interior still lacked a real stimulus for increasing farmland or altering agricultural strategies. However, by 1981, the existence of the road began to open up market possibilities. Both the direct and indirect demands of the market fostered agricultural change, as farmers were urged to switch from subsistence to market crops. When this type of change occurs, the household can be effected since it becomes necessary to supplement farm income to meet deficient subsistence needs. If male household heads are forced to give up agricultural activities for all or part of the year, then the role of women, children and older family members in agricultural production may actually increase. When males do not seek wage labor, but continue as full time agriculturalists, then the importance of ancillary "female" income, and/or contributions from employed relatives become critical. These contributions rarely appear in official information concerning sources of income. I hoped that observation and structured interviews would make it possible to determine the extent to which these activities were occuring in Baviácora.

Demographic Change

The lives of Baviácoran women stand squarely at the intersection between the two primary social goals of production and reproduction (see Goody 1976). Their roles are shaped by balancing the often conflicting forces of these two goals, especially in modernizing countries such

as Mexico where family subsistence is critically linked to individual inputs into the productive process. As Caldwell (1982:40) suggests, the crucial variable in understanding demographic trends in developing countries is not modernization per se, but the direction of wealth flow. In subsistence economies it goes from children to parents. However, as cash assumes a larger role, a child's labor contribution is not as critical. In fact, each additional child begins to require more parental investment. As demand for income increases, behavioral changes occur which ultimately result in alteration in fertility (Caldwell 1982:40). To do so, these changes must alter one or more of the biological processes comprising reproduction. Of the seven proximate determinants of natural fertility (Bongaarts 1983:5), only marriage and frequency of intercourse require the participation of husbands in the decision-making process. The others, including contraception, abortion, and permanent sterilization, can be determined by the behavior of women acting without family knowledge. In fact, it has been noted that one of the effects of modernization is to increase the amount of control women have over their own fertility. The influence of men (and mothers-in-laws) in forcing fertile women to over reproduce is lowered (Anker 1982; Barkow and Burley 1980: 168-70). During initial phases of modernization, high fertility can persist because of the continued benefits associated with the extended family and child labor (Caldwell 1982:110). However, as the desire to access the economic and social opportunities associated with modernization increases (education; wage labor; consumer durables), women may begin to view reproduction in terms of the heavy allocation of their time, energy and resources. If this were true for Baviácora, then birth rates would not begin to decline until the late 1970's.

Most theories of fertility decline depict time, energy and resources in purely economic terms. In contrast, Draper and Harpending (1983) use a biosocial perspective which views expenditures in terms of rising physical and emotional costs of parenting. An effect of modernization is to change the physical and social interaction between parents and children. When older children are no longer available to care for their siblings, mothers must take on responsibility for the socialization of those remaining at home.

In Baviácora, the paved road increased the opportunity for education and employment away from the municipio. I assumed that as both men and adolescents took advantage of these opportunities, women would be forced to reassess their ability to deal with, and provide for, their children. This would be exacerbated by the demands of cash economy as described above. One effect of this type of modernization is to cause changes in the timing and spacing of birth, as women delay childbearing due to education or employment. A second consequence is the outright limitation of family size. When this is the case, then changes occur not just in overall birth rates, but in the percentage of all births that were first or second order as well. When women are merely delaying the beginning of their reproductive careers, then the expected result would be a short term reduction in birth rates with an increase in the average age at first or second birth. However, if they are using contraception to control completed family size, age at first and second birth might remain the same, while the percentage of all births that were first and second order increased. It would indicate that more women were electing to limit the size of their families. When this is the case, change can occur rapidly (cf Lee and Bulatao 1983: 233-287), and would be evident in the municipio's birth records.

Methodology

This dissertation is an ethnography, but in addition to the traditional ethnographic data gathering technique of observation, it also uses a series of other methods. Though some of the information derives from six months of fieldwork during the summers of 1977 and 1978, the bulk of the data was gathered during eight months of residence in the municipio of Baviácora beginning in May, 1984. During that time I was accompanied by my five year old daughter and visited during the summer by my fifteen year old. Thus, I was like many other Baviácoran women, with an absentee husband, and an adolescent daughter away at school.

Integration of Data Sources

In the fieldwork process, several sources of data were used in order to provide time depth, increase the accuracy of historical information, and allow certain measures to be quantified.

These included observation and informal interview, archival research, analysis of primary demographic information, and secondary published material, and a structured interview which was administered to a sample of 48 women in the child bearing years. The application and integration of data sources is summarized in Figure 1.2.

Observations were recorded in both formal field reports and a less formally structured field journal. When possible, information in these was supplemented by related articles from Sonoran periodicals. Historical data for the years 1880 through the present was excerpted from the municipal archives of Baviácora and Banamichi, while information concerning earlier years was obtained from various state archives. In addition, several residents of the municipio provided oral reminiscences of past years in Baviácora. Published demographic and economic sources used included Sonoran censuses and statistical handbooks. Unpublished data was supplied by government health and economic agencies. The Civil Registry of Baviácora was the major source of primary birth, death and marriage records for the years between 1956 and 1984. The selection of 1956 as a starting point was a function of the nature of available data. Prior to 1956 birth order was not recorded on birth certificates. Because this is a vital consideration, I elected to begin my analysis with that year.

Analysis of Data

Data from the structured interview was coded and readied for computer entry. Analysis was accomplished using the Statistical Analysis System (SAS), in conjuction with the VAX computing system and the I.B.M. 370 computer. Because of the restricted size of the interview sample, statistical reporting is largely descriptive. Qualitative ethnographic data is used to add depth to these indications. While the sample size limited the possibility of testing the strength of the relationships, it was a necessary part of the research design. It was important that each of the forty-eight women interviewed be revisited on at least two occasions. Such spot checks helped to confirm the accuracy of the interview responses. It also provided an indication of household

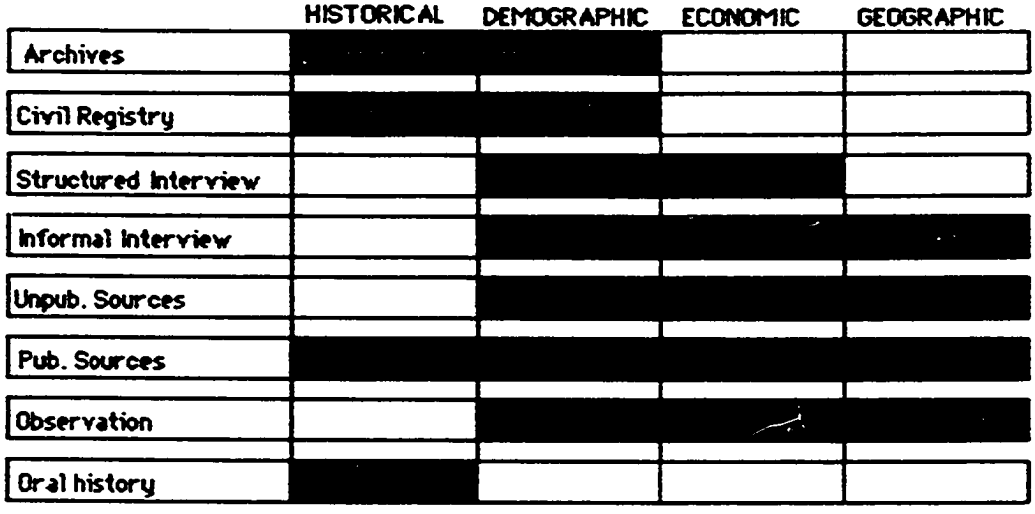


Figure 1.2. Integration of Data Sources By Subject Area

flexibility in economic and social realms. It is this aspect which is an index of the extent to which a particular reproductive and economic strategy may provide an adaptive advantage.

Organization of the Dissertation

The nine chapters of this dissertation are grouped into three main sections which reflect the assumptions underlying the research. The first three chapters are introductory in nature. Chapter 2 reviews and critiques current theories concerning economy, health and demography. In it, I enlarge upon notions introduced in chapter one, and link all components into a coherent whole. The third chapter provides the setting, presenting first the geography and climate, and finally, a profile of population and settlement patterns. Chapter 4 places Baviácora into historical perspective, describing the economic, ethnic and epidemiological antecendents of life today.

Chapters 5 through 7 argue the theoretical premises discussed in Chapter 2 by presenting and analyzing factors contributing to fertility and economic change in the municipio of Baviácora. Chapter 5 focuses on the process of modernization and development between 1945 and the present. It shows how each facet of infrastructural improvement contributed to the changing epidemiology of the region. This is further linked to the intricate balance of health and illness deriving from the seasonal aspects of rural poverty. In Chapter 6, the local and non-local economic resources providing the bulk of male-earned income are analyzed. Access to these resources is related to local economic inequality and stratification, as well as to the fickle demands of the world economy. Finally, Chapter 7 is an examination of the impact of Mexico's economic crisis on municipio households, and the methods they use to make ends meet.

The last section uses the material presented in all the preceding chapters to argue the key premise of the dissertation: that, faced with economic crisis and the social consequences of modernization, women will elect to reduce fertility. In Chapter 8, an analysis of births, deaths, and marriages between 1956 and the present is provided. Changes in birth rates, spacing and completed family size are examined in relation to concurrent changes in family structure, educational and work opportunities, sources of "female money", and patterns of child care.

Finally, church, state and male attitudes toward contraception are contrasted with the individual decisions made or contemplated by Baviácoran women. Chapter 9 returns to the major concepts stressed in the dissertation, once again linking markets, modernization and motherhood. Findings are presented in terms of the economic and biosocial processes which are affected, and discussed in light of their theoretical and practical implications.

The dissertation text will be supplemented by maps and tables which should serve to clarify points being made. Where applicable, statistics will be used to describe behavioral patterns. At the same time, I will also present anecdotes and illustrations which are the human side of life in Baviácora. Because this work is first and foremost an ethnography, its quantitative dimension is only there as a supplement to the qualitative picture of Valley relationships. For the most part, the "facts" recorded are the interactions and statements of individuals, stressing people and their actions in social, spatial and temporal context. Much as a camera records the dignity, fear and happiness in a face being photographed, I hope that this work will succeed in presenting a portrait of Baviácoran women and their families, and the ways in which they adapt to a simple life which has forever ceased being simple.

CHAPTER 2

FERTILITY AND ECONOMIC CHANGE: DISCUSSION AND CRITIQUE

Fertility change is a product of the complex interaction between socioeconomic and biosocial processes. To understand how these processes eventually influence the fertility decisions of individuals, it is first necessary to consider the interface between resource exploitation, the natural environment, and reproduction, as shaped by historic, cultural and ideological traditions in a particular setting. Thus, this discussion begins with the notion of "peasantry", describing the divergent strategies that can be used by rural, agricultural populations in order to adapt and survive within the constraints set by overall national goals, as a particular nation relates to the larger world-system. Next, it places these struggles into an environmental context in which climate and geography impact not just on agriculture, but on the overall health of participants as well. Further, it links health and epidemiology to changing fertility, discussing the biological, social, and economic processes which influence reproduction. Finally, it focuses on the fertility decsion-making process, considering the contribution of all these factors to individual decisions made by women. The purpose of this chapter is not to present an exhaustive review of current thought in all these areas. Its purpose is to link related theory from diverse areas into a coherent whole which will be illustrated by the data presentation in the remaining chapters.

Agrarian Adaptation and the "Peasantry"

The productive activities of rural, agricultural populations are critical to the survival of even the most highly industrialized countries. The production of food worldwide takes place in settings which include agri-business, family farms, cooperatives and collectives, as well as the small subsistence plot of the peasant-farmer. It is this last category which has endured through the centuries in spite of all nature of hardship. Peasants show neither the inflexibility or inertia once attributed to them, nor have they all become the landless proletarians predicted by Marxists.

Instead, peasant-farmers survive and adapt as well as they can, using the means that are available to them within a given socioeconomic context.

The years of debate in anthropology concerning the notion of peasantry produced as many definitions as there were debaters. Firth (1950), saw an economic referent in the word peasantry, describing the primary means of livelihood as the cultivation of the soil or small scale production such as fishing and rural crafts. In contrast, Wolf (1955:454) based his definition not on the nature of the work done, but rather on the disposition of the product of household labor. Peasants were agriculturalists who aimed at subsistence, not reinvestment. He was among many who described the peasantry in terms of its relationship to a wider societal order, stressing a rural-urban opposition. This implied a power structure in which the peasant was subordinate (Wolf 1955; see also Kroeber 1948; Redfield 1956; Steward 1950).

Social-economic class distinctions underlay many of the older definitions of peasantry. Peasant production was seen as related to the need to fulfill obligations to the holders of political and economic power, who controlled resources and products (Halperin 1977:12; Shanin 1971). Full scale Marxist perspectives viewed the peasantry as the suppressed and exploited producers of precapitalist society. These described the peasantry's place within a social formulation dominated by the capitalist mode of production, and predicted the transformation of the class to an oppressed proletariat (see Goodman and Redclift 1982). More recent Marxist analysis argues that it is within the interests of commercial agriculture to maintain certain peasant institutions, since subsistence agriculture pays the costs of the reproduction of a labor force to serve capitalist needs (Sheridan 1983:44).

The peasantry has always faced the problem of balancing the demands of the external world against the need to provision the household (Wolf 1966). A peasant's ability to survive depended largely upon "how easy it is for him to mobilize the needed factors of production- land, labor and capital- and of course, on the general condition of the market "(Wolf 1966:15). The peasant retained his capacity to survive through his control of land and crops, maintaining not just access

to the product of his labor, but control over its disposition as well. As Foster (1967:6) noted, "it is not what peasants produce that is significant; it is how and to whom they dispose of what they produce".

The basic subsistence orientation of peasants does not imply production exclusively for one's immediate needs. As defined by Chibnak (1978:561), a peasant-farmer is "anyone who grows much of his harvest for home consumption purposes, but also sells some crops at market". This market orientation can be a strategic option in upholding the delicate balance of livelihood in relation to national, political and economic environments (Galeski 1971). Thus, there is a dual character to the peasant enterprise which allows it to respond to unfavorable product prices or taxes. This flexibility leads to a situation of power for those who practice the dual strategy. The existence of a subsistence base makes it possible for producers to explore market possibilities in a cautious and uncommited fashion. Further, the resulting cropping strategies of peasant farmers can greatly affect national economies (see Chibnak 1978).

Household Contributions to Small Scale Production

There are very few settings today in which the family can remain a closed production-consumption unit. While small communities still maintain traditional systems of reciprocity, redistribution and barter, some method must usually be found to meet escalating cash needs. Agriculture can only meet both the subsistence and cash requirements of the household when peasant farmers maintain a certain ability to assess and utilize the market to their own benefit. Under such circumstances, the full value of household labor may be best obtained by commiting it to agricultural production. The decision to do so may be influenced by such objective considerations as the conditions of the market; sources of capital; or the availability and nature of off-farm employment; as well as a subjective assessment of family needs, the age-sex structure of the household, and a non-fatalistic view of the climate. In formulating agricultural strategies, decisions concerning the wise investment of family labor must be coupled with choices concerning the allocation of land between subsistence and cash cropping. Further, subsistence crops must be

divided between food with value for human consumption, food with potential barter value, and fodder crops for household livestock (see Barlett 1980a for a complete review; also Gudeman 1978; Osterud 1978).

In developing countries such as Mexico, where land tenure systems restrict field size, efficient cash cropping strategies may be virtually unworkable (de la Peña 1981; DeWalt 1975; 1978; Wilkie 1971). In addition, the often cited lower demand for labor during non-peak periods of the agricultural cycle (Greenwood 1976; Halperin and Dow 1977) does not hold true in areas where double or tripple cropping is the practice (Belshaw 1967). The result is agricultural activity which is not sufficient to produce needed cash, but requires time commitments which severely limit wage labor. In these cases, at least one household member must leave agriculture to earn cash on a regular basis. The allocation of household labor resources between agriculture and wage labor is not arbitrary. It can be seen as related to an unstated assessment of cyclically changing returns to labor based on age and experience of household members (cf Chayanov 1966; Chibnek 1980; Netting 1968). It is less a preference for wage labor that sends younger males to city jobs (see Greenwood 1976), but the fact that they are the household members most likely to find work.

The labor contribution of women and children often becomes critical in households where male labor is divided between agricultural production and the generation of capital to support that production. Female participation is often neglected by researchers because many studies of agricultural strategies assume that the actors are male (Barlett 1980a:561). Even in those areas where women's involvement in subsistence production was once considered important, it is now frequently assumed that their roles are no longer significant (Burton and White 1984; Ember 1983; Rothstein 1982;). Because the potential wage earning power of uneducated Third World women is generally less than that of their male counterparts (Bossen 1981), it is in the home setting that women's contributions can be most critical.

The transition from food producing household economies to wage labor does not bring about the demise of the family as a labor group (Gough 1975;Sahlins 1972), but instead causes a reassignment of tasks within the family (Ferdnandez-Kelly 1981:418). As a result of this, women may take over some aspects of agricultural production completely; earn cash income by undertaking non-wage service activities such as cooking, sewing or washing (Baer 1984); or combine production and sales through local marketing of farm produce (Simonelli 1985). Women's work can be especially important in periods of economic crisis since the services and products most easily integrated into the female schedule are those which usually remain in constant demand in local communities (Nespor 1984). Thus, they maintain a continual supply of petty cash to meet daily needs at times when neither crops nor wages are producing income. Rather than resulting in the further exploitation of women on the household level, such female generated money often represents a certain degree of autonomy for women who previously had no control over any aspect of household spending.

Undoubtedly, a key to this additional earning power is that dual-strategy households put in exceptionally long workdays. Women who must meet both traditional farm schedules and contemporary work and school hours find themselves working from five to nine, rather than from nine to five. Such self-exploitation has always been a facet of agricultural households, where consumption needs were frequently met by increasing work hours. As Chayanov (1977:265) noted, "The degree of self-exploitation is determined by a peculiar equilibrium between family demand satisfaction and the drudgery of labor itself". Households will increase production levels as long as they lack adequate income to meet consumption demands. In consumer societies, demand escalates in response to perceived needs related to the availability of goods. As more goods become "needed", households will reevaluate the consumer-labor balance, reallocationg household labor to income generating tasks.

Even when household members are willing to increase their labor contribution in agriculture, additional monetary resources will only result when production and market conditions are

favorable. Though the resulting strategies are related to micro level phenomenon such as the physical environment or demographic characteristics of the family, these strategies must be considered in relation to the larger national and international economic environment. The next section will discuss this issue.

Local Economies in the World-System

The need to compete on the world market shapes a nation's demands on its domestic labor supply and resources, as does the need to satisfy certain conditions pertaining to political legitimization. These macro level considerations form the basis of political economy, a holistic perspective that considers the interface between economic processes and political institutions. As such, it integrates knowledge of culture, ideology and the state to provide social scientists with a means of understanding the larger environment in which local and individual decisions take place (Harpham and Stone 1982:16-17). To be dynamic, microlevel anthropological studies must be related to this macro framework. Contemporary national, regional and local peasant studies which fail to consider the relationship of local agricultural systems to the larger world-economy may overlook key factors influencing these investigations (Downing 1982:276).

The concept of a world-economy derives from that developed by Wallerstein (1979) to the describe the origins of the modern capitalist world-system and economy. Within this perspective, the political basis of capitalism is seen as the multicentric interstate system which emerged in Europe in the sixteenth century, remaining as a central facet of the current capitalist world-system. In this, the world-economy is depicted as containing a hierarchical division of labor between core, peripheral and semi-peripheral zones. Since Wallerstein's original formulation a modified world-system perspective, which views core-periphery relationships as a fundemental dimension of domination and exploitation in the capitalist world-economy has been advanced by Chase-Dunn (1982:11-12). The explanations of both Wallerstein and Chase-Dunn argue for a single capitalist world-system, with socialist states holding a semi-peripheral position. In contrast, others attempt to prove that socialist economies are not a product of the logic of

capitalist markets, and thus should constitute a separate socialist world-system (see Szymanski 1982:57-84). They argue that core-periphery relations are ideological as well as economic. It is clear that this is not the case. While socialist states are socialist internally, their external economic relations are still dictated by the capitalist world-economy.

The key to national financial stability is the ability to produce commodities in demand on the world market. To be able to do so, both socialist and capitalist countries seek capitalization from monetary sources which are international in nature. As a result, in today's world economy we have neither a single capitalist system nor a dual capitalist-socialist one. Instead, it is increasingly recognized that there is now a metanational system in which the internationalization of capital forms the core, and hard currency is the lingua franca of economic transactions. This system has as its foundation social forms which are both transnational and transideological (Borrego 1982:11-143). The logic of economic decision-making no longer emanates from individual core countries.

The transition to this system is based on the internationalization of capital and related qualitative changes which occured in the structure of international economic activities. As Downing (1982:270) stated, "the internationalization of capital involves a modification and increase to a worldwide scale of production and a shift in the loci of capitalist decisions away from the nation states to the international level....[It] is a process which has neither nationality nor commitment to a particular commodity or industry."

Pronounced export orientation is a prerequisite for participation in international capital. Capital in the form of loans and credits is extended only to those who appear to have the infrastructure and skills for efficient utilization of funds. This international practice is duplicated on a national level, as needed loans and credits to regions are delegated in relation to this same goal (Langman 1982). Thus, on the national level, individual countries support economic development programs which are neither consistent through time nor evenly distributed in all parts of the country. Prosperity on the household level becomes linked to these

governmental decisions, which are based on world economic demands. Consequently, the rationale of development often bears little resemblance to actual local needs. To survive, rural communities must have the flexibility to utilize long tested local strategies by manipulating the added resources made available to them as nations attempt to keep domestic production in concert with international market requirements.

Development or Modernization?

The process of development is often an attempt to impose growth oriented models of capitalist or socialist "progress" on areas which have no antecedents for either. The aim is to extract commodities and labor from a region on a scale that differs radically from traditional systems of production. Among the prerequisites for economic development, especially in the agricultural sector, is a need for social institutional change, including modification in systems of land tenure (Joraleman 1983; Newman 1981). Further, these must be accompanied by a modernization process which allows for the importation of values, culture and infrastructure associated with urbanization and technological change (Belshaw 1976:65-82).

When considering the political economy of a nation, it can be a useful tool to separate the process of development from that of modernization. Development, including economic change and industrialization, stems from the overall economic concerns of a country and relates to the productive infrastructure. In this respect, it is not always a positive process, as once implied in traditional developmental theories. Neoevolutionary in character, these theories described change as cumulative or progressive, either in terms of complexity, level of personal options, or degree of rationality (Jones 1976:22). Instead, by changing the economic structure of a region, development can actually lead to a decline in the autonomy of the area, and a dependence on outside economic inputs (see Schneider, Schneider and Hansen 1970:340). Though the number of alternative life strategies for inhabitants may be enlarged (cf Barlett 1980a;1980b;DeWalt 1979), because the inputs are non-reciprocated (see DeVillé 1982:170), the short-run outcome may be perceived of locally as negative.

In contrast to the economic connotation of development, modernization can be seen as deriving from the concerns of political legitimization. Improvements in non-productive infrastructure, including sanitation, health care, mass communication, transportation and education are often the legacy of political struggles in which social obligations are part of the price of stability. Often, monetary difficulties will force a nation to prioritize the requirements of development and modernization. When this is the case, it is likely that resources will be diverted to the economically motivated demands of development before meeting the politically motivated demands of modernization. Because the two processes are interwoven, this can be self-defeating. When modernization is underfinanced, infrastructural changes keyed to impact on economy can undermine development programs. In addition, underfinanced "improvements" related to health and sanitation may actually be ietrogenic, as the "cure" becomes the cause of new problems.

Though modernization does much to improve the standard of living in rural areas, it is clear that the poorer majority of rural people in the Third World do not share proportionately in these fruits of economic growth (Chambers 1981:1-8). However, though rural poverty is in part related to the worldwide economic environment described above, it is also intricately related to the overall physical environment. This will be demonstrated in the following section.

The Impact of Seasonality and Cyclicity on Rural Populations

The key to adaptation in any ecosystem is the consideration of all the existing constraints to life. In rural areas, development and modernization programs can disrupt long tested patterns of adaptation by producing changes in lifestyle which disrupt ecological relationships. Though these changes may be technological improvements in production or standard of living, they may also be the importation of the daily rhythm of urban living, as seen in wage labor or education. In non-temperate climates, seasonal change demands a flexibility that is not characteristic of urban schedules. While urban dwellers can meet the extremes of heat and cold, wet and dry with technological modifications to the environment, in rural areas it is often only the elite who are able to take advantage of such improvements. The rural poor remain under the influence of

seasonally adverse factors which interact and reinforce each other at certain times of the year. This following section will discuss the way in which these seasonal and cyclical changes in climate affect the adaptations of rural populations in arid environments.

Adaptation to Arid Lands

Twenty to thirty percent of the earth's surface is comprised of arid or semi-arid desert lands. These are characterized by low and random distribution of rainfall, high levels of solar radiation, high daytime temperatures, high evapo-transpiration rates, and a scarcity of vegetation during large parts of the year. Because they are not homogeneous, each type of desert displays unique variations in daytime temperatures, level and seasonal distribution of rainfall, and vegetation. Surface heating is rapid, but cooling can be just as rapid once the sun sets. During periods of sudden rainfall, water runs down poorly vegetated slopes, along gullies, forming alluvial fans rich in sediments. In areas where it is possible to capture or divert water, conditions will be favorable for human populations (Moran 1979:174-176).

In some arid areas, characteristics of tropical climates combine with those of temperate zones to produce extreme seasonal changes. As a result, wet season-dry season patterns produce rainfall at certain times of the year, while annual temperature fluctuations may be more than 100 degrees fahrenheit (see Walsh 1981:11). In addition to such seasonal fluctuations, these areas are also likely to experience cyclical changes in which years of drought or inundation alternate with "normal" years.

Human groups in desert environments must develop adaptive strategies which take into consideration both seasons and cycles. Individual survival requires behaviors which conserve water, while permitting constant cooling through effective sweating. During the summer months, individuals who live and work in arid lands are constantly threatened with dehydration and dangerous heat loads. Body water must be replaced by continual intake of fluid; urine volume is decreased; and the salt concentration of sweat is reduced, preventing cardiovascular inadequacies and muscle cramping. Though these physiological acclimatory adjustments occur, it is social and

cultural modifications which are most critical. These include diet, clothing, shelter, and activity schedules designed to avoid exposure to strong sun or the drying effects of extreme temperatures (Moran 1979:204).

In arid and semi-arid areas, centuries of adaptive modifications produced social and cultural patterns which maximize physiological performance under conditions of temperature extremes. People who depend on agriculture and animal husbandry for subsistence live in close contact with natural communities of plants, animals, insects and micro-organisms. With the coming of the wet season, all members of the ecosystem begin a period of growth and renewal. It is not just crops and animals which prosper, but insect vectors and micro-organisms responsible for the spread of disease as well. As a result, agricultural production requires high labor input at a time when the human body is subject to great stress. Under these circumstances, climatic, environmental and human factors combine to produce a synergistic impact on the epidemiology, demography, and health status of the rural poor.

Seasonality and Disease

The continual ebb and flow of seasons stimulates changes in the relationship between the disease process and its human host. In arid areas, climatic extremes influence the frequency and distribution of disease; the interaction of disease and individual health status; and the ability to utilize sanitary improvements and medical care. Micro-organisms are a natural part of the ecological balance in this environment. Though capable of replication in minutes or hours, in a constant environment a generally stable equilibrium usually holds. Humans, as agriculturalists or industrialists, intrude on that equilibrium, interrupting the evolution of disease producing organisms, and providing the necessary conditions of host and reservoir needed for the spread of infection (Burnet and White 1979:137-154).

Of all the seasonal contrasts, it is the coming of the summer rains that is most striking. When the spring dry season draws to a close, the human body is often at its weakest. Among subsistence farmers, food stores from the last harvest are depleted, while cash reserves are destined for

investment in the upcoming crop. Livestock may also be half-starved, causing milk production to decrease. Since vegetation has not yet emerged, neither domestic animals nor human gatherers can take advantage of its potential sustenance. Prices for imported foods reach peak levels, as demand for packaged goods increases (Chambers 1981).

Agricultural activity at the onset of the wet season requires high energy expenditures from all household members. For the most part,the variable crop-planting strategies related to subsistence farming compensate for irregularities in food supply, in order to reduce the levels of risk to which producers are exposed. In contrast, mono-cropping for commercial purposes intensifies seasonal cycles of plenty and hunger. If not exported, such rural productive enterprises often meet the needs of wealthy townspeople, denying the producers themselves their daily food needs. It has been suggested that market agriculture actually increases the amount of energy needed to obtain sufficient calories. Further, by limiting the diversity of foods produced, patterns of intra-family food redistribution are endangered (Fleuret and Fleuret 1980:252-254; Haswell 1981).

Individuals who find themselves in a state of nutritional deficit at the start of the wet season enter into a synergistic relationship with infection. As temperature and humidity begin to soar, clouds of insects emerge to complete whole life cycles in the space of a few days. With the onset of rain, water gathers to provide the breeding ground for vector-borne diseases such as dengue and malaria. At the same time, runoff from storms transfers bacterial pollution to water sources, causing peaks of some diarrheal diseases during the heat and inundation of the early rains (Bradley 1981:127-130). Thus, the frequency of disease producing conditions increases at a time when the infection fighting defenses of the human host are greatly diminished.

In many regions, further pressure is added to these environmental stresses by both cultural practices and the modernization process itself. Exposure to mosquitos, flies and other disease bearing insects is increased when families sleep out of doors to take advantage of nocturnal cooling. Grazing of cattle in faraway pastures increases the possibility that milk destined for local

consumption will become contaminated. Though electricity and refrigeration have been extended to rural areas, the availability of these is also influenced by heat and rain. Use of fans and coolers during afternoon heat can push inadequate electrical generating systems to their limits, as do the electrical storms which are a hallmark of arid climates. When the current fails, refrigerated foods are left to warm to temperatures which support the growth of diarrhea producing organisms.

Potable water systems are also dependent upon electricity for power. If the pump fails, individuals frequently resort to using unsanitary water sources. Thus, the incidence of childhood diarrhea, food poisoning and enteric fevers such as typhoid, rises in response to heat and rain aggravated conditions (see Rowland et al 1981: 173-174). At high risk in these situations are infants, who are often weaned to formula as women return to extra-household duties at the start of the growing season (see Corell 1983:711).

Persistent diarrhea can lead not just to nutritional deficit, but also to electrolyte imbalance. The latter condition is further aggravated by high ambient temperatures which cause loss of body water in the form of sweat. Water requirements increase proportionately with increase in activity level and temperature (Moran 1979). However, heat related fatalities result less from single temperature peaks than from the effects of persistent heat over a period of consecutive days. Under these conditions, the very young, the very old and those whose health has been compromised are at highest risk. In urban areas, and among the rural elite, the use of air conditioners reduces the impact of dehydration and heat related infirmities (Greenberg *et al* 1983). In the absence of these, the *siesta* or midday rest provides a respite from excessive temperatures in many parts of the world. However, as urban work and school schedules impinge on rural lifestyles, the adoption of comfort-producing devices does not keep pace with the steady reduction of the *siesta* period. Thus, proven adaptations to seasonal variability are slowly being modified in response to urban demands.

In contrast to tropical climates where temperatures remain almost constant year round, arid lands experience annual temperature fluctuations which can exceed those of temperate zones. The

physiological stress brought on by the heat and rains of summer alternates with winters in which inhabitants must endure freezing temperatures and a second rainy season of persistent cold precipitation. In these areas, adjustments to living designed to maximize comfort during the summer months work against residents during the winter. Heat generating sources such as fire hearths are often located out of doors and are useless as sources of indoor heating. Though high heat capacity building materials such as adobe absorb heat during the daytime, it is reradiated during the night. Children and women whose daily activities keep them grouped indoors during the daytime are susceptible to cold related infections, including influenza, pneumonia, and bronchitis (Mausner and Bahn 1974).

Climatic changes influence not just the epidemiology of disease, but the decision to seek medical care as well. In rural areas, treatment by physicians is a function of accessibility of services, availability of cash, and traditional beliefs concerning disease causation. Coreil (1983) examined the link between medical treatment and seasonal cash flow among a rural agricultural population. In contrast to previous studies which concluded that more medical care is purchased during high cash periods (see Weise 1974), she found that beliefs concerning the debilitating effects of climate produce a negative effect on care-seeking behavior during harsh weather, even when money is available. According to Young (1981:149-151), availability and possibility of transportation has a stonger effect on the decision to consult a physician than monetary concerns. This is reinforced when wet season rains and flooding make health practitioners inaccessible to both pedestrians and those with transportation.

The above discussion describes the ways in which seasonal and cyclic factors can impact on individual health status. These same factors can also influence the reproductive success of women and the survival of their children. As Wood (1983:81) summarizes, " the ability to produce living children who, in turn, will successfully respond to their environment's disease pressures and will reproduce themselves is tied inextricably to the disease configurations and the cultural circumstances that confront the reproductive woman and her children." In agricultural societies,

children born during times of plenty may be better equipped to resist the seasonal stress which results from temperature and/or rainfall.

Consideration of how climatic variables such as these impact on season of birth is a subject that has been debated for decades. Seasonal birth patterns have been linked to greatly varying climatic and cultural circumstances. Among these are the avoidence of sexual activity during hot weather; extreme temperatures or rainfall(Thompson and Robbins 1973); and relative workload in the month of conception or birth(Nurge 1970). Pasternak (1978) proposed that the reliability of food supply as a result of the productive cycle has a decisive influence on birth seasonality. As in the case of disease, it is the intervening variable of diet which may link conception to the cyclicity of production among peasant cultivators (Mosher 1979).

Acceptance of a seasonal or cyclic pattern of conception or birth raises the related question of whether women conciously time conception so that children will be born at low stress periods of the year. Decisions such as these are a part of the larger debate concerning fertility decision making and are tied to the two-way interaction of biosocial and economic variables which influence reproduction. These issues will be reviewed in the final section of this discussion.

The Fertility Desicion-Making Process

In the past decade, anthropologists joined with economists, sociologists, and demographers in attempting to present a theory of fertility change which could challenge the primacy of a western model of demographic transition. The model, which correlates population change with industrialization, could not explain demographic trends in non-western countries. While accepting the model's strength in parsimony, simplicity and predictability, researchers noted that it was merely descriptive and did little to further the understanding of the mechanisms of fertility and demographic change. As a result, multi-disciplinary perspectives emerged which attempt to shed light on fertility regulating behavior.

It has been noted that socioeconomic factors do not impact directly on fertility, but do so through a series of intermediate variables, or proximate determinants. This recognizition is

based on early work by sociologists Davis and Blake (1956). They showed that to affect fertility, a factor must do so through one or more of the biological processes comprising reproduction. During the past decade, Bongaarts (1976;1978) considered the Davis-Blake variables, concluding that fertility has seven proximate determinants. These include marriage (and marital disruption); onset of permanent sterilty; post-partum infecundebility; natural fecundebility or frequency of intercourse; use and effectiveness of contraception; spontaneous interuterine mortality; and induced abortion. According to Bongaarts, the first two of these determine the duration of the reproductive period, while the remainder determine the rate of child bearing and the duration of the birth interval. Observed variations in fertility of populations are the result of variation in one or more of these proximate determinants (1983:5). This is also true in the case of individual fertility.

Discriminating further, Bongaarts distinguishes between natural fertility (occuring in the absence of deliberate birth control) and regulated fertility. The latter occurs through the proximate determinents of marriage, contraception, and induced abortion. The former is a function of postpartum amenorrhea, age at marriage, waiting time to conception, and less importantly, spontaneous interuterine mortality and permanent natural sterility (ibid.). It has been noted further that the total fertility rate of a population can generally be accounted for by only four proximate variables. These are 1) proportion of married women; 2) the average duration of postpartum infecundebility; 3) the rate and effectiveness of contraception, and 4) the rate of induced abortions. In addition, the age pattern of child bearing is also critical in population change (Handwerker 1983:7).

The question of why regulated and natural fertility undergo changes in a population is linked to both biosocial and economic processes. Explanations derived from evolutionary biology, demography, economy and anthropology will be reviewed below.

Evolutionary Biology and the Demographic Process

Evolutionary biology maintains that an individual strives to maximize inclusive fitness, as defined by personal genetic representation in the next generation. A means of achieving this is to have as many reproductively successful offspring and close relatives as possible. If this is the case, then a demographic transition in which fertility declines without a corresponding decrease in available resources would appear to be a contradiction of the fundamental postulate of evolutionary biology. To address this contradiction, Barkow and Burley (1980) use a sociobiological perspective concerning the phenomenon of human fertility and the demographic transition. Their review of demographic transition literature convinced them that the theory, as originally presented, is a valid one. Development and mortality decline are noted to be consistently correlated with natality decline in a general way. To account for this, they surveyed evolutionary biological concepts, formulating two contrasting hypotheses to try and explain the transition.

In the first of these hypotheses, a quality versus quantity explanation utilizing the assumption that human beings are "K-selected" is advanced. K-selection involves the emphasis on quality rather than quantity in the reproductive strategies of a species within its ecological niche (Barash 1982:306). This first hypothesis, as applied to humans, is summarized by stating that "men in traditional societies might typically maximize their fitness at the expense of their wives, by forcing them to bear more children than in optimal behavior. With modernization however, women become free to follow their own best strategy; in a sense, females are K-selected compared to males (Barash 1982:306)."

To understand the quality-quantity trade off in human reproduction, one must determine what constitutes the "quality" of a child, and the amount of related "investment" which would be useful. Parents devote much of their income to their offspring, allocating it among their children. However, to have a biological meaning, this economic aspect must be understood in terms of reproductive success. According to Barkow and Burley (1980:160), an "individual optimizes his

reproductive success by strategically apportioning his economic resources so as to fall on the line of greatest possible utility. Beyond a certain point, increases in investment per offspring yield no inclusive fitness benefits ". To use an economic analogy, one can utilize a principle of economies of scale in reproductive strategy, or rather, "biologies of scale".

Despite the possible utility of this argument, Barkow and Burley (1980) determined that it failed to explain why affluent people in expanding societies should choose to restrict reproduction when conditions are ideal for expanding it. They believe that a second hypothesis, based on parental investment theory, has more potential for explanation (Barkow and Burley 1980 :164-167). To summarize,

> Human conciousness may have led to a reluctance by women to reproduce. With modernization and a reduced influence of mates and kin, women may finally be choosing to reduce their reproduction in a manner that maximizes their happiness, if not their fitness (Barash 1982:306).

To understand parental investment, one must also consider the quality-quantity trade-off, because the amount of energy available to an organism to invest is finite. Males and females are not equally affected by the quality-quantity dicotomy; therefore, male tactics in reproduction might not correspond to those of the female. Though males contribute some kind of aid to their offspring, they may deceive females by over-representing the amount of aid that they are willing to provide (Barash 1982:169).

Within this context, the effect of modernization is seen as increasing the amount of control women have over their own fertility, and as decreasing the influence of men (and mothers-in-law) in forcing fertile women to over reproduce. Thus, the demographic transition is related to the increase in the power of women to control their own fertility, and the reduction of control over them by males and older women. It is related to the fact that humans tend to practice non-adaptive fertility control, as a result of the special traits of intelligence and behavioral flexibility. According to Barkow and Burley, the main evolutionary-ethological contribution to resolving the

problem of the demographic transition is the above assumption concerning the autonomy of women, which has been derived from theory of parental investment (Barkow and Burley1980:178).

Draper and Harpending (1983) also use the notion of parental investment to explain divergent reproductive strategies, exploring the reasons why parenting techniques change from low to high investment when mortality falls. They noted that human parenting strategies range from those in which biological parents are primary socializers to those in which children in early childhood are nurtured by a multi-aged group of peers.They believe that the difference in environments produced by these strategies can lead in later life to differing perceptions of available resources. Further, these resources include not just economic, but also finite parental energy for supervision and interaction with children. As a result, parental care can be an important source of behavioral variation among humans. Decisions concerning the number and quality of offspring can be viewed as a means by which humans compete over resources (1983:18).

An effect of modernization is to change the physical and social interaction between parents and children. Young adults participating in urban modernization are products of peer group raising, and might be expected to practice a reproductive strategy which favors producing more offspring. Draper and Harpending note that young adults maintain ties with relatives in rural areas, and often send their children back to the village for rearing. This is seen as temporarily solving the problem of what to do with children when the familiar rural peer caretaking system is no longer available to absorb them. Parents who do so are seen as continuing to behave as if resources were abundant, and it is conceivable that their own children might also do so as well (Ibid.:44-45). In contrast, as this research will show, some young adults who were peer raised themselves are choosing reproductive strategies which favor fewer offspring. This may be partially explained by the fact that just as urban children are sent by their parents to the country, rural teens are often sent by theirs to relatives in the city. Thus, they are exposed to the climate of scarce resources before their own reproductive careers begin. This may partially account for the fact that when change comes, it often does so rapidly.

The Impact of Socioeconomic Factors on Fertility

Evolutionary biology proposes that a crucial variable in understanding demographic trends is the changing patterns of child care which result from modernization. Further, it presents the notion of parental investment in terms of investment of energy, emotion, and time. In contrast, Caldwell (1982) suggests that it is economic investment, and the direction of wealth flows that is critical. According to his model, wealth flow in traditional societies goes from children to parents. In contrast, in modern states, the flow is from parents to children. Therefore, in the latter case, it is advisable to limit fertility because each additional child requires more investment, competing with siblings for resources.

When industrialization and urbanization occur, high fertility may often persist because of the continued economic and non-economic benefits associated with the extended family, even if they are dispersed geographically. Though need for the extended family is reduced, it still remains an efficient unit for profiting from variable and unpredictable economic opportunities. According to Caldwell (1982:110), "it has proved surprisingly efficient in selecting and financing children to climb the educational ladder to high salaries , ultimately reversing wealth flow." For Caldwell, the critical factor is not necessarily the exportation of the European economic system, but that of the social system which accompanied it. As he so aptly notes, "If there are thresholds for the demographic transition, they are likely to be levels of education, literacy, urbanization or occupation which, with a certain level of exposure to imported culture, hasten familial changes and lead to a different economic calculus with regard to fertility (Caldwell 1982:112)."

By uniting the perspectives presented above with those of Bongaarts and others, it is no longer necessary to look at high fertility as uncontolled or irrational, supported only by religious precepts and unthinking cultural norms. Similarly, low fertility is no longer rationally controlled fertility reflecting an orientation toward achievement and universalistic norms. High fertility is parity independent; low fertility is parity dependent. Both are economically rational, with specified parental utility functions and budget constraints which, like the proximate

determinants, reflect culturally definable problems of subsistence varying over space and time (Handwerker 1981:1; see also Coale 1983).

Clearly, cultural-economic explanations of demographic change such as that of Caldwell and Handwerker are not at variance with sociobiological theories of parental investment in reproductive strategies. As economist Gary Becker (1976:818) observed:

> The approach of the sociobiologists is highly congenial to economists, since they rely on competition, allocation of scarce resources and adaptation to the environment. Yet sociobiologists have stopped short of having rational actors who maximize utility functions subject to limited resources (1976:818).

Rational Fertility Decisions

Reproductive behavior is a product of a complex assessment of the natural and sociocultural environment. Understanding of that behavior results from a careful analysis of both the reproductive and non-reproductive decision making process, and the factors which shape such decisions.

Nardi (1981:30) views factors which influence reproduction as either deterministic or self-regulating. She states that:

> deterministic factors involve no element of personal choice or purposeful behavior; demographic outcomes are determinmed for individuals by external factors over which they have no control. Deterministic factors impinge upon individuals in such a way that they make no deliberate decision as to their operation or outcome. They are primarily biological or environmental in nature and they effect both fertility and mortality (1981:30).

In contrast, self-regulation in population control is represented by ways in which individual parents manage their reproductive lives. Demographic process is viewed as the outcome of rational action and human intention. The study of fertility regulation becomes the study of regulatory behaviors including abortion, infanticide, sterilization, and abstinence.

Nardi proposes an integration of concepts concerning deterministic and self-regulatory variables in models of demographic process. It is her belief that the mechanism for achieving integration is the use of decision-making models. Barlett (1980c) also advocates the use of a

decision-making model as a means for understanding fertility. She notes that three anthropoploical orientations: ecological, cognitive, and statistical aggregate, can be used to contribute insight into studies of fertility behavior. Drawing from the ecological paradigm, Barlett isolates two groups of macro level variables, the natural environment and the social environment (including political institutions, economic influences and other social factors). Within this framework, behavioral patterns may be seen as responses to the environment. Population change can occur when parental behavior in caring for and feeding a child interacts with biological factors in health and illness. Thus, the relationship between food intake and fertility (Bongaarts 1980: Frisch 1978, 1981), as well as attitudes toward lactation (Harrell 1981) would influence decision-making on this level. Patterns of infant and early childhood mortality also become critical factors in moderating population growth (Scrimshaw 1981; Wood 1983).

According to Barlett (1980c), the interaction of natural and social environmental factors influence behavioral options available to households and individuals. Family resources such as land, labor, information and other skills determine, and are determined by, needs and goals. These include aspirations for the future and basic subsistence needs which vary throughout the life cycle. Numerous studies have addressed this relationship between demography, household and subsistence. They include Netting et al (1984); Bossen (1981); Rothstein (1983); Ryder (1976); and Simic (1973). The interaction between land, labor and fertility is discussed by Lee (1980); Nerlove (1974); and Sweet (1982); while Caldwell (1982); Gussler (1980); and Willis (1980) address the issue of future aspirations. Masnick and Katz (1976); and Nag's many discussions of the economic value of children, (especially 1981; 1976), examine the relationship between fertility, subsistence and economic cycles. Finally, Schumann (1984); and Stycos (1971) consider the influence of traditional values, religion and ideology.

It is Barlett's contention (1980c:171-173) that all of the factors just mentioned are weighed and balanced in the individual cognitive decision process. Here, past personal history, perceptions

and other psychological variables can contribute to an eventual decision and ultimately, a behavioral outcome which can impact on fertility and the demographic process . It is this research, concentrating on the decision-making process of *individuals* as they create their families *with definate goals and plans in mind* (italics mine), which will be an important anthropological contribution to population studies (Nardi 1981). In spite of much work which concentrates on the decisions of households and couples together (see Beckman 1983; Hollerbach 1983), it is the decisions of individuals, especially women, which may prove to be the critical element in determining reproductive stategies.

Individual Decisions and Societal Constraints

Both individuals and households must make fertility desicions within the policy context set by their own governments. Often, individual goals may be in conflict with the societal. Governments, whether they are socialist or capitalist, often view human beings as economic commodities. To a great extent this is expressed in terms of health, work, and loss to productivity (cf Feldstein 1979:15-29; Rice and Cooper 1967), and in a general theory of human capital as developed by Becker (1964). In addition, both the United States (Bradbury 1977; Morgan, Johnson and Burt 1983) and several socialist countries have attempted to determine effects on fertility which might result from the provision or curtailment of income derived from social programs. Thus, the demand for labor and the constraints of the environment may shape a nation's population policy.

Nardi (1981:11-46) discusses demand for labor, and the requirements of productivity, on both the societal and individual level. Citing Coontz; Marx; and Faris, (see also MacFarlane 1978), she notes that expanding production requires population growth. "Producers no longer really control decisions about population planning, but reproduce in terms of the demands of the production system, now controlled by the ruling class (Faris 1975:265)." In this light, understanding of demographic change derives from an analysis of individual and household decisions about age at marriage, birth control, and family size within limits set by a specific economic, social and political system (Ferdnandez-Kelly 1981:416).

The relationship between demand for labor and these individual and household decisions concerning fertility has been examined in the context of studies discussing the economic value of children. Societies maintain a strategic interest in children as economic commodities. Individual households, on the other hand, have a tactical interest, in so much as they are concerned with the production of an immediate labor force. This is especially true in agricultural societies, and alters as modernization occurs. This notion is addressed specifically by Mamdani (1974), Nag (1981;76) and White (1973) for traditional societies, and is also a basic facet of Caldwell's thesis (1982). Minge-Kalman (1978) discusses this same issue for early industrial societies, concluding that during this era, children were accepted as a market for family labor.

Women are, literally, the means of production in the reproductive endeavor. Their roles in child bearing and child rearing are comprised of domestic relationships which must be acknowledged as part and parcel of the political structure of a society. As Leacock (1978:xii) states:

> It is not the family that keeps women in an inferior position in the labor force and in society, but the need for women's marginalized role as workers and as the unpaid producers and reproducers of the labor force that is responsible for family organization and its social-psychological concominants.

The subordination of women does not necessarily result from the division of socio-economic activities into women's and men's domains. The articulation of a particular society within the international economic and political order may determine whether the status of certain groups improves or regresses (Ferdnandez-Kelly 1981:415). A society's official attitude and policy towards women's productive and reproductive roles may modify in response to the demands of international capitalization.

Summary

This chapter reviews the complex interaction between economic, political, biosocial,and environmental processes which eventually influence the fertility decisions of individuals. Though the atmosphere produced by these processes can help shape reproductive strategies, ultimately it

is a decision made by individuals as both household members and independent persons. The requirements of modernization encourage agrarian households to modify both their child rearing practices and economic strategies. Women experiencing a new autonomy as household decision makers may extend that power out of the economic realm and into the area of reproduction as well.

CHAPTER 3

THE GEOGRAPHY AND POPULATION OF THE MUNICIPIO OF BAVIACORA

> Sonora is altogether a blessed country. It's hills and valleys shine with gold and silver mines.....The fertility of the soil incites wonder. It produces incomparably all plants, trees and growing things which require rich soil and warm air.....On the hills as well as on the plains, there are the most excellent pastures, where grow in superabundance the choicest grass and all kinds of healthful herbs (Pfefferkorn [1794] 1949:42).

> I never cease to be amazed at the variety of insects that are found here. The natural environment has produced almost infinite possibilities;- one for every conceivable eventuality of climate, terrain and season. They are much like the strategies of the people here. They, too, try to be prepared with as many options as possible (Field Report #3: 6/9/84).

Geography and Physiography

The Sonoran Desert presents a wonderous series of contrasts. Though the notion of desert conjures up an image of endless shifting sands and dryness, it is in reality a region of micro environments in which the possibility of plenty alternates with the threat of devastation. The municipio of Baviácora is located in this setting, occupying 85,896 hectares of land in the drainage of the upper Río Sonora. Located at 29° 43' north latitude, and 110° 9' west longitude, the pueblo *cabecera* (county seat) of Baviácora is actually only 289 km. south of the Mexican-American border (M.E.B.E. 1984:5-6).

Recent maps show that Sonora Highways 21 and 118 follow the Río Sonora north from Hermosillo through the upper valley to connect with main arteries at the mining center of Cananea. In spite of frequent promises, rail service was never extended into the valley. During rainy seasons, travel north from Baviácora by motor vehicle on the newly completed highway is often curtailed by flooding.

The southern entrance to the upper Río Sonora Valley is guarded by the Cajón de Ures. This winding *barranca* (gorge) is rimmed by 33 km. of rapidly rising cliffs, which begin at the tiny

pueblo of Puerta del Sol, and end at Mazocahui in the municipio of Baviácora. The Cajón marks the boundary of the lower Sonoran Desert. Here, the lower Río Sonora cuts southwest across the coastal plain toward the Gulf of California (Doolittle 1979: 94-95). Historically, the *Cajón* divided the Opata country in the north from the Pima settlements to the south. As the Spanish explorer Cabeza de Vaca noted, "....it is the passageway to many provinces which are on the South Sea; and if those who go to seek passage should not enter through it, they will lose their way (Sauer 1932:17)."

Baviácora is the first municipio encountered after crossing the Cajón de Ures. Channel bottom altitudes within the municipio range from 492 meters above sea level near Mazocahui in the south, to 620 meters at the pueblo of Baviácora. Within the municipio's boundaries, the Sierra de San Antonio to the west rises 1500 meters, while the Sierras Verde and Pinta to the east are about 1400 meters each in altitude. Nearby, the Sierra de Aconchi to the northwest of the pueblo of Baviácora is the highest point in the area at 2180 meters (Doolittle 1979:95; M.E.B.E. 1984:6; SARH Document: # 1; SPP : Hoja # 12-8).

The municipio is located in the Mexican transition zone of the North American Basin and Range physiographic province. In Sonora, the province is comprised of a series of more or less parallel ranges, approximately thirty km. apart, with elevations which increase in height from west to east. In the Río Sonora Valley, the usual north-south orientation of the Basin and Range transition zone changes to north-west-southwest. Peripheral mountain ranges are closer together in the municipio than they are in other parts of the Río Sonora Valley to the north. The river cuts its main channel diagonally between the adjacent mountains, with bajada (thick alluvial deposits) development more extensive to the east than it is to the west (Doolittle 1979:94-99).

The features of the Sonoran Desert landscape result from relatively recent and violent mountain forming processes (Dunbier 1968:8). Volcanic activity, dating to the Mesozoic in the western ranges, persisted through the Pliocene period. The materials comprising the base of the bajadas originated as alluvium and colluvium from the eroding Mesozoic-age granite montains in

the west. Later, the products of the erosion of Cenozoic age mountains to the east covered the bajada alluvium. Though some of the western slopes are comprised entirely of Mesozoic age deposits, the more common picture is an assymetry of deposition of older and younger material. Tertiary volcanic activity is responsible for the Serrita de Baviácora, located about 10 km. east of the pueblo. This is a large, weathered volcanic dome surrounded by extrusive flows, which also underlie Baviácora itself.

Violent geologic activity in the Río Sonora Valley ended in the Pliocene. Recent evolution of the landscape derives from the processes of erosion and sedimentation, which are closely controlled by the prevailing arid conditions (Doolittle 1979:112-121; Dunbier 1968: 8-14). The resulting terrain rises gradually away from the flood plain and is characterized by a rugged mixture of hills, bluffs, bajadas, mesas, and arroyos. Level land is found principally along the river channel, and along the sides of the larger arroyos. Between the municipio's northern boundary near San José de Baviácora and its southern most limit at Mazocahui, the average width of the flood plain is approximately 1 km.. This includes sections south of La Aurora where there is sometimes less than three hundred meters of cultivable land (Figure 3.1).

The Río Sonora meanders through this land, alternately depositing silt and sediment, or causing extensive degradation. The result is a stream channel whose course has altered considerably in recent years, within the limits set by adjacent bajadas. It is in the *milpas* (flood plain fields) of this area that most irrigated agriculture takes place.

Hydrology and Climate

> Since the heat in May, June, and July is already so intense, it would necessarily be quite unbearable during the hot season in August and September were the heat not moderated....by daily rains. Consequently, this season is called *tiempo de aguas*, or the rainy period. The rain is not continuous, but passes off in two or three hours....These rains would be considered a priceless blessing of nature were they not always accompanied by the most horrible thunder storms....At times [these] bring with them a damaging hail which destroys all growing things in the field or garden....or there may occur a ruinous cloudburst....called

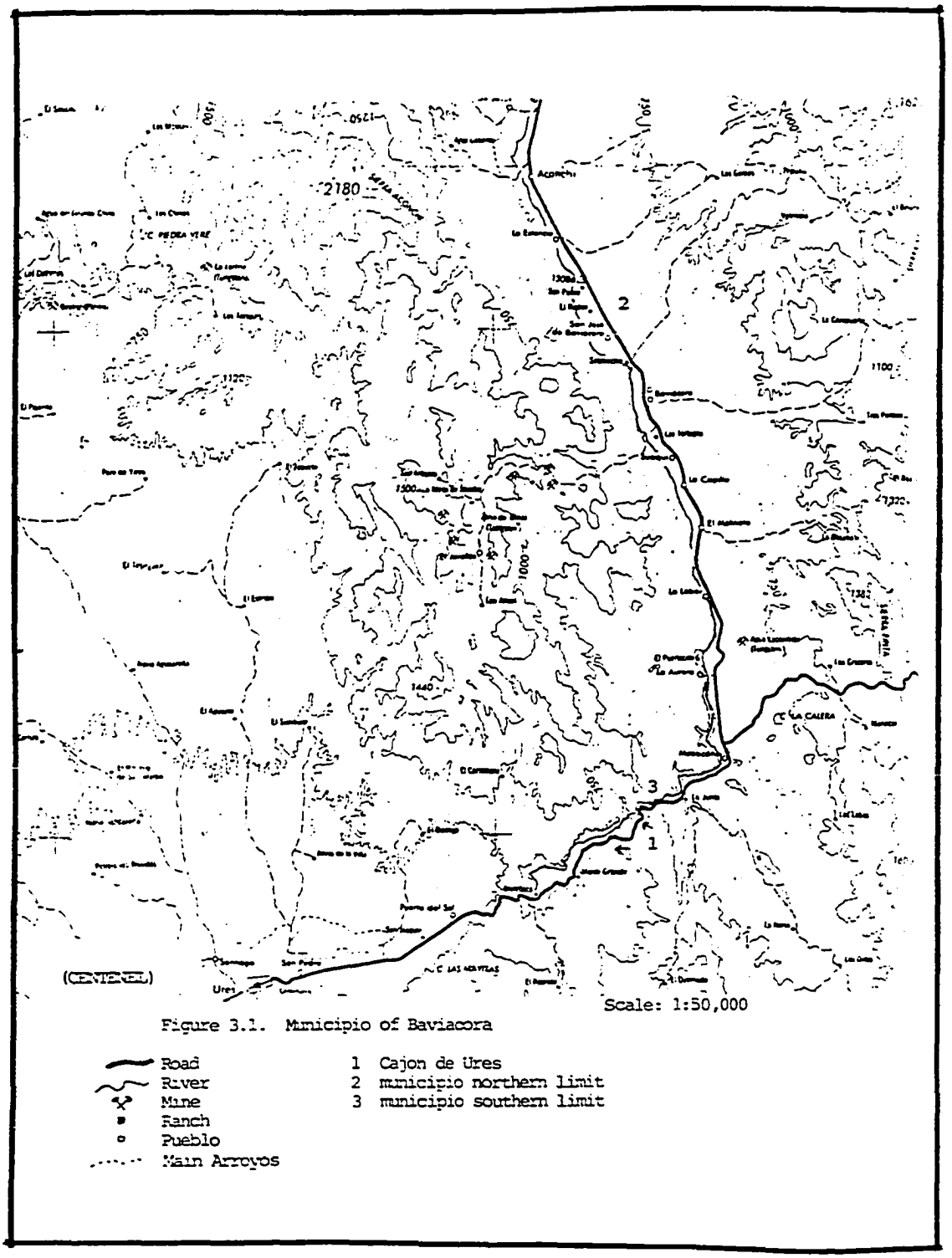


Figure 3.1. Municipio of Baviacora

Road
River
Mine
Ranch
Pueblo
Main Arroyos

1 Cajon de Ures
2 municipio northern limit
3 municipio southern limit

Source: SPP Carta Topografica 1:250,000. Hermosillo H12-8

> *culebra de agua,* or water snake, which floods over country and villages devastating them (Pfefferkorn [1794] 1949:41).
>
> "Whatever happened to the warm, dry Southwest? The night rains continue, the days are cloudy and damp. Mid-day temperature outside is about 55° (F). Indoors, its about 58°. Since this is not all that cold, I can't wait to see what happens when the frosts arrive. Up river, the *vados* (low water bridges) are impassable once again, as the river rises with the winter rains (Field Report #24: 11/19/84).

The Río Sonora is described as an intermittent stream which originates on the desert margins. It rises in the mountains southeast of Cananea, flowing southwest to Arizpe, where it is joined by the Río Bacanuche (Roca 1967:149). Its headwaters are found near the pueblo of Bacoachi, in an area where rainfall regularly exceeds 508 mm (20 inches) per year. Though parts of the river both north and south of Baviácora may experience a dry period during the non-rainy months of spring and autumn, the largest stretch of uninterrupted flow is found in the Baviácora area. According to Doolittle (1979:105), this is a result of the combination of three factors: dependable groundwater sources; the downstream flow from the head of the stream; and the rainfall received in the peripheral mountain ranges surrounding the Valley. The latter condition deposits water in the main channel of the river during the rainy months via the many arroyos which cut through the bajada. Dunbier (1968:92) notes that during five months of the year parts of the Río Sonora may have little or no streamflow, resulting in a 7.62 mm (0.3 inch) average over the Sonora River basin. Doolittle (1979:99), however, points out that the increase in irrigation over the last century may actually account for much of the loss of streamflow.

The shape and width of the channel and flood plain is in part related to the economic activities which support the municipio's population. In their agricultural endeavors, farmers use brush weirs or living fencerows of cottonwood and willow, to divert water through *acequias* (canals) into the *milpas* (fields) (Nabhan and Sheridan 1977). At the same time, upland grazing of their livestock reduces vegetation and increases runoff. This is carried down and into the major arroyos

of the municipio, which feed from both the east and west sides of the river during heavy rainfalls (Figure 3.2).

The Río Sonora's channel and flood plain are formed by frequent floods rather than perennial flow, as occurs in most Sonoran watersheds (see Sheridan 1983). Consequently, excessive degradation has occured both in the arroyos and along the river course during the last decade. Flooding along the streamways of northern Sonora usually takes place in the four months beginning in July. According to Dunbier (1968:94-95), in nine out of ten years, this produces 98 percent of the Río Sonora's total runoff. The tenth year is often characterized by an unusually heavy winter rain that can produce flood waters which exceed the total flow of the entire summer season.

Major floods occured in northern Sonora in 1905, 1914, 1926, and 1940 (Sheridan 1983:81). More recently, a period of drought which ended in 1977, was followed by seven years in which high rainfall produced incidents of flooding. The most serious of these occured in 1978-79, 1983, and 1984. During thirty-six days beginning on October 5th, and ending on November 10, 1983, excessive stream flow from the Sonora and San Miguel Rivers forced officials to release water stored behind the Abelardo Rodriguez Dam near Hermosillo. This was repeated during August and September of 1984, when the reservoir was filled to within 2.5 million cubic meters of its 253.5 million cubic meter capacity (Sonorense: 9/9/84). The flooding in the late summer of 1984 was followed by yet another deluge during the following winter.

The inundations of 1983, 84 and 85 augmented a process of flood plain degradation which began in 1978. According to SARH (*Secretario de Agricultura y Recursos Hidralicos*), the seven years of periodic flooding resulted in a thirty percent loss of cultivable land in the upper Río Sonora Valley. Locally, campesinos blamed this on the decline of traditional methods of water control, including the living fencerows cited previously. These once provided a certain degree of natural protection by forming a network of trees and shrubs to impede the flow of the water onto the land (Informador del Rio: 9/26/84). The years since 1977 are unique in that they deviate from the usual Sonoran Desert pattern of rainfall. Flooding occured during both the winter and

summer rainy seasons in more than one year out of ten. In addition, during 1983 and 1984, rainfall persisted through the summer season and into the fall and winter months as well (Field Reports: September-December 1984; SARH: Document #1).

Under normal conditions, the Río Sonora Valley experiences the Sonoran Desert pattern of winter and summer rains. *Las equipatas* (winter rains) begin in November and continue on and off into March. They occur during the period when the Pacific sub-tropical high is farthest south, and low pressure areas can pass across the southern margin of the continental land mass. *Las aguas* (summer rains) usually begin in late June and continue into September. A westward circulation of air brings moist, tropical air into the region from the Gulf of Mexico, causing an abrupt beginning of thunderstorm activity. In northern Sonora, this often occurs close to San Juan's Day (June 24), which is celebrated as the start of the summer rainy season (Doolittle 1979; 1984; Dunbier 1968: 15-20).

Rainfall in the municipio of Baviácora varies both temporally and spatially. In the former circumstance, yearly and monthly totals averaged over several years can be extremely deceptive since they represent years of low, normal or high rainfall. Data averaged for the years 1947, 49, 50, 53, 54, 55, 56, 59, 60, 61, and 62 yields a total yearly rainfall of 249.6 mm (9.98 inches) (Doolittle 1979:107), while data averaged from 1944 through 1970 yielded a figure of 309.1 mm (12.36 inches) (MEBE 1984: Cuadro 1.2). This figure is lower than the 363.5 mm (14.54 inches) which fell during the first nine months of 1977, (considered to be a drought year), and the 370.1 mm (14.8 inches) yearly total for 1982. These figures contrast with those of 1983, during which 725.41 mm (29.01 inches) of percipitation fell, and 1984, which experienced 648.3 mm (25.95 inches) between January and August (Table 3.1; SARH: Document #1). Though yearly averages are convenient for the academic to cite, for the *campesino* it is absolute rainfall, not averages which determine whether crops will survive during a given year.

To understand the impact of Sonoran climate on Bavácorans, spatial variablity must also be taken into consideration. Statistics from municipio weather stations are indicative of rainfall in

Table 3.1. Monthly Rainfall (in mm.), Municipio of Bavíácora, 1977,82,83,84

	RAINFALL			
MONTH	1977	1982	1983	1984
January	41.5	19.5	33.5	38.6
February	0	0	45.0	0
March	6.0	0	87.4	0
April	0	0	17.9	12.0
May	5.0	0	0	2.8
June	0	0	10.5	15.4
July	232.0	83.9	195.5	237.4
August	79.0	82.8	170.8	342.1
September	18.0	28.3	133.0	Not Available
October	Not Available	0	87.6	"
November	"	73.7	45.2	"
December	"	81.1	32	"
TOTAL	363.5 (9 months)	370.1 (12 months)	725.41 (12 months)	648.3 (8 months)

(Source: SARH: Document # 1)

that locality only. In comparison, streamflow is a function of rainfall not just within the area, but in the upstream and upland areas of the watershed as well. In August, 1981, Baviácora received 87.3 mm (3.5 inches) of rainfall, while Aconchi, 14 km. upstream received 241 mm (9.64 inches). The most conclusive statement which can be made concerning rainfall is that two thirds of the yearly total usually falls during July and August (Doolittle 1979:108), or that a particular year was either more or less rainy than another.

Summer rainfall is characterized by localized afternoon and evening thunderstorms which sometimes affect only a few square miles. These are often heaviest near sunset, producing high amounts of rainfall in short periods of time. Many storms end with several hours of gentle rain (Dunbier 1968). During August of 1984, this pattern of gentle rains and cloudbursts began on August 4th and continued until August 9th. A maximum 87.5 mm (3.5 inches) of rain fell on the 8th of August. Two days later the monthly minimum of 1.1mm was registered (SARH: Document #1).

Winter rains are less localized than summer storms, falling in steady but modest amounts (Doolittle 1984:249). As with total rainfall, there is no hard and fast pattern to winter precipitation. On the average, March, April, and May are the driest months. However, in 1982-83, winter rains began in November with some accumulation occuring each month until May, 1983. This contrasted sharply with the 1981-82 season in which the only rain falling between November and July was a sparse 19.5 mm (.8 inch), most of which fell on one day in January (SARH: Document #1).

In Sonora, rain fall amounts exhibit marked variation from year to year. In comparison, temperature ranges in most areas vary little from one year to the next (Dunbier 1968:26). In the upper Río Sonora Valley, temperatures are highest from June to September, with a day-night differential of up to 25º centigrade. Data collected over a period of seventeen years yielded a summer average of 30 º (Table 3.5; Doolittle 1979). However, daytime peaks frequently reach 45 º C., with night time lows averaging around 20 º C.(Table 3.2;3.3;SARH: Document # 1).

Table 3.2. Minimum Monthly Temperatures, Municipio of Baviácora, 1977, 1982, 1983, 1984 (in ° C)

	TEMPERATURE			
MONTH	1977	1982	1983	1984
January	1.0	-1.0	1.0	-2.0
February	0.5	0	1.0	-2.0
March	0.5	2.0	2.0	1.0
April	1.0	5.0	2.5	2.0
May	8.0	7.0	6.0	6.5
June	15.0	11.0	8.5	15.0
July	18.0	11.5	13.0	20.0
August	19.0	20.5	15.0	20.0
September	19.6	14.0	15.0	Not Available
October	Not Available	2.0	10.0	"
November	"	1.0	1.0	"
December	"	-1.0	1.0	"
OBSERVATION	(9 months)	(12 months)	(12 months)	(8 months)

(Source: SARH: Document # 1)

Table 3.3. Maximum Monthly Temperatures,
Municipio of Bavicora, 1977, 1982,1983,1984 (in °C)

	TEMPERATURE			
MONTH	1977	1982	1983	1984
January	26.5	28.0	26.0	27.5
February	32.0	32.0	27.5	27.5
March	30.5	30.0	29.5	32.5
April	35.0	36.0	33.3	40.5
May	41.0	36.0	45.5	42.5
June	44.0	40.0	45.0	44.0
July	42.5	42.0	43.0	40.0
August	39.0	41.0	42.5	38.0
September	41.0	40.0	40.5	Not Available
October	Not Available	38.0	35.5	"
November	"	31.5	29.0	"
December	"	27.0	28.0	"
OBSERVATION	(9 months)	(12 months)	(12 months)	(8 months)

(Source: SARH: Document # 1)

Winter temperatures have been described as cool to mild. December and January averages are the lowest, at 14.5 ° centigrade and 13.6 ° centigrade respectively (Table 3.5; Doolittle 1979). These figures are higher than those available for 1981-1984, which give a 11.2° C. average for January at the Mazocahui weather station, and a 12.3 ° C. average for December. Minimum readings for winter months include -2 ° C. in January and February, 1984; -1° C. in January 1982; and 0 ° C. in November and December 1981 (Table 3.4; SARH: Document #1). Frost was noted on more than 22 days in 1984; one day in 1983; 23 days in 1982; and more than 18 days in 1981. This begins as early as November (in 1981) and sometimes extends into April (in 1977) (Ibid). Complete records are not yet available for the winter of 1984-1985; however during December, 1984 more than two inches of snow fell on Baviácora. It was the first snowfall in more than seventy-five years, and was the first time many Baviácorans had ever seen snow. It caused extensive damage to the winter crops and froze most of the municipio's water pipes (Post-field Correspondence #1).

Vegetation and Ecological Zones

Climatological patterns and geological history in the upper Río Sonora Valley have resulted in a distinct series of physiographic and vegetation zones. Though the overall area is classified as the Foothills of Sonora (Shreve and Wiggins 1964), a series of correlated vegetation-physiographic changes can be distinguished. Thus, the flood plain is associated with riparian woodland; the bajada, with desert scrub; undifferentiated slope ,with mixed shrub; and the pediment, with thorn forest vegetation. The upper portion of the pediment; the piedmont; and the lower portion of the uplands are all characteristic of piedmont transition vegetation. Finally, the remainder of the upland physiographic zone is oak woodland, with pine-oak-woodland found only in the highest altitudes.

The pine-oak -woodland, limited to areas between 1800 and 2400 m. above sea level, is found largely near the municipio's upland borders to the northwest and east. It is dominated by a mixture of several species of pine and oak, with most growth occuring in the evergreens in late

Table 3.4. Average Monthly Temperatures,
Municipio of Baviácora, 1977, 1982,1983,1984 (in ° C)

	TEMPERATURE			
MONTH	1977	1982	1983	1984
January	12.5	10.3	11.4	11.9
February	15.1	14.6	13.1	13.1
March	14.4	15.1	14.5	16.7
April	20.2	19.7	15.9	19.5
May	21.7	22.3	22.9	27.1
June	30.3	26.5	27.8	29.1
July	29.2	28.8	29.6	28.1
August	28.5	28.2	28	27.4
September	29.8	28.2	27.8	Not Availeble
October	Not Available	21.0	21.9	"
November	"	16.8	15.6	"
December	"	11.0	13.3	"
OBSERVATION	(9 months)	(12 months)	(12 months)	(8 months)

(Source: SARH: Document # 1)

Table 3.5. Average Monthly Temperatures for the Municipio of Beviácora (in °C)

MONTH	AVERAGE TEMPERATURE
January	13.6
February	16.2
March	19.1
April	23.1
May	25.6
June	29.9
July	30.4
August	29.5
September	29.1
October	24.8
November	18.8
December	14.5
Annual Average	**22.8**

(Source: Doolittle 1979; averaged for 1945-1962, from Hastings 1964)

Table 3.6. Population Change 1930-1980, Municipio of Baviácora

YEAR	TOTAL	Men	Women
1980	4661	2457	2204
1970	4224	2297	1927
1960	3873	1941	1932
1950	3127	1576	1549
1940	3080	1516	1564
1930	2340	1143	1197

(Source: MEBE: 24-32; X Censo: 16)

spring and early summer. When rainfall is restricted, the Quercus spp. (silverleaf oak) and other broadleaf species tend to lose their leaves in late May and early June.

The majority of Baviácora's mountains are comprised of oak woodland. These range between 1300-1800 m. in altitude, and are characterized by a variety of species of Quercus. These are found intermingled with pine at the upper limit and with the thorn forest species of the Piedmont Transition Zone at the lower boundary. Acorns (*bellota*)from the Emory Oak (Q. emoryi) are harvested for sale and consumption locally. Also exploited are Agave palmeri (*lechuguilla*), and Agave vaquia (*bacanora*), both of which are distilled into a powerful bootleg mescal.

The Piedmont Transition Zone lies in areas ranging between 800 to 1,200 m. above sea level. The volcanic dome of the Serrita de Baviácora falls into this classification, which is characterized by both rugged and rolling terrain. The zone is dominated by mesquite (Prosopis velvtina), which grows both widely spaced and in dense *bosques* (forest areas). Cattle graze extensively at these altitudes, consuming the mesquite pods which were once a staple of the local diet. Also found are ocotillo (Fouquieria splendens), breadgrass (Andropogon sp), kapok (Ceiba acuminata) and desert hackberry (Celtis pallida). During the fall, the wild "chile" called *Chiltepin* (Capsicum sp.) is gathered in this upland region. Though only a few scattered *ranchos* are found at this altitude, the ranching which goes on here is the most successful economic activity in the *municipio*. In addition, the Sonoran White Tailed Deer (*venado*) and the wild pig known as *javelina* are still plentiful and are hunted extensively during the fall and winter months.

Below the piedmont transition is the mixed scrub zone, which resembles both the desert scrub zone and the thorn forest. In the municipio, it is found along the west side of the river, above the flood plain. Vegetation found here includes Acacia, Ipomea, Cereus thurberi, Dasylerion, Yucca, and many Opuntia species including buckhorn, pencil and jumping cholla, and the prickley pear. It is an area with dense grass cover, and more trees and shrubs than in pure desert scrub country. Though vegetation is not as thick as in other zones, there is increased plant diversity. Agave species are also abundant, as is the medicinal herb Bursera.

The most widely distributed vegetation in the municipio is the desert scrub. Found on the bajades between the altitude of 600-800 meters, the plants of the desert scrub zone remain the primary source of wild food for both humans and livestock. This zone is dominated by thorny shrubs and small trees including mesquite (Prosopis spp.), palo verde (Cercidium spp.), palo chino (Pithecellobium mexicanum), Acacia spp., and Mimosa laxiflora. The latter accounts for 43.0 percent of all vegetation in the zone. In association with these leguminous trees is the columnar cactus known as *pitahaya* (Stenocereus thurberi). The fruit of this cactus ripens with the summer rains, to be gathered in late afternoon by the young boys of the municipio. Also found in abundance is the jumping cholla (Opuntia fulgida), a decidedly unpleasant cactus which favors disturbed ground.

Grasses are not particularly lush or common in the desert scrub zone. However, family cattle are often brought to graze here after the rains replenish the vegetation. During this period, a spinach-like green known as *bledos* (Amaranthus spp.) proliferates, and is gathered for human consumption.

The final ecological area in the municipio is a riparian woodland zone of fertile agricultural land. It is found within the flood plain which surrounds the Río Sonora's meandering channel. Though narrower below the pueblo of Baviácora than in other parts of the Río Sonora Valley, all concessioned flood plain land is cultivated. It is here and along the nearby mesa tops that most Baviácorans dwell.

The riparian woodland vegetation which dominates along the flood plain is primarily Prosopis. Most of the natural vegetation including Willow groundsel (Senecio salignus) and *jecota* are fast growing and winter deciduous. Canopy trees such as cottonwood (Populus fremonti), willow (Salix goodingi) and walnut (Juglans) grow in areas not under cultivation. Many of the cottonwoods and willows have been planted by *campesinos* for use in living fencerows. They give shade to desert broom (Baccharis sarithroides), seep willow (Baccharis salicifolia), and other riparian shrubs which are utilized in constructing the fences. In addition, both *bledos* and

quelites (Chenopodium spp.) grow in abundance. These wild greens yield successive "crops" which are harvested throughout the summer rainy season (Doolittle 1979; Dunbier 1968; Felger et al 1976; Hastings and Turner 1965; Sheridan 1983; Shreve and Wiggins 1964).

The flood plain is used intensively for both agriculture and livestock pasturing. An almost continuous sequence of cultivation, harvest and grazing occurs throughout the multiple growing seasons. However, in spite of the agricultural and cultural activity which is centered in this area, in economic terms it is probably one of the least successful environmental zones in the municipio. Though more people exploit the riparian woodland, it is the restricted mines and ranches of the upland regions which are today the most potentially productive from a monetary standpoint. Thus, the upper altitude *agostadero* (grazing land) remains a focus of dispute between local elites and *campesinos,* the majority of whom live close together in the tiny pueblos along the margins of the river.

The Population of the *Municipio* of Baviácora

> The next day the governor with his party entered the first settlement of the Valley of Señora....From here the party marched by this Valley and river upstream four short journeys, the greater part of the distance being inhabited by people and villages at three and four leagues from each other and on both sides (Obregon; quoted in Sauer 1932:41).

Settlement Patterns

As Sonora Highway 21/118 winds down the last switchback out of the *Cajón de Ures*, the whitewashed spire of Mazocahui's Catholic church can be see reflecting the ever present sun. Though the isolated farmstead at La Junta marks the official southern boundary of the municipio, the *congregación* of Mazocahui is the first real village. From here, the municipio extends for 30 kms. north along the Río Sonora and east and west into the surrounding mountains, encompassing a series of small pueblos, *congregaciones*, ranches and mining encleves, several of which are now abandoned. As in most Mexican municipios, the actual bounderies are extremely fluid, and have been redrawn on a number of occaisions.

Baviácora's communities are found scattered on both the east and west sides of the river (see Figure 3.1). Of these, the largest is the pueblo *cabecera* of Baviácora, with an "urban" population of 2,339. Unlike other Sonoran municpios (cf Baer 1984; Sheridan 1983), both Baviácora's population and territory experienced continued growth in the last few decades. Consequently, the pueblo's original nucleus surrounding the church and central plaza now extends in a suburban sprawl both south and north of the village. Called *Loma Sur* and *Loma Norte* respectively, these areas are characterized by free standing houses situated on small parcels of land called *solares*. They are found both on the flood plain and on its overlooking mesas. In contrast, "old" Baviácora occupies the mesa top and is comprised of contiguous, one story adobe houses. Many of these have central courtyards where household tasks such as cooking and washing take place, and where chicken, pigs, cattle, burros, and horses can be penned.

Baviácora's old and new churches sit on the northern edge of the mesa. They face the central plaza, which is surrounded by residences on the south and west sides. On the east side of the plaza is the state-run primary school, which was given its own building in 1949. From here, the pueblo's businesses extend along the highway and in the narrow back steets. Today, these are clogged with cars and pick-up trucks which try to navigate along lanes designed for horse and burro. These streets extend north, south and west to the mesa edge, and east as far as the gates of the pueblo *panteón* (cemetery) (Figure 3.2).

The remaining 2322 inhabitants of the municipio live in ten *pueblitos* (small pueblos) and *congregaciones,* and in a few ranches in the upland areas. The largest of the pueblos is San José, whose 520 residents live on the edge of the flood plain north of Baviácora. Six of the other villages, including Suaqui, La Capilla, El Molinote (La Concepción), La Labor, La Aurora and Mazocahui, contain between 200 and 300 persons each. Of these, only La Aurora is located on the west side of the river. The remaining population is scattered throughout tiny enclaves which once were the ranches and haciendas of the municipio. Until recently, the mining communities of San Antonio and El Jaralito also contained full time residents, but these were abandoned when the

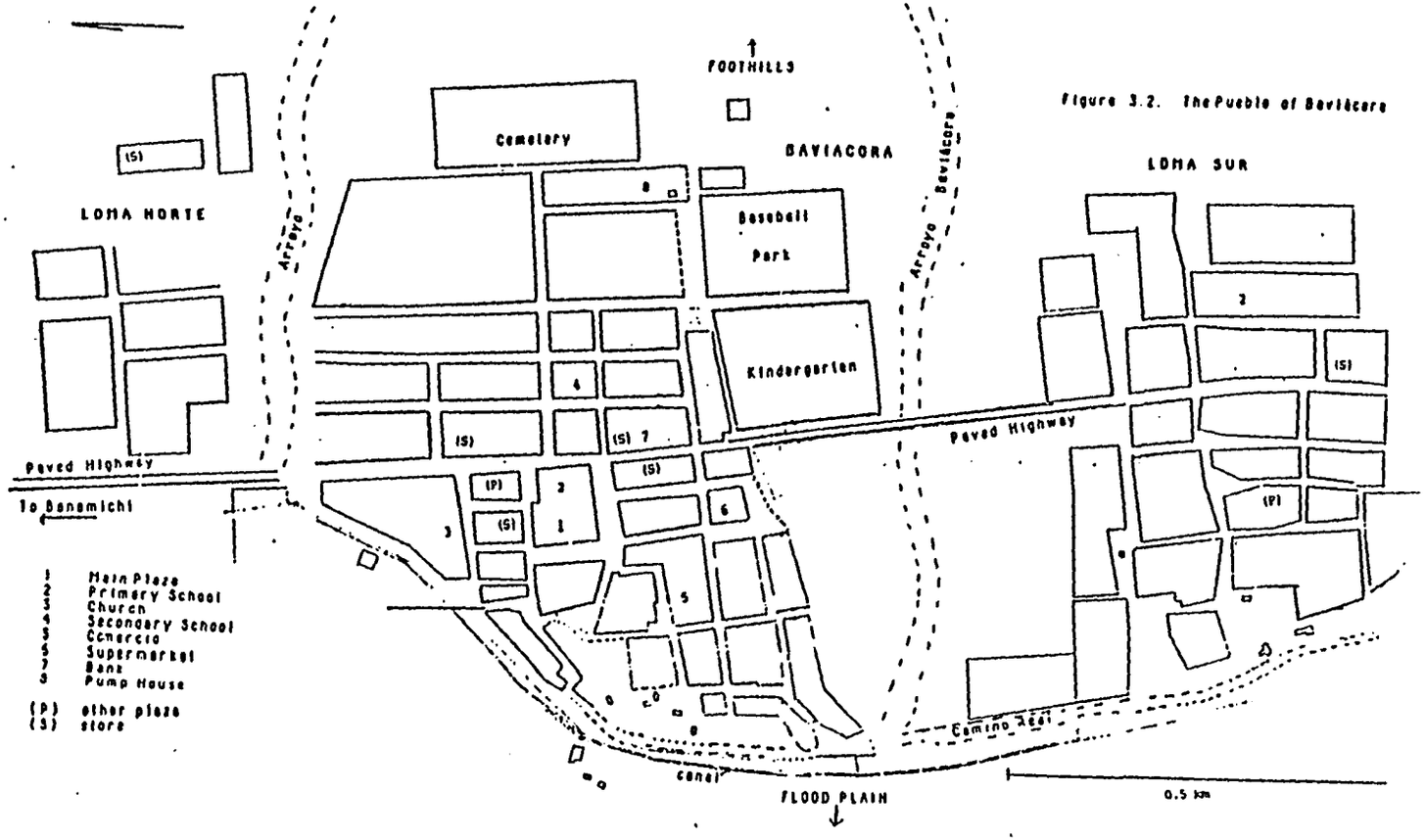


Figure 3.2. The Pueblo of Baviácora

mines shut down four years ago. Most of the *pueblitos* are built on the pattern of Baviácora. Generally, a central plaza with contiguous houses and a small chapel is surrounded by individual homes. Of the municipio's 862 dwellings, the majority are privately owned, two or three room adobe structures. Of these, all but 94 have some source of electricity (X Censo 1984).

Characteristics of the Population Today

In 1895, the municipio of Baviácora contained 2496 persons. Since that time, the population has grown steadily. Though all the pueblos and *congregaciones* grew slightly, the greatest part of this growth was in the pueblo of Baviácora itself. As the small, outlying mines, ranches and enclaves became depopulated during the last three decades, the *cabecera* absorbed the numerous families seeking relocation (AMBav [Pres. 1835-1971]). Population growth is summarized in Table 8.1 (MEBE 1984:24-32). The age-sex structure of the population is presented in Figure 8.2, which compares 1970 figures with those from the 1980 census. At the time of the 1980 census, all but 102 persons living in the municipio had been born there.

Loss of population is highest between the ages of fifteen and twenty-four. Of the 419 persons aged 15-19 in 1970, only 265 remained in 1980. Similiarly, of the 324 persons in the 20-24 year old cohort, only 257 remained ten years later (MEBE 1984; X Censo 1984). This trend is largely a result of out migration which occurs when adolescents and young adults leave the municipio in search of education and/or jobs. A lesser factor is the increase in mortality in the 15-24 age group which occured during the last decade (see Chapter 5).

Households

Settlement patterns in the municipio remain a function of kin ties. Those who do not migrate live close by other family members, even though they may leave their parents' household to set up a new residence when they marry. Forty-eight households containing 264 persons (5 % of the total population) were sampled between July and September 1984. Of these, 31 households (64.6%) were simple family households (see Laslett 1972), comprised of a married couple, its equivilent or remnant, and biological offspring. Of these, six were female-headed most of the

time, with absentee husbands involved in long term commuting. A seventh was comprised of a single woman and her offspring. The remaining seventeen households (35.4%) were of the extended type, containing more than one adult couple. Of these households, four included women whose commuting husbands were absent most of the time (Author's questionaire: questions 22 and 23).

The percentage of simple families is similiar to the 62 % found by Sheridan in a survey of 90-95 % of all households in the Sonoran municipio of Cucurpe. In that Río San Miguel area, the remaining 37.8 % of households were divided between extended families and a third category termed solitaries. The latter included widows, widowers, single persons, and married men with families elsewhere (1983: 101-105). The Baviácoran survey misses this group because the sample concentrated on households containing women within the childbearing years.

Many of the households surveyed in the municipio of Baviácora were visited on more than one occasion. These revisits made it clear that household membership is not a constant. Many are in a continual state of flux, as family members leave their villages in search of work or education. Further, households often expand, as children of those working in the cities are sent to their rural relatives for care. Thus, there is a continuous exchange, not just of members, but of resources and ideas as well.

In Baviácora, the gradual population growth seen in the municipio during the last century has begun to slow. Households which alternately engage in agriculture, raise livestock, or work for wages now find only limited land and opportunities for employment. Many members leave in search of jobs or education. Those who remain exploit the rugged, semi-arid terrain with varying success, coping with seasonal and cyclical patterns of climate which alternate heat and cold, rain and drought. The location of Baviácora at the southernmost end of the upper Río Sonora drainage is in part responsible for the municipio's growth. Modernization proceeded from south to north, and its benefits served as a magnet for those in outlying areas. Of equal importance were the conditions of Baviácora's historical development, which are the focus of the next chapter.

CHAPTER 4

LOS PUEBLOS DEL RIO: BAVIACORA IN HISTORICAL PERSPECTIVE

The growth of Baviácora during the last century is a result of both geography and historical process. While its more illustrious neighbors to the north and south declined both politically and in population, the *cabecera* of Baviácora retained the characteristics of a burgeoning frontier town. Largely unburdened by the political and economic elite which controlled Arizpe, Ures and even Banamichi in the second half of the nineteenth century, the municipio of Baviácora remained open to those engaged in non-agricultural pursuits. The pueblo of Baviácora was surrounded not just by haciendas and mining settlements, but by independent *comisarías* as well, an arrangement with antecedents in the early mission period (Nentvig 1980:97). As this chapter will illustrate, the municipio of Baviácora at the turn of the century was home to more than just hacendados and campesinos, miners and military men. It also boasted an entrepreneuring merchant community that included foreign nationals from the United States, France and China. Later, as the process of modernization spread from south to north, the *cabecera's* location at the southern most part of the upper Río Sonora Valley made it the natural location for shops and services, much as Arizpe had been when the Spaniards first settled the Opata country 250 years before (see Voss 1984).

Los Indios Naturales: The Prehistoric and Protohistoric

> Because they are village dwellers, the Opatas....are regarded as more advanced than those who remain in isolated huts. These village dwellers, while retaining their status as Indians, are more amenable to reason. They are the best Christians and the most loyal vassals of the king, having never rebelled against him or the missionaries. They are the truest and bravest in war, aiding the royal troops when they are campaigning against the common enemy. Moreover, they are inclined to till the soil and breed livestock (Rudo Ensayo [1764] 1980:67).

> They're not the same, Opatas and Indians. Opatas are something else, different from Indians. I think so. We were Opatas (S.P.; Field Report #26: 12/3/84).

One kilometer north of the pueblo of San José de Baviácora is a mesa-top pastureland known locally as *Casas Viejas*. Over grazed, and choked with the unpleasant cactus called jumping cholla, little now remains of the "old houses" referred to in its name. Between 1975 and 1978, this "San José site" (Son. K:4:24 OU) was the scene of extensive excavation and analysis by a team of archeologists from the University of Oklahoma. Though all that can be seen by the casual observer today is an occasional row of stones indicating the foundation of a surface structure, the forces of erosion often lay bare pot sherds and projectile points that are the remnants of prehistoric occupation. It is here, and in the smaller occupation sites of the Valley, that the beginnings of the *Opatería* (Opata territory) are found.

Prehistoric occupation in the upper Río Sonora Valley during the post-Archaic is divided into three phases. Pailes (1984) refers to these as Early, Middle and Late, basing these divisions on ceramic and architectural distinctions. An earlier, Archaic stage occupation is presumed, but was not the subject of archeological investigations in the Valley. Most of the sites excavated date to the Middle and Late phases. The Early phase is associated with a radiocarbon date of 550 (70) B.C., obtained from a depth of 93 cm. at a site located on the upper edge of the Río Sonora Valley floor. The remaining sites all date to the Middle and Late phases and are located on the bajada edge, or on ridgetoes overlooking the flood plain. These are considered to be the product of the Río Sonora culture as defined by Amsden in 1928.

Pailes (1984) divides the upper Río Sonora Valley into a lower segment (Baviácora) and an upper segment (Banamichi). The San José site is the largest site in the Baviácora segment. During the Middle phase, which began about 1000 A.D., it contained at least sixty houses-in-pits, though it is possible that there may have been as many as three times that number. In addition, 81 houses-in-pits were located at 29 other sites in the lower section of the Valley (Pailes 1984:312).

The late phase began sometime between 1150 and 1200 A.D.. Houses-in-pits which appear during this period may have been used as storage facilities rather than dwellings. As residences,

they are replaced by one room surface structures, and by multi-room units at the larger sites. Though Middle phase sites continue to be occupied during this period, an additional 92 sites were added in the upper and lower segments of the Valley. Population became evenly distributed between both parts of the Valley, though it had been higher in the Baviácora segment during the Middle phase.

There is some disagreement concerning cultural events during the Late phase. In addition to the lower segment center at San José, two very large sites developed in the Banamichi area. The textured red-on-brown pottery that was characteristic of the Middle phase underwent stylistic changes during this period. Moreover, Chihuahuan polychromes began to appear in association with Late phase occupation. Further, public architecture was introduced in both segments of the Valley. The most notable example is a large, rectangular ballcourt located at San José.

These changes in architecture and pottery appear to be accompanied by a concomitant change in population size. Pailes (1984:314) proposes a population increase of 6 per thousand per year, correcting Doolittle's (1979:264-272) estimate of a rate of increase of about 5 per thousand between 1000 A.D. and the Spanish entrada. Citing work by Cowgill (1975) and Wrigley (1969), Pailes argues that it is unlikely that rate increases of that magnitude could be accounted for by internal growth alone. He uses multiple lines of evidence to support the hypothesis that the settlement changes reflect a westward migration of a northwestern Chihuahuan-extreme northeastern Sonoran Mogollon culture associated with the Casas Grandes Viejo period (see DePeso 1974). According to Pailes(1984) these people reached the Río Sonora Valley sometime after A.D. 1000, and continued as a gradual intrusion first into the Baviácora segment, and later the Banamichi area. Additional migration is thought to have occured sometime after A.D. 1200.

A center of specialized activities associated with the rectangular ballcourt developed at the San José site. The distribution of Chihuahuan polychrome sherds and exotic items such as shell and copper was greatest there and at the two major upper Valley sites. This indicates a continued relationship with the migrants' source community, as well as the possibility of commercially

motivated exchange. It is Pailes' (1984;1979)hypothesis that the commodity being traded by those in the Río Sonora Valley may have been cotton goods. The abundance of spindle whorls; strands of cotton; and seeds recovered in the excavations are given as support for this contention.

In contrast to Pailes' scenario, Doolittle (1984; 1979) contends that Late phase population growth in the Río Sonora Valley was internal. He describes settlement changes in the Late phase as heralding the formation of a modified chiefdom form of social organization called "statelets" (see Riley 1976). These are interpreted as developing without outside influence, as the result of population growth and increased local exchange. The large settlement at San José, and the two in the Banamichi segment, are considered to be the result of intravalley interaction rather than extra-valley trade and migration. Doolittle concludes that though goods from outside areas were probably traded in the Río Sonora Valley, the large settlements and statelets "evolved out of a local redistribution network, as the population increased and a variety of lands were used for agriculture (1984:23)."

Whatever the stimulus for settlement and population growth in the Río Sonoran Late phase may have been, it is accepted that in late pre-Spanish times a Meso-American-Southwestern trade route existed through the Valley of Sonora (Kelley and Kelley 1974). Archeological evidence shows that Late phase occupation is continuous with the historic period Opata. There is no break in the archeological record between Late phase and historic period sites containing glass beads and metal knives (Pailes 1984:312). Thus, it is likely that the ancestral Opata inhabited both the Baviácora and Banamichi segments of the Valley, and participated in trade linking areas to the south with those in the north. According to Riley (1976:40), from about AD 1400, traders from the Pueblo Southwest regularly visited the flourishing Opata centers. Trade routes from Altar and Magdalena in northwestern Sonora ran east to the upper San Miguel and Sonora Valleys, finally ending in the plains of Chihuahua. A free and constant movement over the main north-south and east-west trails probably occured. It was over these trails that news of the Spanish intrusion traveled.

It is likely that word of the Spanish arrival preceded their appearance in central Sonora. It is equally probable that the Old World diseases carried by the newcomers also traveled before them. The Jesuits who arrived in 1636 did not find the Opata living in the large, nucleated settlements indicated by both sixteenth century explorers and the archeological record. Instead of the large town sites such as San José, they found small, dispersed settlements described as *rancherías*. Gone was the pueblo described by Obregon in his chronicle of Ibarra's 1565 expedition as "settled by clothed people....more advanced than those seen before....[consisting] of six hundred houses of flat roofs, and mud walls, with regular streets, irrigation ditches for their fields....(Sauer 1932:42).". Also gone were the complex social organization and trading systems referred to by Cabeza de Vaca, Coronado and other explorers whose travels through the "Señora Valley" are the subject of early accounts. It was in this Valley that the Spanish established a camp that they called "Corazones", among a highly militaristic people in possession of elaborate trade goods including turquoises, "emeralds", cotton shawls and parrot feathers (see Reff 1981). This camp was relocated on two later occaisions.

There has been much speculation concerning the location of the three explorer encampments known as Corazones, or San Geronimo de Corazones. In considering this, Sauer (1932) enlarged on Bandelier's (1892) hypothesis that Corazones and Señora were located in the current Río Sonora Valley. According to Sauer, Corazones I was located at the southern end of the *Cajón de Ures*, at the village now called Puerta del Sol. He placed the second Corazones near Baviácora, and the third in the north near Bacoachi. In contrast, DePeso (1974) argues that the three settlements are not in the Sonora Valley at all, but instead further south and east along the Sahauripa-Casas Grandes trade route.

Reff (1981) disagrees with DePeso. He uses both historical documents and the archeological evidence cited above to support Sauer's identification of the Río Sonora Valley with the Señora of early accounts, and the location of the three Corazones along the Río Sonora drainage. Reff contends that the radical changes which occured between the time of the first Spanish contacts and the

arrival of the Jesuits were related to the spread of European diseases. These are known to have devastated Sinaloa and Southern Sonora, and were presumed to have preceded the arrival of missionaries among different people in Sonora and the Southwest. The spread of these epidemics along trade routes through the Opata lands during the late sixteenth and early seventeenth centuries may have resulted in the fragmentation of nucleated settlements, and in a change in Opata social structure.

The period of exploration through the Valley of Señora ended with Ibarra's entrada in 1565 (Sauer 1932:50). It was another seventy years before the Jesuits would set off along the Camino Real, entering the upper Río Sonora Valley through the *Cajón de Ures*.

Missions, Mines, and Mercedes: The Colonial Period

By the close of the sixteenth century, the Spanish were firmly established in New Spain. In order to best take advantage of the country's bounty, the Colonial government began the work of changing the Indians into "civilized" people. Two approaches were used to accomplish this. The first was organized around mission communities where the way of life was not seriously altered. The second took place in nearby mining towns where Indians purportedly supplied wage labor. In Sonora, the mission centers sought to integrate Indians into Spanish culture as self sufficient communities. In contrast, the mining towns, military garrisons, and haciendas were controlled by Spanish employers or hacendados. These two environments produced different social worlds, requiring different strategies from those who participated in each of them (Spicer 1962:285). Both of these occured in the Río Sonora area.

Baviácora was largely a mission community. In 1638, the Jesuit Bartolomé Castaño arrived in the area, following initial traveling missionary work two years earlier by Lorenzo Cárdenas. The result was the establishment of a mission *cabecera* (center) at San Pedro de Acotzi (Aconchi) and its *visita* (satellite) at Nuestra Señora de la Purisma Concepción de Babiácora (Baviácora). It is estimated that in 1600 over 50,000 Opatas lived in the Opatería. By the time the Jesuits arrived this population may have been reduced by half (Gerhard 1982:285). Of these,

209 families (about 1200 individuals) lived in the Baviácora area in 1646 (Sauer 1935). By 1639, Pedro Pantoja began mass baptisms among these Opata, beginning construction of the church as well (Molina 1979; Roca 1967:162-166).

Early Jesuit missionization in the Río Sonora extended only as far as Banamichi and Sinoquipe. The far northern end of the Valley was first served by a band of Franciscans, brought to upper Sonora shortly after 1642 by Commandant Pedro de Perea. At the same time, Perea established the first "capital" at San Juan Bautista de Sonora. This was located in the mountains to the east of Baviácora, along a trail leading to Cumpas in the Río Moctezuma. With the death of Perea a few years later, the Franciscans withdrew, and the Jesuits were free to move north through Arizpe to the northernmost Opata pueblo at Bacoachi (Roca 1967).

The location of the mission at Baviácora was probably at or near a small, prehistoric or protohistoric Opata "hamlet" rather than atop a major occupation site (Doolittle 1979:291). The Jesuits tended to favor high ground for their churches, above the possibility of damaging floods (Roca 1967; also Lange and Riley 1970). Thus, it is assumed that the current location of the Baviácora church on the north end of the bajada was also the location of the original mission. Further evidence can be found in local place names. Often, territory or landmarks with long forgotten associations still retain former designations (see Hewes 1932). The *acequia* (irrigation ditch) which runs below the San José archeological site is still called *Casas Viejas* after the mesa top itself. Similarly, the ditch which runs from near the old church of Baviácora to the south edge of the pueblo is known as *La Misión* (AMBav [Aguas y Tierras 1897-1973]: 1931,33).

The fortunes of the Baviácora mission were closely tied to its neighbor in Aconchi. At various times throughout the Jesuit occupation, the positions of *cabecera* and *visita* were exchanged between the two missions. Father Pantoja ministered to both areas after Castaño left in 1645. When Juan Fernandez took over the two churches in 1678, the mission populations numbered 455 at Aconchi and 530 at Baviácora (Molina 1979; Roca 1967).

The number of missionized Indians in that year was considerably below area population estimates for 1645-1655. This was due both to disease and to the demand for Indian labor at the mines and ranches in the surrounding mountains. In the Río Sonora area, mining developed at about the same time that the missions were established. The mining *real* of Mateporé near Banamichi was settled in the mid seventeenth century (Roca 1967) as was an unnamed silver mine near Baviácora (Voss 1982). The *hacienda mineral* at San Felipe is thought to predate the mission pueblo at nearby Huepac (AUS: Ejidos #1). Thus, not all Opata were reduced to Jesuit missions. Among those who were, the arrival of Spanish miners and settlers offering material goods and wages increased the probability that they would leave the mission pueblos. In spite of these incursions and desertions, the Jesuits maintained the upper hand in Sonora through the seventeenth century. They warned the Indians that contact with the Spaniards would endanger their souls; they refused to supply Indian labor to the mines and ranches; and finally, they controlled the sale of goods to the mines by underselling Spanish producers (Voss 1982).

By the time Father Juan Echagoyan took over the mission sometime near 1720, Baviácora was again the *cabecera* and Aconchi, the *visita*. In 1730, the church of the Purisma Concepción of Baviácora served 52 families, 17 singles and 63 "children of doctrine". That year, 17 additional souls were baptized, and 43 deaths were recorded. In San Pedro de Aconchi, 98 families, 27 singles and 62 "children of doctrine" were counted. Here, 29 new baptisms occured, while 15 individuals died with sacraments. According to reports, there were two decent churches in the mission, and the Opata language was spoken. In all, 579 souls had been saved in the two pueblos (Molina 1979).

The influx of settlers continued during this period. The Spanish usually claimed agricultural and grazing lands which bordered the mission pueblos and the communally held territory of the indigenous peoples. In Baviácora, these fields and *bosques* (woods) extended on both sides of the river from near San José (where they bordered Aconchi communal territory), to just north of Baviácora. A second parcel began south of La Concepción (El Molinote) and extended past

Mazocahui (SRA Folio 1-10-59; SRA Document #3). Spanish settlements included a way station at La Concepción; a ranch at Massocagui (Mazocahui); and El Sauce, the Nuñez ranch to its east. Near La Concepción, the Cerro Gordo mine was also operating.

The gradual encroachment of Spanish settlers onto communal lands was met by formal moves to secure legal title. This was eventually granted to "*los Indios naturales*" of Baviácora in the form of *mercedes reales* (royal land grants) on October 27, 1716. The authority cited was the *Juez Oficial del Real Hacienda y Caja* of the city of Durango. A second title was granted by the same authority on August 3, 1717. These lands included over 30,000 hectares corresponding to territory in possession of the community from *tiempo immemorial* (time immemorial). They extended north and south between Mazocahui and La Concepción, and east and west into the surrounding mountains (SRA Folio 1-10-59; SRA Document #1). A similar title was issued to the *comunidad* of Aconchi covering lands beginning just north of San José (AMBav [P. 1932-33]: 2/12/33). It is not clear whether formal title was ever granted for the area between San José and the mission site at Baviácora.

The mission community of Baviácora proved more durable than the Spanish mines and settlements surrounding it. Nentvig's 1764 account of his travels through the area notes that the Spanish settlements were all depopulated by 1753-54. Though this is attributed to the raids of hostile Apaches and Seris which began at the close of the seventeenth century, it may also be related to the formal grants of land to the Opatas. This was not the case further north where the real of Motepore still flourished. The Spanish community was firmly entrenched in Banamichi, where the Corella family established a mill in 1764 (AMBan [P. 1882-1929]:1894), and in Arizpe, which became a formal administrative center in 1776 (Voss 1982).

A series of Jesuits staffed the Baviácora-Aconchi mission until the religious Order was expelled in 1767. During this time, the Opata tilled the fields, cared for the livestock, cleaned irrigation ditches, constructed buildings, spun and wove cloth, and sewed clothing. Part of this work was performed for the mission, and the rest for their own needs. Stock breeding was

probably of importance to the mission, as it was among the Spanish settlers of the pueblo. During an earlier period, the Jesuits were noted to have shipped more than five million Sonoran cattle to Mexico (Polzer 1976).

Apache and Seri hostilities continued during much of the eighteenth century, forcing periodic abandonment of outlying settlements. It is likely that Baviácoran settlers may have occasionally sought shelter close to the mission community, as occured in Cucurpe (Pfefferkorn 1949). Official attitude toward Sonora and the Jesuits was ambivalent. For part of these decades, Sonora was neglected by the Crown which was engaged in external difficulties. Later, the northern frontier became the renewed center of attention, as Mexico looked to the Jesuit mission system as the base for still greater frontier expansion. These missions were seen as a provisioning center for mines and military ventures aimed at securing the resources of the northern region. Concomitant with this, a cadre of "urban notables" developed in the major settlements of the province, laying claim to mines and territory in what were to become the centers of personal, political, and economic power in Sonora (see Voss 1982).

In the Rio Sonora Valley, family empires were established early in Arizpe and Banamichi. It is not clear why this did not occur further south in Baviácora and Aconchi. Sheridan (1983:59) speculates that perhaps Indian hostilities helped preserve some communities by making ranching, farming, and mining risky ventures. This may be the case. In Baviácora, the most profitable economic activity for the Spaniards occured (as it does now) in the isolated mountain ranches. In contrast, Banamichi's location at the widest portion of the flood plain gave rise to a centralized and successful agricultural community. A landed oligarchy like that which took hold in Banamichi could not do so in Baviácora until the the missions were dispersed and peace established over the frontier.

By the year 1800, the the Rio Sonora Jesuit missions, which had been transferred to the Franciscans in 1767, were already secularized. Apache hostilities were temporarily quelled by placating gestures and military ventures (Voss 1982), and Spanish families resettled on land

surrounding the pueblo of Baviácora. According to local sources, the Robles family was already in possession of land on the northern edge of comunidad territory at this time, followed soon after by the Villescusas and Bustamentes. As the century progressed, intermarriage between these three families eventually resulted in their control over large sections of municipio land.

Fronterenos: 1805-1905

The early nineteenth century brought a movement for independence from Spanish royalist control of New Spain. Of all the Mexican provinces, that of the peripheral northwest was probably the least inclined to support the insurgent cause. The colonial society which had developed was reinforced by a strong royalist military presence in the frontier presidios. The Indians were still largely tribal, and had been accorded separate status and privileges by the crown. Thus, when the Intendency of Arizpe (as the province was then known) was called upon to support the patriot cause, royalist troops assisted by groups of Opata Indians were sent from Arizpe to defeat the rebels. It was a short lived victory and by 1821, Mexico was independent.

With the end of the War for Independence, Indians and native born descendants of Spaniards in Sonora were left largely on their own to work out a new political, economic and social organization. The Indians of the area had a heritage of two hundred years in mission communities. In contrast, a Spanish criollo society was just beginning to become the rural variant which would eventually dominate in northern Mexico (Spicer 1980:133). In part, Sonora's political and social flexibility was a result of its isolation. This was to some extent geographic, a result of the sea and the sierras. It was also related to the barrier created by renewed raiding by marauding Apaches along the international border in the mid-nineteenth century. This isolation made it critical that the new state of Sonora establish economic ties independent of the rest of the country, and develop agricultural self-sufficiency. In the south, the rich river valleys of the Yaqui and Mayo became the focus for agricultural activities. In contrast, the mountainous topography of the interior attracted those in search of mineral wealth (Acuña 1974:1-3). However, Apache raiding

into the pueblos of the central region prevented the Mexicans from developing the lands and the mines, ultimately weakening the economic status of the state.

Reallocation of Land

A by-product of the secularization of the missions and independence was the need for the state to develop a legal structure concerning land tenure. Mission lands were judged to be the property of the state, to be returned to "*los naturales*" in the form of private property. This intention was the subject of Decree 89 of the State of Occidente (Sonora and Sinaloa) which was issued in 1828. In anticipation of this redistribution of land, an official was sent by the governor to each of the Opata pueblos along the Río Sonora south of the administrative center at Arizpe. The purpose of this journey was to call together all of the indigenous peoples of each community to alert them to the consequences of this decree. The official spent several days in each community, and recorded his observations of conditions. In his report dated June 3, 1829, he compared Baviácora to the other Río Sonora pueblos noting that "among the indigenous of this pueblo there is a general neglect of children....there is no regular school. (AUS Ejidos #1)." In contrast the Franciscans had opened schools in the other pueblos as early as 1788 which were maintained by the community after their departure (Brown 1978). Baviácora lacked other facilities as well, such as the mill opened by the Jesuits in Banamichi in 1759 and later taken over by the Corella family.

The Opata sent their leaders to hear out the governor's representative, yet they showed little interest in obtaining private parcels of land. They still held the communal lands which had been deeded to them by the crown during the previous century. These were noted to be comprised of "three or four ejidos" in the Baviácora area. At the close of his journey, the writer concluded that "there will be grave prejudice if no one attends to the right of the indigenous in this new adjudication of some of the land (AUS Ejidos #1)." Thus, in 1832 a title to the communal land was issued by the new republican government (SRA Folio 1-10-59). It is not entirely clear what happened to the mission lands which stretched from south of San José to La Concepción. It is likely

that it was during this period that Spanish, criollo and mestizo settlers in the secularized Baviácoran community acquired title to the valuable flood plain land along this section of the river. As Voss (1982:41) notes, though land could be bought, a method often employed was simply to occupy the unused land of the Indian pueblos, and then legalize the occupation in court through personal influence and/or bribery.

Wars and Interventions

The first half of the nineteenth century was a time of continued unrest and crisis in Sonora. With the creation of the republic, a process of "Mexicanization" occurred, which eliminated the special status of the Indians and granted all Mexican-born persons citizenship (Spicer 1962: 334-339). The Indians were not altogether satisfied with this arrangement, since it was accompanied by a move to break up and redistribute communal lands and to the abolishment of tribal self-government. In 1832, Yaqui leader Juan Banderas attempted to unite Sonoran Indian tribes and march on the new capital at Arizpe. Though the Opata promised him their support in this endeavor, in the end they opted for neutrality, choosing not to challenge the hispanic culture they were gradually adopting.

The failure of the Yaqui-Mayo revolt did not end Sonora's trouble. It was followed closely by renewed raiding by the Apaches. By the 1840's, Arizpe and Bacoachi were virtually deserted, converted into "a rude cemetery which announces to Sonorans....extermination, ruin and destruction....[for the]..... unfortunate *fronterenos*" (Voss 1982:106). In the wake of this, the capital was moved from the northern end of the Rio Sonora to the southern end. Frontier emigrants moved to its new location at Ures, and the up river pueblos were left in isolation to defend and develop their respective territories. Apache raids continued as far south as Ures. The old military presidios were abandoned; the state depopulated. Rumors circulated in Mexico and the United States that the state of Sonora was up for sale.

In the upper Rio Sonora Valley, Ignacio Pesquiera rallied the pueblos to their own defense. A rising state politician who was soon to become governor, Pesquiera had established an hacienda at

Las Delicias near Banamichi following the 1828 land reform. Though he was not successful in routing the Apaches, the attempt aided in securing his power both in the Valley and beyond it. During this period, Pesquiera's hacienda and others which were established at the same time in the Río Sonora Valley attempted to market what goods they produced through Hermosillo. For the most part, the economy of the northeast was stagnating; houses were abandoned; and others were in ruin.

During the middle years of the nineteenth century the newly developed local governments of the post mission communities grew in strength. The constitution of 1861 gave the municipios even greater power and autonomy. In many of the Río Sonora pueblos, the old missions were transformed into family ruled *cabeceras* which dominated the surrounding territory. Though political control of the pueblo of Baviácora gradually fell into the hands of its three major families, the municipio also contained a series of haciendas, ranches, and independent *comisarías* (townships). In these small towns, the pattern of individual ownership, power, and production found among the Spanish families in the larger pueblo was duplicated among the mestizos of Opata descent.

In the 1860's,the Sonoran government under Pesquiera continued to promote a program of colonization throughout the state. This involved further encroachment into the communal lands still held by Sonoran Indians. Thus, when Pesquiera called for support from Sonorans against the imperialist forces of the French intervention in 1864, the Yaqui, Mayo and Opata tribes joined forces with those supporting the imperialists. Though the Yaqui and Mayo were to continue this policy of armed opposition to the Sonoran government, for the Opata this alliance signaled the last gesp of formal tribal unity. In the years following the defeat of the French the utility of being Opata declined. They retired to their villages to till the soil as mestizo *campesinos*, watching and waiting as the growing haciendas ate away at communal lands.

Baviácora was less affected by Apache raiding than the pueblos to the north (see Lejeune 1984). It is likely that families of Opata descent viewed the situation with mixed feelings. The

destruction and disturbance was unfortunate, yet the luxury of abandoning one's farmstead was reserved for the well-to-do criollo families. Though the *campesinos* were sometimes forced to seek shelter in nearby caves or woods, to leave the Valley where they had lived since time immemorial was not a viable option. Apache forays into the Rio Sonora Valley chased the less hardy settlers off the lands which they occupied. They accomplished what the Opata had been unable to do in their 1864 alliance. A century later, photographs of Apache leaders still occupied a place of honor in more than a few mestizo homes.

During the final decades of the nineteenth century the Opata kept a low profile. The mestizo *comisarías* of Suaqui and San José grew in population. Some families farmed their own land, grazing livestock on the communal *agostadero* (pastureland) deeded to them in 1832. Others became tenants and sharecroppers on the lands of the gentlemen farmers of Baviácora. By 1878, all but one of the families who were to figure as major property holders in Baviácora's future were already present in the municipio (AMBav [P 1878-99]:1878). As the Yaqui and Mayo to the south continued to fight against government usurption of tribal lands, the Rio Sonora Opata found it to their benefit to emulate the "civilisation" of criollo Baviácora in the smaller settlements. This arrangement lead nineteenth century scholars such as Lumholtz and Hrdlicka to conclude that they were "unable to find an Opata population and culture (Johnson 1950:44)." In reality, this was not the case. Though the Opata were finished as a tribal unit, their identity as *"los indios naturales"* was to be of value to them at various times through the twentieth century.

The years following the French intervention brought increasing economic depression to Sonora. The district of Arizpe was particularly hard hit. Shut downs in the mines led to loss of revenue in many Rio Sonora municipios. No funds were available to make repairs to badly deteriorating roads and buildings. Only Banamichi and Huepac, located close to functioning mines, were able to maintain their public buildings in a decent state(Voss 1982:198). Since the economy was near paralyzed on a state wide level, the fate of the municipios lay largely in their own hands.

Blame was laid on the administration of Governor Pesquiera. By the mid 1870's opposition to Pesquiera took the form of armed rebellion. In March 1876, Sonora was declared under a state of siege, and the Pesquiera era at an end. In the years which followed a new regime of Sonoran notables forged working connections with the national interests of Porfirio Diaz. The rapidly reviving economy of the Sonoran periphery became a central facet of Mexican needs (Voss 1982:242-300).

Agriculture and mining were the key to economic revival in Sonora in the late nineteenth century. To this end, the government encouraged the investment of foreign capital in both ventures. The key to agricultural success were the fertile Yaqui and Mayo Valleys, where the two rivers flowed continually year round. Though the Mayo Valley was won with relative ease, the Yaqui Indians remained a thorn in Sonora's side. Their persistent claim that all the river belonged to all the Yaquis thwarted plans to redistribute the territory in individual parcels, and led to a program of expulsion and annihilation of all such rebellious Yaquis (Aguilar Camin 1980:95-97). Initially, the government encouraged migration, offering the Yaquis (and others) parcels of land in other parts of the state. By 1897 however, the resettlement option was closed, and the campaign against the Yaquis was in full swing (AMBav [P 1901-1979]:1897).

The plan to redistribute communal land in small parcels fared no better in the Río Sonora Valley. Like the Yaqui, the Opata resisted efforts to transform them into independent small farmers. Between 1882 and 1886 attempts were made to measure and demarcate the ejidal lands of the Río Sonora pueblos (AMBan [P. 1880-1889]:1882). This culminated in a plan to "measure, mark off boundaries, and distribute in lots the ejidos" of the pueblos. In Banamichi, first class land was divided into 158 lots which corresponded to the heads of families(AMBan [P. 1880-1889]:4 June 1884). Finally, the land was redivided between 144 residents of the pueblo. Criollo families received just over 25 hectares each, while the 35 indigenous families of the pueblo received twice that amount (ibid: 19 February 1886). Though such records are not available for Baviácora, it is assumed that a similar distribution took place (cf Sheridan 1983).

The continual reallocative shuffle of Sonoran land persisted through the 1890's. In the municipio of Baviácora, the Robles-Villescusa-Bustamente hegemony had established haciendas at La Capilla, La Victoria and La Concepción. It was never entirely clear which land belonged to whom. In 1898, the state government asked the district of Arizpe to determine which persons were currently exploiting *terrenos nacionales* (federal land), so that these territories might be legally sold and deeded to the holders or returned to the government(AMBav [P 1878-1899]:26 Oct. 1898; 12 Nov. 1898).

Land value and ownership was further complicated by the question of water rights. While land might legally belong to a family, the more critical rights to water for irrigation could be denied by those in control of the *tomos de agua* or *acequias* (irrigation system). Distribution of water for irrigation in northern Sonora is accomplished through formal water users associations called *comunes de agua*. These are supervised by the *juez de agua*, an elected official with considerable responsibility and power. Like other municipio offices, the *juez* was usually an individual who already possessed wealth, power and property (see Sheridan 1983:137). During these years, multiple complaints to the *presidente municipal* (mayor) of Baviácora were lodged by *ejidatarios* (communal land users) and *pequeño propietarios* (small property owners) against the more powerful landowners. They complained that the latter were constructing *tepextles* (dams) across the irrigation ditches to interrupt the flow of water needed for their crops (AMBav [P 1900-1905]: 1900; 1901). The conflict heightened in 1902, when a group of *usarios* (joint users) of the canal known as Misión protested the allocation of the *acequia's* waters by a powerful property owner who was also *presidente municipal*. They were forced to take their complaint to the district prefect at Arizpe for adjudication, since it was likely that the *presidente* would again find in his own favor (AMBav [P 1900-1905]:3 Apr. 1902).

It is clear that the struggle for land in Sonora that emerged at the close of the nineteenth century was clouded by an even greater struggle for water, without which the land was valueless. The Opata and mestizo residents of the municipio attempted to hold on to their legally granted

rights to water, farmland and pasture. In the wake of a growing mining boom in the mountains surrounding the municipio of Baviácora, workers and settlers flocked into the district. The result was a rapidly escalating demand for the wheat and livestock which could be raised on the municipio's lands. Hacendados and property owners renewed their attempts to secure the land for their use. To the north of the pueblo of Baviácora, the residents of the *comisaría* of San José complained that entrance to their communal *bosque* and *agostadero* was blocked by the area's largest landowner (AMBav [P. 1900-1905]:6 Sept. 1901). To the south, the *comuneros* wrote that "the haciendas of Señora Guadalupe Robles de Bustamente (La Capilla, La Victoria and La Concepción are being made out of the ejidos of this village (ibid:1902)." Those living in the vicinity of the Rancho de Mazocahui registered grievances against livestock owners who allowed their cattle to destroy all that was planted (AMBav [P.1878-1899]:1899).

During the boom period, the haciendas themselves were in desperate need of workers. In addition to the local tenant farmers who worked portions of the land, they looked to the dislocated Yaquis to supply the necessary labor. These were the so-called "civilized Yaquis" who were protected by their toil from the state's persecution and slaughter, and given protection by their *patrones* on the haciendas. In turn, these "civilized" Yaquis offered shelter to "*los Yaquis rebeldes*", their rebellious brothers who refused to submit to either the state or the hacendados (Aguilar Camin 1981;1980). These could be heard at night as they came out of the mountains to eat and drink at the homes of their relatives in the municipio (Field Notes: 11/5/84). In order to distinguish the two groups, the state ordered the registration of all members of Yaqui families living legally within Baviácora haciendas. A 1902 census revealed more than 100 living in the municipio. Many of these worked at Vinatería, a large mescal producing hacienda near San José.

The state of Sonora's campaign against the Yaquis was pursued with vigor on two fronts. On the one hand, the individual municipios organized vigilante groups to track down, kill or imprison the *Yaquis rebeldes* found within the district. Baviácoran men joined with groups from Aconchi and Banamichi in their pursuit of the unfortunate Yaqui, thus perpetuating the tradition of civil self-

defense which had developed over the years in the isolated frontier environment. Later, the municipio expected to be reimbursed for expenses incurred during these ventures(AMBav [P 1978-1899]:1899; [P 1900-1905]:1900;1902;1904; [P 1901-1925]: Libro de gastos). In contrast to these local actions, an organized campaign was conducted by militias in the pay of successive Sonoran governors (Aguilar Camin 1981). To obtain men for these forces, the state asked each municipio to "draft" three men. The prefect of Arizpe described the conditions of the draft to the *presidente municipal* of Banamichi. In a letter dated August 29, 1896 he wrote that "we want volunteers if at all possible, at 50 centavos daily and 25 pesos for the enlistment.....these are different conditions than usual for military service, and they are not good conditions....The service is for one year, after which each man will receive a certificate freeing them from further military service. If the ones who are named need resources, and you trust them, give them 25 pesos for the trip." He then added the following note: "as it is, you know these people....whether it possible to obtain them under these conditions....since it is not the usual way (AMBan [P. 1882-1929]:Folio 17, 29 Aug. 1896)."

The Yaquis gradually replaced the Apaches as the official scapegoat held responsible for disruption and destruction in the Sonoran interior. To control this, underpaid soldiers obtained in this "not usual way" were quartered throughout the district of Arizpe. They were there to protect the interests of the foreign mining, livestock and agricultural investors who had become partners in Sonoran development. Though the major mining activity was centered in Cananea and Nacozari, smaller operations soon dotted the landscape surrounding Baviácora. These were frequently owned by Americans, who opened company stores in the tiny communities which sprang up surrounding the mines. They included the more profitable enterprises such as the Belen Copper Company; Buckeye; Mina Grande and Las Cabezas, and numerous small placers worked by both Mexicans and foreigners (AMBav [P. 1878-1899]:1897; [P. 1900-1905]:1903;1904). To meet the consumer needs of Valley miners and residents, well capitalized stores were opened in the pueblo of Baviácora by Chinese "mercantile societies" and individuals. These competed successfully with

the stores run by local merchants both in the *comisarias* and at the haciendas (AMBav [P.1878-1899]:1898; [P.1900-1905]:1901).

Though some non-Mexicans had cattle ranches in the municipio of Baviácora, agriculture was firmly in the hands of two groups of municipio elites. The first were the criollo hacendados who controlled the largest parcels of flood plain land. The second were the mestizo families who were the ruling elite of Suaqui and San José. In comparison to Yaqui and Mayo River Valley enterprises, these two groups were no more than small property owners. In spite of this, portions of the hacienda land were rented out to tenant farmers and sharecroppers (*aparceros*). These, with the remaining *comuneros* and *pequeño propietarios*, formed an incipient rural, lower-middle class. They raised subsistence crops including wheat, *maiz* (dried corn), *elotes* (green corn) *frijoles* (dried beans), potatoes, sugar cane, tobacco, and chiles which were either consumed at home or traded locally. Wheat was processed and stored at one of the local mills. Land "rent" was paid with a portion of the crops raised. The resulting flour was sold by the haciendas to the flourishing Moctezuma Copper Company located in the next valley (AMBan [P.1864-1908]: HAC-083, Aug.1905).

If these years were not times of relative prosperity for frontier Sonorans, they were certainly years of bustle and activity. Those Baviácorans not involved in agriculture sought wage labor in the numerous mines. Mexican, American, Swiss, French and Chinese entrepreneurs did business in a pueblo *cabecera* which sported no less than six cantinas. Schools were opened and maintained in Baviácora, Suaqui, San José and La Capilla. News of events in the rest of the state traveled slowly down the river from the prefect at Arizpe. Finally, a telegraph was installed in Banamichi to relay news to the other river pueblos. Smallpox epidemics in 1895 and again in 1902 were met by attempts to vaccinate all children. The ancient *Camino Real,* which remained the only artery through the Valley, was maintained each year following the rainy season by the communal labor of all able bodied men of the municipio.

In the years leading up to the revolution of 1910 frontier Baviácora was international in nature. Mexicans, including criollo, Opata, Yaqui and mestizo interacted with Americans, Swiss, French, Italian and Chinese. Though this ethnic diversity was duplicated in the short lived mining boomtowns, it was not the case in most of the Río Sonora pueblos. Further, many of the immigrants who invested their money and energy in Baviácora during the pre-war boom eventually became full time residents and Mexican citizens.

The Revolution in the Río Sonora Valley

The years between 1880 and 1910 produced a period of unprecedented growth and economic activity in Sonora. Security along the frontier was guaranteed by the presence of federally funded troops and rural police which were a result of state alliance with the national political machine of Porfirio Díaz. Foreign interests penetrated all important aspects of the economy. Those powerful families with the flexibility to diversify their own activities along the lines of economic growth flourished. Those individuals who could anticipate market needs reaped windfall profits (Voss 1984).

The principal benefits of economic investment in rural Sonora were felt in the district seats such as Arizpe, and in the urban centers. Falling into neither category, Baviácora's growth can be traced to an inherent flexibility and the relative political obscurity of the municipio's elite. Banamichi and Arizpe were tied to the ruling state and national power structure. In contrast, Baviácora was never really linked or indebted to a particular ruling faction. Thus, though the municipio lost out on special economic favors, it was able to make rapid adjustment to the unpredictable political climate as such changes occured. Though Baviácoran families were not represented in the vanguard of revolutionary fervor, neither did they bear the immediate wrath of the new government. *Campesinos* didn't rise; haciendas were not burned. During the revolutionary years, battles fought against other Mexicans were often overshadowed by those with the indomitable Yaquis, the forces of the river, and the fatal diseases which swept through the pueblos.

Securing the Countryside

The key to economic growth in the mining and agricultural regions of Sonora was the ability to market the goods produced. As a result, the twin booms in the north and south were accompanied by a frenzy of road and railroad building. In this, the Sonoran interior was largely neglected (Aguilar Camín 1981). The extent and nature of production in areas like Baviácora simply did not merit the same kind of infrastructural investment lavished on other regions. Fortunately, not all state officials were that shortsighted. It was recognized that the Río Sonora could not be fully and efficiently exploited without roads or rails. In 1906, then Secretary of State Alberto Cubillas wrote to the *presidente municipal* of Baviácora to ask his cooperation in the building of a *camino carretero* (highway). This was to be constructed between the villages of the district of Arizpe and the station "La Poza" on the Sonoran railroad. The work was viewed as being of great potential aid to the businessmen of the region, as well as to the authorities of the river pueblos. Its purpose was to raise the prosperity of the traffic through the area by opening the way toward a market and sales (AMBav [P. 1906-1910]:8 Oct. 1906).

The dream of roads and external markets for Baviácora was not to be realized for another 60 five years. In the meantime, mule teams hauling ore completed the 15 day run from the municipio to Cananea (Field Notes: 5/22/84). The trip from Ures through the barranca to Banamichi by wagon took three days (AMBan[P1882-1929]:folio 9,5/7/96). News continued to be relayed by mounted messenger between the *cabeceras* and their tiny pueblos, and between the state and the *cabeceras* through the telegraph office at Banamichi. The subject of much of this correspondence remained the hostile activities of the ever present Yaquis. The tribe continued to be held responsible for attacks up and down the Valley. According to reports, they robbed and attacked the hacienda of La Victoria; the *tienda de raya* (company store) of the Belen Mining Company at Las Cabezas; and a mescal producing operation at Rancho San Bernadino. They were alternately rumored to be traveling in twos; in groups of over seventy men; or with their entire families (AMBav [P1900-1905]:1905; [P1906-1910]:1906; 1907). Hacienda and *comisaria* heads

asked the *presidente municipal* to send men, arms and money for the pursuit of the Yaquis (ibid). The ultimate response was a military presence which was garrisoned at La Cañada Ancha in the southern part of the municipio. Within a short time, reports of travesties by the military protectors were equal to those concerning the Yaquis.

In 1908, the Yaqui persecution took on more sinister overtones. Prior to that, *los indios naturales* (the original indigenous families) of the Rio Sonora had been protected by their identity as Opata. In that year however, government directives and reports began to refer to the Indians of Sonora in general rather than the Yaquis in particular (AMBav [P. 1906-1910]:Mar.-Aug. 1908). Under the hand of General Lorenzo Torres, and at the request of other highly-placed Sonoran officials, the military was determined to "throw out of Sonora all of the Indians (Aguilar Camin 1981:65)." For the Opata families of Baviácora any advantage gained from acknowledging Indian heritage was lost. The time had come to become just another Spanish speaking Mexican. Whatever the Opata intention, official Baviácora was not that ready to forget ethnic distinctions. Municipio birth, death and marriage certificates through 1935 continued to record the ethnic identity of individuals as *raza indigena* or *raza indigena mezclada con blanca* , a practice outlawed in Mexico one hundred years previously (Field Report #26: 12/3/84).

This period of intensified anti-Indian sentiment coincided with declining prospects in the economic sector. The momentum of the mining boom was shattered by the violent strike against the Cananea Consolidated Copper Company in 1906. Economic contractions in Arizona in 1907 and 1908 were mirrored by closings in the northern Mexican mines. Financial backers in Wall Street considered additional investments with caution. Crisis also occured in the agricultural sector, as the 1909 harvest fell way below expectations.

The municipio of Baviácora was less consistently affected by the worsening economic picture. Among those engaged in agriculture, the tenant farmers of the hacienda La Concepción informed the *presidente municipal* that they would not pay "five centavos more" in tax contribution (AMBav [P.1906-1910]:1 June 1908). Campesinos continued to press state and municipal authorities

for a fair and accurate resolution of the boundaries of the ejidos of the pueblo of Baviácora (AMBav[P.1900-1905]:29 Jan. 1905). Though 127 men were employed by the *Dos Amigos* copper and silver mine at a daily wage of 2.50 to 3.50 pesos, others were destitute enough to resort to stealing wheat (AMBav[P 1902-1960]:1909;[P 1906-1910]:1908).

As the Porfirian era drew to a close, mining towns like Cananea and Nacozari were swelled with a frontier labor force which had endured foreign exploitation and dangerous working conditions in the interest of high wages. With the economic crisis of 1907-1909 , many of these landless *jornaleros* (day laborers) who had found jobs in both agriculture and industry on either side of the border during the boom drifted back to their pueblos with little or no prospect for employment. It was these unemployed miners, cowboys, railroad workers and laborers who were soon to become the revolutionary supporters of Madera and later, of Villa, Carranza and Obregon (Aguilar Camin 1980; Radding-Murrieta n.d.; Sanderson 1981).

The Battles of the Revolutionary Era

> ....In the pueblo of Baviácora on the 23rd day of the month of August 1912, it is sworn before the state civil judge that.....
>
> yesterday at four o'clock in the afternoon, more or less, Señor A. S. R., age 54; single; and a laborer; was killed by a revolutionary force in an attack on this plaza.....Also killed by a party of revolutionaries was Señor P.M., married.....And at five o'clock in the afternoon Señor A.V., single; age 26; also a laborer; was killed by Orozquistes (RCB [Libro de Defunciones]:1912).

On the sixth of July 1911, Mexico City telegraphed through Hermosillo to the *presidentes municipales* of the Río Sonora pueblos. Using the newly installed telegraph lines in each municipio, the authorities wished to ascertain the sentiment of the people concerning the new government which had been established. In reality, there was probably little sentiment either way. Those who remember the years of the revolution in Baviácora do so for reasons other than the sporadic war they experienced. Even the official municipal archives give only a slight hint that anything occured. On the national level, Díaz was replaced by Madero. Locally, Porfirian *presidentes* were succeeded by those who supported Madero. When the people of Baviácora did

embrace a revolutionary tenet, they were quickly corrected in their interpretation. The revolutionary moment, which passed quickly into civil war, brought little or no change to the municipio.

It was not until the first weeks of February, 1911 that revolutionary forces were seen in the area. These stopped just long enough to expropriate the local treasury and then retreated into the mountains (Aguilar Camín 1981:140). In March 1912, Sonoran Governor Maytorena applied a statute calling for the conscription of all able bodied men for the defense of the countryside (Aguilar Camín 1981:108). Baviácoran *campesinos* responded that going to register would cause them hardship, for they would be forced to leave their homes and families for several days (AMBav. [P. 1911-1929;35-39]:2 Apr.1912). It was the municipal militia organized as a result of Maytorena's decree which met the forces of Orozco in the Baviácora plaza in August of 1912. In spite of local sentiment against military service, Río Sonora men swelled the ranks of the rebel forces. Two shipments of arms and cartridges were received in Baviácora (AMBav. [P. 1911-1929;35-39]:1912). As one woman recalled, "All of the women and children went across the river to hide. When night came, Orozco's men retreated across the mesa close to San José. Because it was dark, and they did not know the land, they were caught in the cholla, many without shoes. By morning they were gone (Field Report #8: 7/20/84). "

The existence of the Sonoran militia made the state ready to oppose Huerta in 1913. Fighting largely in defense of state sovereignty, the rebellion was not a spontaneous mass uprising, but an organized program using the resources and logic of the existing state government. In charge of the Sonoran offensive, General Ignacio L. Pesqueira told a group of Río Sonoran rebels that they should maintain "absolute order and respect for the established authorities and the interest of individual citizens (Camín-Aguilar 1980:110)." It is probable that the Baviácoran rebels were a little confused. By mid-1913, many of them were responding to the revolutionary rhetoric issued from central Mexico. In two community decisions the people of the pueblo voted first that all Chinese and their descendents be ejected from the area; and second, passed a resolution asking for the

redistribution of the critical waters of the municipio (AMBav [P 1911-1929;35-39]:17 July 1913; 31 July 1913). Other documents indicated that the people also questioned the rights of other foreigners to remain in the municipio. Clearly, this was not what the Sonoran government had in mind. In the case of a Frenchman (later to become one of the municipios most wealthy citizens) the government asked the director of the Baviácora boys school to "help gain respect from others for [this man], since though a foreigner, he will soon be a naturalized citizen of Mexico (AMBav [P 1911-1929;35-39]: August 1913)."

The dichotomy between local and official interpretation of the meaning of revolutionary events did not even begin to come to resolution for another twenty years. In the interim, some power shifted locally and the Chinese merchants withdrew for a few years. The remaining economic and social relations of production in the Municipio went unchanged. Baviácorans were forced to turn their attentions to battles of another sort. In 1914, the rain swollen Río Sonora brought floods and destruction unmatched in living memory. In the *cabecera*, the river covered the flood plain on its east bank, reaching as far as the bajada edge (Field Notes 11/3/84). Half of the land belonging to the hacienda La Victoria was inundated and carried away by the river's force (AMBav [P 1932-33]: 2/15/33). Further north, residents of the tiny pueblo of Bamori were forced to move to nearby caves where they spent the winter (Radding-Murrieta n.d.). It is these events which stand out in local memory.

The revolution claimed a handful of lives in Baviácora, much as the Yaqui and Apache had done in previous decades. These sporadic acts of violence cannot be compared with the continuous process of illness and death which effected the municipio during these same years. Tuberculosis, measles, whooping cough, gastrointestinal diseases and enteric fevers, and pneumonia provided the background noise of daily life. Malaria and polio followed seasonal incidence patterns. Smallpox epidemics remained a constant threat, and accompanied the spread of the revolutionary forces through the state in 1913 (AMBav[P 1911-29;35-39]:1913; RCB [Libros de Defunciones]:1910-1920).

Baviácorans do not remember the exact sequence of events and people that shaped Mexico's future during this period, since they had little to do with them. Their municipio was officially chartered in 1916. The Chinese returned to the area at the same time, reopening their stores and acquiring land for agriculture. The 1920's were hard years for all. Correspondence between Arizpe and Baviácora was carried out on the back of old election ballots. Whole estates were liquidated for taxes. The priests were thrown out of the Valley; the church closed; its statues burned. For the mestizo campesinos whose communal lands had been eroded by continual encroachments, agrarian reform was slow in coming. It was not until 1929 that they would begin the process of restoration of corporately controlled land, water, and forests guaranteed to them in Article 27 of the Constitution of 1917 (AMBav [Pres 1888-1959]:1922; 1926;[P 1911-29;35-39]1916;1918;1923;1924;1929).

La Reforma Agraria: Land and Economy 1930-1955

The process of agrarian and social reform which was the promise of the Revolutionary years was slow to spread through Mexico. Though the *hacendados* were unable to oppose the revolution with any unified power, the haciendas survived because of their ability to adapt to, and utilize the postwar confusion. In the 1920's, the haciendas persisted, though some *ejidos* were returned and a system of small holdings developed. In actuality, it was the latter situation which was the ultimate goal. The *ejido* was intended to be transitory; a training ground for small holder farmers, who would then become good agricultural capitalists (see Esteva 1983: 30-32).

For Baviácora, small holdings were not an alien concept. Though *campesinos* had held communal land, much of this was in *agostadero* and woodland. The independant *comisarias* had grown up around small holdings; many of the other *campesinos* had farmed small pieces of hacienda land as tenants. Thus, there remained only the break-up of hacienda territory, and its redistribution for agrarian reform to begin. In January, 1929 the residents of the municipio placed before the agrarian authorities of the state a resolution asking that "the restoration and/or

endowment of *ejidos* should occur, according to procedures set out in the Constitution (AMBav[P 1911-29;35-39]:1929)."

In reality, the breakup of the haciendas began decades earlier, and derived not from agrarian law but from those of inheritance. Mexican law and local tradition dictate that if an individual dies intestate, the estate is divided up equally among all male and female heirs. Though the land can be willed differently, subdivision was the usual practice. This took a heavy toll on parcels of flood plain land, which was in itself limited. The intermarried hacienda families of Baviácora were characterized by typically large households. Thus, by 1930, the *milpas* had already been divided into numerous small parcels. Though the families still held large tracts of upland pasture, these too, had been divided among multiple heirs. Finally, inter- family squabbling prevented the landowners from presenting a united front against agrarian reform (Field Report # 24:11/19/84).

The formal process of change was initiated by the election of Lázaro Cárdenas in 1934. Under his administration, the *ejido* became the cornerstone of the national agricultural economy. On the third of August, 1935 the *Ejido de Baviácora* was formally endowed. It included 12,546 hectares of newly donated federal land which stretched from San José to La Concepción. Of this, 300 hectares were agricultural, and the remainder pasture (SRA Document #1). In the rest of the municipio, a complicated reallocation of land was begun, as residents used all available legal and extra-legal means to gain ownership or occupance of territory.

As had occured in past centuries, the question of legal ownership and title to municipio lands was hotly disputed in the 1930's and 40's. In anticipation of a series of laws relating to land and water rights, authorities attempted to find out exactly who occupied and/or owned which kind of land. Many landholders were notified that the territory they occupied was actually federal property (AMBav [P 1934-39]:6 Sept. 1939). Others attempted to occupy and purchase federal land not yet designated as *ejidal* (AMBav [P 1937-41]:20 Nov. 1940) . In the wake of this, *comuneros* and private owners unearthed ancient titles which frequently gave both parties rights

to the same property. In the case of certain lands surrounding San José, title dating to 1716 was held by both the the *comisaria* of San José and the pueblo of Aconchi. In addition, an individual produced a titled to part of the land, dated 1822. The lands in question were eventually awarded to Aconchi (AMBav[P 1932-33]:12 Feb.1933).

The transition from hacienda to *campesino* land ownership on the local level threatened to create state and national problems in the agricultural sector. Under the *Ley Federal de Tierras Ociosos* (Law of Idle Land), land which had not been in use for three consecutive years could be claimed by individuals. Authorities feared that *campesinos* anxious to take advantage of this would abandon the crops on sharecropped land. They warned the municipio that it was critical to enforce sharecropping laws under which contracts had been signed for three years. As summarized by a federal land inspector to the *presidente municipal* in 1934: " I ask that you do not accept any surrender of lands by the land tenants of El Molinote (La Concepción) who are out to destroy the three year arrangements of their sharecropping contracts.....[this is] in light of some complaints that various elements of the *campesino* proletariat have risen....(AMBav [P 1934-41]:14 May 1934)." In spite of this caution, by the late thirties sharecropping contracts were almost completely replaced by personal petitions for small parcels of idle land (see AMBav[P 1892-1979]:Sindicatura 1934-39).

By 1940, the haciendas were gone, their lands either sold or divided among family members. *Comuneros* in the southern half of the municipio continued to seek the endowment of corporate lands, a process which would continue until the 1970's (AMBav[P 1934-41]:1934,1941). This struggle for land was accompanied by an even more critical struggle for water. The transfer of land needed to be accompanied by concomitant access to the *acequias* which watered it. *Comuneros* who impounded the waters of an irrigation ditch known as "de los Suaquis" found themselves in court with a land owning neighbor. The state found for the landowner, and ordered the *comuneros* to alter the course of the ditch. When they refused to do this they were denounced

for "the rebellion manifested on the part of the aforementioned *comuneros* (AMBav[P 1934-41]:1938).

The Baviácoran Economy

The 1930's brought more than just land reform to Baviácora. Mistrust of foreigners gave way to a generally perceived anti-capitalist slant in the Cárdenas reform government. As a result, foreign investors were both encouraged and inclined to leave Sonora (see Sanderson 1981:93-131). The remaining Swiss, American and French merchants and landowners in Baviácora were invited either to become Mexican citizens or sell their property and leave. This extended to the *presidente municipal,* a member of an immigrant French family who had made their fortune in the Río Sonora Valley and remained. He was forced to resign his post while the entire family applied for and received naturalization. The Chinese families had already done the same following a second wave of violent anti-Chinese sentiments in the twenties (AMBav[P1897-78, migraciónion]:1933; [P 1934-41]: Oct.,1941; also Field Report # 24: 11/21/84).

The closing years of the decade brought economic crisis to Mexico once again. To survive this, the government asked the municipios to dedicate all energy to production for external commerce. In response, the now naturalized and reelected *presidente municipal* of Baviácora wrote: "in this municipio it is impossible to respond in any form to your suggestions, by virtue of the fact that we have not developed any activities worthy of export.....Nevertheless, we support you in spirit and patriotism (AMBav [P1934-41]:7 May 1938)." Though Baviácorans produced just about everything they needed for subsistence, only five individuals were producing for sale. Of these, two were cattlemen and the remaining three grew *maiz* and *frijol* (dried beans). The bulk of production was for consumption and included wheat, *maiz,* and beans. Tobacco, cane, chile, potatoes, sweet potatoes, onions, garlic, peanuts, melons and watermelons were also grown. Local orchards raised oranges, limes, *membrillos,* figs and peaches in good quantity. Wheat was processed at the mill "El Progreso" at El Bagote. Tobacco was made into cigarettes at the factory known as *"Tabacleria del Río"*. Sodas were produced locally at a *Fabrica de Aguas*

Gaseosas in the pueblo of Baviácora. Most families kept a few chickens, some pigs and a dairy cow, while beef cattle were produced on numerous ranches surrounding the town (AMBav [P 1835-1971]:estadisticas; [P1902-1960]:1949; [P1937-41]:Mar 1941).

During years of "normal" seasonality, the agricultural production of the municipio was notable and met all of the population's basic subsistence needs. It was simply not marketable or convertible to cash. As one *secretario municipal* lamented in reply to an official request for agricultural statistics: "we don't have cultivation on a large scale here owing to the fact that the markets are very distant from this place and it isn't worthwhile to send them away because the freight is so expensive(AMBav [P 1835-1971]:15 Dec 1934). Though the municipio boasted 15 trucks by this time, the roads north and south were no better than they had been at the turn of the century(AMBav [P 1902-60]:estadisticas 1935). In spite of this, Baviácora was able to support her population, which continued to grow steadily. By 1950, the 2496 of the 1898 census had reached 3127. This contrasted the pattern in other municipios of the Sonoran interior and the Río Sonora, where population dropped drastically following the collapse of local mining (see Sheridan 1983:69).

Baviácora too, experienced the decline of local gold, silver and copper mining. By 1950, the once flourishing mine at Las Cabezas was closed, its well traveled highway and attendant community abandoned and overgrown. Families who lived there and in other mining enclaves moved to the *cabecera* and sought other forms of wage labor (AMBav [P 1835-1971]: estadisticas 1950). Ranching soon became the only profitable enterprise in the area. Weathering a cycle of prosperity and setback, by 1952 there were sixteen active ranches in the area.

Que Haceres del Hogar: Roles of Baviácoran Women

On the municipio level, the fifties saw official concerns turn to the modernization process and the battle to secure funds to bring electricity, water and medical care to the pueblos. These changes would be long in coming. The *bracero* program was about to begin, offering men a chance to seek employment in the United States. Once again, the fortunes of Río Sonora families would

become tied to the American economy. The world was about to expand for many Baviácoran men, yet for the women it would be just another year; just like the last year; just like the last century.

The roles of Baviácoran women have been shaped by the same natural and political forces which conditioned the distribution of resources in the municipio. Women have always been an integral part of the subsistence economy, whether as mothers, housekeepers, gatherers, gardeners, or stock keepers. As Opata women, they joined the men in everyday labors, ceasing heavy work during pregnancy. During these times, they devoted themselves to cooking, grinding, spinning and weaving (Nentvig 1980:67). Completed families were estimated to have contained four children (Sauer 1932), far below the number which Baviácoran women could expect to bear in the twentieth century.

As the gap between *campesino* and elite broadened over the past hundred years, municipio women added the role of wage laborer to their other duties, duplicating their own household activities in the homes of the wealthy. Until the 1950's the only other rural occupation open to women was that of school teacher. For this, men and women received the same education, yet women were paid consistently lower wages. This situation was encapsulated in an exchange of telegraph correspondence which took place in 1895 between the *presidente municipal* of Banamichi and the director of education at Ures. In desperate need of a teacher, Banamichi asked Ures to please locate a man to direct the school at sixty pesos a month. Ures replied that no man was available, but that there was a competent young woman who could begin in two weeks. " Great! " wired Banamichi. "Tell her to come. Forty pesos a month. (AMBan [P 1882-1929] Folio 9; 5/7/1896)." It was the natural order of things.

Clearly, until the 1970's a rural Sonoran woman's place was in the home. There, she might manage the household; own property; or sell cooked food and dairy products; but these were invisible activities never enumerated officially. On birth and marriage documents her occupation was always listed as "*que haceres del hogar*" (that which is done at the home), or simply "*quehacers*". Before marriage, she could look forward to dancing at the many local fiestas; once

married, her social world was comprised of family and church. She could expect to have "*todos los hijos que Dios mandan*" (all of the children that God sends), and to bear all the burdens that "He" sent as well.

By the 1950's, development and modernization had begun to alter the lives of Baviácoran women and their families. As urban "progress" began to catch up with rural Baviácora, it would become a time of striking contrasts; an era of transition in which life would be lived in alternating centuries. For the women of Baviácora, it would demand a new flexibility. Adjusting once more to the seemingly capricious whims of the economy, the municipio would begin a well intentioned program of modernization. It is this process which is the subject of the next chapter.

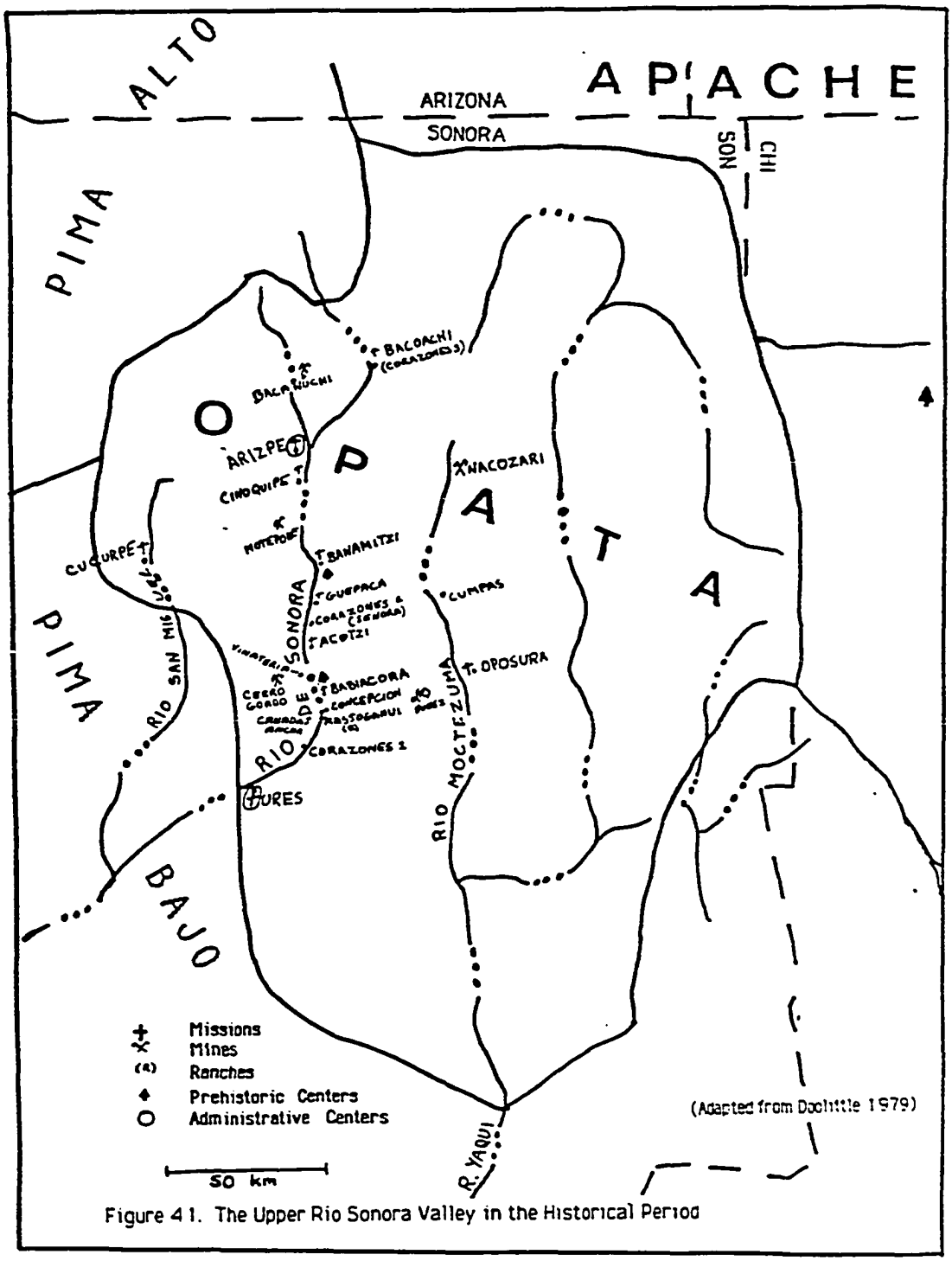


Figure 41. The Upper Rio Sonora Valley in the Historical Period

CHAPTER 5

THE MODERNIZATION PROCESS: 1945-PRESENT

As with many revolutions, the Mexican conflict of 1910 created a social debt to the country's citizens. This included not just the promise of equitable resource distribution through agrarian reform, but the extension of life standard improvements to previously neglected rural communities as well. Like the land reform program, modernization did not really begin until the administration of President Lázaro Cárdenas. It proceeded slowly through the subsequent decades, as the need to invest in both economic development and modernization concurrently resulted in a double drain on national and local finances.

For the municipio of Baviácora, the modernization process began with restricted electrification, clean water, and sanitation programs in the 1940's. Accelerating in the 1970's, it did much to improve the standard of living in most municipio pueblos. Electricity, potable water, sanitary conveniences, and medical care were brought within reach of all residents. Improved transportation and communication systems were the source of urban ideas and information. These were superimposed on traditional life styles, creating the transitional variant found in the Río Sonora Valley today.

As the decades passed, childhood diseases, polio, and smallpox were controlled through a vigorous vaccination program and the extension of maternal-child health services to the pueblo of Baviácora. The configuration of mortality and morbidity in the municipio gradually began to change from a rural to urban pattern. In spite of this, the ever-present diseases of poor sanitation and poverty failed to decline, and in some cases actually increased. The attempt to rapidly satisfy short term needs on a widescale basis led to poor quality, underfinanced projects which were often obsolete or deteriorated as soon as initiated. In the final analysis, modernization in the municipio of Baviácora remained a duct tape and baling wire construction reminiscent of the late Rube Goldberg.

Infrastructural Modernization and the Health of the Community

It was early summer, 1984 in Baviácora. The billowy cloulds of the rainy season had not yet come to provide some relief from the mid-afternoon heat. Just returned from the milpa, Francisco was about to begin midday *comida*. He sat at the kitchen table, chilled by the breeze of an ancient evaporative cooler purchased during the late 1970's. As his wife Lupe took a barely cool sixteen ounce bottle of Coca Cola from their badly laboring refrigerator, the cooler sputtered twice and died.

It was the tenth day that month in which the electricity failed in mid-afternoon. It was *expected* that the power would go in the evenings during the rainy season, but this was something new. Installed in 1979, the electrical system, which began at Loma Norte and extended north through the Río Sonora Valley as far as Arizpe, was already obsolete. As the use of appliances increased in the municipios, the overloaded system would blow a fuse on hot afternoons and give out.

It was the job of the employees of the Federal Electrical Commision to see that power was restored. Their task was not an easy one. The power lines were constructed like a set of series Christmas lights; when one fuse went, they all went. Repair was accomplished by going from pueblo to pueblo, throwing each and every circuit breaker on the way. It was a long and arduous process.

The women of the Río Sonora Valley were fed up. "*Madre de Diós*!." swore Lupe. "Not again. We bought a refrigerator and filled it full of meat and milk, where once we would have dried our beef. We bought a cooler and put it into the kitchen window, where once there came a breeze in summer. We filled in the outhouse and put a flush toilet next to the kitchen. Now there is no electricity. The meat rots in the refrigerator; the cooler blocks the window; and the toilet won't flush because the pump fails without power. I tell you. Everything is modern, but nothing works. It's Mexican "*estyle*". We were better off without."

Just then, the orange truck of the electrical commission pulled up to the light pole in front of Lupe's house. Getting out of the truck, the men grabbed a long bamboo pole and began to throw the breaker. Eyeing them, Lupe picked up a large rock from the pile in front of the house. "*Pinche hombres*!" she yelled. Who will pay for my food?" The rock bounced off the side of the truck as the two men beat a fast getaway towards the next village (Field Report # 7: 7/12/84).

Agua Potable: The Sanitary Water System

No one can dispute the strides made in controlling infant mortality in much of Sonora. The books of death certificates housed in the Civil Registry of the municipio of Baviácora no longer chronicle a tale of desperation in which more than half of all infants died before the age of two. Much of the improvement is recent. In the last three decades infant mortality declined from 74/1000 in 1960, to 33/1000 in 1970, reaching a low of 22/1000 in 1980 (MEBE: 1984; RCB:Defunciones; X Censo 1984). These inroads resulted from a combination of factors, including the eradication of smallpox and measles and the availability of low cost medical care. As important, however, was the extension of clean water and sanitation systems first into the pueblo of Baviácora, and eventually into the tiny hamlets as well.

For as long as people have lived in the Río Sonora Valley, the Río Sonora itself has been the sole source of water for all purposes. Whether using water from the stream course, or tapping the subsurface aquifer through springs or wells, a substantial portion of a woman's day was occupied with tasks requiring massive amounts of water. Water was hauled to the house in ceramic *ollas* (large jars) for cooking and cleaning; laundry was hauled to the river to be laundered on rocks, or in a make shift *pela* (washtub). Though household water was sometimes boiled, for the most part it was the same water which was used for all tasks. Recontamination was a continual problem, as sewage and waste washed back into the Río Sonora from poorly dug latrines or the frequently used arroyos which served as bathrooms.

Public Health officials realized early that gastrointestinal diseases such as salmonella, and enteric fevers such as typhoid could not be controlled until potable water was made available

throughout the state. In the late 1930's, municipio authorities received a grant of 5000 pesos from the Cárdenas administration to begin construction of an agua potable system in the pueblo of Baviácora. The initial goal was a public faucet in the central plaza where residents could come to draw water which would not be contaminated. Additional funds for the project were raised during fiestas organized by the village's *Comité Por Agua Y Luz*. By 1943, the town had limited running water, due to the "supreme spirit of the residents." The *presidente municipal* noted that just the small amount of clean water had reduced infant mortality. He asked for a 2500 peso subsidy per year to maintain the service (AMBAV [P 1929-1959]: 11/11/43).

The success of the system during the 1940's was limited. As in the present, the availability of water was tied to the generation of electricity at a power station near Ures. The electricity ran the pump which brought the water into the town. When the power failed, so did the water. Frequently, service was suspended as often as it was operative (AMBAV [P 1929-1959]: 11/11/43). Though the distribution network was extended to the vicinity of individual houses during the following decade, the problem of availability was not solved.

In a letter written in 1958, the president of the *Junta de Agua Potable* complained that water seldom arrived at homes until very late in the day, and then for only a few hours (AMBAV [P 1929-1959]: 4/16/58). In response, the man in charge of water plant reminded him that " you know the condition of the pump; that it has begun to break. You know the problem with parts; that these are not available. You know also that many of the users have installed sanitary facilities in their houses, and these use a lot of water. Perhaps the problem is in the lines, and we need more of them. But the lines are not my job; I haven't the authority to arrange for more. Maybe you should talk to the one in charge of the lines, and not the one in charge of the plant. Besides, it's almost summer, and you know how the electricity is in the rainy season (AMBAV [P 1929-1959]: 4/17/58)."

Until the late 1960's, even this sporadic type of service was only available in the central section of the pueblo of Baviácora. Residents of the outlying *pueblitos* continued to rely upon old

wells or the river to meet all of their needs. As a result, water-related morbidity and mortality remained extremely high through 1970. It was not until 1969-1970 that the *agua potable* network was extended to the larger *congregaciones* of Suaqui and San José, and in subsequent years to the other tiny towns as well (AMBAV [P1889-1979]:1958-1972).

How Potable is *Agua Potable*?

In spite of the fact that piped water is now universally available throughout the municipio, water related diseases still remain a serious problem. Both typhoid and hepatitis continue to be endemic to the area, though outbreaks of these are not as severe as they once were. What is striking however, is that the spread of these diseases stops at the American border, just 150 miles to the north. The causative factor is the Rio Sonora's poorly designed and inadequately funded "improvements", which are characteristic of Third World countries. It seems clear that the epidemiology of the region is related to a deficiency in the system, which might have been avoided if competition for funds did not always exist between productive and non-productive infrastructure.

A principle problem with the water distribution system is related to waste disposal. The pueblo of Baviácora is one of the few in the Valley which uses a waste water stabilization pond in the disposal of sewage. Under the best circumstances, families rely on shallow septic tanks located just outside each individual dwelling. Often, these use old wells as the holding tank for untreated waste, failing to take into consideration the extent to which well sites communicate with subsurface aquifers. Under normal circumstances, indoor toilets are connected to sewage pipe which leads out of the house, but only as far as the nearest arroyo or ditch. During the rainy season, the sewage is washed out of the arroyos and into the Rio Sonora, where it eventually ends up back in the water supply (Elite Interview # 2).

As a result of these conditions, public health officials continue to caution residents that drinking water must be boiled, especially during the summer months. Water-related gastrointestinal problems are most severe among infants and young children. However, if routine

sanitary procedures are followed, illness can be kept to a minimum. When serious outbreaks occur, it is usually the result of one of the frequent breakdowns in the *agua potable* system itself. When this happens, residents often fall back on traditional water sources, including old wells, *acequias*, and the river itself.

During the summer of 1984, the main pump for the pueblo of Baviácora broke down. After attempting to repair the pump for two days, authorities concluded that a broken part was at fault. They sent it to Hermosillo on the early morning bus, hoping to receive a replacement the following day. In the meantime, a municipal dump truck was filled with water in a neighboring village. Residents were able to fill buckets with water from the back of the truck twice a day.

The part was returned to the pueblo as expected. Though the company sent the correct item, it would not fit into the pump. Because it was already the weekend, it was Monday before the defective replacement part could be sent back to Hermosillo for another try. It was a full week before the pump was finally repaired. In the meantime, many Baviácorans (including the local doctor and anthropologist) resorted to bathing in the river or drawing water from a seldom used well. The doctor predicted that the effects of the breakdown would be felt in the municipio within seven days (Elite Interview # 2).

The doctor was correct. An epidemic of gastroenteritis, characterized by diarrhea, cramps and high fever, raced through the pueblo a week later (Field Report #6: 7/3/84). Analysis of the well water used as a substitute during the breakdown revealed the presence of coegulase positive staphalococcus, a result possible only under conditions of serious contamination (Field Notes:11/14/84). A principle source of food poisioning, staph causes infection by producing enterotoxins when allowed to reproduce as food stands at room temperature. Consequently, foods which have been washed with, or reconstituted by, contaminated water can be the source of the bacteria. The epidemic was actually a result of the breakdown in water supply which occured in conjunction with electrical shutdowns which made refrigerators inoperative, allowing food to warm to dangerous temperatures.

The Electrification Program

The program of electrification in Baviácora paralleled that of agua potable. Indeed, the principle reason for electrification was to provide the power to run the pump. Use of electricity for lights, radios, or other conveniences was purely secondary (AMBAV[P 1889-1979]:Electrificación 1958-72). Consequently, as long as enough current was generated to run the pump for a few hours each day, complaints of inadequate service were generally ignored. It was for this reason that the extension of service into the tiny pueblos of the municipio did not come until the early 1970's (AMBAV [P 1889-1979]:Electrificación 1958-72; [P 1934-1978]: 1969).

Full electrification occured in association with the arrival of consumer durables in the Valley. As a result, the demand for energy began increasing almost as soon as the system was completed. Because of the excessive heat of the summer months, fans and evaporative coolers were among the first appliances to be widely adopted. Prior to this, the siesta period provided respite from the long afternoons during which temperatures soared to 105-110° F. regularly, and above 115 ° F. on occasion. However, as urban schedules began to shorten the siesta period from its traditional 12 Noon to 4:00 P.M. cycle, cooling devices became the only avenue for avoiding dehydration, heat exhaustion, or sunstroke.

Currently, afternoon and evening use of fans, coolers, and air-conditioners create peak loads during the hottest times of the day. This is exacerbated by the widespread use of refrigerators, which also stress the electrical generating system. In 1984, afternoon power failures augmented those which resulted from the daily electrical storms of the summer rainy season. Once refrigerators became available, many families who once relied on traditional methods of food preservation no longer dried meats or canned fruits. Stores stopped selling dried foods as well, on the assumption that refrigeration made it unneccessary (Field Reports 4-16).

During the summer of 1984, the electricity and water were off for 55 hours during a ten day period (Field Report #7: 7/12/84). The fans, coolers, and refrigerators of modernized

Baviácora became useless for a large part of the summer. A result of situations such as this is that gastroenteritis is the number one cause of morbidity and the number two cause of mortality in the municipio today (Lopez-Ramos 1984). At highest risk are infants and toddlers, whose milk and formula are frequently made from powders mixed with water.

It is the combination of heat, water-related gastroenteritis, and food poisioning that is most threatening. Each of these conditions depletes the body of vital stores of fluid and electrolytes. Thus, the immediate cause of distress is dehydration. In 1983-1984, it caused three of the 28 deaths which occured in the municipio (Lopez-Ramos 1984). Local mothers are aware of the seriousness of the condition. They serve family members a home made "gatoraide" made from dilute lemon juice, a teaspoon of salt, and three teaspoons of sugar. This replenishes fluids and sodium lost through sweating, vomiting, or diarrhea. When consumed with bananas, which are high in potassium, this remedy contains all components of pharmaceutically produced electrolyte fluid.

Though dehydration and enteric diseases have always been a threat in the Río Sonora Valley, their seriousness is actually increasing. Individuals who now rely on electricity-dependent conveniences during an urban workday and young people who are unfamiliar with the old patterns of adaptation to summer heat are at greatest risk. When the electricity and water fail, there is no automatic return to traditional patterns of food preservation and water purification. Social system changes resulting from modernization make it difficult for this to occur.

Construction of New Houses

A major accomodation to the temperature fluctuations of desert environments is the use of building materials which keep houses cool in the summer and warm in the winter. In the Sonoran desert, houses have been built of adobe since prehistoric times. Easily made from local materials, the thick adobe dwellings of the Río Sonora Valley have been a major component of adaptation to heat, cold and violent thunderstorms. Often, houses were built contiguous to one another, making their design even more efficient.

There are certain drawbacks to the use of adobe. Made of sun-baked earth and straw, adobe walls can deteriorate under the impact of heavy rain. Thus, they must be meticulously maintained, or the structure will eventually "melt". Further, they are difficult to keep clean, and health officials caution that desert insects proliferate under these conditions. This is a serious problem in Baviácora, where the potentially lethal *alacran* (scorpion) hides in corners or clothing, ready to sting when disturbed. While adults will usually recover from a scorpion bite, children are at high risk of death. During the 1984-1985 season, two children (ages two and five respectively) died after being stung by a scorpion (Post-Field Correspondence # 3; RCB:Defunciones).

In recent years, Baviácorans began to abandon use of adobe in house construction. Though health and hygiene are given as reasons for the change from adobe to cinder block, local motivation is more complex. In central Sonora, adobe is seen as a low status building material. This is ironic, since 200 miles north in Arizona and New Mexico adobe is a high priced favorite of desert yuppies. In Baviácora however, cinder blocks are the material of choice among the wealthier families. In many of the "suburban" additions to the pueblo, adobe homes have been abandoned half finished, and block structures erected next door.

In association with the switch from adobe to cinder block, local families have also changed from wood burning to gas stoves. Since Valley homes seldom have fireplaces, the wood burning stove was the traditional source of warmth during the winter months. With the change to gas, many homes have absolutely no heat source. Block houses have neither a heat source, nor do they absorb solar heat as efficiently as adobe. Consequently, winter pneumonias are now the number one cause of death in the municipio, causing 21.4 % of all deaths in 1983-1984 (Lopez-Ramos 1984).

Health authorities are aware of some of the health problems which are the result of the modernization process. They are attempting to help rural populations adapt to change through

health education programs utilizing the mass media. For Baviácora, this was made possible by the extension of television service into the Valley in 1978.

Transportation and Information

The arrival of television in the upper Río Sonora Valley provided the first concentrated exposure to urban values and ideas for many residents. Though the completion of the paved road through the Cajón de Ures four years earlier made trips to the capital city of Hermosillo more possible, Baviácorans did not make the trip frequently. Thus, the completion of the microwave antenna on the nearby Sierra de Aconchi was a long awaited event. For a full year before service began, the one Baviácora store which sold electrical appliances offered a 13 inch black and white T.V. for purchase. Within a year after reception was established, more than 85% of all municipio homes sported T.V. antennas. Only the tiny community of La Aurora on the west side of the river was without service.

The Impact of the Media on Municipio Life

The image of urban life brought to the municipio by Hermosillo's channel 12 in 1978 was a strange one. As in the present, programming was divided into three types. The first of these consisted of live news, public affairs, and entertainment. Here, local stars and experts presented entertainment and information in a fashion more or less familiar to all Sonorans. News broadcasts were interspersed with studio presentations of the "*musica norteño*", a curious mix of country-western polkas with a mariachi beat. Issues discussed were those of concern to farmers, ranchers, and housewives throughout the state.

The second species of program was the *telenovela*. These soap operas were produced on the national level, and contained larger-than-life heros and heroines who lived an urban Mexican way of life. Finally, the bulk of the broadcast day was filled with reruns of U.S. sitcoms and detective shows. In 1978 these were typified by The Carol Burnett Show, and the ever-present Kojak. Several hours were filled with *caricaturas* (cartoons), including Popeye, Looney Tunes, and The Flintstones.

The picture of life outside the Valley was a hybrid. Liberally punctuated by commercials selling autos, washing machines, toothpaste, or beer, T.V. meant mass exposure to a set of new ideas and values, some of them far divorced from local culture. As in the United States in the early fifties, T.V. also meant the disruption of traditional patterns of recreation and social life. There was now more to do in the evenings and long afternoons than sitting on the patio with family or saying the rosary with the other women. In the early years those with televisions earned a few pesos by allowing others to come in and watch. Before long, however, most extended families had their own set.

Six years later in 1984, the quality of programming showed little improvment. Among the imported shows, super heroes were over represented. *El Auto Incredible* (Knightrider), *El Super Heroe Por Accidente* (The Greatest American Hero), *El Hombre Incredible* (The Incredible Hulk), and *Los Super Heroes* (The Super Heros) were all prime time favorites. Little children asked frequently if life was really like that in the United States. In their view of the world, Baviácorans were wisked from the traditional, to the modern, to the fantastic in only a few years. If the streets of Mexican cities were paved with gold, then the streets of U.S. cities were lined with supermen.

The juxtaposition of larger-than-life American video heros with the down home quality of Sonoran programming provided a curious vision of life outside the Rio Sonora Valley for Baviácoran women. Though only the children seriously believed that the Incredible Hulk lurked outside most U.S. cities, the background of living standards and life style possibilities in U.S. shows created a new level of expectations. The female lead on the Greatest American Hero was an unmarried, successful lawyer whose home was filled with appliances and labor-saving devices; none of the women portrayed on Knightrider had large broods of children hanging on to their skirts. Indirectly, urban values and information became part of the repertorie of experience in the once isolated interior valleys of Sonora.

Mexican programers were quick to realize the educational potential of the medium. Local shows directed public health and agriculture extension information at captive audiences in the single channel environment of rural Sonora. More subtlely, the nationally produced *telenovelas* packed social messages into their hour long episodes. Slim, sophisticated women practising family planning kept spotless homes for their two or three children. Non-drinking husbands brought home adequate income in jobs obtained by finishing high school. For many Baviácoran women, the *telenovelas* symbolized both the lives they never had, and the dreams they kept for their daughters. In fact, Sonoran social workers complained that rural women were content to substitute soap opera fantasy for the possibility of change in their own lives (Field Report #4: 6/15/84).

Whatever its ultimate impact, it is clear that television supplemented the formal education obtained by municipio residents. Ideas, goals, and expectations diffused across the airways making direct experience unnecessary. The gap between what modernization actually was and what it could be was filled by U.S. and Mexican broadcasting of varying quality. In December, 1984, this was further extended by the addition of a second channel in the municipio. Using a parabolic antenna purchased through donations from residents, the pan-hispanic, U.S. Spanish language station "SIN" brought yet another viewpoint to Baviácora (Field Notes: 12/12/84).

Formal Education

For older Baviácorans, television provided the secondary education which was unavailable prior to 1970. In that year, a secondaria was opened in the pueblo of Baviácora, making post-primary education possible. During the same period, then President Echeverria established a program to see that all small villages had primary schools within the community. Recognizing that the ability to build roads could not keep pace with the need for education, he arranged for prefabricated school buildings to be flown into areas where paved roads did not yet exist. It was the first time that the Mexican primary education requirement for children between the ages of seven and fourteen could be a realistic expectation.

Mexican primary schools include the first through sixth grades. In the larger pueblos, this is preceded by a *Jardín de Niños*, or *Kinder* for those aged four and five. In 1980, of the 2518 individuals above age 15, 50% had completed primary education. Only 214 were reported to be illiterate. Twenty-three percent of those over age 13 had completed the seventh, eighth, and ninth grades of the *secondería* (X Censo 1984). Today, students can attend either the academic junior high in the pueblo of Baviácora, or the agricultural- technical secondary school near the pueblo of Huepac. Those completing either of these programs can elect to attend the four year pre-college high school in the municipio of Banamichi (*Preparatoria*), or the three year commercial program (*Comercio*) which opened in Baviácora in the fall of 1984.

Though most municipio children attend primary school most of the time, until now attendance at the other units has been elective. In 1984, however, the Mexican government reformulated its education policy, proposing mandatory schooling for ages seven through seventeen. Enforcement of this policy would lead to serious alterations in lifestyle for rural Mexico, where the labor of older children is an essential part of household economic activity. However, it would create thousands of new jobs for those in teaching, at the same time delaying entry of teenagers into the dwindling Mexican job market.

The establishment of regional schools in the upper Rio Sonora Valley was facilitated by the completion of the paved road from Mazocahui through Banamichi in 1978. This made it possible to bus children from all of the tiny pueblos to the schools. For *secondaria* students today, this means meeting the bus on the highway at 5:30 A.M. on cold, dark winter mornings, and returning home at 4:00 P.M. in the mid-day heat of June and September (Field Report #23: 11/14/84). The school schedule violates the rhythm of the traditional agricultural day, robbing participants of both the siesta period and their regular mid-day meal. Though the road made transportation practical, those who continue in school do so through considerable personal effort.

The Impact of Motor Vehicles and Highways on Baviácora Life

Driving through the mountain valleys of Mexico is a singular experience. Stuck behind a smelly, slow moving bus loaded with people, animals, and butane gas cylinders, it is tempting to attempt to pass in places never before believed possible. As you inch out from behind the bus into the path of an oncoming pick-up, you notice a small, white "birdhouse" decorated with flowers at the side of the road. Praying silently, your Mexican passengers make the sign of the cross as you dart quickly back into place. It is not until later that you realize that their gesture was both commorative and supplicative. The "birdhouse" represented the final landing place of the last reckless villager who tried to pass on that particular curve.

The abundance of roadside shrines on Sonora Highway 118 are a tribute to the advent of the motor vehicle age in Baviácora. The proliferation of cars and pick-ups which now crowd the streets of the pueblo of Baviácora paralleled the program of pavmentation, which brought good roads to the municipio after more than 75 years of promises. In 1970, the highway (*camino carretero*) was finally paved through the Cajón de Ures to Baviácora, cutting the eight hour trip to Hermosillo to about two and a half hours. During the next decade, work progressed slowly, as the old river road was replaced by a paved highway which passed through the town to neighboring municipios, finally reaching Cananea in 1980 (AMBAV[P1889-1979]:1958-72; 1903-1976]: 1974).

The road was long heralded as the improvement which would bring prosperity to the municipio. Somehow, miraculously, subsistence production would turn into market cropping, and the limited flood plain land would become plentiful, as soon as the road to markets was established. To date, this has not occured. In most cases, the road's impact has been indirect. If television was the medium by which the promise of the outside world penetrated the Valley, then the road was the avenue which could be used to reach that promise.

With the exception of two model T Fords which belonged to well-to-do municipio residents in the twenties and thirties, cars remained a novelty in the municipio until the mid-seventies.

During the height of the mining boom (1957), 26 large trucks, 33 pick-ups and two private autos were registered in Baviácora. By 1963, a total of 68 trucks and pick-ups, and seven autos existed (AMBAV [P 1835-1971]:estadisiticas). For the most part, *campesinos* used burros or horses to travel between the outlying enclaves and the business center in the pueblo of Baviácora.

With completion of the road from Mazocahui to Baviácora in the early seventies however, an enterprising citizen acted to bring transportion to the municipio. Using an aging school bus, he instituted a series of daily round trips to the pueblo *cabecera*. Baviácorans shopped in the pueblo, hauling home groceries, butane, and other necessities on the rickety bus (AMBAV [P 1919-1970]:Actas). By 1975, regular bus service between the upper Río Sonora Valley and Hermosillo was established. Those able to find jobs or schooling in other parts of the state now had the means to undertake weekly commuting (Elite Interview #3). Thus, the road became a catheter which carried away the municipio's youth, bringing very little in return.

As the number of Baviácorans owning cars and trucks increased, so did their ability to attend the endless round of local saints' day fiestas held in the Valley. The numerous roadside shrines found along the highway commemorate the locations where carloads of intoxicated youths careened off the road and into the surrounding cliffs or arroyos. As a result, mortality among young adults reversed its decline from 4.6/1000 in 1960 to 1.9/1000 in 1970, by soaring to a new peak of 12.2/1000 in 1980. When combined with rising suicide rates and job-related accidents, road deaths became the number one killer in the municipio among all but the very young and the very old (RCB:Defunciones; MEBE; X Censo).

Though violent deaths were the legacy of the paved road and the increase in motor vehicle ownership, morbidity outcome actually improved as a result of the availability of transportation. It became possible to transport a seriously ill individual from the upper Río Sonora Valley to medical care in Ures or Hermosillo in record time, either by private vehicle or the *Cruz Roja* (Red Cross) ambulance. The number of individuals recorded as dying "on the highway between Baviácora and Hermosillo" was drastically reduced (RCB:Defunciones). Improved transportation

increased access to medical care, making it possible to survive conditions which were once certain killers.

Mortality and Morbidity Today

In the Spring of 1985, a five-year-old Baviácora girl died in the hospital at Ures. She had been rushed there by her family after being stung by a scorpion in her home. The chain of events was familiar. A resident of the "suburban" addition of Lome Norte, it was first necessary to run to the pueblo of Baviácora for the doctor, who could then go for the *Cruz Roja* to take the child to the hospital. Though the the trip took only a fraction of the time it once would have taken, it was too late to save the child (Post-field Correspondence #3).

Patricia's death is typical of those which once occured with frequency in the municipio of Baviácora. Because medical care was unavailable, treatable conditions such as pneumonia, gastroenteritis, and insect bite became fatal, especially among children and older individuals. To remedy this, Mexican authorities launched a drive to provide medical services in rural areas. In addition, they sponsored health education programs keyed to impact on hygiene and sanitary conditions. These activities occurred in conjunction with the advent of vaccines to fight childhood diseases and polio. Together, they resulted in massive declines in the incidence of infectious diseases, and in mortality resulting from them.

Pasantes, Brujas, and Curanderos: Biomedical and Traditional Medicine in Practice

The cornerstone of Mexican rural medicine programs is the community *Centro de Salud* (health clinic). Though some Sonorans can obtain low cost medical care from a number of government sources in the cities, the *Centro's* purpose is to make treatment possible in the main villages for all people, all of the time. In order to find doctors to staff the centers, Mexican medical training requires that new physicians undertake a one year rural residency as *pasantes*. Consequently, rural villages are served by young graduates who have never practised medicine on their own.

Pasantes undergo a baptism of fire in the *Centros*, complaining that providing medical care in the villages is a chore. They argue that local families refuse to follow instructions anyway, resorting to traditional methods of healing and traditional healers. Conversely, villagers look with some sceptism at the services provided by the doctors. Their biggest complaint is that the doctor is frequently gone on weekends, seeking solace from his/her lonely practice with faroff family or in the larger cities. The truth is somewhere in between.

Baviácora has had a *Centro de Salud* since 1963. Prior to that time, western medical care was provided by *medicos particulares* (private doctors) who set up practice in the region, and by *promoturas* (public health nurses) who went from village to village (AMBAV [P 1934-1978]:1963). Most births were attended by *parteras* (midwives) who learned their skills by apprenticing to those already practising. In addition, two types of traditional practioners existed. *Curanderos*, who obtained their power through individual visitation by Catholic saints, cured largely by the laying on of hands. In contrast, *brujas* (literally, witches) manipulated herbs and potions which could both cure or render one ill. Further, curing could also be obtained by making a *manda* (pilgrimage) to the chapel of El Retiro at La Concepción. Finally, the waters of several nearby hot springs (*Agua Caliente*) were said to have curative powers.

At present, most Baviácorans understand infectious disease causation in western biomedical terms. It is recognized that vaccination can prevent some diseases, and that antibiotics can cure others. Beyond this however, etiology becomes more complicated. Traditional beliefs concerning causation, especially the role of wind, and the heat-cold opposition, remain prominent in local illness behavior. In fact, modernization has actually increased exposure to conditions related to these. Individuals who must ride in rapidly moving motor vehicles are careful to shroud themselves against the wind; women who must move between the cook fire and the refrigerator take care not to go directly from one to the other. Additionally, non-infectious conditions such as epilepsy or swelling in the extremities are still believed related to the activities of *brujas*.

While individuals usually seek out western medical care, they use this in conjunction with one or several of the curing methods cited above (Author's questionaire: Questions # 51 and 52; Field Report # 25: 11/24/84). Recently, this strategy turned out to be a practical adaptation. Though pharmeceuticals were once found in abundance in *boticas, farmacias* (two classes of drug store) and even tiny *tiendas*, drug shortages are now acute throughout Mexico (El Imparcial: 6/18/84). This is further complicated by the fact that many individuals simply cannot afford drugs. The young *pasante* who took over Baviácora's *Centro* in August, 1984 recognized this problem. Her solution was to incorporate a mixed strategy in her practice. A native Sonoran, she prescribes both the pharmaceutical treatment and a traditional herbal remedy. Thus, when the drug is not available, the herb can be used instead. Because at least some treatment has been forthcoming, the doctor does not loose face in the community (Field Report # 26: 12/3/84).

Herb teas are an almost universal remedy for infectious conditions. These include *Manzanilla* (chamomile tea), *Yerba Buena* (mint), and *Epazote*, which are usually taken in specific sequence to cure such diverse conditions as intestinal diseases, colds, and heat-related disorders. Whatever their other efficacy, these cures serve to replace vital body fluids lost through fever, vomiting, or diarrhea. Since fluid replacement is often the principle constituent of western medical treatment, traditional cures continue to be successful in treating certain diseases.

Changing Patterns of Mortality and Morbidity

Life standard improvements and the extension of medical care in the upper Río Sonora Valley resulted in tremendous reductions in mortality from infectious diseases during the last thirty years. In spite of this however, public health efforts are still not sufficient to make the epidemiology of the region match that found just 150 miles away in Arizona. Typhoid, paratyphoid, and hepatitis are still endemic to the area. Gastroenteritis, pneumonia and bronchitis are often fatal diseases which can be linked to defective modernization and the failure of imported technology and urban practices.

Mortality figures and causes, in relation to age cohorts and decades, are summarized in Tables 5.1-5.4 (RCB: Defunciones). These tables present the major causes of death for selected age groups for the periods 1955-1964; 1965-1974; and 1975-1984. While differences between decades reflect changes in the types of diseases responsible for mortality, they also signify refinement in reporting practices. Hence, the generic category "fevers and infections", which was heavily represented between 1955 and 1964, declined in number in later years. In contrast, the category "all other causes" expanded, as physician-attended deaths and diagnoses increased.

There has been a general decrease in the overall number of deaths occuring among children aged birth to fifteen. This is a result of both the reduction in number of births between 1974 and 1984, and the improved prognosis for youngsters in the municipio. As reported previously, a striking decline in infant mortality occured since 1955. Among neonates (infants from birth to one month), pneumonia and bronchitis remain the number one causes of death. Once a child is weaned from the breast however, mortality from these causes declines, and is replaced by that occuring as a result of gastroenteritis, diarrhea and dehydration (Table 5.1; RCB:Defunciones).

Mortality among children aged one year through five years showed a striking decline. Only two deaths occured in this age group between 1975 and 1984, both due to gastroenteritis. In prior decades, at least 25% of all mortality was the result of measles. During this period, respiratory infections were also heavily responsible for mortality. This picture changed among those aged six through fifteen years. A general decline in mortality between 1955-64 and 1965-74 reversed in the years between 1975 and 1984. This increase in recent deaths reflected a rise in the number of children killed by automobiles after the road was paved (Table 5.2; RCB:Defunciones).

Mortality from trauma or suicide was the principle cause of death among young adults aged 16 through 29. Traumatic deaths increased from 16.7 % between 1965-74 to 68.8 % in the decade ending 1984. These deaths were the result of fiesta-related automobile accidents, suicides among despondent youths, and occupational accidents. In addition, mortality due to cardio-vascular disorders began to be represented in this age group. A similiar pattern was found among adults

Table 5.1. Infant Mortality By Cause And Decade, Municipio of Baviácora 1955-1964; 1965-1974; 1975-1984

BIRTH THROUGH ONE MONTH (NEONATAL)

	DECADE		
PRIMARY CAUSES	1955-1964	1965-1974	1975-1984
Pneumonia and Bronchitis	29.3%	29.2%	55.6%
Fevers and Infections	22.0%	00.0%	00.0%
Dead at Birth	22.0%	45.8%	33.3%
All Other Causes	26.7%	25.0%	11.1%
Number of Deaths	41	24	18

ONE MONTH TO ONE YEAR

	DECADE		
PRIMARY CAUSES (% Of All Deaths)	1955-1964	1965-1974	1975-1984
Pneumonia and Bronchitis	25.0%	37.8%	17.7%
Gastroenteritis	39.3%	44.4%	35.3%
Infections and Fevers	23.2%	0.02%	05.9%
All Other Causes	12.5%	17.8%	41.1%
Number of Deaths	56	45	17

(Source: RCB: Defunciones 1955-1984)

Table 5.2. Cohort Mortality By Cause And Decade, Municipio of Baviácora 1955-1964; 1965-1974; 1975-1984

AGE ONE YEAR THROUGH FIVE YEARS

	DECADE		
PRIMARY CAUSES	1955-1964	1965-1974	1975-1984
Pneumonia and Bronchitis	30.0%	66.6%	00.0%
Gastroenteritis	20.0%	00.0%	100.0%
Fevers and Infections	25.0%	00.0%	00.0%
Measles	25.0%	33.3%	00.0%
Number of Deaths	20	3	2

AGE SIX YEARS THROUGH FIFTEEN YEARS

	DECADE		
PRIMARY CAUSES	1955-1964	1965-1974	1975-1984
Pneumonia and Bronchitis	17.7%	00.0%	00.0%
Gastroenteritis	11.8%	20.0%	00.0%
Infections and Fevers	29.4%	00.0%	00.0%
Trauma	00.0%	20.0%	44.4%
All Other Causes	41.1%	60.0%	55.6%
Number of Deaths	17	5	9

(Source: RCB: Defunciones 1955-1984)

aged 30 through 45. Here, traumatic deaths were supplemented by an increase in cancer-related mortality. The latter condition replaced tuberculosis as a cause of death in the most recent decade (Table 5.3;RCB:Defunciones).

Causes of death among those 46 or over have not undergone much change in the last 30 years. A decline in those listed as dying from "age" or "exhaustion" was countered by an increase in diagnosed chronic diseases. Consequently, deaths due to cardio-vascular disorders or cancer accounted for most of the reduction just cited. Pneumonia was also a principle cause of mortality in older individuals, resulting in from 8 to 12 % of all deaths across the decades (Table 5.4; RCB: Defunciones).

Currently, mortality patterns in Baviácora reflect the infectious disease-chronic disease dicotomy usually found across the life cycle. The principle causes of death among the very young are infectious diseases. Mortality from pneumonia and bronchitis is highest among neonates, especially during the cold months of the year. However, because municipio women do not breast feed for very long periods, intestinal diseases replace respiratory diseases as prime killers as soon as water is added to the diet. Infectious disease mortality decreases after age five, increasing once again among the very old.

Though male children continue to be highly valued among Sonorans, there was no evidence of female infanticide among Baviácoran infants. Infant mortality among males exceeds that among females. In addition, the number of male infants born dead is also higher than the number of females. The over-all number of infants born dead either at term or just before term increased in the last two decades. In addition, the percentage of all neonatal deaths occuring at birth also increased in relation to other causes(see Table 5.1). This may reflect an actual increase or, as likely, more accurate reporting and/or more conceptions surviving to term. The number of full term infants born dead decreased in the last decade, as home midwife births declined and physician attended births increased.

Table 5.3. Cohort Mortality By Cause And Decade, Municipio of Baviácora
1955-1964; 1965-1974; 1975-1984

AGE SIXTEEN THROUGH TWENTY-NINE

	DECADE		
PRIMARY CAUSES	1955-1964	1965-1974	1975-1984
Trauma or Suicide	22.2%	16.7%	68.8%
Cardio-vascular	16.7%	33.3%	06.3%
Tuberculosis	11.1%	00.0%	00.0%
All Other Causes	50.0%	50.0%	24.9%
Number of Deaths	18	6	16

AGE THIRTY THROUGH FORTY-FIVE

	DECADE		
PRIMARY CAUSES	1955-1964	1965-1974	1975-1984
Trauma	11.1%	26.7%	31.6%
Cardio-vascular	16.7%	20.0%	10.6%
Cancer	11.1%	13.3%	15.8%
Tuberculosis	11.1%	06.7%	00.0%
All Others	50.0%	33.3%	42.2%
Number of Deaths	18	15	19

(Source: RCB: Defunciones 1955-1984)

Table 5.4. Cohort Mortality By Cause And Decade, Municipio of Baviácora
1955-1964; 1965-1974; 1975-1984

AGE FORTY-SIX AND ABOVE

	DECADE		
PRIMARY CAUSES	1955-1964	1965-1974	1975-1984
"Age" or "Exhaustion"	26.6%	13.3%	13.8%
Cardio-vascular	36.7%	48.0%	44.0%
Cancer	04.6%	10.0%	11.2%
Pnuemonia	8.2%	11.3%	10.3%
All Others	23.9%	17.4%	20.7%
Number of Deaths	109	150	116

(Source: RCB: Defunciones 1955-1984)

Among those aged six through twenty-nine, trauma now exceeds all other causes of mortality combined. There is no question that these deaths are associated with the completion of the paved road in 1979. The majority of road related deaths have occured in the period since pavement was extended to the pueblo of Arizpe. The trip from Baviácora to Arizpe includes a precipituous stretch of highway which is dangerous at low speeds, in daylight hours. Young people speeding home from fiestas while intoxicated make up the bulk of those killed in road accidents (Field Report # 26: 12/3/84).

Trauma continues to play a large part in deaths occuring between ages 30 and 45. However, for all adults over age thirty, chronic diseases were the major cause of mortality. Cardio-vascular diseases, including heart attack and high blood pressure, were given most frequently as the immediate cause of death. Local physicians link these to the intake of animal fats in the form of lard, cheese, eggs, and milk. In fact, these foods used in conjunction with wheat flour and *frijoles* are the main constituents of the municipio diet (Elite Interview # 2).

Though mortality patterns in Baviácora have begun to take on urban configurations, morbidity still resembles that found in the poverty stricken Third World (Table 5.5 ;Lopez-Ramos 1984). Of those diseases treated by physicians during 1984, gastroenteritis was seen most frequently. This does not include those intestinal difficulties resulting from parasites, which were the third most frequent complaint. As noted in Table 5.5, throat infections followed gastroenteritis in occurance. Included in these were those throat infections which are a part of the typhoid prodrome. In addition, the excessive rains of 1984 made arthropod-born Dengue Fever a threat to the municipio.

For most *campesino* families, the standard of living and life style in Baviácora continues to be that of a late-developing, rural region. The problems faced by individuals of all ages are those related to staying alive, fed, housed, and clothed on a day-to-day basis. In spite of this, urban values have begun to find their way into the community. Alcoholics Anonymous meetings are held every month. Young women gathering at the hairdressers worry about overweight and overeating.

Table 5.5. Summary of Morbidity and Mortality August 1983 - August 1984
Municipio of Baviácora

DISEASES TREATED IN THE MUNICIPIO BY ORDER OF FREQUENCY

1. Gastroenteritis
2. Sore Throat
3. Intestinal Parasites
4. Acute Bronchitis
5. Hypertension
6. Trauma
7. Diabetes Mellitus
8. Urinary Tract Infections
9. Poisonous Insect Bite
10. Intoxications

CAUSES OF DEATH AND NUMBER OF CASES

Cancer	8
Pneumonia	6
Neonatal Death	4
Dehydration	3
Auto Accident	2
Myocardial Infarction	2
Cirrosis of Liver	2
Poisoning	1
Insect Bite	1
TOTAL	29

(Source: Lopez-Ramos 1984)

A middle class mentality is superimposed upon a *campesino* existence, stressing the problems of urban society without ever realizing any of the benefits.

For the women of the municipio, the extension of television service into the Valley helped end the area's isolation from the promise of prosperity. The media played a critical role in the transmission of urban values by increasing familiarity with the results of education, literacy, and technology without direct exposure to them. During the last half of the seventies, government programs continued to fulfill social promises by providing easy access to some modernization benefits. By the early eighties, a faltering Mexican economy made it clear that this would not continue. Consequently, modernization's impact on Baviácora was through the inconsistent fulfilment of its promises, which pointed the direction to change without providing the means. For Baviácora's households, survival became dependant upon the ability to manipulate as many resources as possible, as will be described in the following chapter.

CHAPTER 6

LOCAL AND NON-LOCAL ECONOMIC RESOURCES: "MALE MONEY"

> Of agriculture, we have very little. The mining used to be good, but now it is deteriorated. We have very good ranching, but unfortunately, not many people can participate in this. That's the way Baviácora is today (*Presidente Municipal* of Baviácora, in an interview with Sonoran T.V. channel 12: 9/17/84).

In the early summer of 1984, the three largest stores in the pueblo of Baviácora displayed signs stating that all credit for purchases was suspended. It was the growing season in the municipio, a time when most small property owners and *ejidatarios* were over extended and low on cash. By October, the signs were down, in anticipation of summer crop sales and the late fall sowing of winter wheat which would require new purchases of seed and fertilizer (Field Report # 1: 5/20/84). That month, SARH (*Secretaría de Agricultura y Recursos Hidrálicos*), in conjuction with the federal trading company known as CONASUPO (*Compañía Nacional de Subsistencias Populares*), announced the guaranteed prices which would be paid to agricultural producers for their 1984 spring-fall crops, and could be anticipated for those to be grown during the 84-85 fall-winter agricultural cycle. Though at first glance the prices showed strong increases over that paid for the previous year, the interaction of peso devaluation and inflation meant that *campesinos* would realize little actual profit. Indeed, the smallest price increase was per ton of wheat, the prinicipal cash crop grown in the upper Río Sonora Valley (El Imparcial: 10/14/84). For the *campesinos* of Baviácora, who used mules and ancient tractors to prepare their tiny *milpas* for the winter planting, it meant the beginning of yet another cycle of credit and debt. It was a process which in recent years yielded little, if any, cash for household expenses or reinvestment. Wheat cultivation tied up the rich flood plain land which might have been used to furnish food and pasture for municipio families and their livestock.

De Agricultura, Muy Poco: The Decline of Agricultural Production

Until recently, Baviácorans still chose to identify themselves with the land. In spite of the fact that some relied on non-agricultural wage labor when necessary in 1950, 85.7 % of all economically active men gave their occupations as agricultural. In 1960, the percentage of men in all land related occupations (including forestry and ranching) was 86.2. By 1970, this declined to 58.3 %, reaching a low of 36 % in 1980 (Table 6.1; MEBE 1984: Cuadros 2.2.11; 2.2.12;2.2.13; X Censo 1984: Cuadro 8). Among the younger men, only 230 of the 725 whose wives had first children between 1956 and 1981 considered themselves to be primarily involved in agriculture. Another 231 classified themselves as *jornaleros* (day laborers), a category which includes both seasonal *campesinos*, and those working for wages in agriculture and industry on a day-to-day basis. The remaining 264 gave a variety of occupations which were salaried, and can be refered to as steady (Table 6.9; RCB: Nacimientos).

The reduction in the number of Baviácoran men who consider themselves to be agriculturalists is a partial result of increased availability of occupations outside the agricultural sector, as modernization decreased the distance between Baviácora and employment sources. However, it is also a result of the change in the nature of municipio agriculture itself. Though agrarian reform redistributed municipio land between 1935 and 1937, the 850 hectares of arable cropland, and the waters of the Rio Sonora needed to irrigate it, can only meet the needs of a limited number of families. Divided between *ejidos* and *pequeño propietarios* (small property owners), it is now largely non-market agriculture devoted to alfalfa and similar fodder crops which can be sold at the farm gate to neighboring ranchers. The availability of land and water, and its use and distribution among Baviácorans, will be discussed in detail below.

The Availability of Land

The nightmare dilemmas of agrarian reform which were the result of the Revolution of 1910 yielded a series of possible land tenure systems which now coexist in municipios throughout Mexico. As seen in Chapter 4, in the municipio of Baviácora land reform was preceded not just by

the break up of the haciendas, but also by the federal reclamation of those lands under dubious title. These flood plain and pasture lands fell once more into the category of *tierras nacionales* (federal lands), to be concessioned to individuals, groups and pueblos during the years that followed.

For Baviácora, three categories of tenure resulted. The largest quantity of land went to *pequeño propietarios* who, technically, hold a maximum of ten hectares of crop land each, and up to 5000 hectares of *agostadero* (pasture). Communal lands were granted to both *ejidos* and *comunidades*. In the former, the use of three hectares of newly concessioned flood plain was granted to each of a maximum 72 *ejidatarios* (*ejido* members). In addition, pastureland granted by presidential decree was given for use in common by up to 193 *ejido* members. In contrast, *comunidad* land is entirely comprised of upland pasture. Moreover, it consists of territory deeded previously to the *indios naturales* of the area, which is considered theirs from time immemorial. Crop land used by *comuneros* (*comunidad* members) is not collectively held, but is individually titled to them as small property owners. *Communidad* membership is fixed, limited to those who can prove that their families are "of the pueblo." Contrastingly, *ejido* membership is flexible, as long as a designated ceiling on number of members is not reached (Elite interview # 4: 11/15/84).

As in much of Mexico, the process of land redistribution which began in the 1920's is still continuing in the upper Río Sonora Valley. Unlike many Sonoran municipios, *campesino* petitions bore fruit early for Baviácora. An initial request for *ejidal* land in 1929 was reviewed by the federal government in August, 1935. On December 23, 1935, a presidential decree granted 10, 746 hectares of national territory to the *Ejido de Baviácora*. Designated for the use of 71 beneficiaries, the *ejido* was enlarged by an additonal 1,800 hectares on November 27, 1970. The land stretches from San José to El Molinote, and includes about 300 hectares of flood plain land for agriculture (SRA Document # 3).

Ejido members receive usufructural rights to three hectares of land which remains theirs as long as it is kept in use. The *ejido* meets as a group every two years to determine which members are not working their land, have died, or are renting to *campesinos* who are not *ejido* members. These loose their rights to use the land, and membership is reopened until the full capacity is again reached. A critical problem with both *ejido* and *comunidad* land is that members fail to accept the fact that the land belongs to the corporation, and not to individual members. Further, much of the *ejido* land is simply concessioned by the government for use. As such, it can be reclaimed at any time, should the need arise. In the fall of 1984, this was a viable possibility for the Río Sonora Valley, as the inundations of the summer months filled existing reservoirs to capacity, leading government officials to consider possible additional locations for new reservoirs(Field Report # 13: 8/29/84; Ley Federal de Reforma Agraria 1982).

The donation of land to the Baviácora ejido came hard on the heels of the original agrarian reform in the Valley. As a result, time has healed some of the wounds which arose from early land tenure disputes. In contrast, the *Comunidad de Mazocahui* remains involved in an active battle to regain the lands first titled to the Opata in 1716. Citing a series of titles to *tierras primordiales* (original, undeveloped lands) dated 1716,1717 and 1832 (see Chapter 4), descendents of the 15 original families of the Opateria petitioned for the return of their lands in April, 1971. The petition named 256 *comuneros* whose families had been cited by name during the ill fated attempt to redistribute the land in lots in 1888. Following a five year battle, the government authorized the "recognition and entitlement of *bienes comunales* (Indian community land)" totaling 30, 603 hectares (SRA: Folio 1-10-59).

In winning their battle, the Mazocahui *comuneros* regained thousands of hectares of prime upland *agostadero* which was occupied by members of the municipio's wealthiest family. Latecomers to the Valley, the family could not support their claims to ownership, and were forced to remove hundreds of head of export quality beef cattle which were pastured there. In a process of out of court litigation and manipulation, the family succeeded in maintaining an extensive chicken

and egg raising operation in the heart of *comunidad* territory. This remains a sore spot in Valley relations which is unlikely to be resolved in the near future, as does the continued existence of large private ranches in the same area.

Comunidad land use rights refer only to the extensive semi-arid pastureland which makes up the bulk of the municipio. Of the more than 85,000 hectares of land within Baviácora's limits, only 773 are currently concessioned and considered to be suitable for agriculture (SARH: Document # 2). Approximately 563 of these hectares are privately owned, distributed among approximately 189 individuals, some holding parcels of only .50 hectares. The remainder belong to the *ejido*. Within these broad limits, no one can accurately say exactly how much land is held by how many persons. Land is bought, sold, traded, rented and loaned without much regard to legality. As in the historical period, obtaining title to the land requires a skillful mixture of proven possession and purchase, legal maneuvering, and bribery. Even under the best circumstances, no single individual is in possession of more than about 25 hectares of contiguous flood plain land.

Though a small amount of *tierras nacionales* in the flood plain as yet remain unconcessioned (up to a possible 100 hectares), these are not enough to meet the agricultural needs of Baviácora's gradually expanding population. As a result, *campesinos* began expanding into the marginal agricultural lands found along the largest arroyos of the municipio. This strategy is typified by that found in the Arroyo del Rancho, which runs southwestward from the northern edge of the pueblo of Baviácora. In contrast to the irrigated *milpas* of the flood plain, most arroyo *temporales* are dependent on either direct precipitation or run off for crop production. Expansion into this type of marginal area by low income small holders is on the increase. Of the 41 *temporales* in the Arroyo del Rancho, 13 were added during the last ten years (Doolittle 1983:301-305).

Many of the *temporaleros* are new farmers who were forced into less reliable arroyo agriculture because flood plain *milpas* were unavailable. Recently however, established flood

plain farmers also sought *temporal* fields, as the inconsistencies of Sonoran rainfall led to the destruction of their crops by drought or, alternately, the elimination of their fields by flood. The critical element in agriculture is the availability of water *in the right place at the right time*. Thus, the most successful strategy is one which gives an extended family access to both *milpas* and *temporales*, as a hedge against not just the adversities of nature, but those of fellow Baviácorans as well. For although agrarian reform in the municipio proceeded in a relatively orderly manner, "aquarian reform" was marred by attempts by factions to gain control of land through the manipulation of water distribution.

Control and Distribution of Water for Irrigation

Agriculture in the upper Río Sonora Valley is rainfall dependent. Farmers use direct precipitation, flood water farming, and the ground and surface waters of the Río Sonora drainage to ensure that crops receive the water they need when they need it. The most prosperous lands are located in the flood plain, where water for irrigation is channeled into the *milpas* through a series of *acequias* (canals) which are woven through the flood plain along the river's course. Additional assistance is provided by diversion weirs made of brush, stone and sand. Irrigation by *derivación* is supplemented in some instances by pump powered wells which are installed by individual farmers to tap the waters of subsurface aquifers.

The thirteen *acequias* of the municipio of Baviácora date to the Jesuit missions, and may well have antecedents in the prehistoric period. Each bears an individual name relating it to some feature of the area's geography or history. Some, like El Misión and Casas Viejas, have identifiable referents. Others, such as Saicomachi and Cucubabi, are Opata words which no longer have meaning to the those who utilize their waters. Each of these *acequias*, known officially as *tomas de agua*, are used by a set number of persons (*comuneros* or *usários*). These users are organized into a formal organization (*común de agua*), governed by group vote and controlled by an elected *juez de agua* (water judge).

Water control systems such as those found in Baviácora are a feature of many arid and semi-arid regions in the circum-Mediterranean. In this respect, the official organization of water control has colonial origins. Though water for irrigation must have had some prehistoric distribution mechanism, it is not possible to determine what aspects of the Río Sonora system predate the Spanish. What is clear is that the position of *juez de agua* holds tremendous power and responsibility. As such, it cross cuts land tenure distinctions, as both *ejidatarios* and small property owners must share particular acequias. Since *común* leadership changes every three years, each group has the opportunity to manipulate the distribution of water in its own interest. This struggle for water within particular *comunes*, and between upstream and downstream users, is at the heart of most of the major agricultural disputes in the area.

All water users along the course of the Río Sonora share water diverted from the river, though water welling up from springs and pumped from below the surface is a more localized concern. The purpose of the *comunes de agua* is to oversee the orderly distribution of these waters to all landholders who are legally designated users of a specific *acequia* (for a detailed description of this process, see Sheridan 1983: 137-147). It is possible to hold land in the flood plain and not have the right to irrigate it. Legally, the right to water is inherited, purchased, or concessioned with the land (Ley Federal de Aguas: 1983). Thus, with the breakup of the land into small parcels, the number of hectares to be irrigated did not increase, but the number of *usários* with individual interests did. The number of directions in which potential conflict over the rights and responsibilities of water use could go became almost unmanageable.

Though the number of private landholders with use rights usually exceeds the number of *ejidatarios* (Table 6.1; SARH), the latter can use the leadership position to force individuals to give up their land. Denied water to irrigate crops, the crops will die. When this is the only possible outcome, farmers will eventually stop planting. Under the *Ley de Tierras Ociosas* (Law of Idle Land), land left unimproved for three years can be claimed by someone else. The twin

Table 6.1. Private and *Ejido* Use of Irrigation Ditches (*Acequias*)
Municipio of Baviácora, 1984

	NUMBER OF USERS		
ACEQUIA	Private	*Ejido*	TOTAL
De Suaqui	0	22	22
Retiro	1	3	4
Cucubabi	11	5	16
Mazocahui	0	29	29
Labor	0	34	34
Casas Viejas	0	1	1
Alto-Capilla	12	7	19
Aurora	0	24	24
Alto-Baviácora	12	8	20
De Enmedio	14	4	18
De Felix	15	16	31
Seicomachi	4	27	31
Misión	8	9	17
TOTAL	77	189	266

(Source: SARH Document #5)

threat of no water-no crops can be used as leverage to "encourage" landholders to sell their land or otherwise transfer title (Field Notes: 10/25/84).

The maintenence of water distribution systems through carefully orchestrated programs of collective labor is essential not just in times of water scarcity, but also during periods of abundance. As noted in Chapter 3, the years between 1978 and 1984 were the wettest in recent history. Seven years of periodic flooding resulted in a 30 % loss of arable flood plain land in the upper Río Sonora Valley. *Campesinos* blame this on the decline of their traditional methods of water control, including the living fencerows which once provided a degree of natural protection from destructive floodwaters (Informador del Río: 9/26/84). As indicated in Table 6.2, rains beginning at about 4:00 P.M. on the fourth of October, 1983 caused damage or total destruction to over 350 hectares of land. Though in many cases this represented loss of unharvested crops, in other instances it meant total loss of the flood plain itself. The cost of repairs to agricultural land, *acequias*, bridges and wells totaled more than 1,682,250 pesos (SARH: Document # 6: 11/84).

In spite of these difficulties, the miracle of cooperation that characterizes water distribution should not be underestimated. The pity is that this spirit carries over only marginally to crop production strategies. While extended families remain willing to share land, labor and production equipment, a feeling of "collective individualism" prevails. This attitude has undermined government attempts to transform subsistence cropping into market production, at the same time short circuiting any possibility of local solidarity against more powerful interests.

Crop Production: The Subsistence-Market Transition

The break-up of the haciendas in the upper Río Sonora Valley, and the redistribution of land to corporate land holding groups resulted not in a large parcel of land to be farmed collectively, but instead in small parcels of land to be tilled by individual farmers. This patchwork distribution of small pieces of land worked well within the multicrop, multiplot production strategy which characterized efficient, low risk subsistence production. As long as Baviácoran farmers could

Table 6.2. Damage to Agricultural Land Due to Flooding in October, 1983, and Cost of Repair Municipio of Baviácora

Type of Damage	REPAIR Machine Hours	REPAIR Total Cost (in pesos)
land washed away	6	39,000
land needing leveling	139.5	558,000
protection of land	112.5	731,250
embankment destroyed	59	236,000
construction of protective barrier	29.9	118.000
TOTAL	346.5	1,682,250

(Source: SARH: Document #6)

safely maintain their intra village networks of production and distribution, without the influence of regional and national economies, most family needs could be met. By the early seventies however, the aggressive policies of the reformulated marketing agency CONASUPO allowed national agricultural priorities to actively impinge on Valley production.

In general, CONASUPO's principal activities are to regulate the basic commodities market; to increase the income of poor farmers; and to increase the ability of low income consumers to acquire basic commodities. In meeting these goals, the agency owns and operates milk, corn meal, and wheat flour processing plants. To stimulate agricultural production, the agency provides farmers with access to farm tools, fertilizers, insecticides, seeds, and bank credit. In exchange, it purchases and markets produce through a network of rural receiving centers (Grindle 1977).

Prior to 1965, municipio farmers grew, harvested and processed between 425 and 485 hectares of winter wheat each year. Individual farmers and *ejidatarios* deposited their wheat at the mill "El Progreso" located at El Bagote, just south of the pueblo of Baviácora. There, wheat was processed and stored, to be sold outright, or made available to producers in *quintales* (46 kilo sacks), as needed (AMBAV [Pres. 1902-1960: Estadisticas]: 1956). With the arrival of CONASUPO, local farmers accepting the agency's assistance entered into agreement to sell their harvested crops for processing outside the municipio. By 1968, El Progreso was closed and abandoned. Wheat producing households needing that critical food staple were forced to buy the processed item, which was shipped back into the Valley by CONASUPO.

Because of the high demand for wheat throughout Mexico, the logic of individual farmers marketing their surplus wheat production outside the Valley is not in question. What is suspect are CONASUPO's methods. The agency sewed up the wheat business by offering farmers cash payment for crops at a time when no other means of marketing the product existed. It was not until 1978 that the newly paved road offered underfinanced farmers the opportunity to market goods beyond the farm gate. By that time, many *campesinos* were already locked into a patron-tenant relationship with CONASUPO and its associated lending agencies. As Mexico's agricultural

priorities changed in response to world market demands, attempts were made to force small holders and *ejidatarios* into cash cropping by refusing to extend credit unless they removed fences separating individual fields (Doolittle 1983; Field Notes: 7/3/84).

Once again, the logic behind the request is economically sound. Farmers attempting to profit from sale of marketable goods cannot acheive economies of scale on tiny plots of land, using mules or antiquated farm machinery. Unfortunately, the timing of the move was such that it benefited those already in possession of larger parcels of land and the equipment needed to farm them. Consequently, policy change became a subtle method of redistributing the already redistributed land. The poor farmers which CONASUPO was created to aid are being forced out of production by their inability to change their strategies fast enough. Caught in a cycle of agriculturally stimulated credit and debt, their greatest asset once again becomes the dwindling supply of family labor. Unable to earn cash in agriculture, their best option is to concentrate on fodder crops, interspersed with the familiar subsistence products which once kept the family fed.

The result of a strategy which yields "*puro pastura*" (only pasture) is that Baviácoran farmers in 1983-1984 produced only 47 hectares of wheat (SARH Document #7:11/84). Instead of stimulating wheat production in the Valley, CONASUPO's policies yielded a 400 hectare reduction over amounts produced when the municipio milled the crop locally. By the winter of 1984, the situation had not improved. Potential wheat fields were plowed, but left fallow. *Campesinos* accused CONASUPO of deliberately driving prices down by releasing stored wheat onto the market, in anticipation of price setting for the 1984-1985 crop. They claimed that by the time they repaid debts to CONASUPO for the seed, fertilizer, and insecticide needed to produce the wheat, no profit could be made from sale of the crop. Calling the process "CONASUPO *aparceria*", they saw no difference between their relationship with the agency, and their fathers' sharecropping contracts with the deposed *hacendados* (Field Report #24: 11/19/84).

The failure of *campsesinos* to become market agriculturalists in the municipio of Baviácora is a result of the divergence between land reform and agricultural policy. In the interest of

equity, development plans designed for the *minifundia* of the vast Yaqui and Mayo Valleys were fitted to the finite land resources of the upper Rio Sonora Valley. *Campesinos* were first given land, without capital. Now, as municipio sons seek their futures elsewhere, farmers are offered capital when they no longer have labor. In defense, most have returned to the subsistence type production which has always been the Valley's mainstay.

The official picture of municipio agriculture is a bleak set of statistics in which the only marketable crop is barely produced. In reality, *milpas* produce hundreds of hectares of alfalfa, oats, rye, barley, garlic and walnuts during the winter growing season. In the spring-summer period, *maiz*, *frijol*, chiles, potatoes, sorghum and grass are produced (Table 6.3; SARH). Local agricultural extension agents do not even bother to collect information concerning the squash, pumpkins, sweet potatoes, peanuts, onions, cucumbers and other vegetable crops that are raised by *campesinos* in their flood plain fields. However, records of crop destruction during the recent floods are a measure of the extent of this type of food production (SARH: Document # 8).

An even more neglected area is that of production in the municipio's increasing number of arroyo *temporales*. In these, pasture crops, maiz and chiles are the main products grown under a double cropping regime. Often, *maiz* is intercropped with *frijoles* or *tomatillos*, in order to replace the nitrogen removed from the overworked soil. Some of the more established *temporales* go beyond run off and rainfall dependency in insuring the supply of water for the crops. These use ancient generators to pump water from wells dug near the edge of the arroyo. In doing so, these marginal lands become as reliable as the flood plain *milpas*. Moreover, because they do not have a heritage of a thousand years of cultivation, they are considered by knowledgeable farmers to be highly desireable.

Because farmers are electing to return to food and fodder production, the subsistence-market transition in Baviácora is actually a loop. In retrospect, the paradox of CONASUPO-government agricultural policy is that it forced *campesinos* to abandon wheat production rather than

Table 6.3. Agricultural Production on Irrigated Lands, Municipio of Bavíácora 1983-1984

CROP	ACREAGE (Hectares)		TONS		VALUE (Thousands of Pesos)	
	Ejido	P.P.*	*Ejido*	P.P.	*Ejido*	P.P.
WINTER						
Garlic	1	0	4	0	120	-
Oats	0	11	0	28	-	280
Barley	22	91	78	288.5	185	2,885
Wheat	15	31	53	98.9	1,325	2,472
Rye	4	75	20.8	496	208	4,960
Alfalfa	34	103	212	637.2	2,546	7,682
Pecans	20	0	6	0	900	-
SPRING-SUMMER						
Potatoes	6	0	57	0	5040	-
Chiles	9.5	11.75	-	-	-	-
Forage	0	9.5	0	285	-	855
Maiz	3.3	51	-	-	-	-
Sorghum	3.5	10.5	-	-	-	-
Beans	3	7	2.5	4.8	150	288
TOTAL	87.3	400.75	433.3	1838.4	10,474	19,422

* P.P.: small property owners (*pequeño proprietarios*)

(Source: SARH: Document # 7)

increase it. Whether the government actually conspired to ensnare farmers in an endless and unprofitable credit trap is debatable. What is thought provoking, however, is that the resulting strategy of locally marketed fodder crop production chiefly benefits the wealthy municipio ranchers that land reform was designed to eliminate. Their cattle occupy and degrade tens of thousands of hectares of "wasteland" which, with effort similiar to that expended in the *temporales* located in the arroyos, might be transformed into agricultural land for *campesinos*.

For the CONASUPO sharecroppers who continue to grow a diverse food basket of subsistence goods, the market advantage created by the road is academic. The food they produce generally goes no further than surrounding Valley pueblos. It is distributed through the same network of reciprocity and barter which circulated vegetables and orchard crops in past decades. For those without auxilliary wage labor to meet their household's cash needs, the only alternative income source is to continue the livestock industry first introduced by the Jesuits in the seventeenth century.

Agostadero: Export Ranching and *Campesino* Cattle

The abundant rains of the summer and fall of 1984 resulted in one of the best years in memory for Rio Sonoran *ganaderos* (ranchers). From the time the storms began, a full month prior to the traditional June 24th start of the rainy season on San Juan's Day, the desert foliage remained green and plentiful. The individually owned and *ejidal* cattle, which habitually roam the highway in search of food, lost the cadaver-like appearance that is so characteristic of *campesino* livestock. For the well financed ranching operations located high in the municipio's mountains, it was a record year. Following the October *corrida* (round-up), their herds were moved out of the Valley in huge transports, destined to fill the export agreements negotiated between the United States and Mexico.

Today, ranching is the most lucrative profession in the upper Rio Sonora Valley. It is no wonder that *ejidatarios* and *comuneros* fought long and hard with private holders of the large

Table 6.4. Number of Cattle in Relation to Private, *Comunidad* and *Ejido* Producers Municipio of Baviácora, Fall 1984

	NUMBER		
ENTITY	Cattle	Producers	Head Per Person
Private Owners	14,440	25	577.6
Comunidad	,265	137	45.7
Ejido	5682	154	36.9

(Source: SARH: Document #9 [Livestock Census]).

Table 6.5. Total Livestock Pastured on Private and Corporate Lands
Municipio of Baviácora, Fall 1984

TYPE OF ANIMAL	ENTITY		
	Private	*Comunidad*	*Ejido*
Cattle	14,440	6,265	5,682
Horses	185	373	291
Mules	22	31	55
Burros	2	243	74
Goats	300	77	0
TOTAL	14,949	6,989	6102

(Source: SARH: Document #9 [Livestock Census])

upland spreads for control over municipio pastures. As a result of these continuing battles, the amount of *agostadero* held by corporate groups now compares favorably with that in private hands. As illustrated in Table 6.5 (SARH Document #9), private property totaling 47,145 hectares is just 3799 hectares more than the combined *ejido* and *comunidad* holdings of 43,346 hectares. However, where private land belongs to only 26 individuals, communal lands are shared by 291. In 1984, private owners grazed a total of 14,440 cattle on their land, or an average 577.6 head per person. Members of the *comunidad de* Mazocahui raised 6265 head, or an average 45.7 animals per person. Figures for the *ejido de* Baviácora were lower than these. Total cattle holdings were just 5682, yielding only 36.9 for each member.

Cattle represent only one of the many animals grazed on upland pastures. Each of these reguires a particular number of hectares to survive. Consequently, a measure of the potential quality of cattle production is the land/animal unit ratio. In relating land to livestock, this calculation uses 75% of the actual number of cattle; weights horses and mules as1.25 animal units; burros as 0.5; and goats as 0.1 (Sheridan 1983: 182). Using figures from the October, 1984 livestock census, this relationship was evaluated for the three principal land holding groups in the municipio.

Private property owners graze a total of 14,440 cattle; 185 horses; 22 mules; two burros and 300 goats on their 47, 145 hectares of land. This represents approximately 11,119.8 animal units, and a land/animal ratio of 4.24 hectares per animal unit. In striking contrast, the *ejido de* Baviácora runs 5,682 cattle; 291 horses; 55 mules; and 74 burros on its 12, 746 hectares. This yields 4731.1 animal units with 2.69 hectares of land each. Animals belonging to the *cmunidad de* Mazocahui have the most land available to them. The *comunidad* pastures 6,265 cattle; 373 horses; 31 mules and 77 burros on 30,600 hectares. The 5331.1 animal units have access to 5.74 hectares of land each (Tables 6.6 and 6.7; SARH Document # 9).

Though the *comunidad* has an land/animal ratio twice that of the *ejido*, neither these groups nor the private landowners in the municipio of Baviácora have enough land to adequately support

Table 6.6. Land/Animal Unit Ratios, Municipio of Baviácora, Fall 1984

MEASURE	ENTITY		
	Private	*Comunidad*	*Ejido*
Acreage (Ha.)	47,145	30,600	12,746
Animal Units	11,119.8	5,331.1	4,731.1
Land/Animal Unit Ratio	4.24	5.74	2.69

(Source: SARH: Document # 9 [Livestock Census])

Table 6.7. Cattle Production and Sacrifice, Municipio of Bavicora, 1974-1980; 1984

YEAR	NUMBER OF CATTLE	
	Pastured	Sacrificed
1974	27,043	Not Available
1975	17,470	Not Available
1976	23,669	Not Available
1977	24,847	280
1978	28,346	252
1979	18,320	356
1980	17,876	505
1984	26,387	Not Available

(Source: MEBE 1984: Cuadros 3.1.2.1-7;3.1.2.9; SARH: Document #9 [Livestock Census])

their livestock populations. Based on cattle/land figures for the similiar environment of Cucurpe in the next river valley, Baviácoran *agostadero* falls far short of the 26 hectares per animal unit needed to maintain cattle in that setting. Consequently, in trying to raise market quality beef, both the quality of the land and individual ability to supplement natural forage become important factors. Where the land is concerned, private ranches and the *comunidad* have an advantage over the Baviácora *ejido*. The former are located in the better upland pastures which experience more rainfall and have been less subject to overgrazing than have the lower areas which constitute *ejido* lands. As a result, private and *comunidad* cattle usually fare better than *ejido* stock. In spite of this, it is the ability to feed the cattle during the dry seasons which is most critical.

For *campesinos*, cattle production is a key constituent in subsistence strategy. Though many would like to turn it into a profit oriented industry, at present average ownership is less than forty-five head. Many of these are cows which are kept both for their reproductive potential, and for milk, which can be sold as cheese to other village households. Because ranching is seen as the most potentially profitable municipio business, agriculture has become subservient to it. As noted previously, rather than raise wheat, *campesinos* prefer to concentrate on fodder crop production. Some of this is fed to their own cattle; much of it is sold to the wealthy stockmen of the municipio.

Campesino cattle are part of the agricultural cycle. During the dry season, they are corraled in the pueblos, where they eat the alfalfa, oats, and rye grown the previous year. In the early summer, the fields are replanted and the cattle are taken to upland pastures to graze. When the new crops are harvested, cattle are let into the *milpa* to eat the stubble and fertilize the soil, as the cycle begins again. In this respect, *campesino* ranching bears little resemblance to that found on the wealthier spreads. Because cattle pasturing is not a controlled procedure, *campesino* cattle are lean, mixed breed reflections of their fattened, pedigreed counterparts. *Campesinos* can grow only a limited amount of fodder; stockmen can purchase all that they need.

As the wife of a successful rancher noted, "It takes more feed to produce good cattle than the land can provide. So, it takes money to raise cattle; it takes time; it takes care. Why don't the *ejidatarios* realize this? (Field Notes: November 5, 1984)."

It is not ignorance of what it takes which keeps Baviácora *campesinos* from raising and selling prime cattle. Even with access to the capital needed to keep the operation running, they have thus far been unable to institute the herd management techniques needed to keep cattle breeding selective. Though fine for local sale and consumption, the resulting Brahma-Angus-Hereford mixes are not the type of stock which cattle buyers are seeking. More important, even if *campesinos* were able to produce top weight, purebred cattle, it is doubtful that they would have the connections needed to have their stock designated to fill export quotas.

During the most recent export cycle, the state of Sonora maintained an export quota of 135,000 animals. To have cattle included in these quotas, ranchers must receive permits from the *Delegación Estatal de la Secretaria de Comercio*, and the *Programa Ganadero del SARH* (El Sonorense: 12/4/84). Small ranchers in the municipio claim that receipt of a permit is less a question of the quality of your cattle than who you know and how long you've been in operation. It is the well-financed, long established ranches of the municipio which receive priority in the program (Field Report # 21: 10/28/84).

In spite of this, considerable grumbling was heard in all quarters during the 1984 cycle. As the price of beef sold to Mexican consumers climbed steadily, the price paid by U.S. buyers became equal to, or less than, that available domestically (El Sonorense: 12/4/84) . Stockmen contended that they were being forced to share their export profits with the Mexican government. Where once U.S. cattle buyers filled the Valley during the fall *corrida*, now all sales are made by government agencies. The government is paid by the buyers on the basis of the free dollar exchange rate. The cattlemen are then paid in controlled dollars, an average twenty-five pesos to the dollar lower (Field Report # 21: 10/28/84).

Given the number of cattle raised in the municipio, and the competitive climate for sales, it would seem likely that local markets would maintain an adequate supply of beef. Table 6.7 (MEBE;SARH) presents yearly livestock populations for the years 1974-1980, and 1984. Based on these figures, an average of 22,994 head are pastured in the municipio yearly. Of these, only a mean 348 are slaughtered locally per year (MEBE 1983:Cuadro 3.1.2.9). In spite of what would seem to be adequate supply, the Baviácora "Super" was only able to obtain about three head per week for sale to the public. According to the butcher there, the inflated meat prices outside the Valley limited his ability to find enough cattle to satisfy local demand (Field Notes:12/5/84).

As the economic strategy with the most potential, ranching in Baviácora is frought by disagreement and difficulty. Ranchers fight not just *ejidatarios* and *comuneros*, but battle each other as well. The same inheritance disputes which split hacienda lands in the first quarter of the century continue to plague wealthy families. Quarreling brothers erect fences between adjacent mountain lands, making easy transport impossible. Families holding choice land are forced to rent it because they cannot afford to purchase stock or feed it adequately. Herds fail to increase because calves must be weaned prematurely when a family needs the milk for cheese (Field Notes:11/5/84).

Today, Baviácoran beef production is an export oriented industry which provides profit for only a limited number of participants. While unable to meet local meat needs, it is the focal point of municipio agriculture. In the last analysis, almost all municipio land is tied up in the cattle business. From the upland pastures to the nearby bajadas; from the irrigated *milpas* to the arroyo *temporales*, land not given to grazing is devoted to fodder. For the stockmen, the land is a gold mine. For the *campesinos*, it is an elusive vein yet to be found.

Branching Out: Pigs, Poultry, and Market Opportunities

Faced with the realities of the beef cattle business, many Río Sonora corporate groups have elected to try their luck in areas which are not yet the domain of established producers. Several were successful in obtaining credit to establish modern dairy operations utilizing high quality

Canadian breeder cattle. Milk produced in these dairies is shipped out of the Valley, where it is processed, packaged and sold.

Unfortunately, a plan by the Baviácora *ejido* to begin this type of dairy did not succeed. Further south, the *comunidad de* Mazocahui has been more successful in branching out into what might be termed "collective entrpreneurship". Obtaining loans as *comunidad* members, mini-corporations were formed by individuals wishing to establish agriculture-related industries. In 1978, fifteen *comuneros* set up a pig raising operation just south of Mazocahui. By 1984, the group owned 3,650 pigs which, as is generally the case, are destined to be shipped out of the Valley for sale in the cities. In addition, thirteen individuals acted to exploit the wild bee population by setting up 2750 hives throughout *comunidad* lands. The honey is collected and packaged in the pueblo of Mazocahui. Though it can be bought at the processing plant, once again most is sold to a distributor in the city. In addition to these industries, an individual *comunidad* member uses corporately held land to house a poultry and egg producing business comprised of 62,467 hens. Based on the success of these operations, twenty *comuneros* met in Fall, 1984 to begin the process of forming a stockbreeders corporation. Their goal is to obtain a financial base which would enable them to set up a controlled operation similiar to that found among private ranchers (SARH: Document #9; SRA: Document #3).

The implications of these moves are clear. First, the municipios of the Valley need agriculturally-related industries such as these to provide jobs which are in the context of traditional economic strategies. These would allow subsistence production to exist in concert with wage labor, rather than divorced from it. They can help slow the flow of population out of the Valley by making it economically viable to remain. Conversely, urban Mexico needs to stimulate food production in the countryside to feed the millions who have already gone to the cities. While some privately owned pig and chicken farming does exist in the area, few individuals have access to sufficient funds to invest in additional operations. To date, the municipio has also been unable to

raise the capital to establish industry. Thus, the logical entrepreneur becomes the collective, for which lines of credit are available.

The success of collectively financed milk, meat, chicken, egg, and honey producing operations such as these would, in essence, mean *campesino* control of products critical to the survival of middle class city dwellers. If this is the case, then Baviácorans and other *campesinos* involved in similiar enterprises may have finally found the avenue which will allow them to explore market possibilities, eventually reaching a position of power vis-a-vis the cities.

Comunidad success at regaining their upland agostadero created a series of options with long run potential for the future. In possession of land that rivals the quality of privately owned acreage, they can attempt to pursue the controlled ranching practiced by neighboring stockbreeders. In addition, they can continue to branch out into agriculture-related industries with market potential as they have begun to do. Finally, they are in a position propose an agricultural experiment to determine whether these upland pastures are as non-arable as private ranchers claim.

Members of the *ejido de* Baviácora are not as fortunate. Their limited pastureland includes some of the most highly eroded hectares in the Valley. Because too many cattle are grazed on too little land, they are forced to search for additional pasture or supplement with home grown fodder crops. This last is seldom adequate, since seventy *ejidatarios* must share the few pieces of farming equipment that the *ejido* owns (see Table 6.3 for production figures). Consequently, *ejido* families are like most Baviácoran households trying to stay afloat. Unable to survive on agriculture or ranching alone, they have a long history of supplementary participation in wage labor. For many, it is the central Sonora mining industry which has been the primary source of employment.

"La Mineria Muy Deteriorada": The Decline of Municipio Mining

The summer of 1977 represented a high point in Baviácora's economic cycle. The sound of sunrise in the pueblo of Baviácora was the sound of the big trucks beginning their daily trek up to

the nearby mines. Filled to capacity with municipio men, the trucks traveled the dirt road past the abandoned flour mill at El Bagote, across the river, and up the mountain to El Jaralito and the Mina San Antonio. There they joined the men and families who chose to live in the small mining communities rather than make the trip back to Baviácora at the close of the day. In the early seventies, these tiny pueblos were booming, as young men worked hard in the mines, drank hard in the evenings, and met and married the daughters of older *mineros* (miners) (RCB Matrimonios: 1973-74).

The mining industry in Baviácora is almost as old as the Jesuit missions. Until the 1960's, it was largely restricted to gold, silver, and copper prospecting, its extent dictated by the area's many wars and the changing economic climate. In the last half of the 1960's and the first part of the 1970's, the addition of tungsten and lead extraction made mining the most reliable source of wage labor in the municipio. The principal employer was "Tungsteno de Baviácora", which operated near the tiny enclave of El Jaralito in the mountains east of the pueblo of Baviácora. The mine's output was so extensive that it required its own processing plant, which was located at the base of the mountain, on the east side of the Río Sonora. Men were employed working the mines, in the ore grinding mill, and driving the *dompes* (dumptrucks) between the two operations.

In the fall of 1975, the mine employed 114 individuals. Their fate, and that of the mine, was linked to the ability to produce tungsten which could be sold cheaply on the world market. Periodically, production costs would exceed profit, and the mine would close temporarily. As a result, the 300 families supported by Baviácora mine workers would be forced to seek another source of income. A shutdown in 1975 drove home the implications of the mine's closing. It undermined the local economy to such an extent that the *presidente municipal* wrote to state officials asking their support for some alternative industry for the municipio. As is usually the case, the farsighted request fell on deaf ears. In this instance, the closure was only a temporary stoppage, and the mine reopened the following year (AMBav [Pres. 1973-1976]:11/11/75).

During the late 1970's, Tungsteno de Baviácora offered its employees salaries which exceeded the minimum wage for the region. These were boom years for the municipio, as families invested their income in consumer durables. Many bought televisions and refrigerators; installed indoor toilets and showers; purchased fans and evaporative coolers; and began to experience and enjoy some of the benefits of modernization and urbanization. By 1980, prosperity was over. In spite of relatively low production costs, the Mexican tungsten industry was unable to match or undercut world market prices as set by the Chinese. Both the Baviácora mine and mill closed their doors, depriving hundreds of households of their cash income (Elite Interview #4)

In contrast, world market prices had a positive impact on the Baviácora gold and silver industry. As the selling price of precious metal inched upward, so did its production in the Río Sonora Valley. As indicated in Table 6.8 (MEBE: Cuadro 3.3.22-25), the number of kilos of gold produced from municipio ore increased from zero in 1972, to 23 in 1979. Silver production increased from 11 kilos in 1971 to 722 in 1979, after peaking at 849 kilos during the previous year. Today, the international flavor which once characterized Baviácora mining is gone. Most of the work is done by *gambucinos* (prospectors) who work small scale placer operations. Though they exploit some of the same gold and silver deposits as did 19th century investors, they are mostly local people.

In Mexico, mineral resources belong to the government. As with the land, the right to exploit these resources can be concessioned by the government and belongs to the claimant only as long as the claim is used or improved. In the case of foreign investors, the government becomes a silent partner, receiving the greater part of a 51/49 split in profits. For the gold and silver industry, this still remains a worthwhile partnership. Central Sonoran gold ore continues to yield the one ounce per ton needed to make the investment profitable. Indeed, some foreign companies are convinced that exploitation of early Spanish workings with twentieth century technology will make them produce even more gold than they once did (Field Notes: 11/16/84).

Table 6.8. Extraction of Selected Metals From Baviácora Mines, 1970-79

	YEAR									
METAL	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Gold (Kilos)	-	-	-	1	2	2	1	6	17	23
Silver (Kilos)	29	11	17	188	484	528	679	404	849	722
Lead (Tons)	-	-	-	2	-	-	-	-	15	22
Copper (Tons)	-	-	-	2	3	3	5	4	4	5

(Source: MEBE 1984: Cuadros 3.3.22-25)

Unfortunately, both the number of people that can be employed in precious metal mining, and the amount of related reinvestment in the community, are limited. Unlike Tungsteno de Baviacora, whose profits pumped money into municipio business and trickled down into even the poorest households, gold and silver extraction does not occur on a level which produces widespread benefit. Though some Baviácoran men drive the *dompes* which continue to haul ore out of the mountains to the active grinding mills at Cananea, the number of municipio households benefiting is only a fraction of those whose income was once related to mining.

Currently, State and federal policy actively encourages exploration and development of mineral resources by both domestic and foreign producers. In the former instance, credit opportunities are being made available to small and middle scale miners and *gambucinos* (El Sonorense: 11/18/84). In the latter, the Mexican government is willing to waive the 51/49 profit sharing clause in contracts with foreign corporations (Riding 1985). Though in the summer of 1984, foreign investors were making inquiry concerning mining opportunities in the municipio, to date there has been no positive effect on the economy.

In Baviácora, involvement in the mining industry today means employment in the copper mines at Cananea and Nacozari, where business is booming. Much as the Chinese tungsten industry sounded the death knell for municipio mining, the low production costs of the Sonoran copper industry have led to the decline of copper companies across the border in Arizona. For Rio Sonoran households, the meager wages that make low copper production costs possible are now one of the only year round income sources available.

Working for Wages

> Look around you. Do you remember seeing so many cars in Baviácora? And televisions? There's an antenna on every roof. I'm going to learn how to fix all those things. That's where the future is! Already, there are too many doctors and teachers. I'm going to be a technician (P.C.; aged 16. Field Report #4: 6/19/84).

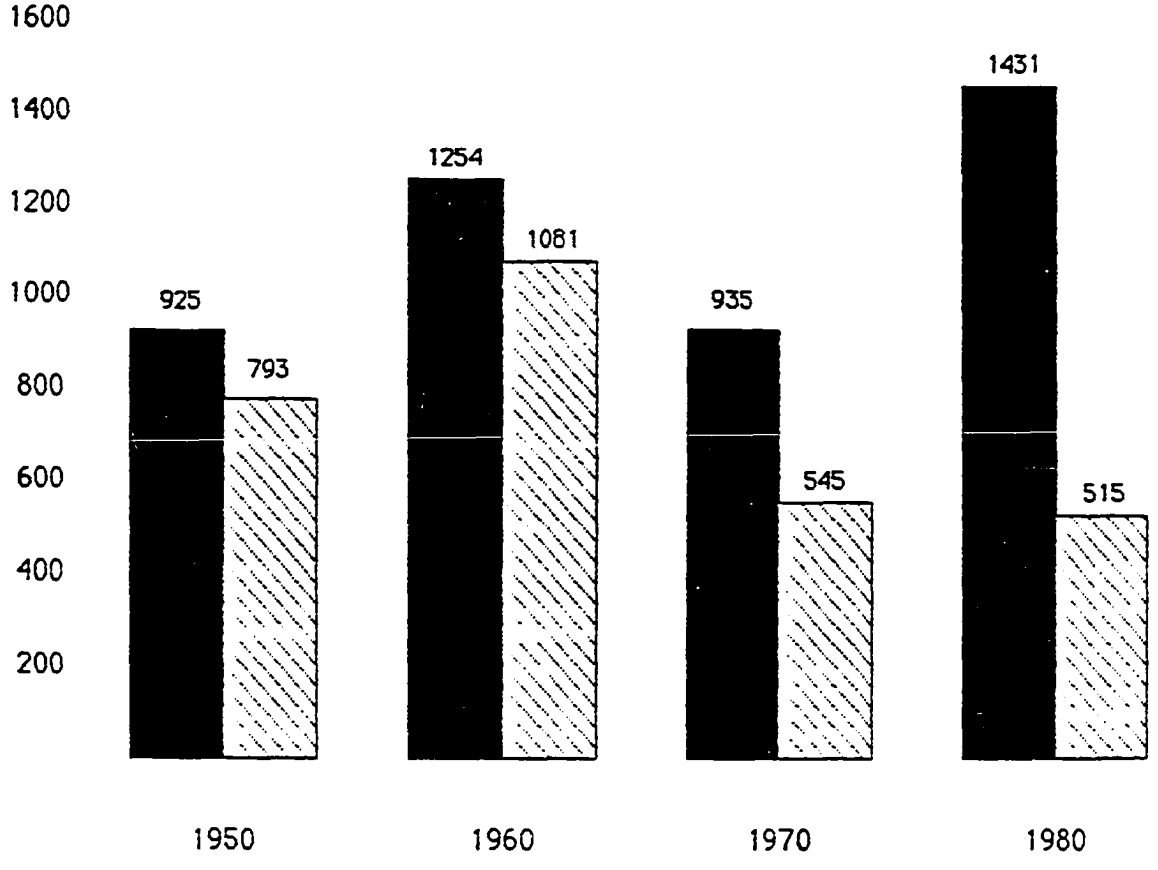
The closing of the Baviácora tungsten mine was a serious blow to the municipio economy and to individual households within it. Those who found themselves out of work in 1980 were faced with the task of finding an alternate wage source in a region lacking any other established place of employment. For most, it meant a return to the pool of *jornaleros* (day laborers) who are available to do most any type of work as they are needed.

Official Mexican statistics listed 1431 Baviácorans as economically active in 1980. Of these, 515 were reported to be involved in agriculture; 189 were professionals, teachers, administrators, retail sales persons, or otherwise included as "employers" or "employees"; 227 were listed as "workers" (obreros); and 289 as "unspecified" (X Censo 1984: Cuadro 9). Only one individual was listed as unemployed.

By using this breakdown, the statistics fail to enumerate the number of individuals who are simply *jornaleros*. As such, they may well be unemployed most of the year. As the title suggests, day laborers are hired on a day to day basis to perform municipio tasks for which sheer indurance is often the only real qualification. Consequently, they may get work in agriculture, ranching, gardening, construction, mineral extraction, or public service which lasts a few days; a few weeks; or, at best, a few months. Technically, *jornaleros* are supposed to be paid the minimum wage for the region (see Chapter 7), but prospective employers will frequently offer food and transportation in lieu of part of the pay.

Self description is a more accurate measure of the type and availability of employment in the municipio. Of the 635 male household heads who listed occupations when registering their first child's birth between 1956 and 1981, 31.86 % considered themselves to be jornaleros. By the time of the second birth, this percentage rose to 37.01 (Table 6.9; RCB: Nacimientos). In addition, many of the men who listed their occupation as agricultural are simply agricultural day laborers. As such, their work is not only delegated day by day, but is also a function of the agricultural cycle. Steady employment, in which the individual receives an assured weekly salary, is at a premium in the upper Río Sonora Valley. In the records cited above, it accounted for 36.41% of

Figure 6.1. Number Economically Active and Number in Agriculture
Municipio of Baviácora 1950 through 1980



(Source: MEBE 1984; X Censo 1984)

the occupations given for first births, but fell to 28.5% by the time of second birth. To a great extent, most of the reduction in the steady category could be accounted for by the increase in day laborers. Among those with steady wages, the greatest reduction was in those listed as "employee"(RCB:Nacimientos).

In Baviácora today, most households have at least one member involved in some type of wage labor. Among the 48 households included in the structured interview, 20 relied on wage labor only and 15 combined wage labor and agriculture(Author's questionaire: Question 42). Of the 12 households in which males participated in agriculture exclusively, 58.33 percent had wives who earned cash in some type of out-of-home activity [see Chapter 8](Author's questionaire: Question 43).

Unquestionably, demand for employment in the municipio far exceeds the potential supply of jobs. Local authorities admit that there is considerable unemployment in the area. Thus far, the only solution for unskilled males has been to seek jobs in the copper mines at Cananea and Nacozari, or in the large agricultural enterprises on the coast of Hermosillo(Elite Interview #4: 11/15/84). Those who choose to go are among the many who board the early morning bus to the city on Mondays, or catch a ride the on the *dompes* heading north to the mining towns.

Though most commuters return the following Friday evening, agricultural workers will frequently remain for the entire crop-related employment cycle. In the tiny pueblo of La Aurora, located on the eastern bank of the Rio Sonora, women become "agricultural widows" for extended periods each year. Husbands and sons follow the grape harvest in the coastal vineyards of the Sonoran wine industry. Many can earn enough money to devote the remainder of the year to their own crops and livestock. Other La Aurorans work as *vaqueros* (cowboys) at the mountain ranches, returning only on weekends. Because of this, weekday visitors to La Aurora find themselves in a village inhabited primarily by women and young children (Field Report #23: 11/14/84).

Table 6.9. Self Reported Occupation of Men Whose Wives Had First or Second Births Registered in the Municipio of Baviácora Between 1956 and 1981

	OCCUPATION			
EVENT	Agricultural	Day Labor	Steady Employment	TOTAL
First Birth	230 31.72%	231 31.86%	264 36.41%	725 100%
Second Birth	219 34.49%	235 37.01%	181 28.50%	635 100%

(Source: RCB: Nacimientos)

Men working as agricultural and mining *jornaleros* take on labor intensive, minimum wage work. Higher pay is only available for those who have learned some kind of skill or trade in the technical programs of the *secondaria*; in teacher training; at the business programs of the *comercios*; or in the health professions. Determined by government scale which varies from zone to zone (see Fgure 7.1), even these "professional" jobs pay less than four dollars per day. Further, they represent areas in which supply is rapidly surpassing demand. In spite of this, municipio households strive to send their oldest offspring to the city as a professional. In later years, the child is expected to repay years of parental sacrifice with cash contributions to cover household needs and the expense of educating the remeining children.

Agricultural families who give up the labor of a male child are making a strategic decision concerning resource allocation. They assume that the value of forgone agricultural labor is less than the potential value of that child's contribution from an urban occupation. Further, most families expect that at least one son will be able to return to assist during peak periods of activity. In the interim, it is assumed that women can perform less strenuous tasks such as weeding, harvesting, crop protection, and processing, which would have originally been relegated to the son.

For those who have tired of the continual battle to make ends meet on Mexican wages, the United States remains a symbol of potential prosperity. Many Baviácorans who are now middle-aged participated in the original *bracero* program as young men in the late fifities and sixties. Some of these remained in the U.S., establishing the extended family networks which would make migration a possibility for others later on. Of those interviewed, one third had at least one relative "*al otro ladd*" (on the other side)(Author's Questionaire: Question 28). For these, the trip across is one of minimal risk. With an established base in the United States, and one person working there legitimately, families can rotate working members on a three to six month basis using tourist visas.

For those without an established network, the decision to become one of the countless undocumented migrants looking for work in "*el norte*" (the north) is a difficult one. Men would

rather exhaust all other options before entering the unknown world of migrant labor camps, back room factories, and fear of the "*emigres*" (immigration officers). Some prefer to first try their luck in the border towns like Nogales and Mexicali, where *maquiladoras* (assembly plants) pay minimum wages which exceed those in the Sonoran sierra. In the summer of 1977, very few municipio men considered crossing the border a viable option. It was a possibility to be discussed between beers, and among friends. By 1978, those who tried and succeeded achieved a certain status, setting a new standard for others to reach (Field Recollections 1977; 1978). By 1984, it was a way of life for some, yielding not just steady pay checks, but other extra-legal sources of income as well.

Though many Baviácorans benefit from relatives in the United States, most men will not be among those who work there. For these, the possibility of hourly pay equal to Mexican daily wages is just a dream. Their hope rests in the establishment of small industry within commuting distance of the municipio. The establishment of agriculture related industry by members of the *comunidad de* Mazocahui is an experiment in that direction. Yet this, too, is available to only a limited segment of the population.

Local leaders recognize the need for jobs in the municipio. In 1975, the *presidente municipal* requested matching funds from the federal government as part of a presidential program for regional employment. Among the proposals for Baviácora were a sandal factory, to run in conjunction with the local tannery; a clothing factory; and the purchase of sewing machines as part of a cottage industry for the women of the pueblo of Suaqui. That year, the federal government chose to finance the construction of a new plaza for Baviácora. Each of the suggestions for development just mentioned was refused. In addtion, the government turned down a proposal to license and legalize the municipio's bootleg mescal industry, which continued to operate in the mountains overlooking the Pueblo (AMBav [P1889-1979]:1973-1976).

Windfall Profits: *Troqueros, Mescaleros* and *Contrabandistas*

The legalization of mescal production in Baviácora would not have set precedent in the region. *Campesinos* have long distilled the potent liquor from the caudices of the local century plant, Agave palmeri or from the hearts of Agave angustifolia, both of which grow abundantly in the higher altitudes of the municipio. Through the years, the official status of production alternated from illegal to legal and back again, as local powers used official contacts on the state level to gain control over the profitable enterprise. At the turn of the century, the volume of mescal production in the municipio was so large the entire community of Viniteria, near San José, existed solely for that purpose. In the nearby municipio of Banamichi, the *mescalero* enclave was even more extensive, requiring its own school and chapel for the 100 plus families living there (AMBan [HAC-083, P1864-1908]:1905).

It is likely that the scale of production of bootleg mescal in Baviácora today matches that of the past. Studies of mescal manufacture in Sonora (Bahre and Bradbury 1980; Sheridan 1983:228-234) speculate that the practice is so extensive in Sonoran municipios that the supply of Agave is diminishing rapidly. It is used to distill two qualities of beverage, equal in potency, but varying in palatability. Most commonly produced is *lechiguilla*. It is a powerful, unaged brew, drunk almost as quickly as it can be distilled (ten to fifteen days). In contrast, *bacanora* is a high quality liquor, produced from Agave hearts, aged longer, and less widely available.

The manufacture of *lechiguilla* and *bacanora* requires little equipment. The still that is used includes mesa top, stone lined cysts, where the agave caudices are roasted; fermentation drums; and a distilling apparatus. In recent years, the familiar copper coil of most back country stills has been generally replaced by the use of car radiators. As a result, there is a certain degree of potenital for lead contamination in the alcohol. Consequently, the current drive for legalization is related not just to the desire for revenue, but to the need for quality control as well.

Lechiguilla and *bacanora* production remains extremely profitable enterprises. Requiring low investment of both time and money, the selling price of the bootleg product far exceeds that of

legally manufactured mescal, as sold in the liquor store. In 1984, a liter sold for about 1000 pesos ($5.00 U.S.). Sheridan estimated that in 1981 an independent *mescalero* making only one batch per year could make up to $3,200.00 (1983:230).

Campesinos whose households do not produce their own agave distillate usually cannot afford to purchase a whole bottle. As a result, a brisk trade in *tragos* (drinks) goes on in the pueblo. Ironically, while manufacture of mescal is controlled by males, sale of *tragos* is a female dominated business. Women sell small amounts out of the home, in any available container, much as they sell cokes or tortillas. Business is especially brisk late Saturday night after the cantinas close, and for the remainder of the weekend. Perhaps the division of labor is a logical one, since by Sunday morning, women are often the only ones sober enough to carry out business. Because of its illegal status, profits remain high. Neither the sale of the beverage nor the income made by those involved in its distribution can be taxed (Elite Interview* 1).

A second area where profit remains untouched is in the importation and sale of goods from the United States, especially clothing and small appliances. This enterprise, which is tied to a successful and steady smuggling operation, is the domain of the *troqueros* (truckers). Their name is derived from the camper topped pick-ups which are driven from pueblo to pueblo laden with garments, shoes, appliances and toys purchased from U.S. discount stores. Some *troqueros* follow the local fiesta schedules, setting up shop in conjunction with the rotating saints' day feasts celebrated in Mexican villages. Others favor a less predictable timetable, attempting to circumvent the "gratuities" which must be paid to local authorities for the privelege of unmolested operation.

In character, the *troquero* enterprise closely resembles the traditional rotating markets which are conspicuously absent as a public institution from the area's way of life. Because of the nature of the merchandise sold and the periodicity of sales in each municipio, a geographer working in Baviácora referred to *troquero* vending practices as "periodic K-Marts" (Field Report *2:6/1/84). In addition to these periodic salesmen, some municipio extra-legal

retailers operate semi-permanent establishments out of their homes. As in any clandestine operation, the profits may be high, but the risks are as well. Cleaned out by thieves, there is no hope of insurance or police aid in reclaiming lost items (Field Report # 2: 6/1/84).

The final area in which windfall profits can be made yields the highest proceeds and involves the most risk. Recently, *campesinos* elected to sow the ultimate cash crop in Sonora's fertile, but secluded mountain valleys. Operating in an environment ideal for both marijuana and opium production, *contrabandistas* (traffickers in contraband) expanded on a small, but long standing record of drug cultivation. In October of 1984, Mexican officials awaited the harvest of the largest marijuana crop in Sonoran history. They estimated that cultivation of the drug increased by 500% in the four years since Mexico's economic situation began deteriorating in 1980 (El Sonorense: 10/25/84). While the area surrounding Caborca was cited as the highest production zone, the Río Sonora Valley was represented as well (El Sonorense: 11/14/84).

On two occasions during the fall of 1984 the *Policia Judicial Federal*, whose job it is to seek out and confiscate contraband crops such as marijuana, made their way through the Río Sonora Valley to the illegal mountain *temporales*. Though no production was ever seen in the municipio of Baviácora, residents eluded to its presence. Some suspected that the ability of some *campesino* households to purchase hectares of choice flood plain land was related to their involvement in marijuana trafficking. Others speculated that army seizures of north Valley marijuana crops that autumn would ultimately be sold by the government to pay off the interest on the international debt. On more than one occasion, Sonorans arrested for drug related crimes told authorities that they had done so to be able to keep their legitimate agricultural and livestock operations running (Field Report #11: 8/15/84)

The incidence of marijuana cultivation in Sonora is important not only as an underground economic activity, but also for its implications for agriculture. The existence of viable and successful marijuana fields in the isolated, unirrigated hectares of the Sonoran mountains violates the often cited adage that these pastures are only good for grazing livestock. One wonders how

opium and marijuanacan survive in an area which has been touted as inhospitable to agriculture. Agricultural extension agents have yet to seek out these enterprising farmers to find out the secrets of their success, for if they should do so, they would be invading the sacrosanct domain of Sonora's gentlemen ranchers.

Like the secret of marijuana agriculture, the Baviácoran economy is comprised of hidden facets which are not revealed except on close examination. It is true that current status of the agriculture-ranching-mining economic base is not sufficient to provide adequately for all municipio residents. This is in part a product of the way in which municipio land was originally divided between *campesinos* and "*ricos*". It is also related to the absence of wage labor to meet the cash needs of local familes, and to Mexico's debt-ridden position within the world-economy. The recent aquisition of upland *agostadero* by the *comunidad de* Mazocahui, and their moves toward collective entrepreneurship may help to remedy this slightly.

Campesino handling of the problem of the subsistence-market transition comes as a big surprise. The ten fold reduction in the amount of wheat being cultivated and the persistence of the subsistence food basket in the face of the market economy is a striking response to the threat of CONASUPO sharecropping. An informal, non-public network distributes most locally produced goods throughout the municipio. In effect, this replaces the traditonal peasant market which was so conspiculously absent in the Sonoran sierra. The degree to which most municipio households juggle economic resources is a tribute to *campesino* flexibility. Whether it is sufficient is a separate issue, and the subject of the next chapter.

CHAPTER 7

THE COST OF LIVING

In the Fall of 1984, a new one hundred peso coin was placed into circulation in Mexico. At the same time, the familiar silver dollar sized one peso pieces were slowly being replaced by smaller "new pesos". These currency changes were a result of the continual devaluation of the peso, which turned the once valuable thousand peso bill into little more than pocket change. As the peso steadily declined on the international currency market, basic goods became luxury items for the average Mexican family. Minimum wage increases failed to keep pace with double digit inflation, which made the price of food in Sonora almost equal to that found across the border in the United States. For many Baviácorans, income which provided "*puro comida*" (only food) was supplemented by subsistence farming, hunting, and gathering in order to keep the family alive.

Devaluation, Inflation, and the Minimum Wage

The late 1970's were boom years for both Mexico and the Río Sonora Valley. Though the peso slumped to 29 to the dollar at the close of Echeverría's stormy presidency in November 1976, it had finally stabilized at 23. The discovery of new oilfields and the rhetoric of President José López-Portillo helped quell some of the unrest which followed this first devaluation since 1954. During López-Portillo's term, the influx of petrodollars enhanced Mexico's position in the world-economy, buying a temporary reprieve for the country. Inflation slowed and the economy grew by 8.2% in 1978.

Recovery was short-lived. In 1981, more than $8 billion dollars were removed from the country in anticipation of a new devaluation. Though López-Portillo swore to "defend the peso like a dog", on February 17, the Bank of Mexico announced its withdrawal from exchange markets, and the peso dropped from 26 to 45 to the dollar. When the exchange markets reopened, the dollar jumped to over 120 pesos. López-Portillo's response was to nationalize the country's private banks, and impose total exchange controls. The result was a two tiered exchange rate of 50 pesos

to the dollar for "essential" transactions (*dólar controlado*), and 70 pesos to the dollar for ordinary trade (*dólar libre*). The move opened the door for black market currency transactions at even higher rates of exchange.

Since that time, the peso has continued to devalue at the rate of 13 *centavos* per day. In May of 1984 the exchange rate was approximately 180 pesos to the dollar; by December, it had reached 206. In 1982, Mexico registered 0.2 percent growth and 100 percent inflation; unemployment doubled; and the public sector budget deficit was the largest in history. Over the next two years, the government attempted to renegotiate its massive debt to international lending agencies(Riding 1984:134-156). On the local level, one Baviácoran noted: "I'm not worried about the debt. The Mexican government is going to pay with Sonora. They're going to move the fence south, and we'll be part of the U.S. (Field Report # 6: 7/3/84)."

For *campesinos*, the behavior of the peso on international currency markets was reflected in alterations in the domestic wage and price structure during 1982 and 1983. In the wake of inflationary price increases, wages were no longer sufficient to maintain a family. In June, 1984, the government granted a 20 % increase in the minimum wage. For those in the Sonoran sierra regions, this meant a daily wage of 660 pesos, and a monthly total of 19,800 pesos based on a six day work week (El Imparcial: 6/18/84). Therefore, in December of 1984, Baviácoran *jornaleros* earned about $96.00 monthly. Primary school teachers earned about 1071 pesos daily, or about $115.00 per month (Table 7.1).

Making Ends Meet

Though in June, 1984, authorities recognized that these monthly salaries were barely enough to feed a family of five, the worst was yet to come. As depicted in Table 7.2, price increases between December 1982 and April 1984 had undergone increases of up to 400 %. During the summer of 1984, food prices continued climbing, as government subsidies on many basic necessities were removed. In November 1984, wheat flour cost 91 pesos (45¢) per kilo (2.2

Table 7.1. Minimum Daily Salaries For Selected Workers and Professionals Rural and Urban Sonora, June 11 to December 31, 1984

	SALARY AND ZONE (in pesos)		
OCCUPATION	Coast	Sierra	Nogales
Campesinos	750	660	816
Construction	1014	892	1103
Truck Driver	1121	986	1219
Practical Nurse	1019	897	1109
Primary School Teacher	1156	1017	1258
Mechanic	1136	1000	1236

(Source: Comisión Nacional de los Salarios Mínimos 1984)

Table 7.2. Price Increases on Basic Goods in Sonora, December 1982 to November 1984 With Comparison to Prices in U.S. Supermarkets (in Pesos)*

	PRICE (per kilo) AND DATE				
PRODUCT	12/82	12/83	4/84	11/84	Supermarket (U.S.; 5/85)
Cooking Oil	82.30	112.00	172.00	249.00	238.00
Rice	31.75	-	80.00	120.00	150.00
Sugar	26.94	38.50	50.00	50.00	198.00
Frijol	28.30	31.00	45.00	63.00	118.00
Eggs	59.74	99.50	139.00	190.00	120.00
Milk (liter)	24.30	54.30	70.00	90.00	120.00
Salt	13.95	-	24.00	25.00	66.00
Beef	310.00	-	600.00	700.00	632.00
Tortilla	11.20	15.00	25.00	74.90	170.00
Wheat Flour	-	-	65.00	91.00	100.00

(Source: Congreso del Trabajo e Instituto de Investigaciones Económicas de la UNAM; El Imparcial: 11/16/84; Author's Survey)

* Prices are given in pesos for comparable amounts, based on the December, 1984 exchange rate of 200 pesos to the dollar.

lbs.) in Mexican grocery stores. In comparison, five pounds of flour cost about $1.00 in U.S. supermarkets.

Similar changes occured in all items of the Sonoran food basket. The price of eggs, *frijoles*, sugar, milk, corn flour, and cooking oil, all underwent increases of 50 to 150 percent. The cost of a kilo of beef rose to between 600 and 700 pesos, or about one day's wages. As a result, the Mexican social service agency DIF offered Sonorans a soy-based ground beef substitute at 495 pesos ($2.50) per kilo. During this same period, the cost of chicken also rose, reaching 375 pesos per kilo (over 75¢ per pound) in December 1984 (Field Notes: 12/5/84). In addition, the cost of bread, tortillas, and sweet rolls also skyrocketed, as government subsidies on ingredients were reduced or eliminated.

By October 1984, consumption of basic foods in Sonoran households underwent reductions of up to 60 % (Sonorense: 10/14/84). *Campesino* families could no longer afford to purchase those items which once were dietary mainstays. In the Rio Sonora Valley, the cost of non-food basics also increased. Electrical rates doubled; as did the cost of city water. By the winter of 1984-1985, a load of firewood (a small pickup truck full) cost 3500 pesos ($17.50). Families needing to purchase shoes, clothing, or consumer durables also faced substantial price increases, which were worsened by the imposition of a value-added tax (IVA) of up to 15 %.

Baviácorans responded to escalating prices, inflation, and unemployment by resuming production of the subsistence food basket which had sustained them through the centuries (see previous chapter). Extended families and neighbors bartered eggs, cheese, milk, beans, potatoes, fruits, vegetables, and services in an effort to meet family dietary needs without spending the money needed for clothing, utilities, and transportation. In making cash expenditures, they used the meager earnings gleaned from *jornalero* wages, and manipulated seasonal credit extended to them by local shopkeepers.

For many municipio families, the 1983-84 economic crisis resulted in a renewal of the multifaceted subsistence strategies which had characterized the Valley throughout the historic

period. A principal aspect was the resumption of hunting and gathering on the broad mesas and in the surrounding mountains. During the rains of 1984, wild greens (*bledos* and *chaul*) grew in abundance and were harvested by primary school children. With the arrival of Fall, attention turned to the Sonoran White Tailed deer (*venado*) and wild pig (*javelina*) which are still found in abundance in spite of centuries of hunting.

In an effort to limit depletion of wildlife, the Mexican government regulates hunting. Officially, the hunting season in Sonora takes place in December, with a limit imposed of one deer and one wild pig. In 1984, a hunting permit cost 3,000 pesos, plus a fee of 1,000 pesos for pig and 2,000 pesos for deer. Though these figures effectively price most *campesinos* out of the legal hunting game, they replaced fees of 18,000 pesos which had been levied the previous year.

The cost of hunting, as a sport, limits the number of those who can be involved. Poaching is another story, however. Under federal law, the penalty for hunting out of season, without a permit, is a fine of 100 to 10,000 pesos, confiscation of guns and game, and no permit for five years. Further, it is illegal to take more than the specified number of animals or to hunt at night using artificial light (Ley Federal de Caza 1982). In spite of this, the Fall and Winter comprise a long "hunting" season in the Sonoran sierra. Those with the equipment and transportation to go high into the mountains at night form the hunting parties. Many go out as much as once a week, bringing back more meat than they can possibly consume. This is redistributed within extended families and through village "neighborhoods".

During the Fall months, there is more meat hanging on municipio clotheslines than there is clothing. Because the meat is brought back in large quantities, women usually resort to the old techniques of drying and processing. Meat is spiced, and hung in the sun for about ten hours. Once dried, it is cut into small pieces and prepared for later use in tacos and tamales. While some women continue to shred the meat using bowl shaped *manos* and *metates*, many simply throw it into the *licuadora* (blender) and let technology take over. Because the price of meat commercially has become prohibitive, this preparation of *carne moshaca* (dried meat)

supplies the protein base of many family diets for a good part of the year (Field Report # 16: 9/21/85).

For households in the municipio of Baviácora, Mexico's financial problems have proved that the extended family remains an efficient unit for taking advantage of economic opportunities. At a time when no single income or resource base is certain, families which fare best are those with both male and female members involved in diverse economic activities. Just as a *campesino* prefers to have several small pieces of land in different locations, so a family likes to spread its members between agriculture and wage labor; and between rural and urban settings. In the final analysis, however, the manipulation of resources is only a short term solution. For Baviácoran women faced with making ends meet on a daily basis, the lean years of the 1980's accentuated the need for long term changes. The ways in which they have begun to deal with this problem are the subject of the next chapter.

CHAPTER 8

WOMEN, WORK AND DEMOGRAPHIC CHANGE

> It is my children's job to go to school and get finished, because there is nothing for them here, in this life. If they work, the money is theirs, to buy what they need for school. There are ten of them now. I had twelve; I would have had twenty if I hadn't done something (Field Report * 7: 7/13/84).

The deteriorating economic situation in Mexico forced municipio households to develop a multifaceted strategy designed to utilize any available resource. These modifications, as described in the previous chapter, helped women make ends meet on a short term basis. Food, clothing and other household needs were met by manipulating all possible economic, social and material assets. For most, it was a hand to mouth existence which underscored the fact that such short term solutions offered no hope for the future. Women recognized that survival, in the long run, was linked to the ability to obtain education, and to their own and their daughters' abilities to limit family size. The cycle of demographic change which began in the municipio of Baviácora in the last 25 years is a reflection of this belief, and of the modernization process which engendered it. To illustrate this, this chapter presents aggregate fertility statistics and measures derived from analysis of primary and secondary sources of demographic data, as well as information on individual households obtained during informal and structured interviews. Changes in birth rates, spacing, and completed family size are examined in relation to concurrent changes in family structure, educational and work opportunities, sources of "female money", and patterns of child care. Finally, church, state, and male attitudes toward contraception are contrasted with the individual choices made or contemplated by Baviácoran women.

Demographic Measures in Population Description

The statistical description of human populations with respect to structure (number and composition of the population) at a given date, and demographic events (births, deaths and marriages) is the concern of demography. Demographers derive statistics concerning the size and

structure of a population from population censuses, which permit description of the demographic structure of a population at a particular instant. In addition, statistics classifying demographic events for a given time period, in a particular population, can be derived from civil registries. As tools of analysis, a series of rates are used to describe demographic change. These reflect relationships between overall or specific population, and between births and deaths in a given area, during a specified period of time (Pressat 1972: 1-12).

The reliability of demographic rates and statistics is a function of the size of the population under consideration. Because most anthropologists do not study large groups of people, our use of such measures is often suspect. However, since we have to date developed only a few techniques specifically for small populations, we have no recourse but to use these measures as hueristic devices in attempting to describe demographic change. In the case of Baviácora, with its total population of 4661, only those statistical methods appropriate to small sample sizes are used. These supplement percentages and ratios given to illustrate change in fertility and mortality through the years in question. Baviácora's population is at the lowest limit of reliability for rates of this type.

In deriving fertility-related rates, a frequent denominator is the number of women in the child bearing years. The years included in this classification vary with the analysis, often ranging from 15 to 44 or 49. In analyzing the total fertility rate of its population, Mexican demographers use age twelve as the lower limit of the age range. This is a valid measure in areas of the country where births to those under the age of fifteen occur frequently. In Baviácora however, only one out of the 4697 births (.02 %) registered in the municpio between January, 1956 and Nov. 15, 1984 occured in the 10-14 age cohort. Further, only 12 births (.25 %) were to women aged 45 or older. Since most births occur between the ages of 15-44, this range is used in calculating rates for Baviácora.

The bulk of the analysis of primary data from the civil registry focuses on the years between 1956 and 1981. It was during this period that birth records for the municipio included birth

order. Since this is a critical consideration in this analysis of fertility change, it is these twenty five years which form the basis of the aggregate statistics used in the study.

Population in Baviácora in the Twentieth Century: Aggregate Data

Population size at a given point in time is a function of the relationship between natality, mortality, and emigration. Though the latter has alternately had both positive and negative effect on the municipio's total population, the twentieth century was characterized overall by gradual, but continuous growth. Population rose from 2496 in 1895 to 4661 in 1980, an increase of 87.7%. This encompasses a slight decline which accompanied the last years of the turn of the century economic boom period and the high mortality of the revolutionary era. The greatest increase occurred between 1950 and 1960, when population grew by 746 (23.9%) over the previous decade. Growth continued between 1960 and 1970, yielding an increase of 351 individuals, all of whom were male (Table 8.1; MEBE: 24-32). This was probably a function of economically motivated changes in population distribution, as described in Chapters 6 and 7. It is apparent in the age-sex composition of the population for that decade, as presented in Figure 8.1 (MEBE:24-32).

In small groups, the influence of migration can cause great variation in the composition of the population. This often overshadows changes in age structure which are the result of variation in the level of fertility. In addition, future change by natural increase is often dominated by the initial age structure for long periods of time (see Pressat 1972:357). Age composition must also be taken into consideration in the interpretation of simple mortality measures such as the crude death rate.

With this in mind, the age-sex structure of the municipio's population from 1930 through 1980 is presented for comparison in Figure 8.2. These population pyramids reflect the interaction of changes in patterns of natality, mortality and migration which have occurred during this century. These patterns are analyzed separately below for the 25 year period of greatest importance to this study.

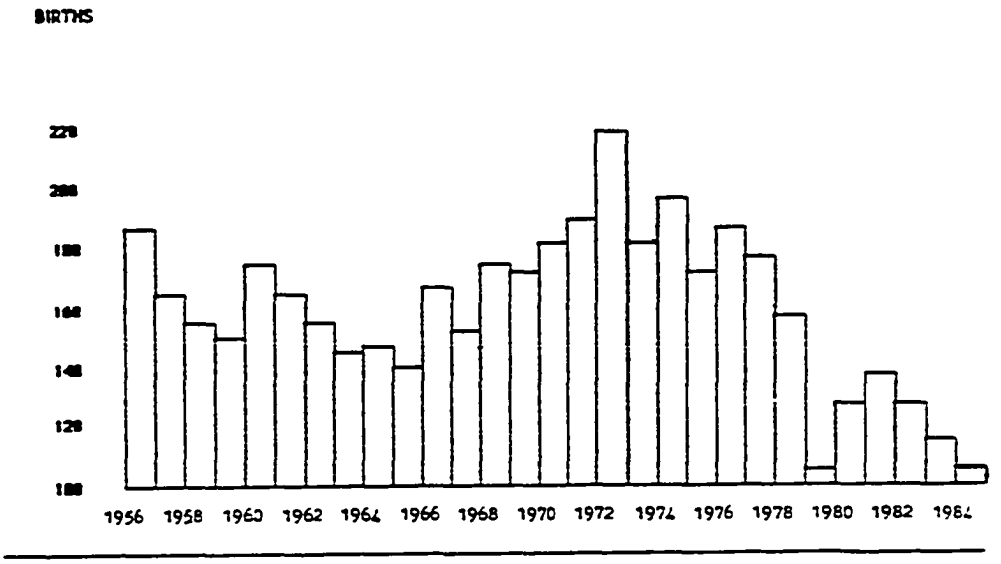
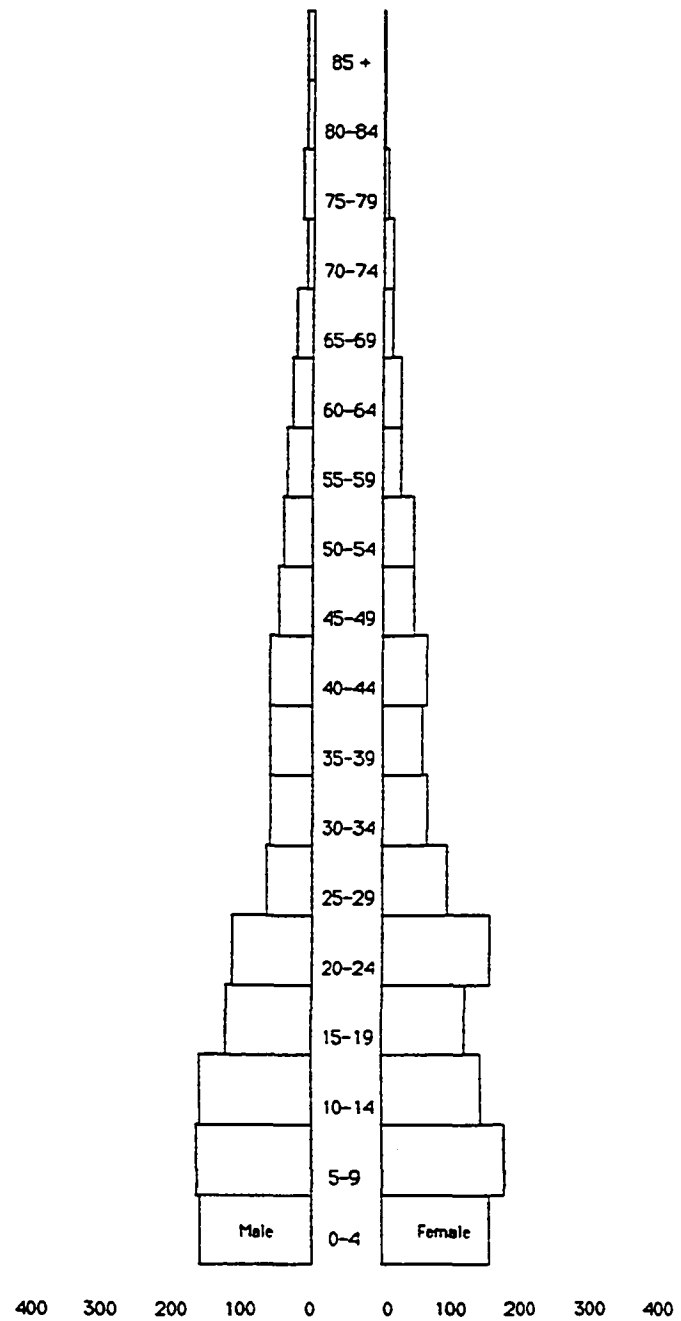
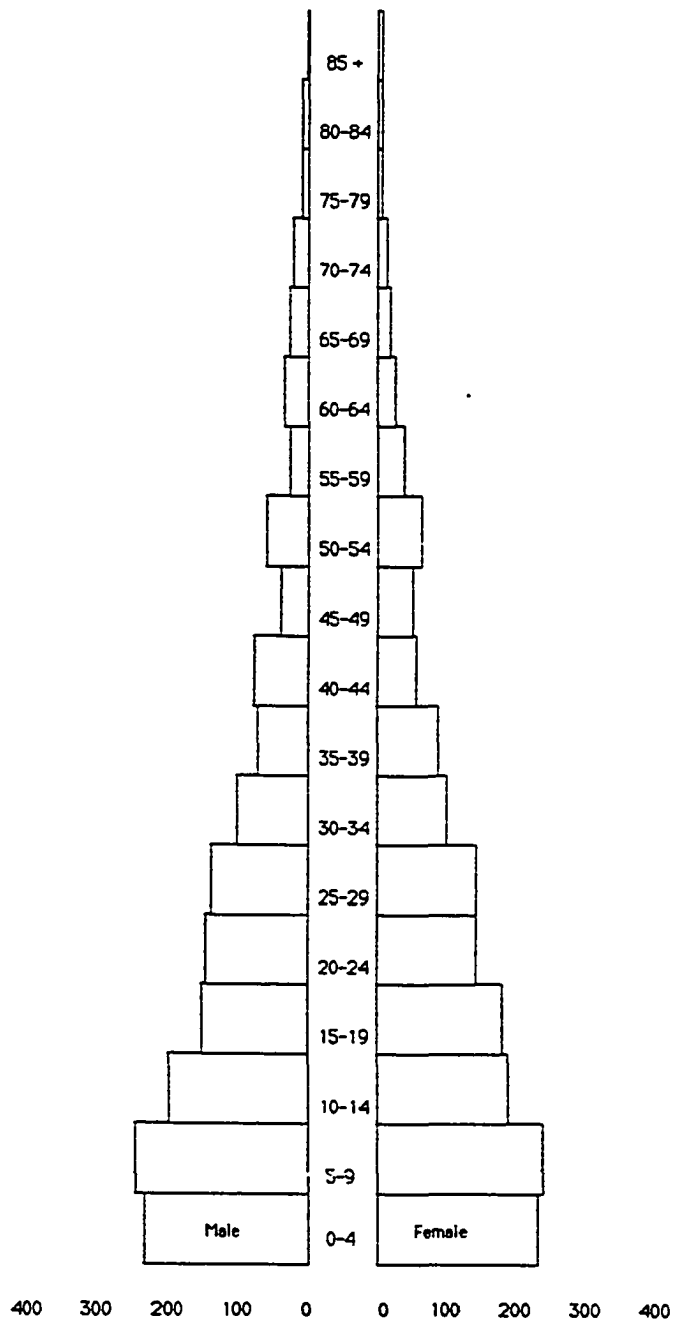


Figure 8.1. Annual Births Registered in the Municipio of Baviacora, 1956-1984

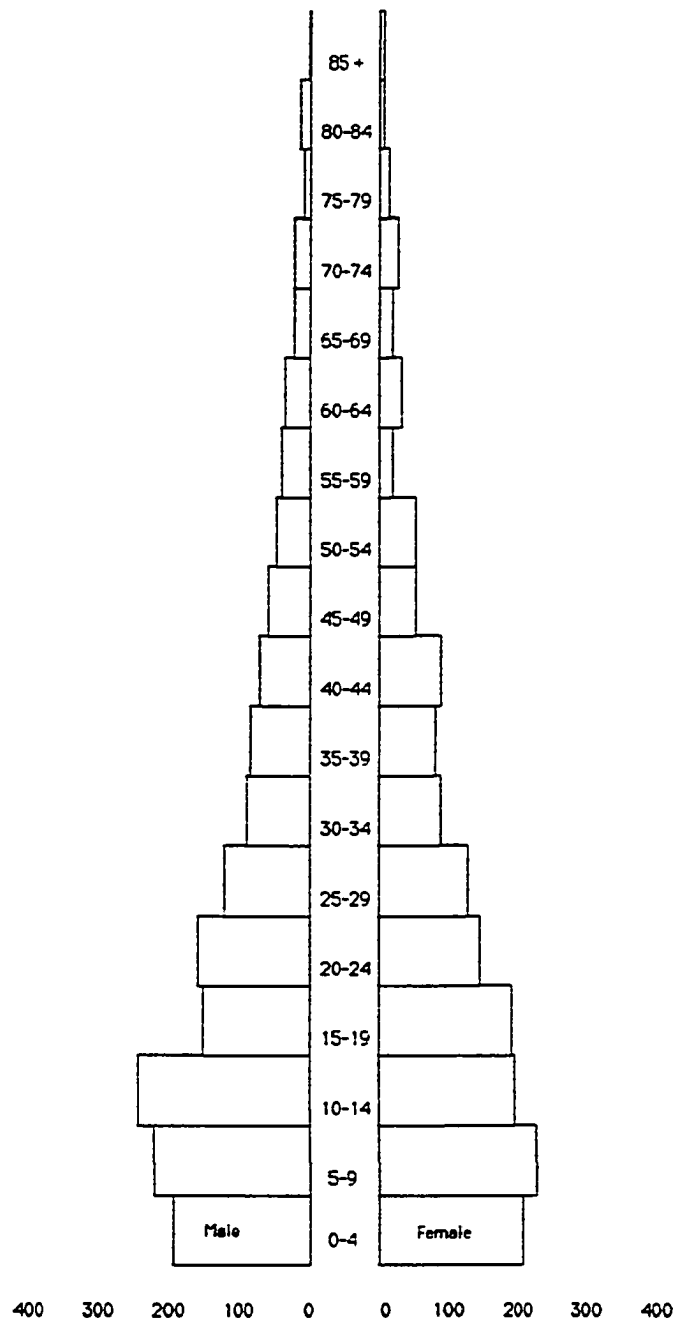
Figure 8.2. (a-f)Age-Sex Structure of Baviacora's Population



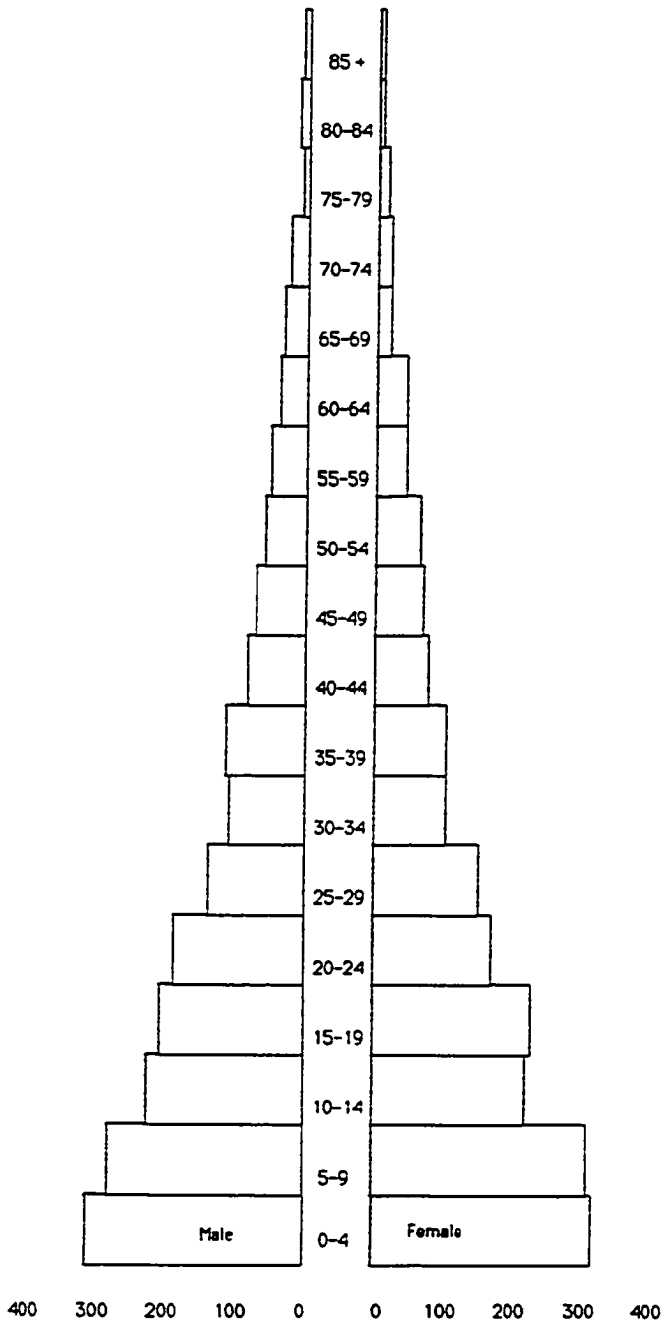
8.2 a Age - Sex Structure of Baviacora's Population 1930



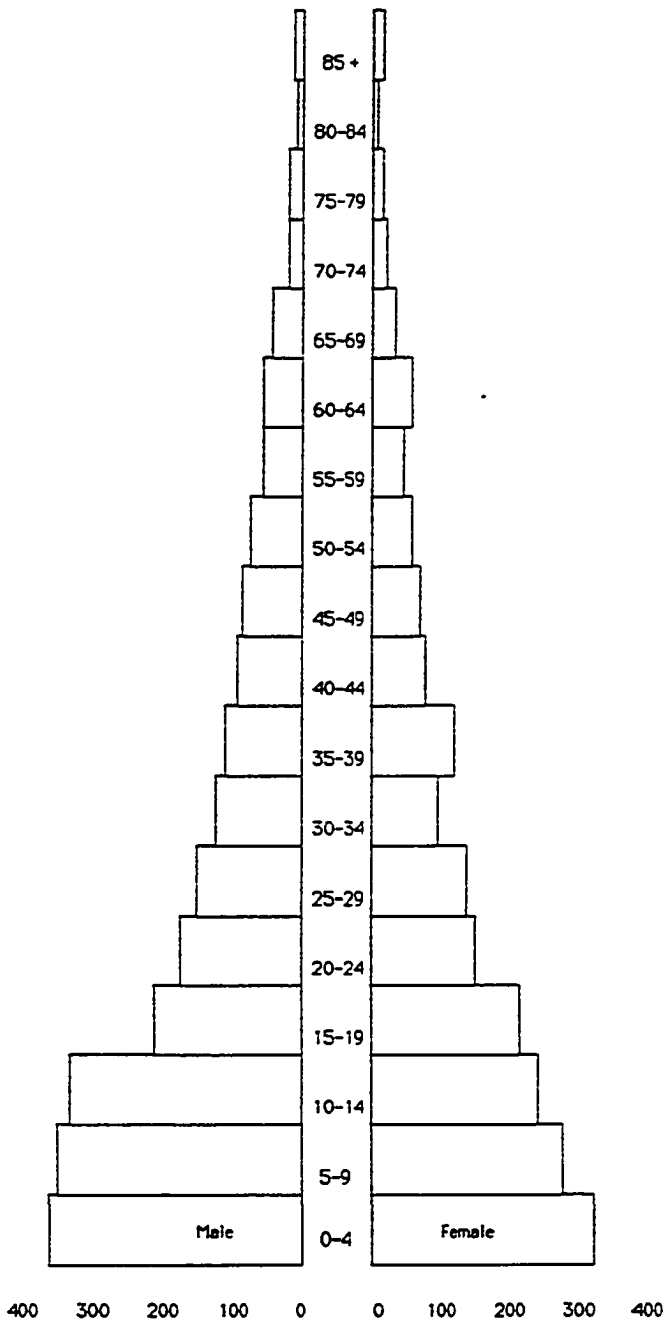
8.2 b Age - Sex Structure of Baviácora's Population 1940



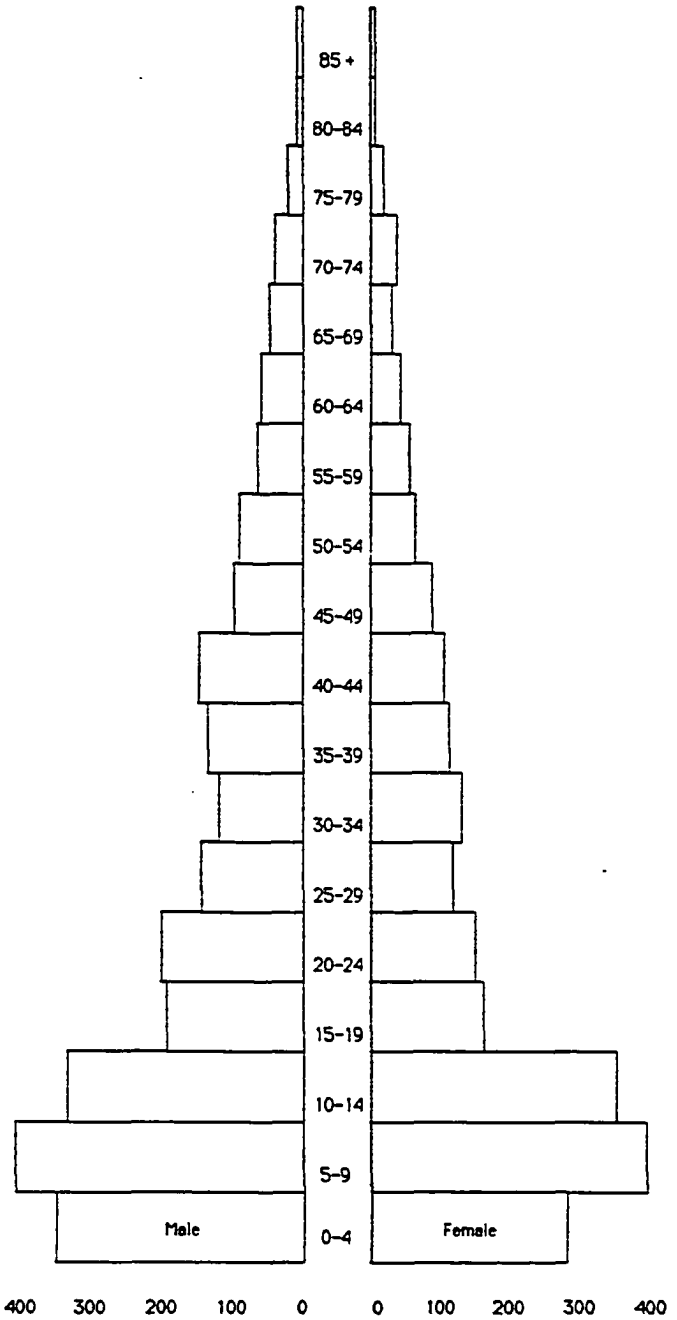
8.2 c Age - Sex Structure of Baviácora's Population 1950



8.2 d Age - Sex Structure of Baviácora's Population 1960



8.2 e Age-Sex Structure of Baviácora's Population 1970



8.2 f Age - Sex Structure of Baviácora's Population 1980

Table 8.1. Population in the Municipio of Bavíácora 1930-1980

YEAR	TOTAL	[+]	Men	[+]	Women	[+]
1980	4661		2457		2204	
		+437		+160		+277
1970	4224		2297		1927	
		+351		+356		-5
1960	3873		1941		1932	
		+746		+365		+383
1950	3127		1576		1549	
		+47		+60		-15
1940	3080		1516		1564	
		+740		+373		+367
1930	2340		1143		1197	

[+] = increase between decade

(Source: MEBE: 24-32; X Censo: 16)

Natality and Mortality

A series of demographic indices are normally used to describe levels of fertility within a population. Of these, only the simplest will be used here to depict the extent to which fertility change has occurred in the municipio. A comparison of data for the years 1960, 1970, and 1980 relates the total population of the municipio to the number of women between the ages of 15 and 44, and to the number of births occurring in those years (Table 8.2; X Censo; R.C.B.: Nacimientos). It shows that though population increased, the number of fecund women remained almost constant. In spite of this, the number of births first increased from 176 in 1960 to 181 in 1970, and then declined by 29% to 128 in 1980. Population figures are only available for the decade, but birth figures are obtainable by year. These indicate that births climbed to a peak of 219 in the six years prior to 1972, then declined to pre-peak levels over the next seven years. Since that time, births duplicated that pattern, but on a new, lower plateau. They climb from 106 in 1979 to 138 in 1981, declining once more to 105 by 1984 (Table 8.2; X Censo; R.C.B.: Nacimientos).

Using these numbers, two rates were calculated for comparative purposes. These yielded a declining crude birth rate, as well as a decline in the general fertility rate for the decade years 1960, 1970 and 1980[1] (Table 8.3; MEBE; RCB:Nacimientos). Crude birth rates declined from a high of 45.4 / 1000. in 1960 to 42.9 / 1000. in 1970, finally reaching 27.4 / 1000. in 1980. General fertility rates also experienced a dramatic decline. After increasing from 217 / 1000. in 1960 to 231 / 1000 in 1970, they dropped to 164 / 1000. in the ten years leading to 1980. There are all indications that this trend is continuing.

Table 8.2. Total Population in Relation to Fecund Women and Total Births: 1960, 1970, 1980

YEAR	Population Total	Women Ages 15-44	Total Births
1960	3873	813	176
1970	4224	785	181
1980	4661	781	128

(Source: MEBE; X Censo; RCB: Nacimientos)

Table 8.3. Crude Birth Rate and General Fertility Rate for the Municipio of Baviácora: 1980, 1970 and 1960

YEAR	Crude Birth Rate	General Fertility Rate
1980	27.4/ 1000.	164/ 1000.
1970	42.9/ 1000.	231/ 1000.
1960	45.4/ 1000.	217/ 1000.

(Source: MEBE; X Censo; RCB: Nacimientos)

A more sensitive indicator of overall level of fertility for small populations is the child-woman ratio. This relates the children to the population in the reproductive years. The index of fertility becomes the ratio of the population aged 0-4 to the number of women of reproductive age, in this case aged 20-44 [2]. The child-woman ratios for Baviácora reflect not just the relationship between the number of women and the number of young children in the community, but also the overall influence of early childhood mortality. Thus, for the decade years 1950, 1960, 1970, and 1980, ratios of .76, 1.06, 1.19, and 1.04 respectively reflect the pattern of increasing births in association with declining mortality, with births finally beginning to decline as well in the final decade (Table 8.4). When viewed from this perspective, fertility trends do not appear as striking as those indicated by the general fertility rate. Yet both measures document an overall decline, the nature of which will be analyzed further following a discussion of mortality trends in the municipio.

Levels of Mortality

Mortality impacts on population size in more than one manner. Unless fertility is restricted, declining infant mortality will lead to population increase. Increased survival among this and other age groups will also impact on the number of individuals who survive to the age of reproduction, and hence, influence the rate of natural increase. Such changes are normally described using the infant mortality rate and other age specific mortality rates, and the crude death rate. As with natality, use of these indices in small populations can have limited significance[3].

Table 8.4. Child-Woman Ratios for the Municipio of Baviacora: 1980, 1970, 1960, 1950 (Displayed with other demographic indicators)

	YEAR			
	1980	1970	1960	1950
RATIOS	1.04	1.19	1.06	.76
Fecund Women	781	783	813	701
Total Births	128	181	176	not available
Infant Mortality*	25.2/ 1000	38.8/ 1000	61.5/ 1000.	not available

* Infant mortality figures calculated based on averages of the five years preceding each decade.

(Source: MEBE; X Censo; RCB: Nacimientos and Defunciones)

For Baviácora, infant mortality rates were calculated in five year cohorts in order to avoid erroneous interpretation based on single, noncharacteristic years. These rates show a continuous and dramatic decline beginning with a high of 61.5 / 1000. during the five year period 1956 through 1960, and ending with a low of 10.3 / 1000. for the four years from 1981 through 1984 (table 8.5; RCB: Nacimientos and Defunciones). This is largely a function of decline in infectious and contagious diseases, a trend which is reflected in all other age groups as well (see Chapter 5). Rates for the municipio are consistently lower than those for Mexico as a whole during the years 1956 through 1975 (Alba 1982:39). Infant mortality in Baviácora dropped even further in the nine years since 1975, representing improvements in sanitation and availability of health care which extended into the area during that period.

In contrast to the encouraging trends just described, mortality due to trauma increased in all groups over age one and below 45. The most striking change occurred among young adults aged 15 through 29. Following a decline from 5.13 / 1000. in the five years ending in 1962 to 1.9 / 1000. in the five years 1968 through 1972, the age specific mortality rate for this cohort rose to a high of 12 / 1000. in the five year period ending in December 1982 [4]. This change in mortality rates among those in their most fertile years in part negates reductions in infant mortality by slowing the rate of natural increase in the municipio.

Natural Fertility

Socioeconomic factors impact on natural and regulated fertility through one or more of the biological processes comprising reproduction. Natural fertility is that which occurs in the absence of deliberate birth control measures. Changes derive from modifications in interuterine mortality; the length of post partum ammenorhea; natural sterility; waiting time to conception, and age of marriage or consensual union. In the case of the latter, a number of socioeconomic determinants have been cited as causing a gradual increase in the age at which individuals enter into a marital-like relationship. These include transition from a subsistence to market strategy

Table 8.5. Cohort Infant Mortality Rates for the Municipio of Baviácora: 1956-1984

PERIOD	Infant Mortality Rate
1956-1960	61.45/ 1000.
1961-1965	53.3/ 1000.
1966-1970	38.8/ 1000.
1971-1975	34.4/ 1000.
1976-1980	25.2/ 1000.
1981-1984*	10.25/ 1000.

* only four years available

(Source: RCB: Nacimientos and Defunciones)

in production; urbanization and urban residence; education; and the nature of the labor market (see Smith 1983:473-531).

Most analyses of age at marriage focus on female age as the critical factor impacting on both the total fertility rate of a population and the completed family size of an individual household. Since the age at which a woman begins her reproductive career influences the number of children she can have during her lifetime, this is a valid consideration. However, both the age of the male and the age difference between the male and female can also influence natural fertility (see Knodel 1983: 61 - 102). In the first instance, it must be remembered that both partners must be fertile for conception to occur, and that fertility decreases with increasing age. Assuming that unions remain stable, both male and female age can impact directly on the eventual number of children born into a given family. In contrast, age difference between male and female can have indirect impacts on age at marriage across the family life cycle as well. In addition to contributing to decline in the marital fertility of a couple, excessive age difference between male and female can also influence the age at marriage of their offspring. When households dependent upon male income lose that provider early in the family cycle, economic pressure can force female offspring into earlier marriage.

Age at marriage is considered to be a predicter of the age at which a woman will begin sexual activity. The accuracy of this will differ from area to area and is dependent upon the incidence of premarital sex, and the extent to which the age pattern of non-formal unions duplicates that of legalized marriage. This can be estimated by using information concerning marital status which is included in birth records as a proxy for non-legalized sexual activity. Table 8.6 (RCB: Matrimonios) summarizes this information for the municipio. During the 26 year period between 1955 and 1981, 14.8 % of all first births were to unmarried woman. The bulk of these occurred during the first 20 years, and represent consensual unions. A government drive to legalize such arrangements led to a reduction in their number in later years. Thus, both births to these and

Table 8.6. Number and Percent of First and Second Births by Marital Status in the Municipio of Baviacora 1956-1981

	MARITAL STATUS			
BIRTH ORDER	Formal Marraige	Single	Consensual Union	TOTAL
First Births				
Total	615	93	14	722
Percent	85.18	12.88	1.94	
Second Births				
Total	579	39	14	632
Percent	91.61	6.17	2.22	
Total	1194	132	28	1354
	(88.19)	(9.75)	(2.07)	

(Source: RCB: Nacimientos 1956-1981)

to single women represent only a small proportion of those occurring, and age at marriage usually reflects the beginning of reproductive risk.

Increases in age at marriage , consensual union and onset of sexual activity can impact total fertility in the absence of birth control by shortening the reproductive career of the woman. To determine whether reduction in birth rates is a result of this process in Baviácora, data concerning marriage in Baviácora was examined for the 28 year period between 1955 and 1983. As indicated in Figure 8.3 (RCB: Nacimientos), neither the mean nor the median age at marriage showed significant gain. In spite of some fluctuation in both measures over the years, these were virtually the same in 1983 as they were in 1955. Male-female age difference showed the same tendencies. Analysis of age at first and second birth also reflected this pattern (RCB: Nacimientos).

There is little specific data pertaining to the remaining determinants of natural fertility. No information was available concerning natural sterility. Interviews with physicians and public health officials indicated that intrauterine mortality rates did not exceed those found elsewhere (Elite Interview * 1: 6/22/84). Analysis of structured interviews, registry data, and local tradition suggests that there is no deliberate waiting period between marriage and conception. Further, post partum ammenohrea is short lived. When breast feeding does occur, it is usually of short duration and sporadic. Of the 36 women interviewed who breast fed their children, only eleven did so for five months or more (Author's questionaire: Question 36).

Regulated Fertility

In the absence of any indication that changes in natural fertility are the source of population decline in the municipio of Baviácora, it becomes necessary to focus on the issue of regulated fertility. Regulated fertility is that which results from deliberate birth control procedures, including contraception, induced abortion and sterilization. Clearly, the most accurate indication that fertility is being regulated are statistics that document use of the procedures just cited. To the extent that these are available, they will be summarized below.

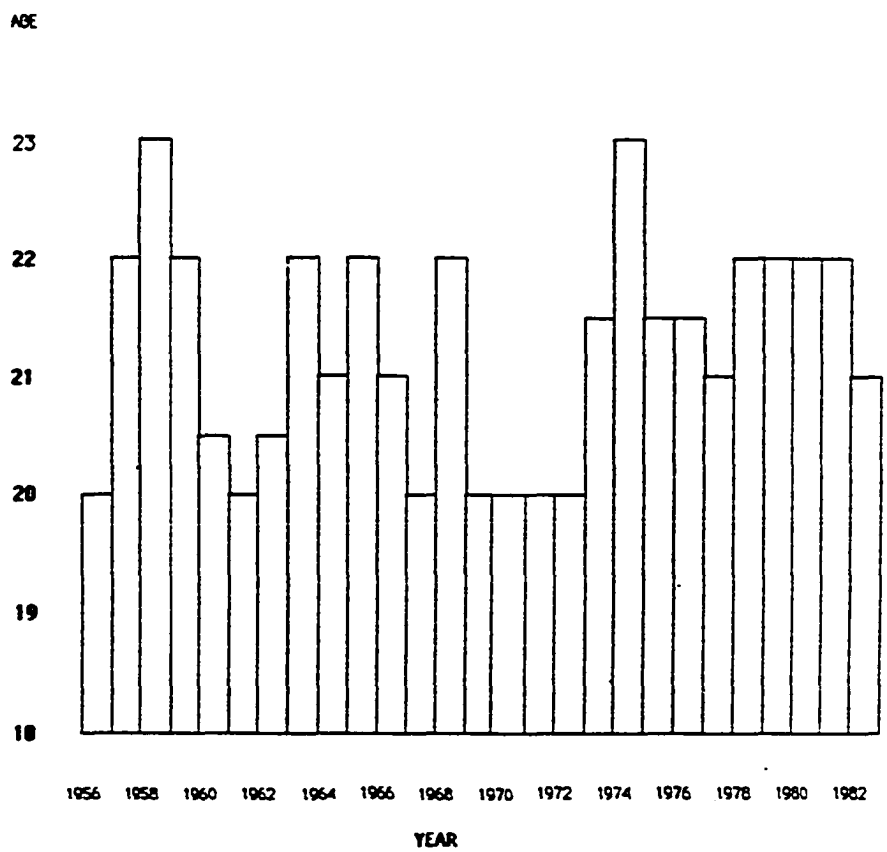


Figure 8.3. Median Age at Marriage 1956-1981
Municipio of Baviacora

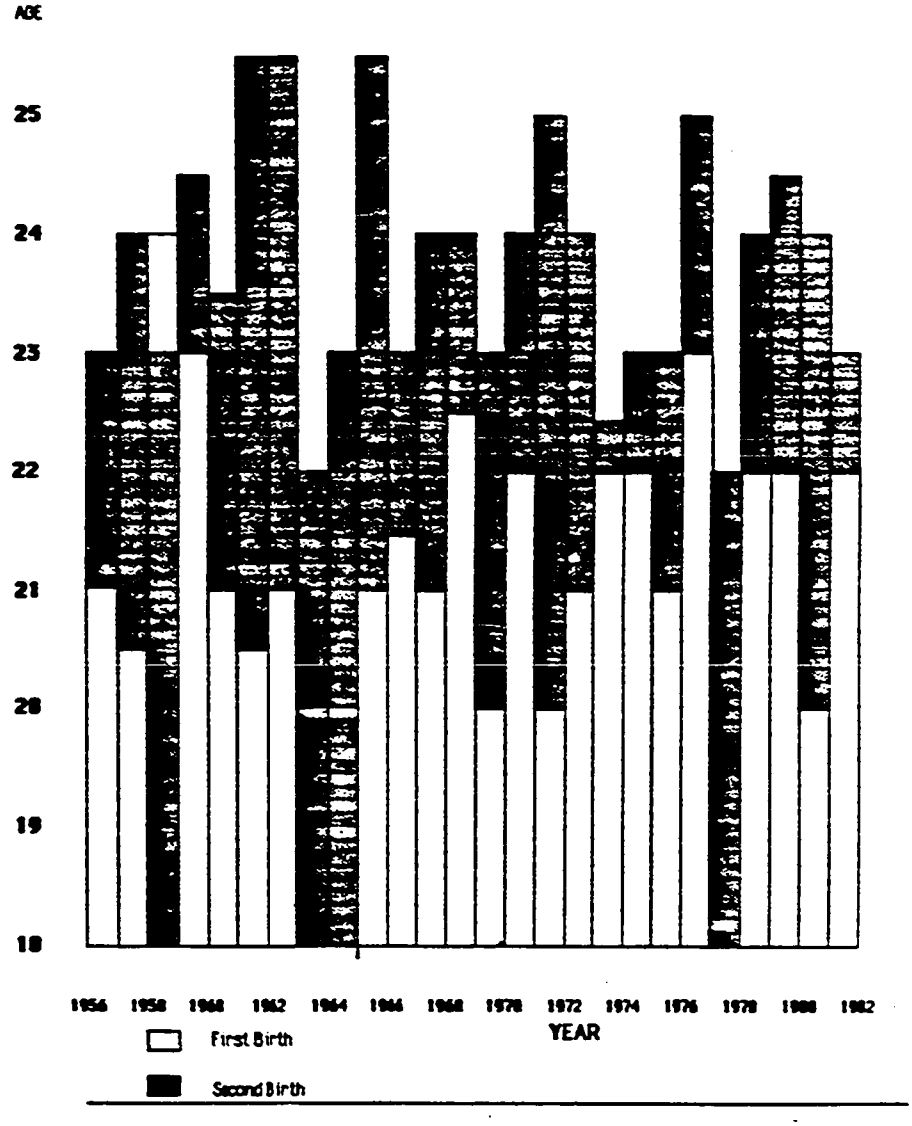


Figure 8.4. Median Age at First and Second Birth 1956-1984, Municipio of Baviacora

In 1974, the Mexican government reversed past population policy and began a comprehensive family planning program. A constitutional amendment was passed guaranteeing the peoples' right to regulate their own fertility (Intercom 1982: 11). In the state of Sonora, this is reflected in the number of new and follow-up visits by women seeking contraception from units of the public health service between 1973 and 1983 (Table 8.7; DMIPF). Total visits increased from 1648 in 1973 to 20,792 in 1974, peaking at 60,441 in 1981.

Comprehensive statistics such as these are not available for the Rio Sonora Valley. However, figures for the first 11 months of 1983 document 100 new visits seeking contraception at the federally run *Centro de Salud* (DMIPF: Document # 2). This represents 12.8 % of all women in the child bearing years. Of these, 83 used the pill; nine used intrauterine devices; and eight used diaphragms. Because sterilization procedures only occur at the hospital in Ures, these are included in figures for that community. During the same time period, 56 procedures were carried out. There is no record of those who may have sought contraception from private physicians in the Valley and in Hermosillo. Further information concerning contraceptive use was obtained from the interview sample and will be discussed in a later section.

Indication that fertility regulation is occurring can also be inferred through examination of statistics concerning the relationship between total births, birth order and the number of fecund women. Regulation of fertility will gradually slow population growth when women artificially postpone childbirth and/or increase the amount of time between births. Information concerning age at marriage, and at first and second births noted above showed that there was little change in these between 1956 and 1983. Using the difference between mean age of first and second birth as an indicator, timing of second birth also appears to have remained constant. In spite of this, all measures of level of fertility for the municipio showed declines in the years between 1970, and 1980 (see Tables 8.2; 8.3; 8.4).

It now becomes necessary to explain the decline by examining the relationship between first, second, and higher order births more carefully. Table 8.8 (RCB:Nacimientos) depicts birth order

Table 8.7. Contraceptive Use at Public Health Facilities in the State of Sonora 1973-1983
New Users and Subsequent Visits

	USER VISITS		
YEAR	New Visits	Return Visits	Total Visits
1973	763	885	1648
1974	5360	15432	20792
1975	5227	14485	19712
1976	8967	28111	37078
1977	13099	36578	49677
1978	15720	39928	55648
1979	15581	41963	57544
1980	14540	45901	60441
1981	12201	45874	98075
1982	9510	46075	55585
1983	8994	46761	55755
TOTAL	109962	362013	471955

(Source: Department of Maternal Infant Care and Family Planning, SCSPES

Table 8.8. Birth Order by Number and Percent of Births in the Municipio of Baviácora, 1980, 1970 and 1960

BIRTH ORDER	DECADE YEAR 1980	1970	1960
First	41 32.0 %	20 11.0 %	35 19.9 %
Second	25 19.5 %	27 14.9 %	20 11.4 %
Third	14 10.9 %	18 9.9 %	27 15.3 %
Fourth	15 11.7 %	28 15.5 %	20 11.4 %
Fifth	6 4.7 %	18 9.9 %	19 10.8 %
Sixth	10 7.8 %	15 8.3 %	18 10.2 %
Seventh	4 3.1 %	12 6.6 %	17 9.7 %
Eighth	4 3.1 %	18 9.9 %	6 3.4 %
Ninth and over	9 7.03 %	25 13.8 %	14 8.0 %
TOTAL BIRTHS	128	181	176
Women 15-44	781	785	813

(Source: RCB: Nacimientos; MEBE; X Censo)

by number and percent of births for the decade years 1960, 1970 and 1980. The percent of all births accounted for by lowest order births (first and second) increases from 28.9 in 1970 to 51.5 % in 1980. Considering third and fourth order births as well, the percentage of higher order births (five and over) decreased from 48.5 % in 1970 to 25.73 % in 1980. At the same time, the total number of women who might begin reproductive careers actually decreased from 359 to 318. Thus, increase in first births is not simply a function of natural increase, nor does decrease in higher order births correlate with decrease in women in these age groups.

Changes such as these can only be achieved through fertility regulation. It is not regulation which impacts on timing or spacing, the result of which would be gradual decline. Instead, it is regulation which impacts on the total number of children born to each woman during her reproductive cycle by ending the reproductive career early through artificial means. In this case, the number of women with completed families larger than three or four decreases rapidly.

The question which must then be addressed is whether the aggregate figures for 1980, as reported here, reflect permanent decisions concerning completed family. Will Baviácoran women elect to have higher order births at some later date? The answer is supplied for the municipio by 48 structured interviews, and from informal observations made during field work. These support the conclusion that reduction in completed family size is intended to be permanent. This information is presented below, following a discussion of the critical social and economic patterns which are the source of this decision.

Is the Role of Women Changing?: The Household Focus

> Have gone to visit a number of my interview families, only to find that the households continue to be in a state of flux. Yet another young woman has left her family and gone to the city in search of employment. She lost her bank job locally and is now living with a relative in Hermosillo, working as an accountant in a supermarket. María is still in Nogales, working at Motorola, while Francisca is working as a maid for a family in Mexicali. Her ten year old remains with Grandma in Baviácora. Carmen goes to school from 2:00 P.M. to 8:00 P.M. at the new *Comercio* here (Field Report # 22: 11/4/84).

> Friday I visited the new baby across the road. The Mom returned from an extended stay at her mother's in Hermosillo. She is now home alone all of the time, instead of just during the week as she used to be. Her husband no longer comes home on weekends, but stays up in the mountains making the run between the mines and the ore mills at Cananea. She seems occaisionally at wit's end (*enfadada*), since she can only get to town by walking the 2 km. with the three kids. "I am so lonely, I have no close family here. I'm afraid the older boys will run into the highway when I'm busy with the baby. This was the last child. Motherhood (*la maternidad*) was not meant to be this way." (Field Report # 23: 11/12/84).

Migration, Employment, and Education

In 1984, Baviácora was a modernized municipio whose inhabitants experienced not just a changed standard of living, but altered expectations for life as well. Just as the modernization process was less than ideal, so the new way of life fell into a gap between what once was and what should be. Men who once worked for wages in the local mines, taking their families with them to the surrounding enclaves, now worked in border towns, on coastal farms, or in distant mines. Their wives saw no advantage in accompanying them, and chose to remain behind in rural villages with the children, rather than suffer the uncertainties of city life. Some maintained their own households, while others shared homes and resources with extended families. Of the 31 simple family households in the structured interview sample (n= 48), 19.4 % were female headed most of the time. Twenty four and one half percent of the 17 extended family households included women whose husbands were involved in long term commuting (Author's questionaire: Questions 22 and 23).

Absentee husbands were away for varying lengths of time. Some left Baviácora on the earliest Monday morning bus, returning late Friday night. Others who worked in Sonora might not return for several weeks, particularly when wages were not hourly or fixed, but were based on piecework. This was most true of those who drove the ore trucks and were paid by the load. They preferred to use their weekends to get in an extra run, especially when family needs escalated. Those men working in the United States returned once every three to six months, or in some cases,

just at Christmas. In the latter instance, women might make a trip to visit them "*al otro lado*" during the summer months (Field Report * 6:7/3/84).

Even with the increase in men working in salaried positions away from the municipio, most Baviácoran men lacked jobs providing a reliable source of cash. Of the 725 couples listing occupation on records of first births between 1956 and 1981, only 264 men (36.4 %) were employed in positions which could be classified as steady (see Table 6.9; RCB:Nacimientos). Women beginning their reproductive careers late (more than age 30) were more likely to be married to agriculturalists than steady workers or even day laborers. Husbands' employment, of those having first births between the ages of 20 and 29, was almost evenly distributed between all three groups. However, those having first births below age 19 were least likely to be married to *campesinos* involved in agriculture. It became clear that household resources are derived from multiple sources which are never enumerated, including not just male, but female and children's labor as well.

The resources offered by extended families remain a critical part of the multi-faceted strategies used by municipio women and their households. The expense of maintaining two residences by households with both rural and urban economic bases are mitigated by the presence of other family members near potential employment locations. Men or women working away from the municipio can board with city relatives during the weekdays, or share an apartment with siblings and cousins. Such social support systems help moderate some of the difficult adjustments which often occur when family members migrate in search of work and/or advancement (cf Walsh and Simonelli 1986).

Family geographical dispersion is especially important when teen aged children are sent to the city to continue education. Prior to 1980, post secondary schooling was available only outside the Río Sonora Valley. Those wanting to attend academic (*Preparatoria*), commercial (*Comercio*) or teacher training (*Escuela Normal*) high schools had to make arrangements with relatives in the cities. To continue schooling without undue financial hardship meant that

someone in the family had to have left the village before you. However, even those who could afford the cost of renting a room preferred to place their children with some kind of kin.

Circumstances for obtaining education improved for Baviácora families during the 1980's. A *preparatoria* was opened in the pueblo of Banamichi to the north in 1980. School bus service was made available to Río Sonora teens who wished to attend the classes running from 4:00 P.M. to 7:00 P.M.. This schedule makes it possible for teens to work during the day time hours, though the majority of students come from the upper income levels in the area. Those who attend the "Prepa" usually intend to go on to college to become *licenciados* (professionals).

In contrast, those attending three year *Comercios* are, ideally, employable as clerks, secretaries and accountants following completion of the program. In September 1984, a branch of an Hermosillo *Instituto Commercial* opened its doors in an abandoned cantina in the pueblo of Baviácora. Eighty students elected to begin studies there, paying tuition and fees for the late afternoon and evening classes. Some of these originally planned to leave the Valley for schooling; for others, the school's opening made continuing education a possiblity.

For women, the availability of commercial courses immediately following secondary school closes the gap created by new laws requiring that students finish academic high school prior to obtaining teacher training at an *Escuela Normal.* Prior to the 1984-1985 school year, the most popular profession for women was that of school teacher. Women could expect to be employed and earning steady wages at the end of a four year program which began immediately following completion of the ninth grade. Families could rely on an additional income source by the time a teaching daughter was 19 years of age. For many families, this income was a key element in the urban education cycle. Unlike sons' wages, which were often committed to the support of a separate household, daughters' income could be counted on to help with the education of other family members, at least for the approximately four years until she married. One young teacher commented that the policy change was likely to cause additional hardship for already stressed rural families (Elite Interview # 3 : 8/15/84).

By 1984, formal income sources for Baviácora's women had changed. While it was more difficult to teach, it became easier to obtain the education needed to apply for jobs in the massive public sector bureaucracy. However, as the Mexican population expanded, the number of women competing for these positions also grew. In the face of a tightening job market, some municipio women followed their male counterparts, looking to "*El Norte*" for potential employment sources. The few with sufficient nerve and relatives crossed the border in search of domestic postions with American families. Others went only as far as Nogales or Mexicali, happy to be "exploited" by the multi-national *maquiladoras* and other border industry which offered a steady wage for unskilled labor (see Ferdnandez-Kelly 1984; Seligson and Williams 1981). Of the Baviácora women interviewed, it was the three single mothers who eventually risked the uncertainties of the border cities in the attempt to support themselves and their children (Author's questionaire: Respondents # 4, 6, 44; revisits). As with the 15 year olds who went to the city on their own to finish schooling during the last decade, such risk taking behevior may well be one of the keys to transition in income, status and reproductive strategy among municipio families.

The Individual Decision

The interaction of natural and social environmental factors influences behavioral options available to households and individuals. In making reproductive decisions, economic, physical and emotional resources are weighed and balanced in relation to needs and goals, eventually producing a behavioral outcome which can impact on fertility. As the preceding chapters indicate, Baviácoran women are being forced to adapt to the climate of scarcity produced by the interaction of unfavorable market conditions, modernization and environmental degradation. The degree to which they are able to do so differs from household to household. In many of these, women are beginning to take on an nonsubordinate position as decision maker. As they acquire more responsibility within the household, their reproductive strategies become more autonomous. Women, as

individuals, have begun to create their families with definite plans and goals in mind, by utilizing the contraceptive means made available to them by government policy.

To understand the decision-making process, it is necessary to examine the degree to which household characteristics condition individual choices concerning reproduction. To do so, the interrelationships of 12 demographic and economic variables derived from the 48 structured interviews were analyzed statistically. These included woman's age and marital status; use of family planning; number of living children; age at first birth; age at most recent birth; time since most recent birth; household type; male and female income sources; and number of children of both mother's and mother-in-law.

The Role of the Church in the Contraceptive Decision

> Before we can get married in the Church, the priest meets with the young woman. He asks her "will you have all the children which God sends (*todos los hijos que Diós manden*)?" Of course, she tells him yes, but it doesn't mean anything. God may send them, but we don't have to accept delivery (Marisa (aged 23)Field Report # 11: 8/15/84).

In July, 1984 Pope John Paul II reiterated the Catholic Church's hardline stance concerning birth control, stating that even natural methods of birth control should only be used in cases of emergency. In doing so, John Paul returned to the original tenor of Pope Paul VI's encyclical *Of Human Life*, which condemned not only contraceptive pills but also natural methods when used expressly to avoid conception. Pope John Paul II's comments sparked emotional editorials in Sonoran newspapers. These called for an acceptance of the concept of "responsible parenthood", which accepts that decisions concerning childbearing and contraception are the responsibility of each individual, before God(El Imparcial: 7/14/84).

The family planning program begun by Mexican President Echeverría in 1974 used the notion of responsible parenthood as a means of avoiding direct confrontation with the Catholic Church. The program still proceeds with that caution, gradually gaining respectability with a noncoercive policy built around the slogan "A smaller family lives better (Riding 1985:225)." In 1975, the

influence of religious belief in Mexico was determined to have a negative impact on family planning and birth control (Alba 1982: 96). However, it is likely that a study carried out today would show little difference in attitude or practice between Catholics and non-Catholics regarding birth control, as has been found in other countries of Spanish Catholic origins (Ramirez de Arellano and Seipp 183:172).

In actuality, the Mexican Church's stand concerning contraception impacts on the village level through the medium of the individual cleric. When a particular priest maintains an attitude of unwavering orthodoxy, village women will be slower to accept, or admit to accepting, contraception. This is certainly the case in the Rio Sonora Valley. Both the priest and the people of a neighboring community north of Baviácora spoke freely and realistically concerning population control. In contrast, the Baviácora priest, a veteran of 17 years in the municipio, would accept no vocalized deviation from Church edicts(Field Report #11: 8/11/84).

Because of the priest's influence, it is difficult to assess the accuracy of self reports concerning use of family planning. If anything, interview data probably errs on the side of under reporting. Of those interviewed, 46.8 % said that they neither used contraception, nor had they received information concerning it; 36.17 % said that they were currently using some family planning method other than rythym; and the remainder (17.02 %) admitted that they were familiar with contraceptive techniques. Of the eight women in the final category, all but one were over the age of 40 when interviewed (Table 8.9; Author's questionaire). Among these, the most recent birth was four years previous. Because few Baviácoran women have children after age 40, it might well be assumed that for them, contraceptive use was unnecessary (Author's questionaire: Questions 1, 25, 26, 39; RCB:Nacimientos).

All of the interviewees stated that they attended the Catholic Church on a regular basis, either daily, weekly, or "as needed." Thus, there was no relationship between church attendance and contraceptive use (Author's questionaire: Questions 2, 39, 53). In this light, the most revealing information concerning influence of Church precepts on contraceptive use comes from an

Table 8.9. Use of Family Planning in Relation to Age Cohorts Among 48 Women Aged 15-45 , Municipio of Baviácora 1984

	AGE IN FIVE YEAR COHORTS						
FAMILY PLANNING	15-19	20-25	25-29	30-34	35-39	40+	TOTAL
Non-User	2	6	5	3	3	4	23
Received Info.	1	0	0	0	0	7	8
User	0	1	4	5	6	1	17
TOTAL	3	7	9	8	9	12	48

(Source: Author's questionaire: Questions 1,39)

interview with a 44 year old mother of eight surviving children, four of whom were daughters. All of the girls were unmarried and living at home. She advised the girls to use measures to limit their families to two children, saying that while she never used contraception herself, it was a necessity to survive with life the way it is now. Though this is not an unusual attitude for a woman with a large family and few resources, it is unique in that in this case the interviewee had a strong commitment to the Church. However, she had no difficulty reconciling her two roles (Field Report * 12, 8/23/84; Author's questionaire: Respondent * 29).

Husbands, In-laws, and Government Policy

Official Mexican family planning policy attempts to avoid conflict with the Catholic Church by using a non-coercive, nonincentive program. Contraceptive methods, including the pill, diaphragm, I.U.D., and sterilization are made readily available at low cost, government run clinics. No one forces women to use them; however, a media wide publicity campaign uses psychology to try and encourage adoption. This extends to Mexican made *novellas* (soap operas) in which the heroine is usually depicted as a contraceptive user.

A further incidence of the use of psychology in promoting family planning occurs through the medium of the medical profession, though in this case it is not clear whether it is intentional or fortuitous. Interview data concerning pregnancy history revealed a high incidence of final delivery by Caesarian section. Of the forty- two parous women interviewed, 28.7 % gave birth to their final child by Caesarian. "Normal" rates for this type of delivery are usually between five and ten percent (see Cohen and Estner 1983). Baviácoran doctors attributed this exceptional rate to the frequency of "*mal parto*" (bad labor). This in turn, is blamed on the excessive weight gain experienced by Sonoran women during pregnancy. Encouraged by older women to "eat for two", by the third child many women have doubled their pre-marital weight.

Women who undergo long, arduous labors (or might be expected to do so), are taken by ambulance to the rural hospital at Ures for Caesarian delivery. The hospital's opening in 1976 coincided with the completion of the paved road, which gave women the option of easy hospital

births for the first time. Births were taken out of the home setting, and into the privacy of the hospital delivery room. The birth experience ceased to be the domain of older, female family members, but instead became a private contract between physician and patient. It is in this setting that Caesarian deliveries take place.

Mexican law states that women who have three non-vaginal births must undergo sterilization to protect the health of the mother. The Mexican medical profession is not alone in following one surgical delivery with another, but the mandatory sterilization policy is a unique aspect. Further, all women who undergo a Caesarian are encouraged to have a tubal at the same time. They are told that their health will be endangered by subsequent pregnancies. For many women, this is the psychological out which allows them to put to rest any remaining religiously stimulated qualms concerning permanent contraception. It also serves to dispel any objections that might be raised by husbands inclined to encourage their wives to over-reproduce in the interest of virility. Technically, both husband and wife must sign the medical release form which accompanies "*la operación*". In reality, this can be waived in the interest of efficiency, and in the privacy of the delivery room (Field Report * 10: 8/9/84 [Elite Interview * 2]). Of the 12 women in the sample who had Caesarian deliveries, four admitted to having a tubal ligation at the same time. Two of these said that the procedure was carried out with their husband's consent; the other two said that it was none of their business (Author's questionaire: Question 32).

Informal conversations with other municipio women confirmed the interview data. Some of the more religious women said that they believed that operations were sometimes carried out without the prior knowledge of the patient. Others expressed scepticism, more inclined to believe that while husbands might be told this by their wives, women were always willing conspirators in the procedure (Field Report * 10: 8/1/84). While Public Health records concerning the relationship between Caesarians and sterilization were disappointingly unavailable, there was no evidence to indicate that women were being sterilized without their knowledge.

It is ironic to note that the influence of older women may positively correlate with fertility regulation through the indirect medium of nutritional advice concerning pregnancy. As expected, a moderate, negative correlation was found between number of mother-in-law's children and use of family planning. While the mean size of mothers family was a little larger than mother-in-law's family, no such correlation existed between size and planning in that instance (Table 8.10; Author's questionaire: Questions 40,41). While in-laws negatively impact regulation by encouraging their daughters-in-law to provide them with more grandsons, if Mexican health officials are to be believed, the older generation may be responsible for the excessive weight gain which leads younger women down the eventual path from "bad labor", to Caesarian section, to tubal ligation.

"Female Money": Education, Work, and Child Care

Continued schooling has gradually become more important for many municipio women. In the last decade, the percentage of those aged 15 through 19 with post primary education increased from 26.8 % in 1970 to 48 % in 1980 (X Censo: Cuadro # 5). Of those interviewed, more than 60 % of the women below age 25 attended secondary school, whereas both their mothers and the older interviewees attended only primary school (Author's questionaire: Question # 22c). This is in part a function of availability, since the Baviácora *secondaria* did not open until 1970. While secondary and post secondary education can by no means be considered a universal, the education process has slowly begun to occupy a larger part of a young girl's time than was once the case.

Teenaged girls who are not in school are often involved in some kind of income generating activity. These are seldom formal or steady employment situations, since such positions are extremely limited within the municipio. Generally, adolescents earn below minimum wages in the rapidly shrinking domestic sector. In this, they compete with their mothers, who once supplemented agricultural resources by doing laundry or housekeeping for the well to do criollo

Table 8.10. Number of Mother and Mother in Law's Children and Relationship of This to Use of Family Planning by 47 Women Aged 15-45, Municipio of Beviácora 1984

MEASURE	NUMBER OF CHILDREN	
	MOTHER (n=47)	MOTHER-IN-LAW (n=36)
Mean	7.7	7
Std. Deviation	2.8	2
Median	8	7
Least Children	2	2
Most Children	15	12

Relationship Between Size of Mother and Mother-in-Laws Family to Use of Family Planning

Spearman Correlation Coefficient	0.28209	**-0.44868**
Probability	0.0547	**0.0061**
Sample Size	47	36

(Source: Author's questionaire: Questions 39,40,41)

families of the Valley. They are also in competition with girls attending school who seek employment in their off hours or during the summer vacation.

Women and adolescent girls relying on these sporadic and low paying jobs claim that they are becoming harder and harder to find. Where once even the many, lower-middle class families of the Valley sent laundry out to be washed, the cost for the service is now beyond their means. Many of those who remain able to pay prefer the higher status option of owning a washer-dryer to the traditional Mexican hand wash and fence dry. Housekeeping remains the most viable option for teens who, unlike their mothers, are unburdened by the need to care for younger children and can afford to work away from home.

There is a paradox to the employment situation. Those looking for work say that there is none to be found. Those looking for workers believe that no one is willing to do menial tasks in and around the house anymore. They claim that the poor are simply lazy and no longer wish to work the way they used to do (Field Report # 8: 7/20/84; see also Baer 1984). This perception is not supported by interview data. Households with working teens struggle to keep the jobs they find, sending other family members to fill in when the principal employee is unable to do so (Author's questionaire: Respondents # 4,18).

Teen labor outside the home is only one of the resource generating activities which keeps the household functioning when "male money" is insufficient to meet escalating needs. Women remain involved in many of the traditional activities which generate a small, but constant flow of cash to support household operations. Of those interviewed, 66.7 % (n=48)reported some kind of out of home economic activity. These supplemented wage and non-wage labor of adult male household members. However ,statistical analysis showed no significant correlation between male and female economic activity (Author's questionaire: Questions 42, 42a, 43).

Women's out of home money making ventures are extensions of basic household tasks, and are frequently food related. Women make and sell cheese, tortillas, sweet bread (*pan dulce*), and *gelitos*(frozen confections in plastic bags) (n=10). They raise and sell dairy products, flowers,

and some fruits and vegetables (n=8). These last are often barter items, which are exchanged with neighbors for other agricultural products rather than for cash, or with merchants for packaged goods. Three of the women operated part time restaurants from their kitchens; two had small *tiendas* (poorly stocked neighborhood stores); four sewed clothing and school uniforms; and two sold consumer goods at below retail prices. One unmarried woman was a full time hair dresser, and two others were "nurses" who were trained to give injections or start intravenous fluids, as needed. A few women sell *lechiguilla* or *bacanora* in *tragos*, as described in Chapter 6 (Author's questioneire: Question 43).

With teens working away from home and women working out-of-the-home, the labor of primary school children still remains a valuable asset. It is up to the young girls to run errands and to sell or make deliveries of tortillas, cheese and *pan dulce* not sold directly from the home. The task of gathering wood, fodder plants, and cactus fruit falls to young boys and their burros. They ride out to the mesas in the late afternoons and on Saturdays when school is not in session to harvest these items which remain critical to the subsistence economy. Thus, both boys and girls are unavailable to assist their mothers with the care of younger children.

The multiple and varied activities of members of Baviácora households means that traditional housekeeping services provided by women must be made available to meet a mixture of agricultural and urban-like work schedules. This is especially true in extended families where household members are both *campesinos* and wage laborers. Women feel that it is their responsibility to provide meals as they are needed. Early light breakfast is at five for the agriculturalists; seven for primary and secondary school children; with late heavy breakfast at nine for those in from the fields. Lunch is at twelve for those returning from primary school, and at two for wage and day laborers. Supper is at sunset for most family members, but at eight for high school students. Baviácoran mothers remain at home, cooking, cleaning, washing and caring for preschool children. During the multiple harvests, they supplement these activities with agricultural tasks, including picking and processing of crops.

Women whose days are comprised of this juxtaposition of two lifestyles see their difficulties as recent. Prior to 1980, life was hard, but it was simple; they were at least getting by. They date their misfortune to the devaluation of the peso, the removal of government food subsidies, and their inability to repurchase as processed the very items they produce (Field Report # 9: 7/27/84). Most women have not yet adapted to modernization induced changes. Married women must be able to juggle a schedule which requires them to be at home as housewives with few conveniences; to take over the child care tasks which once fell to older daughters; and to cope on the local level without the extended family networks which have been fragmented by work related migration. As one harried women puzzled "How can I prepare *Comida* in the old way, pick up the *niño* at Kindergarten because he can no longer walk along the highway alone, and try to earn a few pesos selling all at the same time ? My sister's daughters used to help, but they are in school all day. How do you manage, working and caring for children? (Field Report # 17: 10/3/84; Author's questionaire: Respondent # 22)."

Women with absentee husbands actually fare better with this task than those who try to maintain a traditional home. Those who function as household heads have begun to develop a nonkin support group which shares some of the child care and household tasks, as well as some of the emotional burdens of single parenting. In a relaxed atmosphere of female equality, they get together a few times a week to make a huge batch of flour tortillas on the outdoor *comal* or go out to the field to pick corn or chiles for tamales. They receive household money in lump sums from working husbands who cannot oversee its delegation. This supplements money generated by their own economic activities. Money seems to go further; men are no longer there to drink it away, nor must they be approached for funds for each additional expenditure.

Family Planning, Work and Residence

Among women with absentee husbands, 50 % were engaged in some kind of supplementary economic activity. Most of these were women living in extended families while their husbands were away. Of those living on their own, 67 % did not generate their own income. Since all of

these were women with children born in 1984, it is not difficult to understand why. Among all women, the highest percentage of workers (41 %) were women from families tapping all available resources. In these households, male money derived from both wage and non-wage sources (Table 8.11: Author's questionaire: Questions 23,42,43). Of the 17 women who stated that they used some kind of family planning, 82.4% had "female money" sources (Author's questionaire: Questions 39,43).

Contrary to expectations, women who used family planning did not come from households with absentee husbands. Of these women, only 11.8 % were among those using contraception. Most of the women who stated that they used family planning came from households in which the husband remained in the municipio. In this case, 47 % came from nuclear families, and 41 % from extended families (Table 8.12; Author's questionaire: Questions 23,39). Thus, presence of an older female in the household did not necessarily restrict the use of contraception. It may well be that women whose husbands are not around don't see any need for family planning. It must also be remembered that several of the women in this category gave birth less than one year before the interview .

Not unexpectedly, all but one of the women using family planning was less than 40 years old. However, it is not age itself which is the significant factor. Family planning became available in the municipio of Baviácora after 1976. When the duration of a woman's reproductive career is examined, it is those whose last birth occurred after 1977 that used contraception. Obviously, women whose reproductive careers ended before family planning became available were not likely to use it. However, women began to plan their families as soon as it became possible to do so. As illustrated in Table 8.12, use of family planning is significantly associated with reproductive careers ending after 1977 (Author's questionaire: Questions 26,39).

Though Mexican women have always been the unrecognized source of strength and stability in the family, changing social and economic conditions are forcing this role into the open. Those with husbands still at home must develop a creative ability to manipulate time, tasks and resources to

Table 8.11. Type of Male Labor in Relation to Presence or Absence of Female Economic Activity in 48 Households, Municipio of Baviácora 1984

TYPE OF MALE LABOR Frequency Percent Row% Column	FEMALE ECONOMIC ACTIVITY Absent	Present	TOTAL
Wage	9 18.75% 45% 56.25%	11 22.92% 55% 34.38%	20 41.67%
Non-Wage	5 10.42% 41.67% 31.25%	7 14.58% 58.33% 21.88%	12 25%
Both	2 4.17% 13.33% 12.50%	13 27.08% 86.67% 40.63%	15 31.25%
No Male in Household	0 0% 0% 0%	1 100% 2.08% 100%	1 2.08%
TOTAL	16 33.33%	32 66.67%	48 100%

(Source: Author's questionaire: Questions 42,43)

Table 8.12. Use of Family Planning in Relation to Year of Last Birth Among 48 Women Aged 15-44 , Municipio of Baviácora 1984

FAMILY PLANNING Frequency Percent Row% Column%	YEAR OF LAST BIRTH Before 1977	After 1977	TOTAL
Non-user	8 16.67% 34.78% 44.44%	15 31.25% 65.22% 50.00%	23 47.92%
Recieved Information	7 14.58% 87.50% 38.89%	1 2.08% 12.50% 3.33%	8 16.67%
User	3 6.25% 17.65% 16.67%	14 29.17% 82.35% 46.67%	17 35.42%
TOTAL	18 37.50%	30 62.50%	48 100%

(Source: Author's questionaire: Questions 26,39)

meet changing economic and social demands. Those functioning in the role of household heads must control not just the domestic schedule, but all of the domestic economy as well. In the absence of school age daughters, both must assume responsibility for the socialization of remaining children. Thus, the modernization process and economic crisis are the stimulus for a reassessment of domestic strategies. For Baviácoran women this means the reevaluation of their ability as individuals to allocate scarce resources among existing and potential offspring.

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1 The crude birth rate is obtained by dividing the annual number of births by the mean population of the territory in question and multiplying the quotient by 1,000. In this case, the mean population is that obtained from the national census for the years in question. The crude rate measures the frequency of phenomena in the total population. A refinement of this is the general fertility rate, which relates the aggregate of live births in one year to all women of reproductive age during that same period. The quotient is once again multiplied by 1,000. Both of these are period measures of fertility (Pressat 1972).

2 The choice of these years reflects the fact that fertility is very low after 40-45 years of age, and that few mothers of children aged 0-4 are less than 20 years old at a given time. Thus, the ratio can be expressed as P 0-4 / F 20-44.

3 The infant mortality rate is intended to measure mortality between 0 and one year of age. In actuality, it is the annual quotient of mortality at 0 years of age. It is calculated by dividing the number of deaths among infants under one year of age by the number of live births during the same period and multiplying the quotient by 1000. In the case of Baviácora, both births and deaths were averaged over the same five year period before calculating the rate. This served to avoid misinterpertation which might occur due to the small size of the population and the possibility of idiosyncratic years.

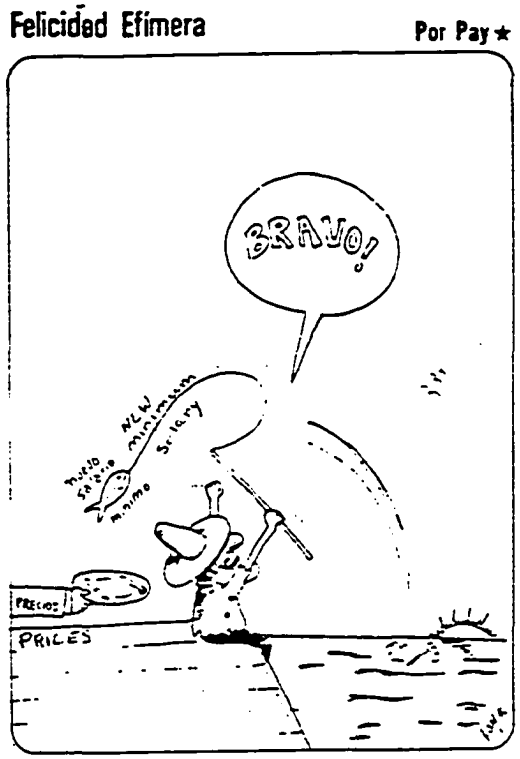
4 A slightly different averaging technique was used in calculating the age specific mortality rate for the 15 through 29 year cohort. In order to obtain a proxy measure for a decade by decade comparison, deaths for the five years surrounding the decade were averaged (ie: 1968, 69, 70, 71, 72). The result was then divided by the arithmetic mean of the population in that cohort for both decades (P 1960 + P 1970 / 2). The quotient was multiplied by 1000.

CHAPTER 9

LOS GASTOS ESTAN DEMASIADOS: FERTILITY AND ECONOMIC CHANGE

> What is to become of Mexico? Mexico will be fine. Mexico is rich;- it has the ranches and the mines and the *petroleo.* Oh yes, Mexico will be fine. The people may not survive, though (B.C.; female; aged 42: Field Report # 9, 7/27/84).
>
> I'll tell you about machismo. It's going to be Mexico's downfall. It's what keeps the *campesinos* and *jorneleros* poor. Machismo is a *puerta falsa.* It's suicide (M. P.; male; aged 52: Field Report #3, 6/10/84).
>
> I don't know how we're going to make it through this season. The uniforms for school are a thousand pesos each; books are five hundred for each child. Sugar and flour are up again, so is milk. We sacrifice so that the oldest one can go to the *comercio.* I am a Catholic; I know God understands. No more children. *Los gastos estan demasiados* (the expenses are too much) (A.L.; female; aged 37: Field Notes, 7/3/84).

In the summer and fall of 1984 both the headlines and political cartoons of Sonora's newspapers chronicled the continual increase in the cost of living for Mexican families. At the same time, the government family planning campaign advised that "precaution is life" (Figure 9.1; Imparcial and Sonorense). It is ironic that in all of these depictions it is the Mexican male that is always shown as suffering the burdens of inflation and deprivation. However, few associate births and hardship directly, or admit that "machismo is suicide." In contrast, Baviácoran women faced with the daily task of matching assets to needs have little difficulty visualizing the relationship between family size and dwindling resources. Just as their *campesino-jornalero* families fail to show "peasant" inertia and inflexibility, the women of these households do not possess the ignorance of cause-effect relationships once attributed to "peasant" decision-making. Their changing reproductive strategies are a consequence of an individual assessment of the social and economic environment of child bearing and child rearing in the upper Río Sonora Valley today.



"Precaution is Life!
Your Family is First."

¡¡Precaución es vida!!

TU FAMILIA ES
PRIMERO

"Electricity Rates-Increase"

(Source: Sonorense: 6/12/84;11/18/84)

Figure 9.1. Media Depictions of Inflation and the Need for Family Planning, Sonora, 1984.

The preceding chapters discussed at length the economic, biosocial and natural processes which are the constituents of the fertility decision-making environment for the women of the municipio of Baviácora. The introductory chapters provided a detailed description of the geographic and climatological limits of settlement and resource availability. Further, they outlined the historical and protohistorical antecedents of land use, economic activity, and sociopolitics. Chapters 5 through 8 then argued the theoretical premises which were also presented in the introductory section. They analyzed the specific factors concerning modernization, economy and fertility which contributed to economic and demographic change in the municipio of Baviácora. Chapter 9 will now focus on the conclusions which result from consideration of the specific research questions addressed in each of these three chapters, closing with a discussion of the theoretical significance and practical implications of these results.

Modernization: Between the Optimal and the Actual

The Revolution of 1910 left a legacy of social promises to be filled by Mexican leaders during the subsequent decades. These included not just the equalization of resource distribution through agrarian reform, but also the extension of life standard improvements to previously neglected rural communities. For the municipio of Baviácora, this process began with restricted electrification, clean water and sanitation programs in the late 1940's. It proceeded slowly through continuing requests by local authorities for government subsidation, and through contributions of money and labor by municipio residents.

Resource Allocation

As with most late developing regions, the need to invest in both economic development and modernization concurrently resulted in a double drain on available resources in the municipio of Baviácora. As described in Chapter 5, in the years between 1950 and 1970 a slow trickle of funds was made available to the municipio to improve both the productive and non-productive infrastructure. For the most part, however, Sonoran interests were dictated by world-economic concerns, and resources were invested in the more potentially prosperous Yaqui and Mayo Valleys.

Though small concessions were made yearly to the modernization program, it was not until the early seventies that changes occurred which would result in the wide scale importation of urban values and culture to the still isolated Rio Sonora Valley.

With the exception of the tungsten mill at El Jaralito, even those changes which were oriented toward development directly did nothing to improve the economy of the region. The paved road and bus service sucked resources out in a nonreciprocated process. Television brought ideas, values, and expectations; few of these could be fulfilled with existing municipio opportunities. Increasing monetary difficulties forced the nation and the state of Sonora to prioritize the requirements of development and modernization. Paradoxically, though modernization was consistently shorted, for the municipio of Baviácora, development was almost totally neglected. Continued efforts by local leaders to bring in new industry or resuscitate old possibilities failed. By 1984, Baviácora's once diverse economy was radically altered (see below). Underfinanced, poorly planned economic ventures were unable to replace the once autonomous economic structure of the region. Only the extension of the school system offered real promise for the future.

Defective Modernization

The modernization program which accelerated in the 1970's did much to improve the standard of living in most Baviácoran pueblos. Electricity, potable water, sanitary conveniences and medical care were brought within reach of all residents. During the period of mid-seventies prosperity, most homes added electricity and indoor water. Childhood diseases, polio and smallpox were controlled through vigorous vaccination programs and the extension of maternal child health services to the pueblo of Baviácora.

As is often the case, official estimates of service requirements did not anticipate actual demand in the first years following installation. The attempt to rapidly satisfy short term needs on a wide scale basis led to poor quality, underfinanced projects which were both obsolete and deteriorated upon as soon as initiated. Though Baviácora in 1984 was a fully modernized community which offered electricity, water, sanitation, and health care, on closer examination each of these

improvements brought new difficulties. Their availability and operation fell somewhere in the gap between the real and the ideal.

The impact of defective modernization on the people of Baviácora is evident in the current pattern of morbidity and mortality. Though tremendous strides have been made in lowering infant mortality in the last ten years, public health efforts are still not sufficient to alter the epidemiology of the municipio's most common diseases. Incidence of certain gastrointestinal conditions can be directly linked to failures in imported technology, while other diseases are related to the incomplete adoption of urban practices which disrupt long tested adaptive strategies. In addition, their treatment is thwarted by pharmaceutical shortages. The ability to utilize costly life standard improvements continues to be unequally distributed according to income. By 1984, poorer families who purchased appliances during the boom years could no longer afford to have them repaired.

The iatrogenic results of defective technology are mirrored in a similiar pattern surrounding the social consequences of modernization. The importation of values sometimes outpaces the realities of day to day existence. Alcoholics Anonymous, diet beverages, and other products of the middle class mentality are offered as solutions to problems which have yet to be identified as such by the community itself. However, it may well be this unsynchronized sequence of idea and situation that allows the change process to occur rapidly. Thus, media plays a critical role in the transmission of the urban values to rural settings by increasing familiarity with the results of education, literacy, and technology without direct exposure to them.

For Baviácoran women, the extension of television service into the Valley in 1978 helped end the area's isolation from the promise of prosperity. The desire to access the economic and social opportunities associated with modernization (including education, wage labor, and consumer durables), gradually began to shape women's strategies in this period. During the last half of the seventies, government programs continued to fulfil social promises by providing easy access to some modernization benefits. By the early eighties however, a faltering economy made it clear

that continued prosperity demanded a more rapid adjustment of personal resource allocation by individual households. In the final analysis, modernization's impact on the municipio was through the inconsistent fulfilment of its promises, which pointed the direction to change without providing the means. The critical element was the provision of information, made available to Baviácorans through both formal and informal education.

Markets: The Municipio Economy in Crisis

For many years, the nature of economic activity in the municipio of Baviácora differed from that of most isolated rural communities in Sonora. During the past century, it was characterized by a remarkably diverse series of options for participants. This was in part determined by the constraints and bounties of the physical environoment, and in part by the nature of capital investment in the area's resources. Until the 1950's, small scale agriculture on land held both privately and corporately provided an adequate subsistence base for families operating within the limits of local land and water availability. Highland pastures supported prosperous cattle production, though the best land holdings generally remained in the hands of the wealthy. Both of these provided wage labor opportunities for landless Baviácorans and those needing to supplement agricultural earnings. Additional wage sources existed in the many small local mines which remained open as long as market prices were favorable. Finally, the pueblo of Baviácora became a haven for those entreprenuers with the ingenuity and means to bring needed supplies from the capital city of Hermosillo through the cajón de Ures to the upper Río Sonora Valley.

In later years, continued agrarian reform modified patterns of land distribution, though agricultural production remained an activity directed toward subsistence, with little market potential. As the copper, gold and silver production slowed to a halt in the Valley, mine workers moved back to municipio villages in search of wage labor which was generally unavailable. Though a later boom in tungsten would revive some of mining communities, its impact too would be short lived. Revival of gold and silver production would have only limited impact. The *bracero* program offered income and hope to those willing to leave the Valley and travel to the United States

in search of work. For those remaining behind, the reorganization of CONASUPO in 1968 meant a contraction of subsistence farming, as a change to market production became the drive behind federal agricultural policy.

By 1984, the economy of the municipio of Baviácora was in crisis, mirroring conditions in Mexico as a whole. The mines were closed; the jobs were elsewhere. Local proposals to begin small industry fell on deaf ears on the state and federal level. The nation could not afford to invest in projects without export potential. Though redistribution of upland *agostadero* returned some of this to *campesino* families, most of these lacked both the capital for development and the connections needed to market the livestock. For farmers who attempted to uphold the delicate balance of subsistence-market production, the combination of environment, cash needs, and loan policy undermined the availability of land, labor and capital essential for survival.

On the household level, families caught in a yearly cycle of credit, wages, debt payment and deficit utilized all available options to supplement farm income to meet deficient subsistence needs. Male members increased the proportion of wage labor supporting the household through local employment, long term commuting and migrant labor, exploiting northern Sonora's peripheral position in relation to the United States. Agricultural tasks became the domain of older men, second sons, and women. The men performed heavy labor; the women were involved in weeding, protection of crops, harvesting, and processing. For many households, agriculture remained a full time activity for only one individual; for those who went to the city it became a seasonal obligation owed to parents in repayment of past sacrifices.

To make ends meet, Baviácoran women continued the service related, income generating activities which were traditional sources of day-to-day earnings. Yet, at a time when these ancillary contributions were becoming more critical to survival, their availability was actually diminishing. Mothers competed with their teenaged daughters for domestic tasks paying below minimum wages. Women with young children favored home based activities such as cooking, sewing, or sales; daughters remained able to work away from home as domestics or tutors.

In light of this, it was notable that home bound women did not choose to become more involved in market gardening as an income earning strategy, as has occurred under similiar conditions in certain rural communities worldwide (see Simonelli 1985) . Vegetables and fruits are found only in limited quantities in municipio markets. These are usually expensive, imported from Hermosillo and are frequently of poor quality. Because Río Sonorans use a select number of these extensively in cooking, local production and marketing seemed a logical option.

It was curious that no one chose to explore market possibilities, especially in light of the fact that women are gardeners. Some plant a few rows of chile and *calabasitas* (squash). Most invest considerable time, energy, and water resources in the cultivation of flowers. For some of these, flower production is economically motivated, since these are sold for use in the cemetery during the Days of the Dead (November 1 and 2). For most however, energy invested in floraculture yields spiritual rather than material payment. Flowers are donated to the Church year round, and adorn the altars of the many municipio *capillas* (chapels) with professional elegance. In like manner, the small amount of fruit and vegetables which are grown usually are destined to sustain traditional avenues of inter-household reciprocity.

As in the past century, there are currently no public "peasant-type" markets in the upper Río Sonora Valley. However, an informal, private network exists to distribute goods throughout Baviácora and neighboring municipios. Fodder crops are marketed from the farm gate. Often, agricultural products are used to pay local debts, or in barter for other food items. Though entrepreneurs bring goods into the Valley, as yet no one sees any profit in taking them out. Neither the small farmers, nor the *ejidatarios* have attempted to create a trading company to market what remains of a once prosperous and diverse Valley food basket. Though women's involvement in agriculture and agricultural decision-making is increasing as more men leave the municipio to work, it does not extend to the consideration of independent growing or marketing strategies.

The bulk of non-wheat production in Baviácora is in feed crops for municipio livestock. In spite of this commitment, small scale stock raisers and *comuneros* cannot compete with wealthy ranchers in marketing the beef that is produced. They cannot obtain the captial which is needed to maintain the herd at export quality year round. They do not possess the skill or connections needed to garner top prices for the stock that they sell. Consequently, the most lucrative economic avenue in the municipio is blocked for the majority of residents, though the collective entrepreneurship of the *comunidad* may be a step forward.

To date, the completion of Sonora Highway 21/118 does not fulfil its promise of increased market possibilities for Baviácoran agricultural and cattle producers. The paved road helps established ranchers ship out fattened livestock each fall, bringing in return consumer durables at inflated prices. For the *campesino* and *jornalero* families however, the road is mainly a catheter which takes sons, daughters and husbands to the cities in search of work and wages no longer available at home. Under ideal circumstances, these send back periodic contributions to household survival.

Indirectly, the demands of the cash economy and unfavorable market conditions both locally and internationally impact on women by placing them in an intermediary position as household accountants. Faced with the task of delegating scarce resources between competing household needs and members; unable to make up the deficit through their own activities, they are forced to deal realistically with the cost consequences of continued high fertility.

Motherhood: Two Boys, A Girl, and Enough!

On a crisp October morning in 1984, Dolores was taken to Baviácora's *Centro de Salud* to give birth to her third child. At 26, she was the mother of two toddler sons, born within a year of each other. A short time later, I discussed the impending birth with a mutual friend. "God willing" she said " it will be a girl. They are already blessed with two sons. Now it is the time to stop. Two boys, a girl, and enough!"

Dolores gave birth to yet another healthy boy. Within a few hours she returned home from the clinic to the house she shared with her commuter husband. It would be six weeks before he could leave work long enough to make a visit. I asked her if she planned to try again, for the girl. "This is it." she answered. "It would have been nice to have a daughter, but three is plenty. We can't afford another (Field Report # 18: 10/8/84; Field Report # 23: 11/12/84)."

There is little question that Baviácoran women would like to limit family size. For most, the ideal family is comprised of three children, "one son to remain at home and work in the *milpa*, one son to go to the city to earn good wages, and a daughter (God willing), to marry out of the village" (Field Report # 18: 10/8/84)." As indicated in the previous chapter , they do not wish to duplicate the size of families found in their mother's generation. These reached peak numbers in the 1970's, as mortality declined in the absence of fertility control. They are pressed by economic crisis and the social consequences of modernization to actively regulate fertility using methods which have immediate outcome. It is the interaction of these economic and biosocial forces which is responsible for the rapid change in reproductive strategy which is occurring .

Biosocial Processes: Modernization and Behavioral Flexibility

Modernization often impacts on reproductive strategy by causing behavioral changes which lead to gradual declines in natural fertility. Among these changes, age at marriage and onset of sexual activity are the intermediate fertility variables usually influenced by increased education and information, change from subsistence to market strategies, and urbanization. Because many of the most radical changes occurring in the upper Río Sonora Valley are the result of accelerated modernization in the last six years, it was expected that a concomitant change would be seen in these variables. Therefore, it came as a surprise to find that both marital age and age at first birth showed little, if any, increase. In fact, the only impact on marriage occurred when the peso was devalued in February, 1982. This wholly economic event resulted in a startling curtailment of marriages for a full year following its occurance.

With this factor eliminated, it became necessary to look at other, less quantifiable behavioral changes related to modernization for an explanation of how biosocial processes influence fertility decline. In Chapter 2, theories derived from the concept of parental investment were presented as biosocial explanations for the demographic transition. These note that potential investment in offspring by parents is not evenly distributed between father and mother. Because of their reproductive roles, women have always made a greater emotional and physical investment in their children than men. Thus, a divergence develops between males and females concerning the number of children each wishes to have. In this respect, an effect of modernization is to increase the amount of control women have over their own fertility, reducing the influence of men and mothers-in-law. Women begin to make decisions concerning family size based on their own assessment of available physical, emotional and economic resources.

In the last four years, all indices of birth in Baviácora showed a steady decline. The fact that this decline is not the result of changes in the timing of events leading to first conception showed that critical behavioral changes were occurring among women already involved in active childbearing. Thus, the change agent became women with families; acting out of their own knowledge of resource scarcity; and uninfluenced by husbands or older women. As the preceding chapters illustrate, the past decade forced Baviácoran women to stretch their available physical, emotional and economic resources to new limits. Economic conditions increased female autonomy, as many became household heads in the absence of working husbands. Modernization changes increased maternal workload and responsibility, as many took over child care in the absence of help from their school age daughters.

While husbands might continue to encourage their wives to favor quantity over quality of children, it is the upcoming generation of older women in the municipio who are actively limiting their families, and advising their daughters to do so as well. Though products of a strategy favoring low parental investment , when faced with current conditions of resource availability,

these women elected to invest in the quality of their offspring, *once the means to limit fertility became available.*

It is the special human traits of intelligence and behavioral flexibility that make it possible for individuals to change their strategies as conditions warrant. It is the social and technological consequences of modernization which enable change to occur quickly. Behavioral modifications which might have taken generations to show adaptive significance in an isolated situation occur quickly because humans have the ability to use outside information in making their own decisions.

Economic Processes: Permanent Change or Temporary Modifications?

The deterioration of the Mexican economy during the first half of the 1980's brought an almost geometric progression of hardship to the municipio of Baviácora. Attempts to replace the centuries old subsistence economy with market substitutes exacerbated the already difficult task of trying to provision the family while also equipping some members to participate in the urban economy.

Under these conditions, Baviácoran women had no difficulty equating economy and fertility directly. The economic crisis accentuated the need to make immediate, short run changes which would increase the odds for survival. In a time when the direction of wealth flows is in a transitional state, women implicitly recognized that the investment of economic resources yields greatest utility when divided among fewer offspring. By their own description, the overwhelming factor in the desire to limit family size is the increasing cost per child. Because of their role as household budgeters, women are closer to the day-to-day deficits in food, cash and clothing than are their husbands. Male concerns, and their solutions, are on a long cycle; they are faced with the long term difficulties of keeping the land, or acquiring a trade. On the other hand, women face short cycle problems which must be met immediately.

Declining municipio birth rates are related to womens' decisions to limit families in spite of the teachings of the Catholic Church. Though sometimes made without the knowledge of husbands, more often decision-making occurs in their absence or in their preoccupation. This is made

possible by access to hospital births and sophisticated contraceptives both in the pueblo and in the privacy of the hospital at Ures, which did not exist prior to 1976.

In the municipio of Baviácora, the economic and social relations of scarcity provide the impetus to modify reproductive strategies to favor quality of offspring over quantity. The critical question to be answered now is whether these modifications are short term responses to economic cycles, or permanent changes which will have long term implications for Mexico as a whole. Analysis of all municipio births between 1956 and 1984 showed little evidence that Baviácora's changes were simply the childbirth timing shifts which occur as a response to economic cyclicity. Declining fertility in Baviácora is the result of parity specific decisions related to the number of children women already have. For individual Baviácoran women who elected to undergo tubal ligation, the decision is permanent. For those using less reliable methods of contraception, the answer lies in the future.

Conclusions and Future Directions

Fertility decline in the municipio of Baviácora is an economically triggered process which is occurring in association with far reaching changes in the traditional social system. Modernization has altered levels of education, literacy, urbanization, exposure to outside information, goals and expectations, and the rhythm of life itself. Mexican policy changes provide information concerning contraception which was previously unavailable. For Baviácoran women, modernization reverses the direction of not just wealth flows, but energy flows as well. While under other circumstances, economic factors may only have stimulated short run strategy changes, in this case, the concurrent influence of modernization allows for behavioral changes with long run implications.

Theoretical Significance

Past research by Masnick and Katz (1975) concerning child bearing strategies in Alaska indicated that women who practice adaptive childbearing in response to economic stress usually continue this strategy throughout their reproductive careers. In that instance, timing changes

occurred which did not carry over to cohorts of women beginning their reproductive careers when economic conditions improved. Similiarly, countries attempting to manipulate birth rates also found that spacing and/or timing changes were not permanent. Policymakers trying to stimulate population increase in Hungary in the 1970's were chagrined to find that early growth in birth rates began to slow in the 1980's. They concluded that the provision of cash and in-kind payments as an incentive for reproduction had only succeeded in altering birth spacing and birth timing for Hungarian women. Families who would have waited longer to have a second child shortened the spacing between children in order to take advantage of economic benefits. In like manner, women had first children earlier as well. In effect, Hungarian population policy created an artificial economic cyclicity, without any concomitant alterations in the social system. Changes were simply temporary alterations in reproductive strategy which lasted only as long as the economic benefit.

In contrast, fertility decline in Baviácora is the result of both economic and social system changes which led women to reassess available physical, emotional and economic resources. The key to change is the *interaction* of economy and modernization. In the case of the latter, lowered infant mortality rates and changing social relations both within the household and without are the critical variables. In the former, economic factors are both the stimulus for reassessment of resource availability and an intervening variable through which modernization impacts on individual women. Declining fertility is a product of decisions made by women as their roles within the household take on new autonomy and responsibility. Most important, these are decisions concerning completed family size, rather than simple changes in timing or spacing. The new plateau of lowered births found in the municipio in the 1980's indicates the rapidity in which such decisions can impact on population growth.

The research reported here was designed to investigate the individual decision-making processes which lie behind women's reproductive strategies, and the ways in which these are motivated by biosocial and economic considerations. As such, neither the questionaire nor the

analysis was designed to test the strength or direction of the relationship between economy, modernization, and fertility. This is the task of future research using a specially designed instrument to collect new data, and continued analyis of existing registry data which would concentrate on the demographic characteristics of women and their households, in relation to parity. The issue of permanence can only be addressed through longitudinal studies in locations like the Rio Sonora Valley, or by retrospective studies in areas where similiar change has already taken place.

Practical Implications

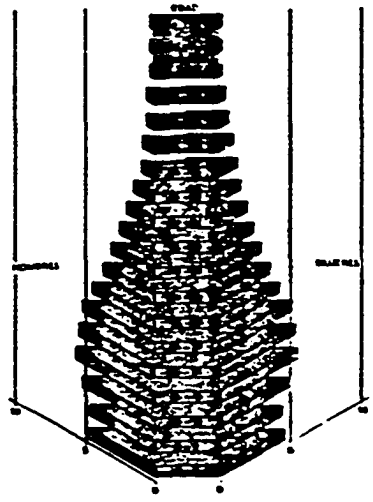
A serious question often asked concerning community level anthropological studies is whether the results are generalizable beyond the study site. If they are, then the study's conclusions can have practical implications which give the work use and meaning outside the academic realm. In the case of studies occurring in the U.S.-Mexican border region, the results will be of potential interest to policymakers in both countries. This is especially true of research such as this which investigates changes in processes critical to border economy and demography.

Mexico's survival is linked to the ability to slow population growth. In considering the country's future, government demographers recently outlined two sets of estimations and projections for the year 2000. The first of these (*hipótesis programática*) depicts potential population growth in Mexico if the government's family-planning-oriented demographic policy is a success. Here, population increase slows to a rate of 2.2% from 1980 to 1990, reaching 1.5% in 2000. In the second (*hipótesis alternitiva*), growth continues at a rate of 2.5 % between 1980 and 1990, falling to 2.1% in the year 2000, in the absence of widespread adoption of family planning methods. Figure 9.2 depicts these relationships.

In this light, declining fertility in the municipio of Baviácora is an optimistic finding for Mexico. Population pyramids for the municipio (see Chapter 8) compare favorably with those for the country as a whole, as derived from the first hypothesis which predicts slowing growth(Figure 9.2; SPP 1983). Demographic indices published by the state of Sonora for each of the other

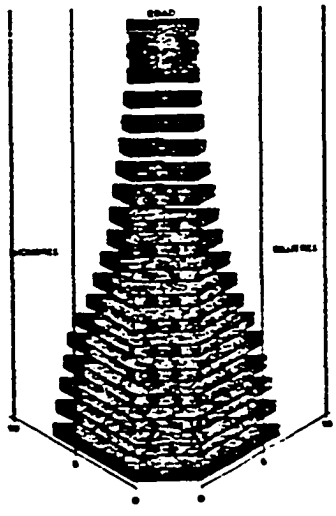
Figure 9.2. Population Predictions for the Year 2000 for Mexico

1. *Hipótesis programatica* for the year 2000.



Potential growth if family planning is successful.

2. *Hipótesis alternativa* for the year 2000



Potential growth without widespread adoption of family planning methods.

(Source: SPP 1983:2)

Río Sonora municipios indicate that similiar trends are occurring in these pueblos as well. Because Sonora is a frontier region which has always been in the vanguard of change, it is likely that these patterns anticipate changes in the rest of the country. Mexico's economic crisis provides a country-wide impetus for fertility control. Unfortunately, the modernization process is more regionalized. Thus, the adoption of family planning will no doubt come very slowly to some areas.

The desire to limit family size can not be realized without easy access to the means to do so. If women are electing to change their reproductive strategy in their husband's absence or ignorance, it is important that contraceptive information and methods be made available where they can be obtained without too much difficulty and in relative privacy. In Mexico, rural clinics and hospitals help facilitate this process. In U.S. border cities, the provision of low cost services within easy reach of public transportation becomes essential.

Summary

Since the devaluation of the peso in 1982 the economic crisis in Mexico has gradually worsened. For the people of the municipio of Baviácora, ten years of modernization and economic reorganization brought radical changes to the traditional way of life which was the legacy of centuries of occupation and colonization in the upper Río Sonora Valley. By the summer of 1984, subsidies on basic food items had been removed, as Mexico attempted to restructure its economy based on criteria dictated by the international banking community. Household budgets were stretched to new limits. The number of men commuting to work in Nogales, Sonora, and Cananea; to Phoenix and Los Angeles increased; yet male wages were still not sufficient to meet changing household needs. Though women attempted to supplement income by selling tortillas or cheese, there was no cash market for other products of household labor. Contributions by working teens were reduced by the recognized need for them to complete education.

Village women describe the ideal family as "two boys, a girl, and enough!." Increasingly, they are beginning to choose to reduce the size of their families, saying that they cannot meet the cash expenses of food, clothing and education required to participate in the changing social system. Left

at home by wage seeking husbands and school age daughters, they assume responsibility for both the domestic economy and the socialization of remaining children. Indirectly, the paved road has helped to decrease fertility by providing access to hospital births and sophisticated contraceptive methods. Often, family size is curtailed without the knowledge of husbands, and without reference to the teachings of the Catholic Church.

In the last decade, life in the municipio has been characterized by increasing hardships and decreasing land. Yet in spite of the need to look for income elsewhere, the population continues to rise as the area becomes an economic suburb of both the Sonoran capital and the United States. Though the clearcut existence of man-land relationships and family bonds is no longer quite as simple as it once was, Baviácorans are not deserting their villages, as has occurred in other parts of rural Sonora. Women, acting out of a heritage of behavioral flexibility characterisitic of the people of the area , are willing to make changes to adapt their families to new conditions. Where in the previous generation, those with the flexibility to change and leave Baviácora were the risk takers, now those who have the flexibility to change and remain must also be viewed as fighters.

For the women of Baviácora, Sonora, the interaction of modernization and economic crisis leads to changing fertility decisions. In the absence of wage labor or favorable market conditions they cannot increase their contribution to family income by postponing childbearing . They are faced by the day to day task of delegating dwindling household assets to escalating family needs. As the economic, physical and emotional costs of parenting rise rapidly, the only rational strategy for them is to quickly limit family size through fertility regulation. As their roles within the household become take on more resposibility, their reproductive strategies become more autonomous. In the case of the muncipio of Baviácora, women, not couples, play the critical role in fertility decisions, and these decisions are motivated by both economic and biosocial considerations.

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APPENDIX A

SOURCES OF CONTEMPORARY INFORMATION

Information concerning present-day Baviácora and Mexico was obtained from the following sources:

1. **Field Notebooks**: Field notes were kept in three types of notebook.

   A. Formal field reports: a total of twenty-six field reports were filed between May 19th and December 7th, 1984. These are cited by report number and date in the text.

   B. Field Notes: kept by date of entry at the end of the day.

   C. Portable Field Notes: kept by date of entry while in the field.

2. **Elite Interviews**: Extensive interviews with the following individuals:

   #1: With A.L., 6/19/84 (Bilingual resident)

   #2: With Doctor E.L-R., 6/22/84 (*Pasante*, 1983-1984)

   #3: With Primary School Teacher, 8/15/84

   #4: With M.R. (*Secretario Municipal*), 11/15/84

   #5: With Director of State-run elementary school, 6/9/84

3. **Structured Interview**: conducted with forty-eight women between the ages of 15 and 45 (included here).

4. **Unpublished Reports**: The following unpublished reports were cited:

   A. **SARH** (Secretaria de Aricultura Y Recursos Hidraulicos)

   Document #1: "Observaciones Climatológicas hechas a las 8 horas en Municipio Baviácora, Estación Mazocahui." SARH, Subdirección de Hidrológia. Hermosillo.

   Document #2: "Tierras concesionadas en el río". SARH, Baviácora

   Document #3: "Los destrozos que hizo en el Río de Sonora". (10/10/83). SARH: Ures.

   Document #4: "Daño a las acequias; Octubre, 1984". SARH:Ures.

Document #5: "Acequias y usários". SARH:Ures.

Document #6: "Rehabilitación, región de Ures; 1/26/84". SARH:Ures.

Document #7: "Producción (riego); 1983-1984". SARH:Banamichi.

Document #9: " Municipio Baviácora, Corrida 1984 (Livestock Census)". SARH:Ures.

B. **SRA** (Secretaria de la Reforma Agraria)

Document #3: "Ejidos y Comunidades, Municipio de Baviácora". SRA: Baviácora.

Folio 1-10-59: "Ejido y Comunidad, Municipio de Baviácora". SRA: Hermosillo.

C. **DMIPF** (Departamento Materno Infantil Y Planificacion Familiar)

Document #2: "Evaluacion del Programa Institucional de Planificación Familiar". Enero-Diciembre 1983. Salubridad Publica. Hermosillo, Son.

SCSPES "Servicios Coordinados de Salud Publica en el Estado de Sonora: Usaries Nuevas y Subsecuentes de Planif. Familiar". 1973-1982. Salubridad Publica. Hermosillo, Son.

5. **Demographic Information from Primary Sources:** information on births, deaths and marraiges was obtained from the following sources:

RCB Registro Civil de Baviácora (The Civil Registry of Baviácora):

A. Libros de Nacimientos, 1955-1984 (Births)

B. Libros de Matrimonios, 1955-1984 (Marraiges)

C. Libros de Defunciones, 1900-1920; 1955-1984 (Deaths)

6. **Post-Field Correspondence:** letters received from informants since returning:

#1: letter from R.T.; 2/85

#2: letter from R.L.; 5/85

#3: letter from R.T.; 5/85

7. **Newspapers:**

A. El Imparcial (Hermosillo)

B. El Sonorense (Hermosillo)

C. El Informador del Río (Cananea)

PROYECTO DE LA VIDA SONORENSE

Jeanne Simonelli, M.A.: M.P.H.

Situacion:_____ Fecha:_____

Informante:_____Edad:_____ Sexo_____Casada?___

I. La Casa

1. Domocilio: a) detached b) row house c) otro_____
2. Material de construcion: a) adobe b) brick c) block d) adobe and brick or block e) brick and block f) otro_____
3. Su casa es: a) propia b) rentada c) repartido d) otro _____
4. Aparte del bano, cuantos cuartos tiene su domicilio? a) 1 b) 2 c) 3 d) 4 e) 5 f) 6 g) mas de 7
5. Tiene porche o patio? a)si b)no
   A) Usos de patio o porche:_____
6. Tiene su casa:

Cosa	si	no
A)electricidad adentro de la casa		
B)agua adentro de la casa		
C)bano adentro de la casa		
D)telas metalicas		
a)ventanas		
b)puerta		
E)refrigerador		
F)estufa de butane en casa		
G)estufa de lena en patio		
en casa		
H)taza de cocina		
I)calentador de agua		
J)calefacion		
a)lena		
b)butane		
c)otro_____		
K)abanico		
L)cooler		
M)aire-conditionado		
N)lavadora		
O)pela		
P)taza de bano		
Q)la tina de bano o aguacero		

7. En su casa, tiene estas cosas funcionadas?

	si	no	n.f.
A)T.V.			
B)radio			
C)tocadisco			
D)caseta			

8. Tiene su familia:

	si	no
A)gallinero		
B)chiquero		
C)corral		
D)bodega		
E)granero o troje		
F)rancho en otro lugar		

pg. 2

9) Animales Domesticos: numero | numero
A)pollos,pollitos | D)cabras
B)vacas | E)ovejas
leche | F)caballos
carne | G)burros
C)cerdos | H)otro_____

10) Jardines, Huertas, Milpas
A)Flores si____ no_____
B)Legumbres,vegetales si____ no____ tamano_____
1. 4.
2. 5.
3. 6.
C)Frutas si___ no____ tamano_____
1. 4.
2. 5.
3. 6.
D.Milpa si___ no____ tamano_____donde?_____
1. 4.
2. 5.
3. 6.
E.Temporlero si___ no____ tamano_____ donde?_____

II. Composicion Del Grupo Domestico

1) Cuantas personas viven en esta casa?

	a)sexo	b)edad	c)educacion	d)L.de Naci.	f)anos Bavi.	g)relacion a inf.
A)						
B)						
C)						
D)						
E)						
F)						
G)						
H)						
I)						

2) Hay personas en la familia que no viven en la casa?

	a)relacion a Inf.	b)lugar	c)por que
A)			
B)			
C)			
D)			
E)			
F)			

3) Cuales de sus parientes viven aqui en Baviacora?
a)madre b)padre c)hermanos__ d)hermanas__ e)hijas__ f)hijos__ g)primos(as)__
h)primos(as)2nd__ i)tios(as)__ j)abuela(o)

4) Cuales de los parientes de su esposo viven aqui en Baviacora?
a)madre b)padre c)hermanos__ d)hermanas__ e)hijas__ f)hijos__ g)primos(as)__
h)primos(as)2nd i)tios(as)__ j)abuela(o)

III. Fecundidad, Fertilidad
(Si la mujer no tiene hijos, continua a cuestion 10.)

1) Cuantos embarazos tuvo Ud. en toda su vida?_____
2) Cuantos hijos(as) tuvo Ud. ahora?
3) Que edad tiene el mayor?__ el menor?__

Pg. 3

4) Cuantos viven con Uds. ahora?_____
5) Alguno de sus hijos nacio antes de tiempo? a)si b)no Cuantos?____
6) Tuvo Ud. embarazos que resultaron en ninos nacidos muertos?___ Cuantos?____
7) Tuvo Ud. embarazos que resulta ron en abortos?____Cuantos?
8) Tuvo Ud. algunos ninos murieron despues que nacieron? a)si o no
b)Cuantos?___ c)edad____ d)sexo_____ e)de que? _____

9) A)Donde nacio cada hijo? a)hospital b)clinica c)en la casa
B)Quien atendio? a)medico particula. b)enfermera c)partera d)familiar
C)Despues de nacimiento, le da el pecho? a)si b)no
D)Cuanto tiempo?_____

sexo	donde?	Por quien?	el pecho?	Tiempo?

10)Cuantos hijos serian lo ideal? Si pudiera tener el numero de hijos que quicuantos tendria en total?_____
11)Si la mujer es de la edad de tener hijos, pregunta si quiere tener mas:_____
B)Si ella no piensa tener mas hijos, pregunta por que no piensa tener mas hijos:_____

Si ella contesta si, pregunta por que? (Contesta sobre la linea.)
12)Ha recibido Ud. informacion sobre los metodos y practicos para no embarazarse?
A)si o no B)donde?_____ C)de quien?_____
13)Que piense de estas?_____
14)Que consejo daria a sus hijos de esto?
15)Cuantos ninos tiene su madre? A)total_____ B)ahora viven?_____
16)Cuantos ninos tiene su suegra? A)total_____ B)ahora viven?_____

IV. Historia Laboral de la Familia

Quiero preguntarle algunas sobre los trabajos de la familia.

1. De los que viven aqui, cuantos personas trabajan fuera de la casa?
a)1 b)2 c)3 d)4 e)5 f)6 o mas
2. Trabajos de la Familia:

	persona(r.Inf)	Ocupacion	Donde?	Salaria	Tipo	Ha cambiado? (2)	(5)
a)							
b)							
c)							
d)							
e)							
f)							

3. Aparte de los ocupaciones principales, hace otras cosas para ganar alguna dinero?
4. A)Cosas o negocios que no hace fuera de la casa:

a)lava ropa	f)hace empanadas	k)plantar y vender legumbres
b)planchar	g)gelitos	l)vende frutas de huerta
c)cocinar	h)duros	m)vende tragos
d)hace tortillas	i)pone duro?	n)tienda
e)pan	j)coser	o)inyecciones

Pg. 4

4. B)Por medio, con que frequencia hace estos? a)todos los dias b) a veces c)seasonal d)_____
5. Quien le ayuda con estos trabajos? a)nadie b) ninos c)esposo d)otro_____
6. Quienes son las personas que assitan con las mandados de la casa?

mandado	persona(s)
los animales	
recoger lena	
regoger carrizo	
jardines	
va a la tienda	

7. Por que tiene (vea Ud. cuestiones 8, 9, 10) .....?

Cosa	Uso
a)	
b)	
c)	
d)	
e)	
f)	
g)	

8. Quien(es) manejan los gastos de la casa? a) el jefe b)la esposa c)otra_____
9. Como se dividen los gastos de la casa?
   A) En que gasta el dinero que gana la esposa?_____
   B) En que gasta el dinero que gana el jefe?_____
   C) En que gasta el dinero que ganan otras de la familia?_____
10. Tiene Ud. una cuenta de ahorro? a)si b)no
    B) Si, si--en que nombre es este? a)el jefe b)Ud. c) los dos

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V. Servicios Medicos

1. Generalmente, a quien acudio para atencion medica?(persona, clinica, hospital)_____
2. Cuando fue la ultima vez que busca atencion medica por algun persona/familia?

Quien?	Cuando?	Problema?

3. Por lo general, que piense de los medicos de Baviacora?_____
4. Para las embarazadas o otras cosas "mujeres" esta mas comfortable con el medico o la enfermera?_____
   B) Por que?_____
5. En Mexico, es comun usar hierbas oplantas medicinales para atender ciertos problemas de la salud. Lo ha hecho Ud. ? a) si b) no

herbas	problemas	herbas	problemas

6. Ademas de curarse con los medicos, algunas personas tratan sus problemas solos o se acuden a curanderos o espiritualistas para solucionar sus problemas. Ha tratado solucionar en algun occasion un problema asi? a) si b) no
   B) Cuales?_____
   C) A quien consulta primero?_____
7. Va a la iglesia a) los Domingos b) todos los dias c)otra_____

YIDA SONORENSE STRUCTURED INTERVIEW CODE SHEET

1. Age | actual
16,16,17,20,20,22,23,23,23,24,25,25,25,26,27,27,28,28,29,30,32,33,33,33,34,34,34,35,35,36,
37,37,38,39,39,40,40,42,43,44,44,44,45,45,45,45,45,45
2. Marital status | 1=married; 2=consenual union; 3=single
[1] 37 [3] 11
3. Residence | 1=Baviacora (urban); 2=rural
[1] 27 [2] 21

CHARACTERISTICS OF HOME

1. Construction | 1=adobe; 2=brick or block; 3=adobe and brick or block
[1] 29 [2] 9, [3] 10
2. Ownership | 1= own, 2=rent; 3=share
[1] 31 [2]=6 [3] 11
3. Size of house | actual number of rooms
[2]6 [3]15 [4]13 [5]8 [6]3 [7+]3
4. Porch or patio | 1=porch, 2=patio
[1]18 [2]29 [0]=1
5. Use of porch/patio | 1=sleep, 2=cook, 3=sit, 4=no use, 5=1+2+3
[1]3,1,1=5 [2]1 [3]19 [4] 1 [5]21 [na]1
6. Electricity | 0=yes; 1=no
[0]=48 [1]=0
7. Indoor bathroom | 0=yes, 1=no
[0]=37 [1]=11
8 Screens | 1=doors, 2=windows, 3=1+2, 4=none
[1]=0 [2]=1 [3]=22 [4]=25
9 Refrigerator | 0=yes, 1=no
[0]=42 [1]=6
10 Gas stove | 0=yes, 1=no
[0]=45 [1]=3
11 Wood stove | 1=house; 2=patio, 3=1+2, 4=none
[1]=7 [2]=22 [3]=8 [4]=11
12 Heating | 0=yes, 1=no
[0]=4 [1]=44
13 Cooling | 1=fan, 2=cooler, 3=air conditioning, 4=none
[1]=16 [2]=28 [3]=1 [4]=3
14 Washing | 1=pele, 2=machine, 3=none
[1]=33 [2]=14 [3]=1
15 Bathing | 1=shower, 2=tub, 3=none
[1]=31 [2]=1 [3]=15 [4]=1
16 Entertainment | 1=T.V., 2=radio, 3=record player, 4=cassette, 5=1+2, 6=all
[0]=7 [1]=6 [2]=6 [4]=1 [5]=27 [6]=1

FARMING, HORTICULTURE AND LIVESTOCK

17.Livestock provision | 1=chicken coop; 2=corral; 3=ranch, 4=coop and corral, 5=none
[1]=4 [2]=6 [3]=1 [4]=9 [5]=28
18.Domestic animals | 1=chickens; 2=dairy cattle, 3=beef cattle; 4=pigs, 5=goats, 6=burros; 7=horses
18e Number of above | code + actual number
19.Garden | 1=flowers; 2=vegetables, 3=both, 4=none
[1]=23 [2]=4 [3]=12 [4]=9
20.Fruit trees | 0=yes; 1=no
[0]=38 [1]=10
20a.Number of above | list name and actual number
21.Farmland | 1=own milpa; 2=temporale, 3=ejido milpa, 4=none, 5=1+2
[1]=10 [2]=5 [3]=4 [4]=28 [5]=1
21a Grazing land | 1=own; 2=ejido or comunal; 3=none
[1]=7 [2]=9 [3]=32

DOMESTIC GROUP

22.Family size | actual number
[1]=1; [3]=5; [4]=10; [5]=9; [6]=8; [7]=5; [8]=5, [9]=4; [10]=1
23 Family type | 1=nuclear; 2=extended
[1]=24 [2]=13 [3]=6 [4]=4 [5]=1
24.Birth spacing | (sex+age)- (sex+age)for each child
25.Inf. age at first birth | actual
26.Inf. age at last birth | actual
27.Family local | 0=yes; 1=no
[0]=46 [1]=2
28.Family in U.S. | 0=yes, 1=no
[0]=16 [1]=32

FERTILITY HISTORY

29 Total pregnancies | actual number
[1]=10, [2]=5, [3]=10, [4]=5, [5]=3; [7]=2, [8]=1, [9]=1, [11]=1; [12]=4, [0]=6
30 Total children | actual
[1]=9, [2]=6; [3]=10, [4]=4, [5]=2, [6]=2, [7]=1, [8]=1; [9]=1, [10]=1; [11]=1, [12]=2, [0]=7
31.Total in home | actual
[0]=7, [1]=12, [2]=7, [3]=8, [4]=5, [5]=5, [6]=3, [8]=1
32.Pregnancy type | 1=normal+#; 2=premature+#, 3=caesarean+#, 4=bad labor+#, 5=none
[1]=23; [2]=2; [3]=12; [4]=5, [5]=6
33.Abortions | actual
[0]=35; [1]=4, [2]=2, [3]=1, [na]=6
34 Mortality | (sex+age) for each, 0=none
[0]=31, [1+]=11; [na]=6
35.Place of birth | 1=home, 2=hospital, 3=clinic (each birth), 4=mixed
[na]=6, [1]=5, [2]=15, [3]=1, [4]=15
36 Nursing | 1=bottle, 2+time in months=breast, 3=both
[na]=6, [1]=5, [3]=4, [2]=3(some nursing, no time given), [ ]=1
[2-4mo]=14; [5-6mo]=4, [7-8mo]=4, [9-10mo]=1, [11-12mo]=1, [1 yr or more]=3
37 Ideal family size | number given
[1]=2, [2]=7, [3]=22, [4]=11; [5]=2, [6]=1, [7]=1, [ ]=2

38.Want more? | 0=yes; 1=no; 2= not sure, 3=can't
[0]=6; [1]=30; [2]=3; [na]=6; [3]=2
39.Family planning | 1=received info, 2=no info; 3=yes+type if available;
[1]=20; [2]=8, [3]=14
40.No. kids/mother | actual
[2]=1; [3]=3, [4]=2; [5]=3, [6]=6; [7]=6; [8]=10, [9]=5, [10]=3; [11]=5, [12]=1; [13]=1;[15]=1
[.]=1;
41.Kids/mom-in-law | actual
[1]=1, [4]=2; [5]=4; [6]=7; [7]=8;[8]=2; [9]=6, [10]=3; [12]=1; [.]=4, [na]=8

WORK HISTORY

42.Wage labor | 1=none; 2+occupation+sex+relationship=yes
42.Non-wage male | 1=none; 2+occupation+relationship=yes
43.Non-wage female | 1=none; 2+occupation+relationship=yes (for each type)
43a Frequency | actual for each
43b.Who helps? | 1=nobody, 2=actual (for each type)
44.Housework help? | 1=none; 2=actual+type (for each)
45.Resource use | actual for each
46.Expense manager | 1=wife; 2=husband, 3=both, 4=other, 5=mother-in-law
[1]=17; [2]=14; [3]=12; [4]=4; [5]=1
47. Use of female money | 1=household expenses; 2=give to husband Use of female money
[1]=30; [2]=3; [3]=1, [na]=14
48.Bank account | 1=husband, 2=wife, 3=both, 4=none
[1]=9; [2]=3, [3]=1; [4]=34; [ ]=1

HEALTH CARE

49.Services location | 1=private; 2=clinic+location; 3=hospital+location
[1]=7, [2]=39; [3]=2
50.Opinion of services | actual
51.Traditional remedies | 1=no; 0=yes+types
[1]=7, [0]=41
52.Traditional services | 1=no; 0=yes
[1]=44, [0]=4
53.Church use | 0=no, 1=Sunday, 2=daily, 3=when needed
[1]=34, [2]=2; [3]=12

APPENDIX B

SOURCES OF HISTORICAL DATA

Archives Used: The bulk of the historical data cited was derived from documents housed in the *Archivo Municipal* of Baviácora and the *Archivo Municipal* of Banamichi. In 1978, the Instituto de Antropologia e Historia, Centro del Noroeste (Hermosillo) sponsored a program to organize the historical documents of the municipios of the Río Sonora into archival collections. The papers were put together largely by year, with some attention to subject matter within years. They were then placed into *legajos* (bound files), and labeled. To a great extent, these *legajos* contain the official papers of the municipal presidencies; consequently a typical title might be "Presidencia 1905-1911". Within the *legajo*, the papers are usually arranged by year. Citations contain the name of the legajo, abbreviated as follows: [P 1905-1911], and the month or date of the document. Description of the documents is provided below.

A. **AMBan:** Archivo Municipal de Banamichi; Palacio Municipal, Banamichi, Sonora

B. **AMBav:** Archivo Municipal de Baviácora; Palacio Municipal, Baviácora, Sonora

C. **AUS:** Archives of the University of Sonora; Univ. of Sonora, Hermosillo, Sonora

DOCUMENTS CITED

Archivo Municipal de Baviácora

Presidencia 1895-1971 (Estadisticas)

1922	5/30	Shipments of smallpox vaccine received
1950:		Report of the abandonment of the mining community at Las Cabezas.

Presidencia 1878-1899

1878	Voting list for that year.
1897	Names of Mexicans and Americans seeking title to mines.

1897 1/11 Telegraph office at Banamichi outfitted.

1898 10/12 Chinese mercantile society formed with 1000 pesos capital.

1898 10/26 Authorization of sale of federal land.

1898 Untitled land returned to federal government.

1899 11/21 Complaint by Mazocahui campesinos that private cattle are destroying crops.

Presidencia 1880-1978

1969 Cost of agua potable in San José enumerated.

1970 10/20 Agua potable installed in Suaqui.

Presidencia 1881-1959 (Judicial)

1901 9/6 Complaint that entry to communal land at San José is blocked.

Presidencia 1888-1959

1922 Secretary of State refuses gun permits to Chinese residents of Baviácora.

Presidencia 1888-1931

1931 6/2 Flour mill established at El Bagote.

Presidencia 1889-1979 (electrificación)

1970 11/26 Plan of investments for electrification of small villages of municipio given.

Presidencia 1892-1979

1935 (Sindicatura) Sharecropping agreement between Francisco Bustamente and José Corella.

Presidencia 1897-1973 (Aguas y Tierras)

n.d. General reference to fines for not undertaking cooperative labor on irrigation ditches through the years.

1913 9/30 Twenty guns sent from Baviácora to Gen. Ignacio L. Pesquiera

1913,1918,1927,1930,1933,1937,1956

List of usarios of municipio's acequias.

1933 8/30 A. Villescusa and F. Bustamente represent Hacienda La Victoria in meeting with acequia users.

Presidencia 1897-1978 (migración)

1926		Lists Chinese in the municipio, dates of entry, and professions.
1933	5/24	Lists all foreigners in the municipio, nationality and occupation.
1933	2/28	Request for naturalization by Louis Gautrin and family.

Presidencia 1901-1925

Libros de Gastos 1901-1910

Documents expenses incurred by the municipio for apprehension and transportation of Yaquis.

Presidencia 1901-1979

1897	11/24	Announces closure of colonization program in the interior of the state.

Presidencia 1902-1960 (Estadisticas)

1909		Copper and silver mine "Dos Amigos" employs 127 men at 2.5-3.5 pesos daily.
1935		Lists trucks and autos in municipio.
1949	9/2	Notice of existence of cigarette factory "Tabaclería del Río".
1952		Lists all cattle and horse ranches in municipio.
1956		Lists all businesses in municipio.

Presidencia 1903-1976

1976		Contamination of the Río Sonora discussed.

Años de la Revolución

Presidencia 1900-1905

1900-1905		Municipio school openings and closings listed.
1900	5/2	Warning to be cautious in sale of arms due to war with Yaquis.
	7/16	Residents of Suaqui complain of "tapextle" across an acequia.
	7/20	Flour mill at Puertecito closed.
	7/18	Notes obligation for military service of those 18-48.

	8/31	Flour mill at El Retiro closed.
	n.d.	"Uncivilized" Yaquis headed toward Baviácora.
1901	8/11	Residents of Baviácora protest barricade across river.
1901		Chinese merchant has business in Baviácora.
1902	2/6	Flour mill at El Retiro closed.
1902		Smallpox vaccination campaign started.
1902		Tapextle across acequia "Misión" protested.
1902		Complaint filed that municipio haciendas are being made out of the ejidos of the area.
1902		Request by state gov't. for census of Yaquis living in care of patrones.
1902		Census of Yaquis reveals 100 living in municipio.
1902		Request for apprehension of Mayo Indians headed toward Baviácora.
1903		American owners of businesses in the comisaría of Mina Grande and Belen Copper Companmy listed.
1904		American opens store at "Buckeye".
1904		Baviácora sends force to fight Yaquis.
1905	1/29	Civil engineer Andres B. Canavale asked to survey the ejidos of the pueblo.
	2/4	Thirty Yaquis take possesion of mescalero ranch at "San Bernadino".
	11/20	Complaint that Yaqui attacks disrupt the economy is filed.
1905		Lists peaceful, Spanish speaking Yaquis living in Suaqui.
1905		Three documents describe misbehavior of military forces sent to protect citizens from the Yaquis.

Presidencia 1906-1910

1906	10/8	Alberto Cubillas to Rafael Lopez concerning construction of roads to meet the railway at La Poza.
1906	July, August, November:	Reports of damages incurred and deaths due to Yaquis.
1907		Reports of Yaqui attacks; report of attacks of 100 Indians.

1908		Reports of continued Yaqui attacks.
1908	1/18	Thirteenth regiment garrisoned at Cañada Ancha.
	6/1	Residents of La Concepción refuse to pay even 5 centavos more in taxes.
	3/22;8/2;8/17;8/22:	Campaign against the Indians continues. Report of murders in American owned mines.
1910		Warning issued to workers leaving the country to work in U.S..
1910	6/26	Police asked to apprehend individual accused of stealing wheat.

Presidencia 1911-1929;1935-1939

1911	7/6	Mexico City requests survey of public feeling toward the government.
1912		Twenty carbines sent to Baviácora.
1912	4/2	Conscription of citizens in "fuerza publica" ordered; citizens protest.
	8/23	Attack on the plaza of the pueblo of Baviácora occurs.
1913	7/13	Committee formed for the redistribution of the municipio's waters.
	7/17	Chinese ejected from Baviácora.
	2/18	National Bank of Mexico currency cancelled.
1913		Presidente Municipal asked to use telegraph for speedy communications.
1913		Smallpox vaccine sent to pueblo to prevent epidemic; advised to vaccinate all
1918		Local authorities asked to insure safe conduct of American traveling to Mexico, D.F..
1923-24		Almost all correspondence takes place on backs of old election ballots.
1924	June	Estate of E. Bustamente liquidated for taxes.
1924	5/24	Chinese merchant opens store in San José.
	6/11	Attempts made to collect outstanding debts of American A.C. Abell of Douglas, Arizona.
	5/14	F. Bustamente buys more land.
1929		Residents of Baviácora petition agrarian authorities for restoration or endowment of ejidos.

Presidencia 1919-1970 (Actas)

1970		Application for approval to begin bus service in municipio by F. Machichi

Presidencia 1929-1959

1943	11/11	Notes infant mortality reduced by agua potable; 5,000 peso donation by Cardenas administration; service suspended frequently.
1958	4/16	Correspondence between Pres. municipal and operator of pump house concerning the amount of water service each day.
	4/17	Response to above by pump house operator.

Presidencia 1932-1933

1933	2/3	Recognition of donation of land to Baviácora.
	2/12	Engineer Alejandro McMillan attempts to help settle land dispute between San José and Aconchi involving titles dating to 1716.
	2/15	Pres. Municipal Pedro Robles attests that farm at La Victoria has been reduced by half by the force of the river since 1914.

Presidencia 1934-1941

1934	5/14	Letter to Pres. Municipal Bernabe Robles from Ocampo N. Bolaños, federal inspector, asking that Robles see that sharecropping contracts are upheld.
	5/16	Letter from J.M. Bustamente to B. Robles concerning transfer of title to agostadero.
1938		Gilberto Suarez, secretary to the governor, finds against comuneros in the matter of water rights.
1938	5/7	Pres. Municipal Ricardo Gautrin informs secretary general of the government that Baviácora has no economic activity worthy of export.

Presidencia 1934-1978 (Salud)

1958	3/27	Pres. Municipal asks that health center be constructed in municipio.
1958		Campaign for eradication of polio announced.
1962		Begin inspection of meat slaughter and sales.
1962	5/5	Paratyphoid epidemic in municipio.
1963		$5,000 pesos appropriated for construction of health center.
1969		Committee for electrification of San José established.

Presidencia 1937-1941

1939	9/12	Plans for agua potable in municipio communicated to Dep't. of Public Health.
1940	11/18	Letter from J.M. Bustamente asking that R. Corrales of Suaqui leave land purportedly purchased by Bustamente in 1871
	11/20	A. Navarro atempts to purchase 500 hectares agoatadero under the Ley de Tierras Ociosas.
1941	3/17	Notice of businesses lists soda factory belonging to R. Diaz.
	9/21	La Capilla solicits donation of land.
	10/4	Title to Las Cabezas transfered from A. Abell to Ben Williams.

Archivo Municipal de Banamichi

Presidencia 1864-1908 (Legajo # HAC-083)

1905	August	Emilio Bustamente sells 2000 kilos of wheat from La Capilla to the Moctezuma Copper Company.

Documentos Presidencia 1882-1929

Año de 1882,8/11		Ejidos measured in varas castellanas, based on title dated 1801.
1883	12/18-23	Martin P. Buffum hired to measure and divide ejidos into lots.
1886	2/19	Ejidos divided into 158 lots of 25 ha. each, with 50 ha. each going to the 35 indigenous families in the municipio.
1896	Folio #9, 5/7	Pres. Municipal corresponds by telegraph with Ures concerning director of school; finally hires woman for 40 pesos a month.
1896	Folio #17,8/29	Conditions for campaign against Yaquis described by Sostenes Othan to Juaquin Corella of Banamichi.

Archivo de la Universidad de Sonora

Ejidos File, Río Sonora

1832	"Report on the Opata Pueblos South of Arizpe"

APPENDIX C

GLOSSARY OF REGIONAL SPANISH TERMS AND PHRASES

agostadero.....land used for pasture

acequia.....irrigation ditch

agua potable.....purified, piped water

alacrán.....scorpion

al otro lado.....the United States (the other side)

aparceria, aparcero.....sharecropping; sharecropper

bacanora.....the high quality mescal produced from agave hearts

bienes comunales.....land held communally by the indigenous people of an area

bracero.....legal guest laborers in the U.S. in the 50's and 60's

bruja.....woman with power to cure or render ill, often uses potents

cabecera.....the municipal seat; previously, the mission with priest in residence

campesino.....the rural, agricultural people of Mexico

comal.....grill used over open fire, made from old tractor disk

comercio.....3 year business high school

comida.....the main midday meal

común de agua.....corporate group governing distribution of irrigation water

comunero.....member of comunidad or común de agua

comunidad.....corporate agostadero holders with origins in indigenous of an area

corrida.....the annual fall livestock round-up

curandero.....curer who traces ability to individual encounter with saint

derivación.....irrigation by diverting river or well water to the fields

dompes.....dump trucks

ejidatario,a.....one who works land that is part of an ejidal grant

ejido.....corporately held fields and pasture; recent grants; all eligible

el norte.....the United States

fronterenos.....those living in frontier areas

gambucinos.....individual prospectors

ganadero.....rancher

hacendado.....hacienda owner

indios naturales.....the original indigenous occupants of an area at missionization

juez de agua.....elected head of a comun de agua

jornalero.....day laborer; hired by the day

lechuguilla.....low quality mescal produced from the body of the agave plant

mal parto.....bad labor; long labor

maquiladoras.....the assembly plants located in the border cities

mercedes reales.....royal land grants dating to colonial period

mescaleros.....producers of mescal

milpa.....irrigated farmland located in the flood plain

municipio.....administrative unit similar to a county

olla.....large ceramic jar for water

Opateria.....territory inhabited by the Opata at contact

pan dulce.....sweetened, yeast leavened, flat bread

pasante.....federal doctor in residence at rural clinics for one year

patron.....hacendado or other well to do person with Indian workers

pela.....tub or basin used for washing clothes

pequeño propietarios.....private owners of small pieces of agricultural land

Presidente Municipal.....'mayor' of the municipio

promoturas.....community public health workers

solares.....small lots in town

telenovela.....soap opera

temporales.....unirrigated agricultural land, often in the arroyos

terrenos nacionales.....land belonging to the federal government

tiempo immemorial.....something in effect from before memory

tienda de raya.....the "company store" on haciendas or in mining communities

tierras ociosas.....unimproved or abandoned lands

tomos de agua.....irrigation ditches

tortillas grandes..... Sonoran flour tortillas about 2 feet in diameter cooked on the comal

trago.....mescal sold in small amounts from an individual house

troquero.....person who brings goods from the U.S. by truck to sell in the pueblos

visita.....mission parishes without resident priest