

EXPORT VEGETABLE PRODUCTION IN THE MEXICALI VALLEY:  
A CASE OF UNEQUAL DEVELOPMENT ALONG THE MEXICAN-U.S. BORDER.

By

MARIBEL MARIN

B.A. Development Studies  
University of California, Berkeley  
(1987)

Submitted to the Department of Urban Studies and Planning in  
partial fulfillment of the requirements for the Degree of  
Master in City Planning

at the

Massachusetts Institute of Technology

June 1989

c. Maribel Marin 1989. All rights reserved.

Signature of Author \_\_\_\_\_  
Department of Urban Studies & Planning  
May 15, 1989

Certified by \_\_\_\_\_  
Lance Taylor  
Professor of Economics  
Thesis Supervisor

Accepted by \_\_\_\_\_  
Professor Donald Schon  
Chairman, Master of City Planning Committee



Rotch

EXPORT VEGETABLE PRODUCTION IN THE MEXICALI VALLEY:  
A CASE OF UNEQUAL DEVELOPMENT ALONG THE MEXICAN-U.S. BORDER

by

MARIBEL MARIN

Submitted to the Department of Urban Studies and Planning  
on May 15th, 1989 in partial fulfillment of the  
requirements for the Degree of Master in City Planning

ABSTRACT

The Mexicali Valley in Baja California is an agricultural region adjacent to the Imperial Valley of California. Large scale production of vegetables for export is a recently new development in the Mexicali Valley and in my research I found that Imperial Valley agribusiness firms are responsible for financing many of these operations. For the most part, production of specialty vegetables in Mexicali reflect a decrease in the production of those same crops in the Imperial Valley. It is believed that the growth of the export vegetable sector in the Mexicali Valley results from a transference of Imperial Valley vegetable operations.

The type of production occurring in the Mexicali Valley is one that specializes in the cultivation and packaging of speciality vegetables like asparagus, green onions, radishes and garlic. While these products have a domestic market, almost 90% of Mexicali Valley production is exported to the U.S. Distribution and marketing are mainly conducted through Imperial Valley agents under production contracts and to a lesser degree, are sold by U.S. production partners.

The structure of vegetable production for export in the Mexicali Valley is skewed towards labor intensive phases such as primary production and packaging. These are phases of least value added and therefore, less surplus extraction. Development appears to function as an appendage to the wider vegetable commodity systems of the Imperial Valley. Unequal development refers to the one-sided development of Mexicali export vegetable production when compared to the more extensive system in the Imperial Valley.

## ACKNOWLEDGEMENT

I would like to dedicate this to my family in the Imperial Valley, especially my parents who supported me during my fieldwork over winter break, 1988.

Special mention should be made of my advisor Lance Taylor and my readers, Jonathan Fox, Elena Diez-Pinto, and Louis Dunlap for their helpful comments and guidance. I would also like to acknowledge Elena Diez-Pinto again, and Kelly Robinson for their earlier guidance on my research proposal. To my roommate, Diana Mejia, I would like to extend my sincerest gratitude for all the editorial work she did on this thesis. She did massive amounts of typing during the wee hours of the morning when I could no longer move a finger.

My fieldwork consisted of a hit and miss strategy of locating people who had knowledge of the vegetable market in the Mexicali Valley. Licenciado Luis A. Vizcarra Quinones proved to be invaluable towards this effort. He introduced me to many people at the SARH, provided me with production and export/import data, related the history of vegetable production in Mexicali, and conferred the latest issues of discussion over vegetables that are circulating in his office. In addition, Ingeniero Jesus Roman Calleros, Marta Stamatis Maldonado, Licenciado Jesus Ruiz Heredia, and Professor Scott Whiteford, were excellent resources and were exceptionally willing to assist me in my endeavors. For assistance on my research strategy and for his help in locating many of my initial references, I would like to thank Professor Jonathan Fox.

## TABLE OF CONTENTS

	Page
<b>CHAPTER ONE: A CASE OF UNEQUAL DEVELOPMENT ALONG THE MEXICAN-U.S. BORDER</b>	1
*Introduction	1
*Methodology	5
*Chapter Summaries	7
<b>CHAPTER TWO: THE ECONOMIC PERFORMANCE OF THE MEXICALI VALLEY IN THE 1980s</b>	9
A. Demographic Brief	9
B. General Survey of the Regional Economic Conditions	10
<b>CHAPTER THREE: CREATION OF THE CONDITIONS FOR UNEQUAL DEVELOPMENT</b>	13
<u>Historical Development of the Region</u>	
<b>A. Phase I (1900 - 1934):</b>	
<b>Internationalization of Capital</b>	13
*Colonization of the Mexicali Valley Territory	14
*Internationalization of Capital	15
*Monocultivation of Cotton	17
*Industrial Development and Urbanization	18
<b>B. Phase II (1935 - 1964):</b>	
<b>Nationalization of the Means of Production</b>	20
*Land Reform	21
*Exchange Policies Along the Border	23
*Federal Government Aid	24
*Cooperatives	28
<b>C. Phase III (1965 - Present):</b>	
<b>Reproducing Mexican - U.S. Linkages</b>	28
*Border Industrialization Program	29

CHAPTER FOUR: THE EXPORT VEGETABLE SECTOR	31
<u>A New Agricultural Enclave</u>	
A. Indicators of Change	31
*Surface Area Planted and Value of Production	32
*Level of Exports	34
*Level of Imports	35
B. Mexicali Vegetable Production	38
*Mexican Linkages with Imperial Valley Agribusiness	39
*Mechanisms	42
*Structure of Production	44
*The Role of the Mexican State	46
C. Summary	49
 CHAPTER FIVE: CONCLUSION	 52

## LIST OF APPENDICES

	Page
<b>Appendix A:</b> Economic Indicators for the Mexicali Valley	58
<b>Appendix B:</b> Peso/Dollar Exchange Rates 1930 - 1987	74
<b>Appendix C:</b> Table of Exports From the Mexicali Valley	75
<b>Appendix D:</b> Table of Imports to the Mexicali Valley	76
<b>Appendix E:</b> Utilization of Production Costs per Hectare	78

## LIST OF TABLES

TABLE	PAGE
Figure IV-1 Changes in Surface Area Planted	33
Figure IV-2 Value of Production for the Top 10 Crops	33
Figure IV-3 Vegetable Export	35
Figure IV-4 Vegetable Imports	36
Figure IV-5 Agricultural Price Ranges	37
Figure IV-6 Estimated Profit per Hectare	37
 Appendix A:	
Figure I Population Statistics	56
Figure II Age Distribution of Residents	58
Figure III GDP - All Sectors	60
Figure IV GDP - Agricultural Sector	60
Figure V GDP - Mexicali Valley	60
Figure VI Labor Force Participation Rates	61
Figure VII Employment by Sector	63
Figure VIII Agricultural Employment	64
Figure IX Employment by Hours Worked	65
Figure X Unemployment and Underemployment	67
Figure XI Wages	69
Figure XII Monthly Income of Work Force	71

CHAPTER ONE: A CASE OF UNEQUAL DEVELOPMENT ALONG THE  
MEXICAN-U.S. BORDER

\*Introduction

The border region of the Mexicali Valley in Baja California, Mexico, and Imperial Valley, California, is truly an example of the marvels achieved through modern agricultural technology. An arid desert basin before 1901, the region is today a major producer of cotton, grains, vegetables, fruits, and beef. Extensive irrigation canals feed water from the Colorado River into the two Valleys via the Alamo and American Canals, making agricultural production possible year-round. From the air, the region appears as an oasis of green patchwork amidst the surrounding desert, sand dunes, and barren mountain ranges.

Not so noticeable from above, however, is the international boundary in the form of a chain link fence which geographically delineates two unequal agricultural structures. In Mexicali, agriculture is characterized by small owner operated farms and specialized production of export crops that, with the exception of cotton, have weak links with other domestic industries. In the Imperial Valley, the majority of the arable land is owned by twelve agribusiness firms simultaneously engaged in the production or marketing of several crops and industrial activities (i.e., processing).<sup>1</sup>

---

<sup>1</sup> The term agribusiness refers to corporate-style production and marketing enterprises developed around the international market for agricultural goods. Ray Goldberg, Agribusiness Management for Developing Countries, Cambridge, MA: Ballinger Press, 1974.



When compared to Mexicali, Imperial Valley agriculture has far more extensively developed commodity systems, is more mechanized, pays higher wages, and shows a greater tendency to innovate and adapt new technology.<sup>2</sup> The development of such unequal structures is explained by the dependent role Mexicali agriculture plays (and has played historically) with respect to Imperial Valley agribusiness firms.<sup>3</sup>

The purpose of this paper is to describe the process of unequal development as it stems from dependency, using the agricultural sector of the Mexicali Valley as a case study. This case is interesting because the agricultural sector of Mexicali has traversed three phases of agricultural development, each exhibiting dependent relations with Imperial Valley agribusiness. The consequences of dependent

---

<sup>2</sup> A commodity system encompasses "...all the participants in the production, processing, marketing of single farm product, including farm suppliers, farmers, storage operators, processors, wholesalers, and retailers involved in a commodity flow from initial inputs to final consumer." - Ray A. Goldberg, Agribusiness Management for Developing Countries, Cambridge, MA: Ballinger Press, 1974.

<sup>3</sup> The generally accepted theory of dependency is offered by Theotonio Dos Santos: By dependence we mean a situation in which the economy of certain countries is conditioned by the development and expansion of another economy to which the former is subjected. The relation between these and world trade, assumes the form of dependence when some countries (the dominant ones) can expand and be self-sustaining, while other countries (the dependent ones) can do this only as a reflection of that expansion, which can have either a positive or negative effect on their immediate development. - Dos Santos, "The Structure of Dependence", American Economic Review, 1970.

development have been distinct in each phase.

This case study focuses on the most current phase of agricultural development, the growth of the specialty vegetable sector in the Mexicali Valley. With this example, my investigation illustrates how the pattern of development in export vegetable production is responsive to U.S. demand and is in fact, a specialized appendage to the wider and more complete vegetable commodity system in the Imperial Valley. The dependent link of Mexicali vegetable producers to an external market system precludes their own autonomous expansion in the Mexicali Valley except as deemed functional to the U.S. vegetable sector. In its segregated role as a primary producer, vegetable export production loses the multiplier effects that export growth is believed to produce on the rest of the economy<sup>4</sup>.

My findings from the developmental history of agriculture in the Mexicali Valley reveal that the region was initially formed as an outwardly oriented economy specialized in primary production. In the case of export vegetable production, the reproduction of development in this direction, is related to U.S. dominance either through direct control of the means of production (land rental or bi-national partnerships) or

---

<sup>4</sup> Expansion in primary production is believed to generate a demand for linked residentiary activities and consequent rounds of activity arising from increased demand for local consumer and public goods and services (North 1955, Richardson 1969 and Ladman 1975).

indirectly through the use of financial resources (mainly credit).

I found that Mexicali's emphasis on vegetable production for export has been accompanied by an increase of vegetable imports. This supports the conclusion that export orientation in the production of vegetables stunts the production of vegetables for local consumption, forcing consumers to import these goods at higher U.S. prices. For the Mexicali Valley, in addition to rising costs for consumers, the labor intensive nature of the vegetable sector puts pressure on producers of crops consumed in Mexicali by raising labor costs. Because cultivation of specialty vegetables for export is a more lucrative endeavor, domestic multi-producer groups and U.S.-backed growers can afford to pay double the average minimum wage paid by other sectors (\$8/day compared to \$3.75/day - in U.S. dollars).

Rising production costs create a profit squeeze on smaller producers and producers of less valuable crops, because they are forced to raise their wages (since increasing production is not a viable option given land and water restrictions) in order to compete for labor. Many are forced to rent their lands or resort to family labor. In the case of "ejido" lands, renting or leasing is illegal but occurs nevertheless

less.<sup>5</sup>

For the Mexicali Valley, an emphasis on export production that neglects development of Mexicali consumed goods, intensifies an unstable relationship of dependency on external markets. The external markets for specialty vegetables are especially subject to erratic fluctuations because of the high degree of perishability and large transport costs associated with such produce.

Balanced growth cannot occur because when a certain market fails there is no parallel internal market to support affected growers which also fail and are not necessarily replaced by new ones. Furthermore, U.S. capital is invested in a manner which exploits Mexicali's low wages rather than diversifying and strengthening its economy.<sup>6</sup> The Mexicali case thus serves as an excellent example of a risky market which can falter if consumer preferences in the U.S. change or other third world countries can produce specialty vegetables more cheaply.

#### METHODOLOGY

The traditional means for evaluating economic development in a region is through an interpretation of empirical research which quantifies economic activity. Such a method when

---

<sup>5</sup> Ejidos are agrarian communities where access to land is regulated by the Mexican federal government. Each accepted member is given some amount of land but it is not necessarily communal and agricultural work does not have to be cooperative.

<sup>6</sup> Although wages are higher in specialty vegetable production than in other agricultural sectors, they still represent only 14% of Imperial Valley agricultural wages for unskilled laborers.

applied uniformly, is useful in providing a standard for comparing development over time and across regions. This investigation reviews indicators of Mexicali's economic productiveness such as levels of gross domestic product (GDP), employment, and income, to establish how the status of the Mexicali Valley is viewed in conventional terms.

According to these indicators the agricultural sector of the Mexicali Valley ranks as a leading agricultural producer over other regions in Mexico. In addition, these indicators reflect levels of achievement comparable to those in the Imperial Valley. Agricultural yields and the value of land are similar to those of the Imperial Valley presumably, because they share the same geological conditions but also, because both Valleys have advanced agricultural infrastructures that enable a similar utilization of land.

The semblance of parallel achievement, however, is one based mainly on increasing product per worker and the leading positions both Valleys hold in their respective national agricultural economies. Using only economic indicators to evaluate Mexicali's economic performance could be misleading because they do not reveal the underlying imbalance in the structure of production. For purposes of identifying characteristics of unequal development in the Mexican-U.S. border region, conventional indicators do not provide sufficient criteria.

Unequal development is a dynamic process involving factors

that are not necessarily quantifiable. An account of the historical development of the region and its relationship with U.S. capital would more adequately depict unequal conditions as well as, reveal their sources. Therefore, in addition to conventional empirical methods, this investigation explores the history of Mexicali's growth detailing the characteristics of the key phases of agricultural development.

#### CHAPTER SUMMARIES

Chapter two is an evaluation of the economic status of the overall Mexicali Valley economy with a particular focus on where the performance of the agricultural sector fits in. The mode of analysis is based on traditional economic indicators of gross domestic product, population growth, employment, and income. This chapter serves as a benchmark for reviewing the development of the export vegetable sector.

Chapter three describes the historical development of the region for the purpose of establishing an account of how the conditions leading to unequal development were formed. Attention is paid to the three phases of agricultural development that characterize or were responsible for changes in the economic structure of that sector.

Chapter four presents the example of the Mexicali Valley export vegetable sector. The first part focuses on statistical indicators which illustrate the performance of this sector in comparison with other agricultural sectors in

Mexicali. The following sections describe the production structure and its relationship to U.S. agribusiness firms in the Imperial Valley of California.

Data and other information for this chapter are based on agricultural production reports, research on export vegetable production currently being conducted by Mexicali researchers, and findings from field interviews.

The conclusion chapter presents the final assessment of the case findings and points out additional work necessary for further evaluation.

## CHAPTER TWO: THE ECONOMIC PERFORMANCE OF THE MEXICALI VALLEY IN THE 1980s

The purpose of this chapter is to provide an overview of Mexicali's current economic state as viewed in conventional terms and to establish where the performance of the agricultural sector fits within this framework. A more detailed review of the economic indicators for the Mexicali Valley appears in Appendix A. This chapter also serves as a benchmark for reviewing the development of the export vegetable sector in Mexicali, which is the topic of Chapter Three.

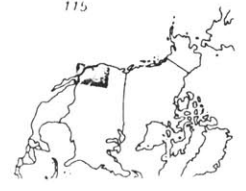
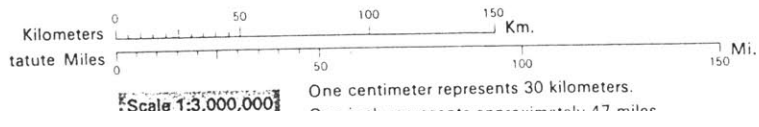
### A. Demographic Brief

The Mexicali Valley is incorporated in the county of Mexicali and is part of a geographically contiguous region with the Imperial County of California, although the two are separated by a chain link fence that forms the international boundary between Mexico and the U.S. (Figure II-1). It is the second largest county in the state of Baja California with approximately 11650 square kilometers in area and houses the largest population in the state.

With 649,707 people in 1987, the Mexicali Valley has 43% of the state's inhabitants and an average density of 55.7 people per square kilometer. The area is highly urbanized with 81% of the Valley residents living in the city of Mexicali which is also the state capital.



FIGURE II-1



## B. General Survey of the Regional Economic Conditions

Using the concept of regional and sectoral GDP for the Mexicali Valley, (namely, the value of total production within the region regardless of whether income accrues to foreign or domestic factors of production), it is apparent that the area is experiencing economic growth on a commendable scale. Regional and per capita GDP has increased steadily over the past 17 years (1970 - 1987); keeping abreast rapid population growth. GDP growth in the Mexicali Valley for the period between 1970-1987, surpasses that of Baja California and of the entire nation.

Agricultural GDP for the Mexicali Valley climbs steadily in relation to state and national proportions but declines in comparison to the rest of the regional industries. Never the less, taking the declining agricultural workforce into account, Mexicali's agricultural GDP denotes increases in worker productivity.

In the area of employment, the majority of Mexicali's labor force is under 25 years of age. Employment is greatest in the service industry and is followed by agriculture, retail trade, and manufacturing. Roughly 40% of the workforce is employed full-time (48 hour work week) while another 42% work 40 hours or less. The official unemployment rate is relatively low compared to other regions in Mexico but this figure is believed to be underestimated.

The underemployment figure based on full-time equivalents,

stands at approximately 26% of the economically active population. In view of the high per capita GDP in the region, however, one could argue that voluntary part-time employment is the case. In the agricultural sector, underemployment is most likely due to the seasonal nature of production in which case, less than full-time employment would be the norm rather than the exception. Any other explanations for such a high underemployment rate would be similarly speculative.

Wages in the Mexicali Valley tend to exceed the general minimum wage set by the federal government despite the high underemployment rate. A possible explanation for this condition may be that over all, workers tend to be more skilled in the Mexicali Valley. The Mexicali Valley is highly urbanized and federal minimum wages for professional and semi-skilled occupations found mainly in urban centers, offer up to one and a half times more than the general minimum wage.

Under conditions of full-time employment, the average minimum salary for 1980 was 4,320.00 pesos (roughly \$186.00 U.S. currency). Excluding the group who did not specify their income, 44% of the economically active population earned this minimum or below at the time of the 1980 Census. 56% of the population earned above this minimum although only 12% of the economically active reported having worked over 48 hours during the week of the census. This reinforces the opinion that people in the Mexicali Valley earn higher wages because they have greater skills.

On the surface, the economy of the Mexicali Valley appears well balanced and certainly not unequal, in comparison to other regions in Mexico. However, this is a region that is oriented towards the U.S. economy and therefore based more on the U.S. dollar than the Mexican peso. In these terms, the balance is not so clear. The following chapter describes the development of the Mexicali economic structure and its relations with the U.S. An account of how Mexicali's economic structure is organized and how it has changed over time, provides a clearer picture of what is meant by unequal development.

### CHAPTER THREE: CREATION OF THE CONDITIONS FOR UNEQUAL DEVELOPMENT

This chapter presents a historical account of the formation of conditions that led to unequal development in the Mexicali Valley. Discussion centers around the three phases of agricultural development and key events that are responsible for its structural characteristics. Each phase is distinguished by the unique links formed with foreign capital.

#### Historical Development of the Region

The economy of the Mexicali Valley is of recent origin when compared to other regions of Mexico. The geographic isolation of this area from the interior markets of Mexico and the scarcity of an indigenous population, expedited foreign colonization and facilitated their control over the regional development process. As a consequence, the resulting economic structure was one which was oriented towards the external markets of the United States rather than the central markets of Mexico. Outward orientation becomes a facet of the economy that has important repercussions later in the Mexicali Valley's development process.

#### A. Phase I (1900 - 1934): Internationalization of Capital

The first phase of Mexicali's agricultural development was characterized by monopoly capitalist expansion. A single

transnational corporation owned over 90% of the land and at one point, controlled 80% employment in the Mexicali Valley. An arrangement of sharecroppers were geared towards the monocultivation of cotton for export.

Foreign control over credit sources, land, water rights and agro-industrial employment (i.e., cotton gins) impeded the development of industry which was linked with the interior markets of Mexico. Foreign capitalists were solely interested in developing the export market. The structure of Mexicali's agricultural economy was established for the express purpose of specializing in cotton production.

#### \*Colonization of the Mexicali Valley Territory

The Treaty of Guadalupe Hidalgo which ended the Mexican-American War in 1848, ceded California and Arizona among other territories to the U.S. and brought streams of American frontiersmen through the border region on their way to the northern California gold mines. Venture capitalists traveling through the area, soon realized the agricultural potential of the ancient deposit of alluvial soils found in the once, Colorado River basin, now the Mexicali and Imperial Valleys.

American entrepreneurs bought up land in the Imperial Valley on the U.S. side and petitioned the U.S. government for assistance in constructing a canal for diverting water from the Colorado River. With the prospect of irrigation water coming into the area, a U.S. investment group associated with

the Anderson-Clayton Company, recognized the value of the Mexican portion of the region and purchased over 800,000 acres of the Mexicali Valley from the Mexican consul in San Francisco, Guillermo Andrade (Whiteford 198 and Ladman 1975). These investors, under the auspices of the Colorado River Land Company (CRLC), were able to acquire rights to develop the land given the prevailing industrialization goals of the Porfirio Diaz era.

Banking on an economic base in agricultural production for export, this Mexican dictator opened the doors to foreign capital in an effort to finance the modernization of the nation. The colonization and development of the Mexicali Valley into an agricultural region, fit well into the federal scheme of the times and this period marked the start of Mexicali's links with U.S. capital. It also began a phase of intensive internationalization of capital. Major portions of Mexico's productive capital was owned by foreign investors and as a consequence they controlled the production surpluses as well. Never the less, the Diaz regime was eager to populate and develop the border region's potential and gladly extended ownership opportunities to the desert settlers.

#### \*Internationalization of Capital

The U.S. government ultimately denied the request of Imperial Valley landowners to divert Colorado River waters because of its navigational attributes. In 1893, an American

firm, the Colorado River Irrigation Company (now the Colorado Development Company), decided to utilize an old river bed of the once, Alamo River on the Mexican side to construct the canal thereby, eluding U.S. authority. With Andrade as a Mexican partner, the firm established distributive and regulatory irrigation agencies on both sides of the border.

The Alamo Canal was completed in 1901 and shortly after, the Mexican government formally upheld CDC's license to the canal waters under the condition that Mexico receive half of the quantity which flows through the waterway (Whiteford 1986). Under the jurisdiction of the Mexican Compania de Terreno Y Aguas de Baja California, fees were charged for the use of water in the Mexicali Valley. The introduction of a steady water supply permitted the CRLC to begin agricultural development of its lands.

The first decade marked a period of infrastructure development as tenants of CRLC's land constructed irrigation canals and roads while members of the CRLC's investment group established a cotton gin, a seed company, and a bank (Ladman 1975). The city of Mexicali was established in 1903 as a center for agricultural services and trade. A railroad line to the Yuma, Arizona, and Tijuana/San Diego areas was constructed in 1904 which facilitated the export of agricultural goods and the further colonization of the area.

Also in 1904, the CRLC obtained Andrade's partnership in the Compania de Terrenos Y Aguas. With control over land and



water resources, the CRLC dedicated itself to the exclusive production of cotton and cattle ranching utilizing a system of sharecropping to develop their holdings. By providing credit to its growers and purchasing all of their cotton, the CRLC gained control over labor and product markets, effectively shutting out other major competitors. The CRLC's monopoly over land, labor and water, its ability to provide credit, and its freedom from state regulation, enabled it to uphold a 30 year reign over the economy of the border region.

In this initial period of building the fundamental market structures for capitalist accumulation, all of the major productive forces were under foreign control. Even the bulk of Mexicali's colonists were foreigners (Chinese, Japanese and Hindu laborers) since the lack of indigenous farmers necessitated that the CRLC import its own cheap labor into the region. Later on, this domination by foreign capital became a source of tension when Mexican nationals began coming into the area only to discover that the CRLC's monopolistic hold, prevented entry into the region's economy except as a laborer or sharecropper.

#### \*Monocultivation of Cotton

The onset of World War I spurred demand for cotton and drove up its world price. In the Mexicali Valley, cultivation of cotton jumped from 12 hectares in 1912 to 12,800 hectares two years later (Ladman 1975). Production increased steadily up

to 1920 after which it stabilized for the next ten years ranging between 34,000 to 64,000 hectares.

The CRLC was able to establish the exclusive cultivation of cotton by its sharecroppers through the provision of credit which stipulated its production. All of CRLC sharecropper's cotton was purchased and exported by the company. As a result, the region's transportation network was forged with an orientation towards the U.S. Fueled by strong demand for cotton on the world market, more land was brought under irrigation and further infrastructure expansion occurred. The new employment this created in turn spurred migration of Mexican nationals into the region although at this time, they were still out-numbered by Chinese immigrants.

Growth continued unhindered throughout the period of the Mexican Revolution (1910-1917) mainly because of the region's geographic isolation. Distance not only placed the Mexicali Valley out of reach from the violence of internal struggles in central Mexico, but CRLC's effective autonomy from political regulation, allowed for the regional economy to flourish as if it were a separate entity altogether -- more like a company town than a region in Mexico or the U.S.

**\*Industrial Development and Urbanization**

From 1910 to 1920, the population of the city of Mexicali increased by almost 31% while that of the county rose by only

7.5%.<sup>7</sup> The immense new proportions of the city, spawned manufacturing activity for consumer goods and the construction of several public works projects (Ladman 1975). As a consequence of U.S. prohibition of liquor production and consumption in 1920, brewery and gambling industries grew prosperous in Mexicali (Ladman 1975 and Mauleon 1986).

Towards the middle of the decade, another American firm, the Compania Industrial Jabonera del Pacifico extended its operation into Mexicali (Ladman 1975 and Whiteford 1986). Introducing an oil mill, soap factory, shortening plant (using cotton by-products), and a cotton gin in connection with two private Mexican Banks, the new firm expanded the manufacturing base of Mexicali. By 1926, urban employment rivaled the rural agricultural sector.

Into the 1930s, the growing manufacturing jobs in Mexicali and the prospects of farming cotton, induced steady flows of Mexican nationals into the region from both the interior of Mexico and depressed areas in the U.S. On arrival, the migrants found themselves shut out from land ownership due to CRLC's monopolistic hold. In the city of Mexicali, CRLC also controls much of the employment in the local cotton gin industry and with its purchase of the Jabonera in 1931, they further increased their economic grip on the region (Ladman 1975).

---

<sup>7</sup> See Appendix B for exchange rates.

The early '30s marked a period of growing tension between landless Mexican migrants and the CRLC. Demanding the fulfillment of post-civil war promises for land reform, Mexican nationals pressured the state and municipal governments to implement policies for the redistribution of land. Region-wide uprisings of landless migrants were quelled by local authorities who were more responsive to the American firms than to the revolutionary ideology of national interests. Agitated colonists subsequently turn to the national leadership of Lazaro Cardenas' administration (1934 - 1940) for help.

**B. Phase II (1935 - 1964): Nationalization of the Means of Production**

Phase II was a period of much reform beginning with land expropriation and redistribution. The Mexican federal government during this time, attempted to readjust the orientation of Mexicali's agricultural sector towards central Mexico by building rural constituencies and providing financial assistance for crop diversification.

Nationalization of the productive resources doesn't quite eliminate the influence of foreign capital in the Mexicali Valley. Despite the Mexican government's efforts to integrate the Mexicali economy into the interior markets of Mexico, the shortage of domestic financial resources for extensive crop diversification and agro-industry development constrains the

development of such ties. In addition, the persistent dominance of cotton cultivation for export leads to the continued formation of production links with the U.S. Foreign capital no longer has direct control over land or the ginning companies in Mexicali but through the use of credit, they maintain indirect control over the production of cotton.

**\*Land Reform**

The post-revolutionary policies for land redistribution were slow in reaching the Mexicali Valley because of its political estrangement. Alienation resulted from the lack of communication and transportation links between Baja California and the Mexican federal government located in central Mexico. Early reform leaders in Mexicali had been exiled to islands off the Baja California coast (Ladman 1975). Not until the Cardenas regime and the fall of world cotton prices during the Great Depression of the 30's, did significant pressure accrue towards the implementation of land reform in the Mexicali Valley.

Production of cotton fell to a low of 10,800 hectares under cultivation in 1932 from an average of over 50,000 hectares the decade before (Ladman 1975). As profits dropped, foreign credit sources dried up and many sharecroppers fled to the U.S. Cardenas promised colonists government credit and the construction of a railroad connecting the region to the interior markets of Mexico.

In 1936, the CRLC signed an agreement with the federal government to sell their land to Mexican families. Dissatisfied by the limited extent of land distribution in 1937, landless Mexican nationals, invaded foreign-owned lands (Ladman 1975 and Whiteford 1986). This action pressured the federal government to execute more rapidly, the expropriation of CRLC lands and water rights. By 1946, all the land in the Mexicali Valley was under the control of Mexican nationals (Ladman 1975 and Whiteford 1986).

The major objective of federal government policy in the region aimed at securing the border economy's success for national benefit. The rapid colonization of the Mexicali Valley by Mexican nationals was achieved by the federal government through the provision of 20 hectare plots rather than the 4 hectare norm of the interior. This insured not only a rural political constituency, but also achieved the consolidation of the means for capital accumulation into domestic hands.

The links between central Mexico and this border region were cemented by the federal government's assertion of its post-revolutionary promise for land reform. Furthermore, because no national landed elite had risen to power during CRLC's reign, there was no manipulation of government assistance policies in order to reconcentrate landholdings. A peasant constituency insured the greater integration of the Mexicali Valley into the national economy and growing

nationalist sentiments eliminated the possibility of foreign landowners regaining their lands.

Despite creation of the National Ejido Bank, however, there were not sufficient resources to finance all the new farmers in the region. The shortage of funds allowed the CRLC, via its gins and the Jabonera, to maintain a large degree of its economic power through the provision of credit (Ladman 1975 and Whiteford 1986). Furthermore, the CRLC still owned the Compania de Terrenos y Aguas which managed irrigation and water distribution in the Mexicali Valley (Whiteford 1986).

The persistence of monocrop production of cotton after the nationalization of land, resulted primarily from the credit relations between ejidatarios and U.S. ginning companies. In addition, the onset of World War II in 1935 and lasting through 1945, raised the world price of cotton as in the period of World War I. The fortunes amassed by local farmers, equipment dealers, and other input suppliers, bred an agricultural bourgeoisie that was reluctant to diversify away from cotton (Whiteford 1986). The Mexican government also benefitted from the World War II cotton boom through the taxation of cotton and the generation of foreign exchange. This facilitated the further expansion and development of Mexicali Valley's agricultural infrastructure.

**\* Exchange Policies Along the Border**

The Free Trade Zone policy was introduced in 1933 but it did not apply to Mexicali until 1937 when President Cardenas extended it to include the entire Baja California Norte territory (Ladman 1975, Farrell 1984, and Montano 1987). Initially, the Free Trade Zone was established as a mechanism to improve the local economy by permitting the free flow of imports and thereby, making living conditions attractive to potential colonists. This zoning privilege was intended as a temporary measure until the population of Mexicali grew to a size that could support local manufacturing industries. Both sides of the region benefitted greatly from the free exchange of goods up until the end of World War II. After World War II, the free zone policy included restrictions which protected domestic industries.

Towards the decade of the '50s, after wartime profits had been depleted, the federal government of Mexico began implementing policies which protected industry and promoted import substitution. The free zone policies no longer permitted the free exchange of all goods but increasingly employed tariffs, import licensing, and quotas to guide commodity trade (Farrell, 1987). Currently, the Free Zone allows free exchange of used machinery and raw materials and taxes manufactured goods only on value added.

**\*Federal Government Aid**

The resurgence of cotton during World War II established



the Mexicali Valley as the most productive cotton region in Mexico (Whiteford, 1986). However, increased production went hand in hand with greater dependence on U.S. credit and markets. By the mid 1950's, few backward linkages to internal suppliers of fertilizer and insecticides were created as insects and mineral depletion were not a problem at this time (Ladman, 1975).<sup>8</sup> Forward linkage with seed and machinery suppliers were still controlled by U.S. creditors who were interested not only in purchasing the Mexican fiber but of expanding their market for agricultural inputs. During this same period, the agricultural and ginning companies of the Imperial Valley became greatly diversified agribusiness systems. They spawned chemical, processing and farm implement companies, transportation firms (truck fleets) and most significantly, began cultivation of fresh produce and sugar beet.

In the Mexicali Valley, over 88,087 hectares were under cultivation by 1955, with cotton as the primary crop (Whiteford, 1986). The following decade however, brought events of crisis proportion to Mexicali's agricultural economy, once again calling for the assistance of the Mexican federal government.

---

<sup>8</sup> Linkages refer to the transfer of intermediary inputs from one industry to another. Backward linkages refer to the entire gamut of industries which provide inputs for the production of a specific good. Forward linkages are with those industries which use the good for generating other products (or for producing a processed version of the good).

The first crisis came in 1956 with the construction of the Glen Canyon Dam in the U.S. which decreased the flow of water into the Mexicali Valley. Water scarcity created conflict among Mexicali growers. The response of the Mexican federal government was to expropriate the Compania de Terrenos y Aguas which managed water resources (Whiteford, 1986). The government placed control over Mexicali's irrigation water under the management of the Secretary of Agriculture and Hydraulic Resources (SARH) as the Rio Colorado Irrigation District. Water distribution was reduced to an amount sufficient for 20 hectares causing growers with larger holdings to lose or subdivide their land (Ladman, 1975; and Whiteford, 1986).

The second crisis was the increasing salination of irrigation water beginning in 1950 but culminating in 1958 when 88,000 hectares were taken out of production because of high salt build-ups and annual losses of up to 30% of farmers gross income (Whiteford, 1986). The peasant organizations, the Independent Rural-workers Centers (CCI) and the National Confederation of Rural-workers (CNC), mounted protests with the U.S. Consulate in Mexicali and in Mexico City. The U.S. ignored the issue until Mexican President Adolfo Lopez Mateos raised the salinity issue into a foremost diplomatic problem. In 1965, a temporary agreement was reached between the two countries providing for the construction of better drainage canals and the substitution of additional water from purer

sources on the U.S. side.

The third blow to the cotton economy of the Mexicali Valley came in 1967. Infestation of the pink bollworm reduced cotton production by as much as 50% (Ladman, 1975; Farrell, 1984; Whiteford, 1986). Pesticide applications rose from 250 pesos per hectare in 1965 to 1,250 pesos in 1973 (Ladman, 1975).

The production of cotton in the Imperial Valley was equally damaged but the devastation of the economic base. Nevertheless, ginning companies who provided most of the credit to Mexicali cotton farmers cut back operations and abandoned their investments in the Mexican cotton industry.

The Mexican federal government responded to the cries for help from the Cotton Producers Association. Taxes on cotton were reduced and a price support system for substitute crops such as wheat, were put into place. Massive amounts of capital were provided through the opening of the Banco Ejidal and the Banco Agropecuario in 1960. The final step which consolidated the central government's power in the region was a comprehensive agricultural rehabilitation program (Ladman, 1975 and Whiteford, 1986).

The program involved a complete renovation of the irrigation system and the sinking of wells. Land was leveled for better drainage requiring the relocation of many farming communities. New roads were built and maintenance machinery and equipment were purchased. The project took seven years to complete (1969-1975), and cost \$97.8 million, 35% of which

came from the World Bank and 65% from the Mexican government (Ladman, 1975 and Whiteford, 1986).

In addition to credit and infrastructural assistance, the federal government through the SARH, implemented a program for crop management. This involved incentives towards diversification. In addition to wheat, the federal government provided price supports for other food crops that were in high demand in the growing urban population. Cattle raising was also re-instituted in combination with cattle fodder crops such as rye grass, sorghum, and alfalfa.

**\* Cooperatives**

The the final expropriatory actions by the Mexican federal government, severed the ties between agriculturalists and U.S. capital and consolidated its own position through the creation of a state-sponsored credit system<sup>9</sup>. The withdrawal of the U.S. agribusiness firms however, also ended the supply of agro-industrial inputs such as fertilizer and pesticides whose use became necessary after the salination of the land and the insect plague. Through government financing, several large cooperatives took position in forward linked ginning of cotton and backward linked production of agro-chemicals. By 1982, 70% of the cotton grown in the region was being processed by cooperatives. Peasant communities established their power

---

<sup>9</sup> The credit system functions under the national bank named Banrural.

bases on the foundations of such agricultural cooperatives and soon the favorative federal credit policies gave rise to an elite rural landed class.

**C. Phase III (1965 - Present): Reproducing Mexican - U.S. Linkages**

The third phase of development is characterized by renewed links between U.S. capital and production in the Mexicali Valley. The first linkages appear with urban based manufacturing but eventually spread into agriculture. Linkages were renewed on the part of the Mexican federal government mostly because population increases resulted in growing unemployment which threatened the political stability of the region.

**\*Border Industrialization Program**

Migrants continued streaming into the area in search of agricultural employment. Most were bound for the U.S. due to the Bracero Program which allowed Mexican laborers to work in U.S. agricultural fields during the post-war period and into the 60s. The termination of this program in 1964, however, stopped the influx of migrants at the Mexicali border.

The population of the Mexicali Valley swelled, creating a landless rural class that represents the only unorganized segment of the rural Mexicali Valley economy. State capitalism that provided the conditions for integrating rural producers into the political structure, has no provisions for

landless laborers.

Mounting population pressure and pervasive unemployment drove the federal government in conjunction with concerned U.S. border governments, to devise the Border Industrialization Program (BIP). This was a program of maquiladoras (assembly plants) which was hoped would ease the unemployment problem and relieve pressure from potential social and political agitation by the unemployed (Whiteford 1986).

The Bank of America financed the early stages of the BIP construction starting in 1965, thus renewing U.S. credit links with the Mexicali Valley. These new urban-based links connected foreign capital with an urban bourgeoisie who managed production from the Mexican side. Centered on labor intensity, these maquiladoras employed mainly young women migrants who were the cheapest source of labor and the least likely to unionize.

The characteristics of maquiladora production easily resemble the specialization of the earlier cotton producers under control of U.S. agribusiness. All of the manufacturing industries in the BIP are supplied with U.S. inputs (semi-finished goods) and once assembled, the final product returns to the parent firm in the U.S. Even the orientation of transportation and communication networks for the BIP industrial parks are geared towards easy access to and from, the U.S.

Employment growth through the BIP program has turned out to be a short run measure. Again, its outward orientation precludes the development of internally linked industries and therefore is not conducive to further growth in the long run. Into the 1980s, maquiladora employment as a share of total manufacturing employment had dropped close to 30% from 41% in 1972, and 64% in 1967.

The development of agricultural export production linked with U.S. capital also has its beginnings around the same period that the BIP was instituted. The renewal of linkages with the agricultural sector is the topic in the following chapter.

## CHAPTER FOUR: THE EXPORT VEGETABLE SECTOR

The purpose of this chapter is to exemplify how new growth in the Mexicali Valley is characterized by linkages with the U.S. economy and how these connections reproduce patterns of unequal development. Production of vegetables for export is a relatively new enterprise in the Mexicali Valley and yet the process of its expansion reflects a specialization based on primary production (raw materials) and assembly stages. Such specialization resembles the era of monocrop production of cotton during which the Mexicali Valley served as an appendage of the wider cotton production system of Imperial Valley agribusiness.

### A New Agricultural Enclave

#### A. Indicators of Change

Asparagus was the first major export vegetable crop grown in the Mexicali Valley. In 1972, 61 hectares were planted and by 1980, 1892 were under cultivation. For the 1988-89 season, 4000 hectares of asparagus are designated for cultivation.<sup>10</sup>

Signs that export vegetable production was becoming an important sector in Mexicali agriculture appeared in the early 1980s. In 1980, vegetables had come to represent 2% of surface

---

<sup>10</sup> Informe de Produccion Agricola, Ciclos 1970 - 1985. Secretaria de Agricultura Y Recursos Hidraulicos. Distrito de Riego #14, Rio Colorado - Zona Valle Mexicali. Jefatura de Estadistica.



area harvested, 3% of total crop production and 10% of the value of crop agriculture.<sup>11</sup> Five years later, the vegetable sector was occupying 4.4% of the surface harvested, accounting for 6.5% of total crop production, and had risen to comprise 26% of the value of crop agriculture.

**\* Surface Area Planted and Value of Production**

Although value and share of production figures are not available at this time for the 1988-89 season, the surface area devoted to vegetable cultivation is reported to be 42% more than in 1985 (21090 hectares from 8951 hectares).<sup>12</sup> Because the Mexicali Valley only has 180,000 hectares of irrigated land (although about a third of this land is planted twice a year), the incredible upsurge of surface area devoted to vegetables can plausibly be expected to raise this sector's share of 1988-89 production value even more dramatically. Corresponding to an interview with Licenciado, Luis Vizcarra Quinones, the Director of the Program in Meteorological and Statistical Studies for SARH, the current level of surface area devoted to vegetable production is upwards of 7%.

---

<sup>11</sup> Derived from: Informe de Produccion Agricola, Ciclos 1970 - 1985, Secretaria de Agricultura Y Recursos Hidraulicos (SARH), Distrito de Riego #14, Rio Colorado - Zona Valle Mexicali, Jefatura de Estadistica, and Estadistica de Frutas y Hortalizas, Ciclos 1970 - 1985, SARH, Subdelegacion de Planeacion Programa de Estudios, Meteorologia y Estadistica.

<sup>12</sup> 1988 report of surface planted by the Union of Regional Agricultural Vegetable Producers (UNPH). Cycles 1987-88 and 1988-89.

Asparagus cultivation is an example of how small increases in surface planted in vegetables, translates into large increases in value. In the ten year period between 1975 and 1985, asparagus on average, took 9th place in area planted (Figure IV-1).

FIGURE IV-1

CHANGES IN SURFACE AREA PLANTED IN THE MEXICALI VALLEY (1975 - 1985)									
1975-76	Surface Planted	1977-78	Surface Planted	1980-81	Surface Planted	1982-83	Surface Planted	1984-85	Surface Planted
WHEAT	44189	WHEAT	53325	COTTON	71056	WHEAT	83805	WHEAT	84110
CEBADA	37778	COTTON	50019	WHEAT	46945	COTTON	35907	COTTON	39078
COTTON	35806	ALFALFA	17638	CEBADA	16251	CEBADA	16955	AJONJOLI	18602
ALFALFA	15490	CEBADA	16654	ALFALFA	14021	ALFALFA	13953	ALFALFA	17280
RYE GRASS	13002	RYE GRASS	10844	RYE GRASS	11388	RYE GRASS	9717	SORGHUM (C)	12362
SESAME	9951	SESAME	9948	AJONJOLI	5384	SORGHUM (C)	2164	RYE GRASS	11339
SORGHUM (C)	5362	MAIZ	3190	SORGHUM (C)	2659	ASPARGUS	1827	CEBADA	7898
MAIZ	3071	SORGHUM (C)	2455	SESAME	2204	SESAME	1797	MAIZ	6501
AJONJOLI	2567	SORGHUM (C)	1963	MAIZ	2076	SORGHUM (C)	1287	ASPARGUS	2436
SUDAN	1790	ASPARGUS	1372	ASPARGUS	1664	MAIZ	1242	SORGHUM (C)	1905

Source: Secretary of Agriculture for Irrigation District #14 (SARH)

From 1975 to 1985, surface area devoted to asparagus increased by 56% compared to a 112% increase in land devoted to maize. The value increase for 1985s asparagus, however, rose by 157% from 1975s while for maize, the period's increase was only 93% (Figure IV-2).

FIGURE IV-2

VALUE OF PRODUCTION FOR THE TOP 10 CROPS IN THE MEXICALI VALLEY (1975 - 1985)							
1975-76	Value of Production	1980-81	Value of Production	1982-83	Value of Production	1984-85	Value of Production
COTTON	1044025023	COTTON	2081136347	COTTON	7615287813	COTTON	14728838496
WHEAT	333842480	WHEAT	937883400	WHEAT	5603055160	WHEAT	12771840745
CEBADA	190031931	ALFALFA	551118960	ALFALFA	1953560000	ASPARGUS	7166245450
ALFALFA	155922625	CEBADA	274219000	CEBADA	583624108	ALFALFA	4392630000
SESAME	67153935	RYE GRASS	102036480	ASPARGUS	520880000	AJONJOLI	2637720300
ASPARGUS	45419750	ASPARGUS	30711000	RYE GRASS	466416000	SORGHUM (C)	1919778250
RYE GRASS	36024179	SORGHUM (C)	75977280	SESAME	104120230	MAIZ	1163696900
AJONJOLI	26247390	AJONJOLI	50605000	FRUTALES	33490475	RYE GRASS	992162500
SORGHUM (C)	21143408	SESAME	28148052	AJONJOLI	74234836	CEBADA	667475375
SUDAN	16317000	FRUTALES	22481636	MAIZ	68530000	FRUTALES	418722500

Source: Secretary of Agriculture for Irrigation District #14 (SARH)

It is evident that in vegetable production, much less land is needed for achieving levels of value equal, if not superior to the eight or nine other crops that cover more area. Again, referring to the example of asparagus, this crop goes from being number nine out the regions ten most valuable crops in 1979 to third in 1985.

**\* Level of Exports**

From 1982 to 1987, vegetable exports exiting through Calexico in the Imperial Valley, have more than doubled (Figure IV-3).<sup>13</sup> Vegetable exports must be registered with the local Plant Sanitation agency in Mexicali in order to meet quality standards and cross into the Imperial Valley. The figures represented in the data correspond to amounts greater than vegetable production levels recorded by the Mexicali Valley Irrigation District agency (SARH).

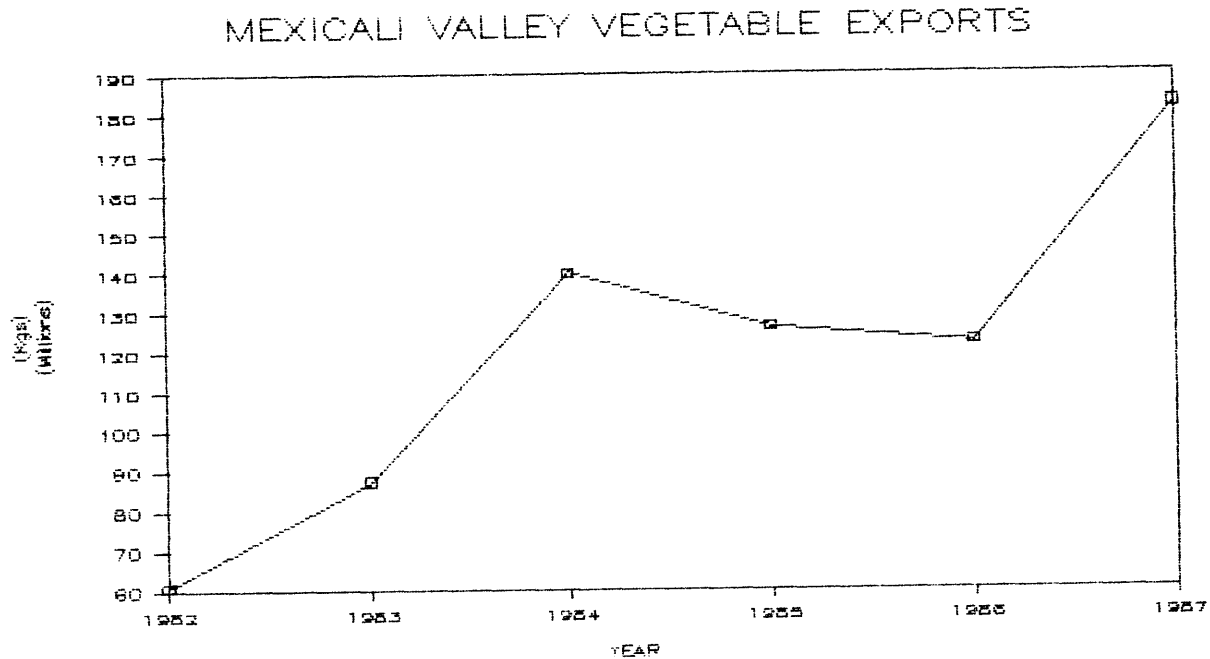
The reasons for this difference is that neighboring farming communities (further south and in the San Luis Rio Colorado Valley of Sonora to the east) bring their products through Mexicali because of its proximity to transportation links with the Imperial Valley, San Diego, and Los Angeles, California. The SARH estimates that close to 70% of these exports actually represent Mexicali grown produce while the rest originate elsewhere. The accuracy figures are difficult to asses because Plant Sanitation does not report sites of origination, only quantities. Mexicali export figures for crops such as

---

<sup>13</sup> Also see Appendix C.

asparagus, green onions, and garlic are believed to be upwards of 95%.<sup>14</sup>

FIGURE IV-3



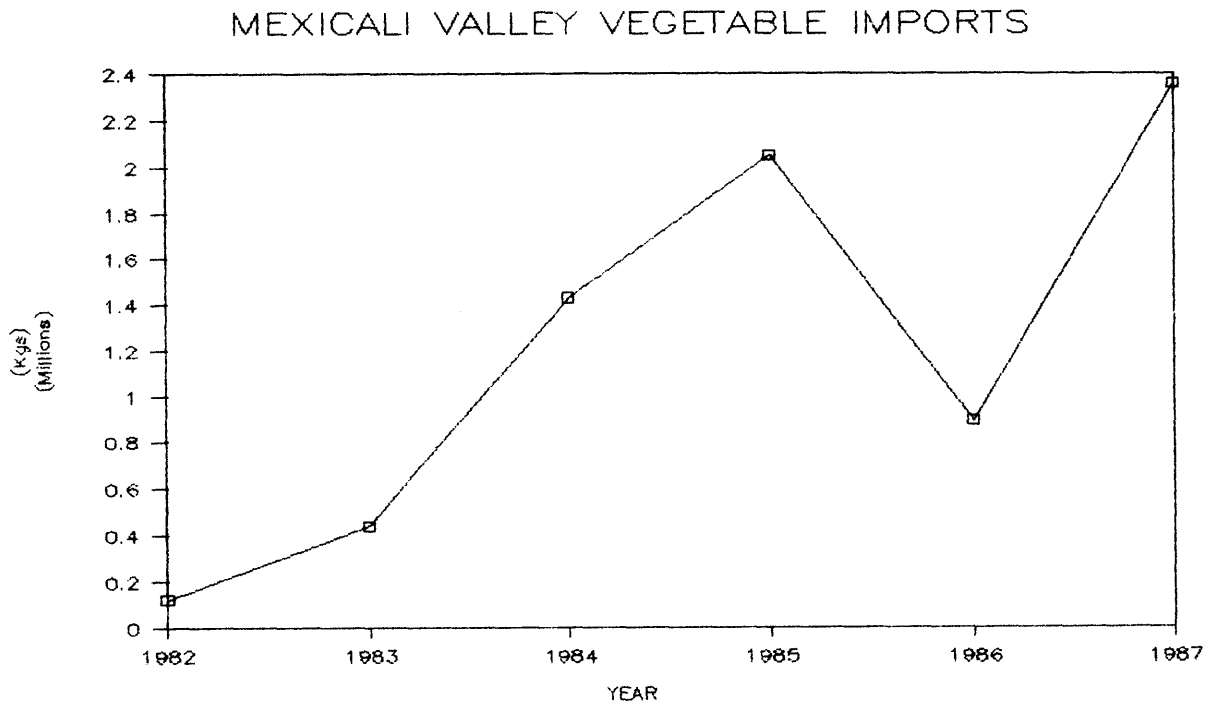
**\* Level of Imports**

Imports of vegetables into the region reflect a more dramatic increase pattern to that of exports; increasing by over 200% from 1982 to 1987 (Figure IV-4).<sup>15</sup>

<sup>14</sup> Based on a discussion with SARH's director of Meteorological and Statistical Studies, Licenciado Luis A. Vizcarra Quiñones, December 1988).

<sup>15</sup> Also see Appendix D.

FIGURE IV-4



An explanation for such rapid increases of vegetable imports may be that as export production expands, vegetables for domestic consumption are displaced. It is logical that U.S. agribusiness firms searching for farming partners, would seek out the growers already established and most experienced in vegetable cultivation. In 1986, both exports and imports decline to rather low levels than the period before. This is a consequence of an unusually dry year which limited production to only one growing season than the two crop per year norm for

vegetables.<sup>16</sup>

Growing exports would explain the rising value of vegetable production in the Mexicali Valley because export prices are much higher than those for vegetables destined for domestic consumption. Over all, the range of median rural prices for vegetables are higher than those for food grains, industrial use crops, and feed grains/grasses (Figure IV-5).

FIGURE IV-5

AGRICULTURAL PRICE RANGES FOR THE MEXICALI VALLEY (1986)

	Vegetables	Grains	Industrial Use	Fodder
LOW	carrots - squash 44130 - 99360	wheat - maize 58000 - 96000		rye grass - sorghum 9500 - 700000
HIGH	broccoli - asparagus 116350 - 753280		cartamo - ajonjolí 116000 - 300000	

Source: Secretary of Agriculture (SARH)

An obvious reason explaining the growth of the vegetable sector is its profitability (Figure IV-6). Asparagus yields the highest profit margin among Mexicali's four most important crops.

FIGURE IV-6

ESTIMATED PROFIT PER HECTARE IN THE MEXICALI VALLEY

	Pesos	U.S. Dollars
Asparagus	2558184.00	2969.45
Cotton	991971.50	1151.45
Alfalfa	327239.50	461.10
Wheat	260703.00	302.61

Source: Derived by author, see Appendix E. Also see Appendix B for exchange rate.

<sup>16</sup> Ibid.

The primary expense in vegetable production besides land, is labor because the delicate nature of the crop prevents mechanization of most production phases. Land is more or less equivalent due to the success of the Mexican agricultural industry in achieving levels of productivity similar to their U.S. counterparts (Mares 1982).

Wages in 1988 for the Mexicali Valley on the other hand, are 14% (minimum \$3.75/day) of Imperial Valley wages (\$26.80/day at \$3.35/hour minimum wage for an 8 hour day). Actual wages for 1988 in the vegetable sector are more like \$5.64/day in the Mexicali Valley compared to \$40.00/day for an 8 hour day in the Imperial Valley.<sup>17</sup> Even under actual conditions, Mexicali Valley vegetable sector wages are still only 14% of Imperial Valley wages. The comparative advantage the Mexicali Valley gains by the differential in labor costs allows it to be a major international competitor in the global vegetable market.

#### B. Mexicali Vegetable Production

The extraordinary aspect of the vegetable sector's development in the Mexicali Valley is not only its sudden rapid expansion, but the degree of sophistication exhibited by Mexican growers. Competing on the international market requires cultivating produce that meets strict quality standards; standards established by U.S. growers who, through

---

<sup>17</sup> National Commission on Minimum Wages, as reported from the Official Daily of the Federation for the years: 1978-89. Converted to U.S. dollar equivalents (see Appendix B).

mechanization and pest control, consistently achieve uniform output.<sup>18</sup> In a relatively short period of time, Mexicali vegetable growers exhibit cost effectiveness in addition to mastering quality control.

**\*Mexican Linkages with Imperial Valley Agribusiness**

The key to Mexicali's success is found in the relationships between Mexican producers and U.S. agribusiness interests (primarily from the Imperial Valley). As discussed in Chapter Three, Mexicali Valley farmers have long relied on imported technology for their production. Mexicali's proximity to the fourth most productive agricultural region in the U.S., the Imperial Valley of California, positions it at the heart of technological innovation in irrigated agriculture. The latest machinery, seed varieties, pesticides, and other material inputs, find their way quickly into the fields of Mexican farmers. Duty-free zoning permits and encourages, such technology transfers. Furthermore, the fluidity of labor that works both sides of the border, going back and forth corresponding to seasonal employment, transfers planting techniques and other production skills from U.S. farms to Mexicali farms.

The Mexicali Valley's sudden yet successful entrance into the international vegetable market is remarkable indeed but

---

<sup>18</sup> Standards of size and appearance were introduced in the United States fresh produce market in order to guarantee quality to consumers and to lessen competition from cheaper imports.



considering the porousness of the border and its neighbor's long history in this field, it is relevant to question -- why the delay? Skill-wise, the Mexicali Valley has long had sufficiently knowledgeable laborers for developing a vegetable sector because a significant portion of Imperial Valley laborers reside in Mexicali and commute daily to work. With respect to infrastructure, the Mexicali Valley is equally well endowed. The regional irrigation system is well maintained given the 1968 upgrading of the entire system. Furthermore, the Mexicali Valley has a complete transportation system with immediate access to U.S. networks via railway, highway, and airport connections.

The reason for Mexicali's late arrival into the export vegetable scene lies instead in the shortage of financial resources necessary for constructing an internally controlled and comprehensive vegetable commodity system.<sup>19</sup>

Imperial Valley growers have specialized in truck farming (large scale production of fresh produce) since the late forties. Many large agribusiness corporations have evolved around this specialty. Although labor intensive, the large scale production of vegetables requires sizable

---

<sup>19</sup> Some specialty vegetables like garlic and green onions were grown for the local urban (Mexicali and Tijuana) market but not at the scales observed in the current phase of production. The current local market system would not be capable of moving such enormous quantities of highly perishable produce. The local market system consists mainly of the network of government administered stores (CONASUPO) and small private markets.

capital investments like airplane crop-dusters for spraying pesticides, refrigerator equipped packing sheds and trucks, transport trailers, and on site packing machines (recent innovations). Another essential facet in the production of vegetables is a marketing infrastructure which in the Imperial Valley, is extensive and effectively controlled by large agribusiness firms. This infrastructure includes distributors and market agents who coordinate the sale of produce and compile information on market conditions (i.e., price updates and levels of sale).

Mexicali's introduction into the vegetable market did not develop out of a sudden surplus of internal resources but rather, came about through linkages with the Imperial Valley vegetable network. With the end of the Bracero Program in 1964, cheap Mexican labor was not abundantly available for California growers. The farm-workers union (UFW) strikes of 1978-79 also pressured California agribusiness for higher wages. The rise of production costs on the U.S. side induced cutbacks by local producers. As Imperial Valley farmers decreased production of the most labor intensive crops (i.e., asparagus, garlic, green onions) Imperial Valley distributors sought new sources in Mexicali for filling in the gaps.

Chapter Three establishes that the era of the 60s and 70s was one in which Mexicali agriculture sought to diversify its production. However, a short supply of credit from the nationalized banking system, made room for only those crops

which the federal government sought to promote. Wheat, maize, and other food grains fit into the current federal policy of basic needs production while cotton in its well established tradition in Mexicali, was maintained as a major generator of foreign exchange (even in its reduced state). Under these conditions, U.S. distributors easily found producers who were ready to supply them with vegetables in exchange for financing.

\* Mechanisms

Financial mechanisms facilitated linkages between primary producers on the Mexican side and U.S. produce wholesalers. Credit of course, is the main instrument but this is allocated in several different ways.

The most comprehensive method is a binational partnership which involves direct capital investment on the part of the U.S. firm for the undertaking of the entire venture on the Mexican side. This includes supplying the Mexican grower with material inputs and machinery. The U.S. firm actually assumes some level of risk alongside the Mexican partner. These types of arrangements are not the norm and occur primarily among growers from both sides, who have had a history of cooperation or prior business encounters. Such is the case with some Mexican ex-cotton producers who previously sold their cotton to Imperial Valley ginning companies or other middlemen and now grow vegetables for these same companies (or produce

subsidiaries of the ginning companies).<sup>20</sup> The U.S. partner markets the produce through his own marketing agents or distributor and splits the profit based on pre-arranged agreements.

The other type of mechanism is the production contract. This method is broader in scope and is found in countless variations but basically functions as a purchasing agreement between primary producers and market agents. A contract can include provision of credit for start-up costs, material inputs and labor, and a commitment to purchase the growers output. The agreement can incorporate all of these terms or any degree of combination.

The most popular because it involves the least amount of risk, is the agreement to purchase the final output at harvest time. Growers willfully accept these offers because contracts also serve as a basis for obtaining personal loans from private Mexican banks. In the past, high risks associated with skyrocketing inflation and the volatility of the market due to the perishability of the product, deterred local production of vegetables for export. Mexican growers' assurance of a buyer for their product now makes private lending an option.

---

<sup>20</sup> Absolute numbers of how many of these partnerships exist is not officially recorded but interviews with Imperial Valley marketing agents, and agricultural agencies and researchers on both sides of the border, confirm that they occur.

**\* Structure of Production**

After the dust settled from the stampede of U.S. investment flowing into the Mexicali Valley during the early eighties, it was evident that a strong outward orientation of the vegetable sector had resulted. The structure of production developed within the Mexicali Valley clearly displays unbalanced growth. The signs of imbalance are depicted in the contrast between the vitality of cross-border vertical linkages and the deficiency of such linkages within the internal economy of Mexicali. This is most evident in the types of enterprises which U.S. agribusiness firms promote and those which they do not encourage through investment.

New producers of primary goods (fresh produce) flourish along with owners of packing sheds while material inputs continue to be imported from the U.S. Sometimes the use of U.S.-made inputs are stipulated in contract clauses; other times they are simply cheaper to import. In addition, all the marketing is conducted on the U.S. side through U.S. marketing agents and distributorships. The distinction between each of the above mentioned, production phases is the differentials of value added corresponding to each. The enterprises which are developing in the Mexicali Valley represent stages of production at the lower end of the value added scale while the ones in the U.S. exemplify the highest levels of surplus extraction.

The resulting production structure within the Mexicali Valley then, is characterized by an abundance of primary producers and second stage assembly (sorting and packing), and a relative absence of industries which supply production inputs and distribute output to the market. Mexican vegetable growers resemble "agro-maquiladoras" in their function of taking U.S. inputs and producing a final product that goes back to the parent firm (in this case the agribusiness conglomerate) to be sold in the U.S. and abroad.<sup>21</sup> A clearer case of this activity is evidenced with carrot producers in the Imperial Valley who bring their produce grown in the U.S., to have it packed in Mexicali Packing sheds. The carrots, packaged under the Imperial Valley grower's label is then shipped back to the U.S. side and sold there.<sup>22</sup>

Currently, Mexicali Valley vegetable production responds to U.S. agribusiness firms and is subject to development in accordance to U.S. needs. These needs have evolved to mean specialization at certain stages of production and the cultivation of strong ties of dependency towards the U.S. commodity system. Continued specialization towards outward orientation occurs at the expense of engendering an internal supply and distributive network that could potentially foster

---

<sup>21</sup> The term "agri-maquiladoras" was used by Licenciado Luis Roman Callero, researcher at the Colegio de la Frontera Norte, in a personal interview to describe the vegetable production activity in the Mexicali Valley.

<sup>22</sup> The Packer, Saturday November 26, 1988

autonomous growth that competes, rather than compliments the Imperial Valley vegetable sector.

Such an example is exemplified by the Mexican vegetable growers in the state of Sinaloa who not only dominate the use of productive resources but have established a strong political voice legitimized by the Mexican federal government. The combination of these two has propelled the Sinaloan vegetable growers into becoming major competitors on the international vegetable scene. The basis for federal government participation in the growing activity of export vegetable production in Mexico is modeled after the Sinaloan experience.

**\* The Role of the Mexican State**

The Mexican federal government has a tradition of intervening in national industry through policy which stipulates mandatory participation in producer organizations tied to state directorships. In the case of agriculture, the Mexican Federation of Agricultural Organizations (founded in 1932 under the administration of General Plutarco Elias Calles) establishes the functional basis for creating local agricultural associations within a state. The format is of a corporatist nature allowing for control from the top down. This way, "they are licensed by the state, limited in number, singular, hierarchically ordered, functionally differentiated, subject to official recognition, and given a representational

monopoly".<sup>23</sup>

The Union of Vegetable Producers (UNPH) is the Federacion's vegetable branch. It was founded in 1961 in response to the development of export vegetable production in the state of Sinaloa and the particular needs of this production enclave. The UNPH is responsible for carrying out five basic functions: 1) regulating horticultural production, 2) promoting vertical integration into marketing and industrialization, 3) coordinating and stimulating cooperative efforts, 4) representing members before relevant public and private agencies, and 5) providing production services.<sup>24</sup>

Regulating production is the principal duty of the UNPH. This is accomplished through the formation of production quotas based on estimates from market trends. These quotas take into account production for export in addition to that destined for the domestic markets. Regional branches of the UNPH are required to register with the ministry of agriculture through the local offices of the SARH in order to participate in the formulation and apportionment of these quotas. In the Mexicali Valley, the UNPH has 444 members. 227 of the growers are ejidatarios and 217 are small private farmers. Members are grouped in producer associations that range from 3-10 growers.

---

<sup>23</sup> David Mares, "Agricultural Trade: Domestic Interests and Transnational Relations" in Jorge I. Dominguez, ed. Mexico's Political Economy: Challenges at Home and Abroad. London: Sage Publications, 1982.

<sup>24</sup> Ibid.



Each branch is responsible for allocating the regional share of production among its members. This apportionment is never-the-less, hypothetical and mostly in the spirit of national cooperation since neither the national nor the regional UNPH have enforcement authority.

In fact, many of the production contracts in the Mexicali Valley are in excess of the quota limits.<sup>25</sup> This is not favorably looked upon by the national UNPH because overproduction can place downward pressure on prices. The argument in Mexicali is that growers are not actually overproducing but rather, assume the U.S. associate's share of the market and as such, are not violating national objectives. In any case, the region has a different climate and thus different growing seasons from other major vegetable producers in Mexico, namely Sinaloa. Therefore, Mexicali growers believe that their production does not compete with other Mexican exports on the international market.<sup>26</sup>

Dissension between the Mexicali UNPH and the national group stems from the fact that the conditions in the Mexicali Valley are very different from those of Sinaloa from which the role of the UNPH was derived. The early start of Sinaloan export vegetable production (early 1900s) and the profits made from

---

<sup>25</sup> Based on discussion with Martha Stamatis Maldonado, researcher at the Autonomous University of Baja California (January 1989).

<sup>26</sup> Ibid.

massive exportation since the mid-50s and 1960s, finds it today with a very extensive domestic horticultural commodity system and a powerful rural bourgeoisie of national origin. In Sinaloa, the concentration of vegetable production in the hands of Mexican agri-firms permits the regional UNPH to control production and exports, match supply with demand, and reap oligopoly prices.<sup>27</sup> In addition, the strength of the Sinaloan UNPH translates into market power because Mexican-owned subsidiary distributorships based in the U.S., control over more than half of the credit provided to local producers.

Mexicali vegetable producers on the other hand, lack financial resources of their own and have a deficient internal vegetable commodity system. Their production of vegetables for export is hinged on the Imperial Valley's vegetable market network as are their credit needs. Under these conditions, it is clear that the Mexicali Valley UNPH is relatively weak in its ability to promote its first two assigned functions of regulation and vertical integration. Its role for the present is mainly one of coordinating cooperative efforts and cultivating a political voice in Mexicali Valley agriculture.

#### SUMMARY

Export vegetable production in Mexicali is a direct consequence of U.S. investment. The Mexicali vegetable sector has been converted into an appendage of the Imperial Valley's

---

<sup>27</sup> David Mares

vegetable commodity system. Similar to what took place during the region's monocultivation of cotton era (1910-1945), the Mexicali Valley growers are being transformed into specialized vegetable producers through linkages with U.S. credit sources and the Imperial Valley vegetable network.

Evidence pointing to the growing dominance of vegetable production for exports is: 1) the increasing surface area devoted to vegetable, 2) the rising value of production, and 3) the accelerating level of vegetable exports. Vegetables have come to represent the second most valuable crop in the Mexicali Valley after cotton which ranks first in surface area planted.

U.S. interest in developing the Mexicali Valley into a producer of vegetables occurs for several reasons: 1) the end of the Bracero Program in 1964 and farm-worker strikes in California during the late 70s which drove up the cost of labor (hence production), 2) the Free Trade Zoning of the area which affords producers the opportunity to import material inputs and allows U.S. firms to take out primary goods free of duties or taxed on value added which is practically zero for raw materials, and 3) the modernity of Mexicali Valley's agricultural infrastructure and its strong links with the Imperial Valley transportation system.

Specialization in the production of vegetables for export is characterized by expansion which is limited to the most labor intensive production phases (i.e., primary production

and packing). Unequal development in the structure for export vegetable production is defined in these terms.

## CHAPTER FIVE: CONCLUSION

The state of the Mexicali Valley economy when viewed in light of traditional economic indicators, presents a picture of a vital economy. Its growth rates surpass that of the state of Baja California and those of Mexico as a whole. In agriculture, employment is decreasing while the share of regional agricultural GDP is rising. In conventional terms, this signifies an increase in worker productivity. Income appears to meet if not exceed, federally set minimum wage standards for the majority of the population as well as for agricultural workers. However, looking at different - more elusive criteria, such as the levels of unemployment and underdevelopment, the degree of specialization characteristic in export industries, and wage inequality, in relation to an adjacent economy with whom economic linkages are strongest, the notion of unequal development makes more sense.

In the case of export vegetable production in the Mexicali Valley, specialization has come to mean a proliferation of new vegetable producers and packing shed enterprises. Missing, however, are the local (Mexicali based) industries such as those that grow hybrid seeds, pesticides and fertilizers, farming equipment special to vegetable production, and most importantly, marketing and distribution sectors. The latter components represent the highest value added stages in vegetable production and have also come to be synonymous with

market power.

U.S. agribusiness interests argue that this segmentation is attributable to the "comparative advantages" of resource endowment found in the Mexicali Valley. Cheap labor makes the region the most efficient site for locating labor intensive phases of production such as primary production and packaging. Similarly, the expertise and technological know-how which allow U.S. producers to manufacture cheap, quality farming inputs, make U.S. imports the most cost effective choice.

This argument, however, does not explain why unequal proportions of surplus extraction and of decision-making power accrue to the U.S. side of the commodity system. In reality, restructuring is taking place in commercial agriculture. U.S. agribusiness is decentralizing production in a manner which exploits the cost advantages of a geographic site while maintaining centralized control over regulatory and investment activity.

The organization of Mexicali vegetable production for export tells of a fundamental restructuring occurring within agribusiness multinational corporations. In a shuffle to reorganize production strategies for the purpose of reducing production costs, labor intensive production phases are geographically located in regions where labor is cheap. This has come to mean that less developed countries get linked up to the international agricultural market at the lower end of the value added scale of production. Agribusiness firms

maintain control over the sale of production inputs and marketing, thus harnessing the bulk of surplus accumulation. For the agribusiness firm, restructuring involves the decentralization of production but the retention of centralized control over regulatory and investment activity.

As in the Mexicali Valley, the resulting structure is one which assigns specific roles in the execution of specific tasks, the manufacture of particular products, and the performance of certain parts of production processes to developing countries. This is part of a wider process of unequal development under the new international division of labor occurring between developed and less developed countries (Frank 1969, Rama, and Stevenson 1986).

The strictly outward orientation of vegetable production in the Mexicali Valley places the region in a precarious position. The current levels of production cannot possibly be sustained without U.S. markets and U.S. financial support. Mexican credit is too scarce and parallel markets are not sufficiently large enough (where they exist) to accommodate the entire scope of the region's specialty vegetable production. Never-the-less, the Mexicali Valley is an important participant in the Imperial Valley's vegetable commodity system and these binational relationships translate into mutual interdependence.

Assessing the degree of transnational commitment towards cooperation and mutual support requires further research into

the area of contractual arrangements. Field surveys investigating the degree to which contractual agreements exist and the characteristics of their terms, would be necessary since contractual arrangements are not required to be reported. Furthermore, an input-output analysis would greatly clarify the precise nature of cross-border linkages. This would allow for an assessment on the actual interdependence existing between the two regions. Investigation into these suggestions would explain many of the ambiguities of whether unequal development promotes economic vitality or presents a potential danger to the border economy of the Mexicali Valley.



**APPENDIX A****A. Demographic Characteristics****\* Population Growth**

As one of the most rapidly growing areas in Mexico, the Mexicali Valley has experienced over 4350% population growth since 1920. Compounded annually, the rate of growth for the Mexicali Valley far exceeds that of the nation (Figure I) for the same period and Baja California's rate reflects this growth. For the Mexicali Valley, growth is most significant in the city of Mexicali (10.6%).

**FIGURE I**

POPULATION STATISTICS FOR THE MEXICALI VALLEY (1910 - 1987)

Year	Mexicali County Pop.	Mexicali County Rate Inc.	Mexicali City Pop.	Mexicali City Rate Inc.	Baja California Pop.	Baja California Rate Inc.	Mexico Pop.	Mexico Rate Inc.
1987	649707	2.4%	528355	4.5%	1524575	2.6%	82855000	2.0%
1980	510644	2.6%	341559	2.6%	1177886	3.1%	67796000	3.5%
1970	396324	3.5%	263498	4.2%	870421	5.3%	48225000	3.0%
1960	281733	8.5%	174540	10.4%	520165	8.6%	36003000	3.1%
1950	124362	10.8%	64658	13.2%	226965	11.0%	26433000	2.8%
1940	44399	4.0%	18775	2.4%	79907	5.2%	20143000	2.0%
1930	29985	7.5%	14842	8.1%	48327	7.5%	16553000	1.1%
1920	14599		6782	30.8%	23537	9.2%	14800000	-0.2%
1910	a		462		9760	2.6%	15160000	1.1%
1900	a		b		7583		13607000	
Compounded Rate		6.7%		10.6%		7.9%		2.3%

a - Mexicali County was not established until 1915  
 b - Mexicali City was founded in 1903

Source: Mexico, Instituto de Estadística Geográfica e Informática y Secretaría de Programación y Presupuesto, General Population Census, State of Baja California and United Mexican States (X, IX, VIII, VII, VI, V, IV, III)

The 1980 census defines urban centers as any community with over 15,000 inhabitants. During this period the urban population represented 67% for the Mexicali Valley and 77% for the state of Baja California. By 1987, urban inhabitants constituted four fifths of the total Mexicali Valley population.

The reasons for such great increases in population rest mainly in the region's geographical position which establishes it as a staging ground for migration into the United States. Between 1970 and 1980, the census reports that 126,466 people moved into the Mexicali Valley with the bulk of these migrants originating from the central areas of Mexico (Jalisco, Michoacan, Guanajuato, Nayarit, and D.F. in order of magnitude). Considering that 96,650 new births were also recorded for the period in the Mexicali Valley, it is presumable, given the 1980 population figure, that the balance represents those who crossed over to the United States. It is possible that some may have returned to their place of origin but, considering that most people leave because of economic reasons, this is not likely.

Migration has historically been the key to the region's growth. Economic developments which have taken place over the past 80-some years, provide additional insight as to why people migrate to Mexicali and remain in the area instead of crossing the border. Such developments are the topic of Chapter 3 in which the historical development of the region is

discussed.

**\*Age Distribution**

In 1980, over 60% of the Mexicali Valley population is under the age of 25. At first, this figure sounds extraordinarily high but for a region where growth is mostly contributed to migration, this is likely to be the norm. People who migrate are apt to be the most mobile members of the communities they leave. That is, landless, unmarried, young men and women who can be spared by their families to find wage labor in the U.S. or other urban centers in Mexico.

**FIGURE II**

Age Distribution of Mexicali County Residents  
(1980 Census)

Age	Age Group Total	Cumulative %	Male	Cumulative %	Female	Cumulative %
TOTAL	510644		252851		257813	
0 - 4	63089	12.35%	31730	12.52	31359	12.22
5 - 9	75500	27.14%	37976	27.62	37524	26.72
10 - 14	69304	40.71%	34661	41.32	34643	40.22
15 - 19	64223	53.24%	31984	53.92	32239	52.72
20 - 24	51220	63.32%	24772	63.72	26448	62.92
25 - 29	38283	70.82%	18372	71.02	19911	70.62
30 - 34	30198	76.73%	14512	76.72	15686	76.72
35 - 39	25466	81.72%	12251	81.62	13215	81.92
40 - 44	21346	85.90%	10426	85.72	10920	86.12
45 - 49	18679	89.56%	9275	89.42	9404	89.72
50 - 54	15689	92.63%	7955	92.52	7734	92.72
55 - 59	12503	95.08%	6650	95.12	5853	95.02
60 - 64	8416	96.73%	4226	96.82	4160	96.62
65 - 69	6560	98.01%	3173	98.12	3387	97.92
70 - 74	4462	98.89%	2179	99.02	2283	98.82
75 - 79	2346	99.45%	1373	99.52	1473	99.42
80 - 84	1528	99.75%	698	99.82	830	99.72
85 - 89	490	99.84%	210	99.92	280	99.82
90 - 94	225	99.89%	90	99.92	135	99.92
95 - 99	114	99.91%	49	99.92	65	99.92
Over 100	73	99.92%	29	99.92	44	99.92
Unspecified	411	100.00%	200	100.02	211	100.02

Sources: X General Population Census for Baja California, INEGI, SPP

**B. ECONOMIC INDICATORS**

**\* Gross Domestic Product**

The GDP measuring gross value of production within a

region, has for the Mexicali Valley, risen at rate of 4.3% a year in real terms for the period between 1970 - 1987 (Figure III). Compared to a pace of 4.1% for the state, the Mexicali Valley's economy gets a superior rating for performance. GDP per capita for the Mexicali Valley during this 17 year period performs equally well; exhibiting a 1.7% annual increase (compounded annually in real terms) despite a population growth rate that exceeds that of Mexico as a whole.

The share of agricultural GDP rises steadily from 1970 to 1980; both as a percentage of national agricultural production and as a part of Baja California's agriculture (Figure IV). Within the regional economy of the Mexicali Valley however, agriculture's sectoral share of GDP declines with respect to all other industry (Figure V).

The decline of the agricultural GDP in the Mexicali Valley is due primarily to the growth of manufacturing (mostly assembly plants also known as "maquiladoras") during the Border Industrialization Program (BIP) of the early 70s. Into the 80s, the decline is due to the growing importance of service sector employment. This phenomena can be associated with the first major devaluation of the peso in 1976 which created a boom for labor intensive industries (such as services) in the Mexicali Valley.

**\* Labor Force Participation**

The rate of labor force participation in the Mexicali Valley is 33% of the total population (Figure VI). This

GROSS DOMESTIC PRODUCT - ALL SECTORS (1970 - 1980)

FIGURE III

YEAR	1970	Nat'l %	State %	1975	Nat'l %	State %	1980	Nat'l %	State %	1987	State %
Mexico	444271.4	100.00%		1100049.8	100.00%		4276490.4	100.00%			
Baja California	11686.0	2.63%	100.00%	26931.9	2.45%	100.00%	96360.0	2.25%	100.00%	1989942	
Mexicali County	3915.0	0.88%	33.50%	8789.0	0.80%	32.63%	35012.0	0.82%	36.33%	727298	36.5%

GROSS DOMESTIC PRODUCT - AGRICULTURAL SECTOR (1970 - 1980)

FIGURE IV

YEAR	1970	Nat'l %	State %	1975	Nat'l %	State %	1980	Nat'l %	State %
Mexico	54123.2	12.80		123150.0	11.20		357131.1	8.35	
Baja California	964.3	1.78	8.25	3242.8	1.82	8.33	8643.6	2.42	8.97
Mexicali County	430.6	0.80	44.65	1625.9	1.32	50.14	5336.9	1.49	61.74

GROSS DOMESTIC PRODUCT - MEXICALI VALLEY (1970 - 1980)

FIGURE V

YEAR	AGRICULTURE	% GDP	MANUFACTURING	% GDP	RETAIL TRADE	% GDP	SERVICES	% GDP
1970	430.65	11.0%	1280.4	32.9%	153.10	26.9%	1013.2	29.2%
1975	1625.9	18.5%	2460.9	28.0%	2636.70	30.0%	2065.4	23.5%
1980	5336.9	16.1%	10188.0	29.0%	10503.60	30.5%	8507.9	24.3%
1984	39446.6	16.3%	60291.10	24.9%	72639.90	30.0%	172398.7	28.8%
1987	93146.8	13.7%	190552.10	26.2%	204370.70	32.0%	204370.7	28.1%

figure may appear low at first glance but it actually represents 50% of the population which is older than 12 years of age. Participation rates by sector of employment are not available from the 1980 Census data.

For women, this rate incorporates 19.1% of all women residing in the Mexicali Valley and 28.2% of all women over the age of 12 who are economically active. Likewise for men, the labor force participation rate represents 48% of all men in residence and 71.8% of all economically active men over 12 years of age. The bulk of female labor force participation falls within the 15-29 year old age group (55.3%) and similarly for men, 55% of participation is found between the ages of 15 - 34.

FIGURE VI

LABOR FORCE PARTICIPATION BY AGE GROUP  
(1980 CENSUS)

YEAR	TOTAL	CUMULATIVE %	MALE	% OF WORKING MALES	FEMALE	% OF WORKING FEMALES
TOTAL	344146		121398		49277	
12 - 14	41786	12.12	2492	2.12	954	1.92
15 - 19	64223	30.82	15154	12.52	7439	15.12
20 - 24	51220	45.72	20147	16.62	11662	23.72
25 - 29	38283	56.82	17243	14.22	8133	16.52
30 - 34	30198	65.62	13925	11.52	5571	11.32
35 - 39	25466	73.02	11760	9.72	4394	8.92
40 - 44	21346	79.22	9950	8.22	3333	6.82
45 - 49	18679	84.62	8850	7.32	2532	5.12
50 - 54	15689	89.22	7426	6.12	1998	4.12
55 - 59	12503	92.82	6113	5.02	1342	2.72
60 - 64	8446	95.32	3591	3.02	790	1.62
65 - 69	6560	97.22	2313	1.92	542	1.12
70 - 74	4462	98.52	1342	1.12	296	0.62
Over 75	5285	100.02	1088	0.92	241	0.62

Source: X General Population Census for Baja California (INEGI and SPP)

An explanation for the large proportion of working women

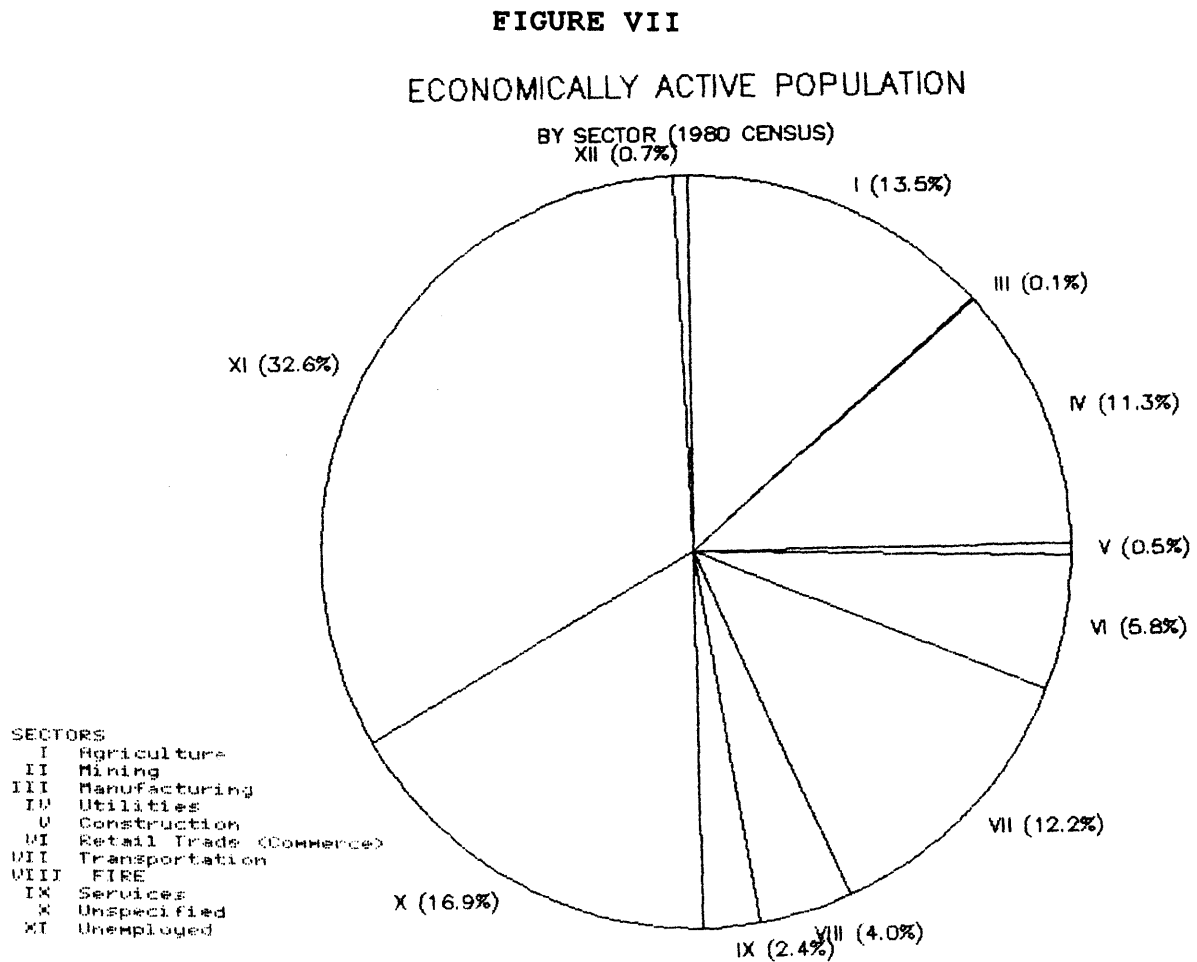
falling in the age group of 15-29 is that employment is abundant in the region's significantly large service, retail trade, and maquiladora sectors. These areas are known to employ mainly young, unmarried women. Another reason is that most women past this age group tend to marry and become homemakers thus, reflecting a lower participation rate for older women.

**\*Employment Distribution by Sector**

Employment figures from the 1980 Census, (Figure VII) exhibit a predominance in unspecified labor with 32.6% of workers corresponding to this category. The census explanation is that these people either reported a job whose description did not fit any of the general categories or did not specify an occupation at all. Compared to the unspecified category's share of 6.8% in the 1970 census, the overwhelming predominance of the 1980 figure, suggests a rise in informal sector employment or a need to reclassify census employment categories to fit a changing economic structure.

Outside of unspecified workers, the leading employment sector is services with 16.9% of the workforce. Agriculture, trade, and manufacturing follow in order of importance with 13.5%, 12.2%, and 11.3% respectively. With a less degree of importance, the sectors of construction, transportation, and FIRE (finance, insurance, and real estate) account for 5.8%, 4% and 2.4% of the workforce. At the bottom end of the scale fall mining (which includes extraction of minerals, natural gas, and petroleum), and the utilities industry representing less than 1%

of total employment.



Up until 1970, agricultural employment (Figure VIII), increases in absolute numbers while decreasing as a share of total regional employment. In 1980, however, absolute employment in agriculture drops by a full thirty percent and as a share of total employment, falls by sixty percent.



FIGURE VIII

## AGRICULTURAL EMPLOYMENT IN THE MEXICALI VALLEY (1930 - 1980)

Employment	1930	1940	1950	1960	1970	1980
Number of Persons Employed	9213	9568	24353	47623	32820	22974
Percentage of Total Mexicali Valley Employment	72.6	66.9	58.8	52.6	33.2	13.5

Note: Percentage calculated as agricultural employment/total employment; does not account for unemployment and therefore will overstate the employment share of agriculture.

Source: X, IX, VIII, VII, VI, V General Population Census for Baja California (INEGI and SPP)

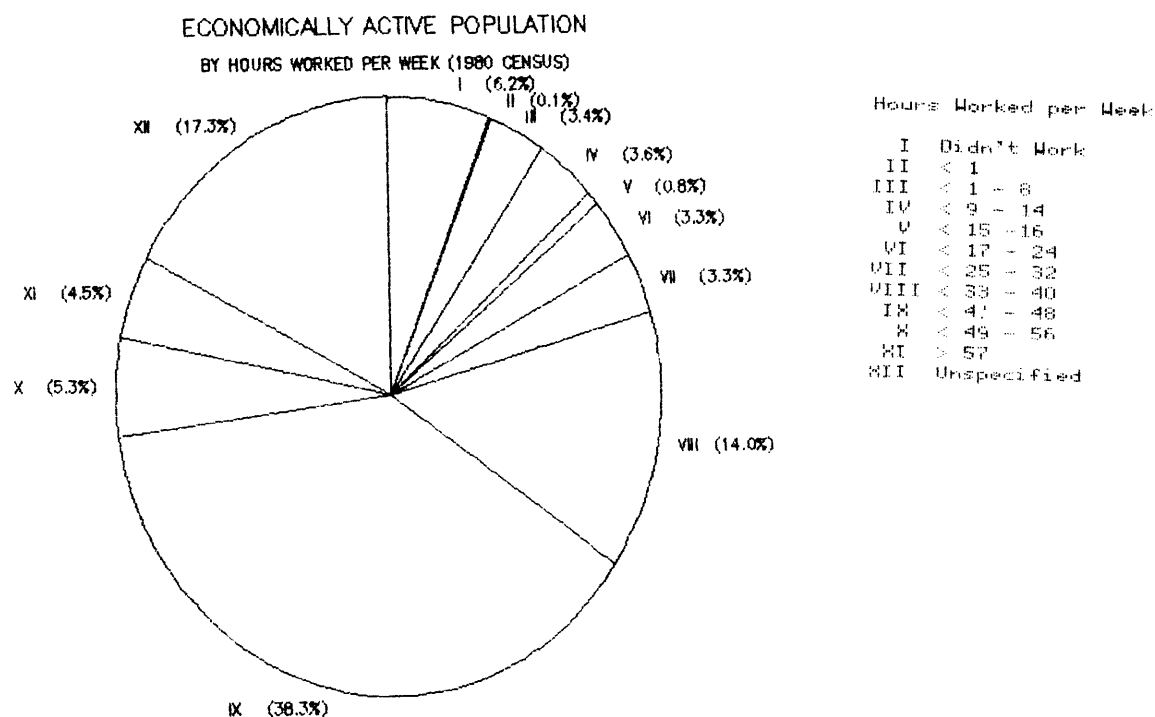
Low agricultural wages in the Mexicali Valley promote labor-intensity in this sector and the increases in employment up to 1960 result partly from expanded production and partly because cotton, the primary crop, was hand picked. Decreases after 1960 can be explained by the diversification away from cotton and the introduction of wheat from the Green Revolution technology.

**\* Employment Distribution by Hours Worked**

The 1980 census defines an employed person as anyone 12 years of age and older that worked at least one hour in the week prior to the census for pay, or at least 15 hours in the week in a family business without pay, or who would have worked except they were absent from work due to sickness, vacation, accident, absences with or without permission, bad weather, work stoppages, or machinery breakdown. In Mexico, under the Federal Labor Law enacted in 1970, the normal work week is 48 hours (8 hours per day maximum).

The breakdown of the economically active population (EAP) by hours worked is shown in Figure IX.

FIGURE IX



At the time of the census, of those who specified their hours, over 40% worked approximately full-time and 12% worked more than 48 hours. Those who worked less than the standard work week comprised 42% of the EAP. The difference of summing these figures corresponds to the unemployed.

The data show a significant amount of full-time employment but with an equal amount of part-time employment. It is not clear why there is such an even split among employment lengths. Seasonal employment in agriculture may explain a certain degree of less than full-time employment and another

portion may be accounted for in the trade and service industries which have a high turnover rate and part-time jobs. The large maquiladora industry accounting for over 30% of employment in manufacturing, may be responsible for many of the full-time positions (Ladman 1975 and Farell 1984).

**\* Unemployment**

The definition of an unemployed person in the 1980 General Population Census for Baja California, is any person 12 years of age or older who does not have a job but tried to obtain one a week before the survey. The 1980 Census reports that 1143 economically active people are unemployed. This corresponds to a rate of less than 1% (.007%). However, the definition of an employed person suggests that this unemployment figure is underestimated. It is not clear that many people classified as employed under this system, are necessarily working at all times throughout the year. It is doubtful that the unemployment rate is as low as the official census figure indicates.

Evidence pointing to underestimation is found in Figure IX. The data for hours worked reports a figure of 10,504, who worked less than one hour during the week prior to the census. This figure in combination with the census unemployment figure, yields an unemployment rate of 6.8% which is more consistent with past unemployment figures (6.3% for 1960 and 5.4% for 1970).

**\* Underemployment**

Figure X shows that underemployment in the region is quite significant for all workers but, especially so for women. The

data show weekly hours worked (for the week prior to the census) for the total labor force and by gender. Based on a full-time equivalent of a 48 hour week, 26.6% of the total work force was underemployed in 1980. For women this rate is much higher accounting for almost a third (28.9%) of the working women while men experience a 25.7% underemployment rate.

FIGURE X

UNEMPLOYMENT AND UNDEREMPLOYMENT OF ECONOMICALLY ACTIVE POPULATION BY GENDER AND HOURS  
(1980 CENSUS)

	TOTAL	FULL-TIME EQUIVALENTS	WOMEN	FULL-TIME EQUIVALENTS	MEN	FULL-TIME EQUIVALENTS
MEXICALI COUNTY	170675	103698.80	49277	27977.82	121398	75720.98
DIDN'T WORK	10504	0.00	2815	0.00	7689	0.00
LESS THAN 1 HOUR	199	4.15	64	1.33	135	2.81
FROM 1 - 8 HOURS	5730	537.19	2036	190.88	3694	346.31
FROM 9 - 14 HOURS	6152	1473.92	1851	443.47	4301	1030.45
FROM 15 - 16 HOURS	1400	452.08	404	130.46	996	321.63
FROM 17 - 24 HOURS	5571	2379.28	1992	850.75	3579	1528.53
FROM 25 - 32 HOURS	5696	3382.00	2152	1277.75	3544	2104.25
FROM 33 - 40 HOURS	23893	18108.64	7304	5554.98	16589	12614.55
FROM 41 - 48 HOURS	65341	60576.55	16730	15510.10	48611	45066.45
FROM 49 - 56 HOURS	9104	9104	2289	2289	6815	6815
MORE THAN 57 HOURS	7621	7621	1730	1730	5891	5891
UNSPECIFIED	29464		9910		19554	
PERCENT UNEMPLOYED	6.2%					
TOTAL EMPLOYMENT	141211.0		39367.0		101844.0	
TOTAL FTE	103698.8		27977.8		75721.0	
DIFFERENCE	37512.2		11389.2		26123.0	
PERCENT UNDEREMPLOYED	26.62		28.92		25.72	

Source: X General Population Census for Baja California (INEGI and SPP)

A similar format is used for estimating the regional underemployment rate in 1970 (Ladman 1975) although, the census data in this case, uses monthly figures by sector for the

region. Ladman's study yields a figure of 22.6% for the total workforce and a 28.4% rate for the agricultural sector (there are no gender figures for this period).

The 1980 figure surpasses the 1970 estimate for the total workforce reflecting a significant degree of under-employment in the Mexicali Valley. Due to a change in format, 1980 sectoral figures cannot be given. In any case, Ladman believes that his figures underestimate true underemployment in the region because it is not clear that people who worked full-time or more, did so throughout the year. It is conceivable in this light, that a weekly estimate would be similarly under-estimated.

In the case of agriculture, the seasonal nature of its employment precludes an accurate yearly estimate. Nevertheless, the fact that production is constrained by tight water supplies, makes it fair to say that the majority of workers in this sector are not employed full-time on a year round basis.

#### \*Wages

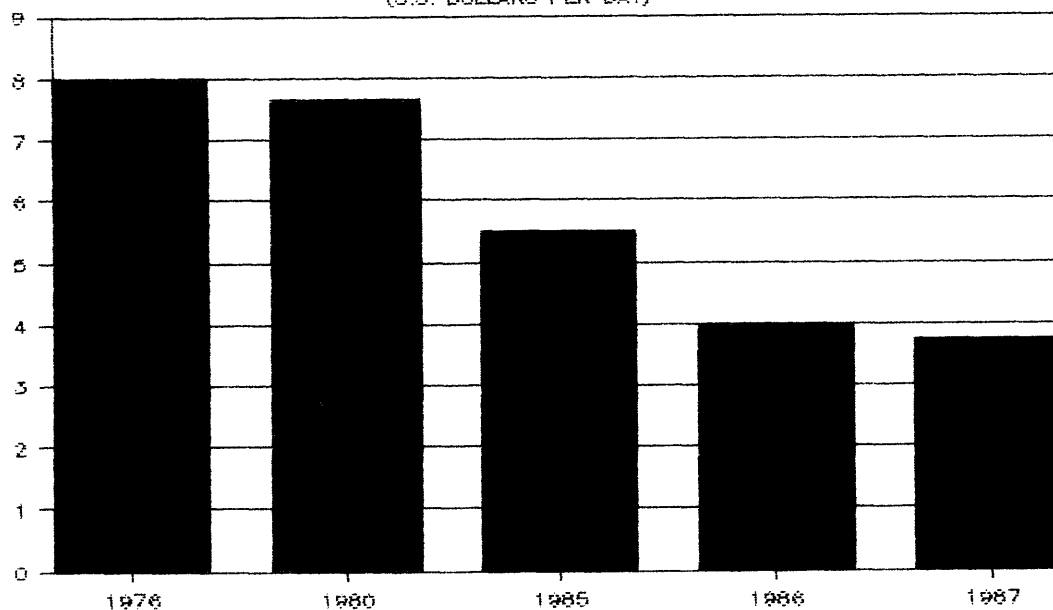
Minimum wages in Mexico are established by the federal office of the National Commission of Minimum Wages based on an eight hour day throughout 111 economic zones in the country. The standard for individual zones is founded in what is considered to be the necessary wage for workers (and their families) to have the minimum acceptable level of living. An "acceptable minimum" is determined by local price levels and customs. The general minimum refers to unskilled labor whereas professional, para-professional and specialized employment minimums average

about one and half times more.

In 1980, the minimum daily wage in the Mexicali Valley was 180 pesos or \$7.75 U.S. equivalents. After the drastic peso devaluation in 1982, minimum daily wages dropped in value by almost 40% and in 1987 fell to less than half of the 1980 figure in terms of purchasing power in the U.S. (Figure XI). The scarcity of local industries producing quality consumer goods makes the ability to purchase U.S. products a fundamental necessity in the Mexicali Valley border region, for consumers and merchants alike.

FIGURE XI

HISTORY OF MEXICAN MINIMUM WAGE  
(U.S. DOLLARS PER DAY)



SOURCE: Industrial Development Commission of Mexicali

\* Income

The 1980 Census does not contain figures for the median family income nor for the total income earned by the economically

active population. There is however, data on income brackets by share of population in these categories (Figure XII).

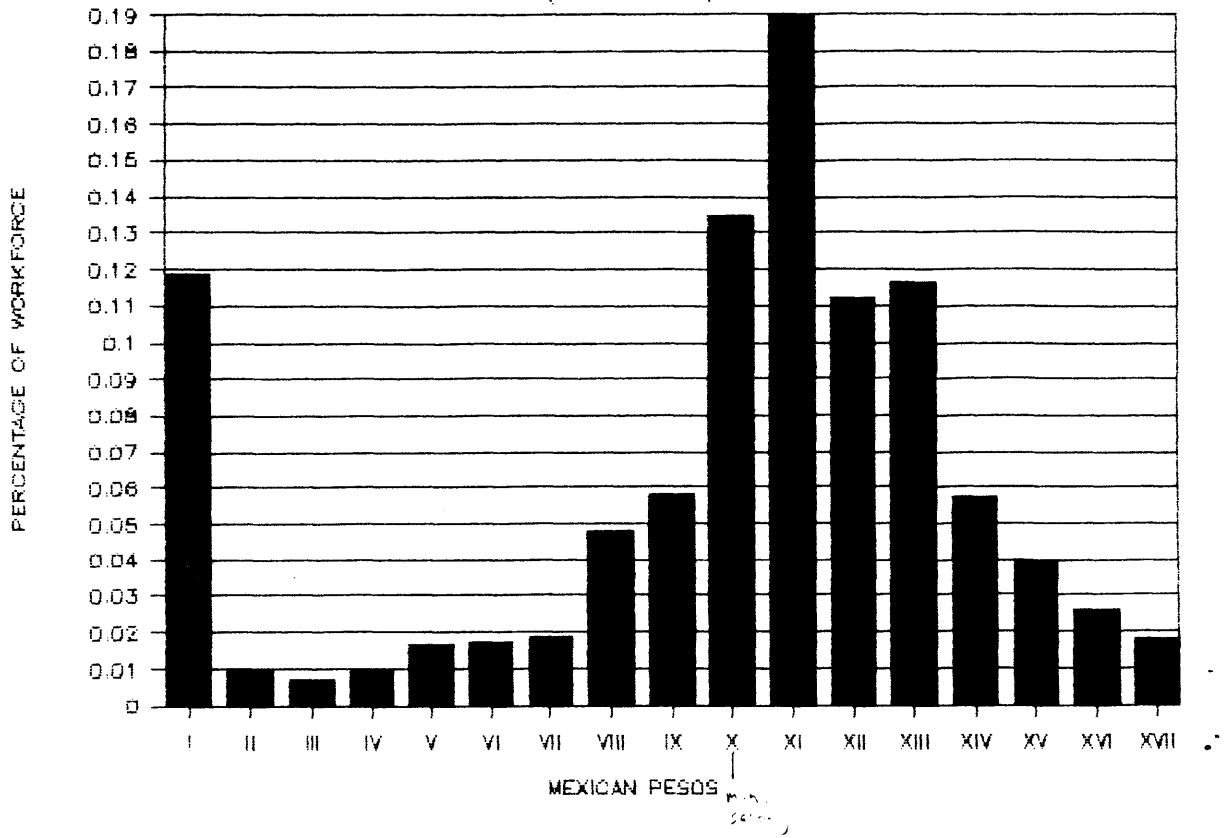
Based on the minimum wage of 180 pesos a day for 1980, the average monthly minimum salary would be 4320.00 pesos (under conditions of full time employment). Excluding the unspecified category, 44% of the economically active population were earning this minimum or below during the time of the 1980 Census. Fifty-six percent of the population was earning above this minimum mark despite the fact that only 12% of the economically active were working more than 48 hours a week. This points to the conclusion that average wages are higher than the federally set general minimum, possibly indicating that a significant degree of the working population is skilled or semi-skilled.

Income data for the agricultural sector show that 60% of this workforce earns up to the monthly minimum wage. This supports the idea that employment in agriculture continues being less than full-time for most employees and/or of unskilled nature.

FIGURE XII

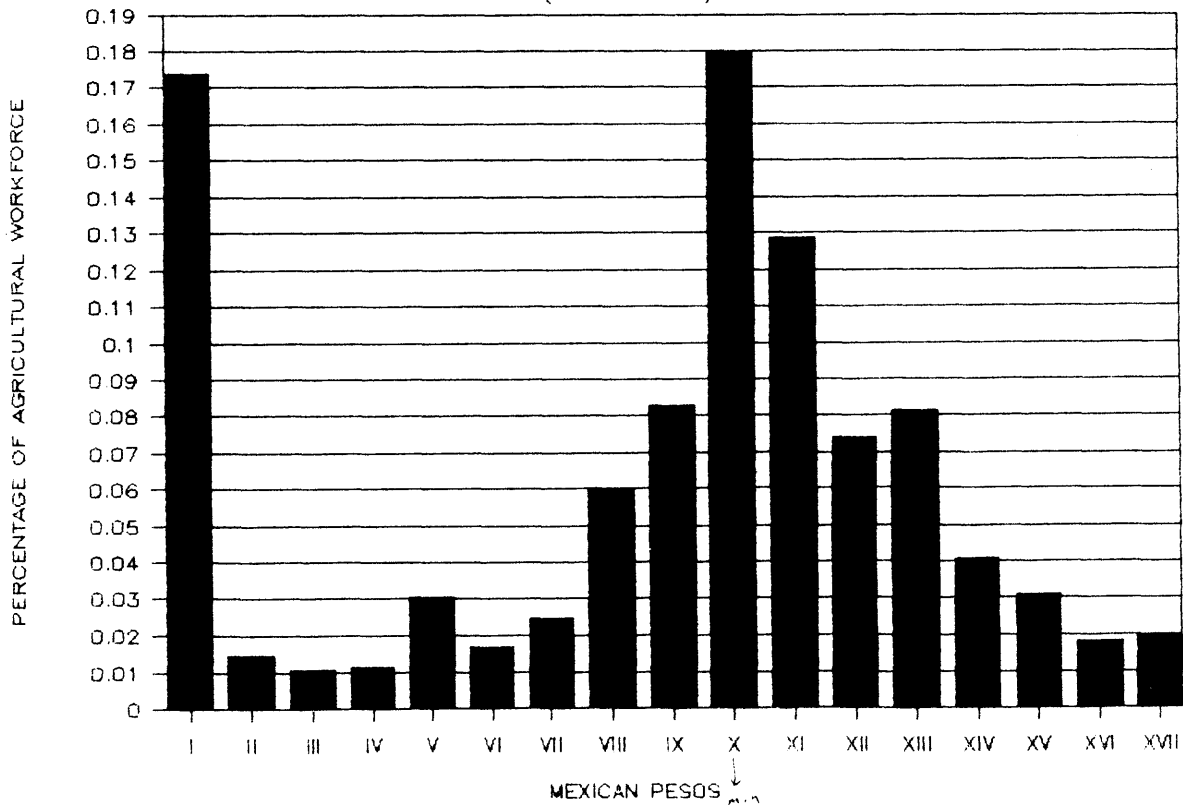
MONTHLY INCOME OF TOTAL WORKFORCE

(1980 CENSUS)



MONTHLY INCOME FOR AGRICULTURAL SECTOR

(1980 CENSUS)





INCOME OF ECONOMICALLY ACTIVE POPULATION BY SECTOR (1980 CENSUS)

	U.S. \$ Equivalent *	Economically Active Population	Cum. %	Agriculture, Livestock, Hunting and Fishing	Cum. %	Mining	Manufacturing	Utilities (Electricity, Gas, and Water)	Construction
MEXICALI COUNTY TOTAL		170675		22974		189	19283	884	9879
EXCLUDING UNSPECIFIED CATEGORY		139130		17232					
RECEIVED NO INCOME		16536	11.89%	2998	17.40%	25	1376	30	866
1 - 435 PESOS (<04 - 18.71)		1433	12.92%	251	18.85%	1	110	1	71
436 - 590 PESOS (18.75 - 25.38)		952	13.60%	186	19.93%	1	70		39
591 - 800 PESOS (25.42 - 34.41)		1361	14.58%	195	21.07%		133	5	72
801 - 1080 PESOS (34.45 - 46.45)		2366	16.28%	528	24.13%	1	154	2	129
1081 - 1460 PESOS (46.50 - 62.80)		2454	18.04%	291	25.82%	6	265	2	167
1461 - 1970 PESOS (62.84 - 84.73)		2606	19.92%	431	28.32%		242	7	132
1971 - 2670 PESOS (84.77 - 114.84)		6680	24.72%	1036	34.33%	5	607	10	282
2671 - 3610 PESOS (114.88 - 155.27)		8066	30.51%	1425	42.60%	4	734	14	413
3611 - 4890 PESOS (155.31 - 210.32)		18767	44.00%	3103	60.61%	29	2430	37	1491
4891 - 6610 PESOS (210.37 - 284.30)		26403	62.98%	2217	73.47%	32	4452	53	1895
6611 - 8950 PESOS (284.34 - 384.95)		15601	74.19%	1274	80.87%	17	1922	85	978
8951 - 12110 PESOS (384.99 - 520.86)		16251	85.87%	1402	89.00%	14	1406	130	652
12111 - 16390 PESOS (520.90 - 704.95)		7958	91.59%	706	93.10%	6	607	135	240
16391 - 22170 PESOS (704.99 - 953.55)		5540	95.58%	536	96.21%	3	413	131	162
22171 - 30000 PESOS (953.59 - 1290.32)		3645	98.20%	312	98.02%	5	262	119	131
30001 AND ABOVE PESOS (Over 1290.37)		2511	100.00%	341	100.00%	8	227	46	87
UNSPECIFIED		31545		5742		32	3873	77	2072

	U.S. \$ Equivalent	Trade	Transport	FIRE	Services	Insufficiently Specified	Unemployed
MEXICALI COUNTY TOTAL		20893	6847	4150	28857	55576	1143
RECEIVED NO INCOME		2065	518	159	2049	5886	564
1 - 435 PESOS (<04 - 18.71)		165	32	9	209	570	14
436 - 590 PESOS (18.75 - 25.38)		92	21	4	140	396	3
591 - 800 PESOS (25.42 - 34.41)		172	29	20	239	489	7
801 - 1080 PESOS (34.45 - 46.45)		239	51	4	294	953	11
1081 - 1460 PESOS (46.50 - 62.80)		301	84	20	380	937	1
1461 - 1970 PESOS (62.84 - 84.73)		295	76	20	460	939	4
1971 - 2670 PESOS (84.77 - 114.84)		806	199	63	1487	2175	10
2671 - 3610 PESOS (114.88 - 155.27)		994	266	79	1400	2730	7
3611 - 4890 PESOS (155.31 - 210.32)		1884	697	157	1945	6978	16
4891 - 6610 PESOS (210.37 - 284.30)		3724	1325	414	3305	8977	9
6611 - 8950 PESOS (284.34 - 384.95)		1913	819	533	2561	5493	6
8951 - 12110 PESOS (384.99 - 520.86)		1730	807	816	3905	5386	3
12111 - 16390 PESOS (520.90 - 704.95)		810	259	441	2275	2479	0
16391 - 22170 PESOS (704.99 - 953.55)		682	181	379	1524	1529	0
22171 - 30000 PESOS (953.59 - 1290.32)		447	88	260	983	1037	1
30001 AND ABOVE PESOS (Over 1290.37)		316	57	221	552	656	0
UNSPECIFIED		4258	1338	551	5149	7966	487

	RECEIVED NO INCOME
I	1 - 435 PESOS
II	436 - 590 PESOS
III	591 - 800 PESOS
IV	801 - 1080 PESOS
V	1081 - 1460 PESOS
VI	1461 - 1970 PESOS
VII	1971 - 2670 PESOS
VIII	2671 - 3610 PESOS
IX	3611 - 4890 PESOS
X	4891 - 6610 PESOS
XI	6611 - 8950 PESOS
XII	8951 - 12110 PESOS
XIII	12111 - 16390 PESOS
XIV	16391 - 22170 PESOS
XV	22171 - 30000 PESOS
XVI	30001 AND ABOVE PESOS
XVII	

Source: X General Population Census for Baja California (INEGI and SPP)

\* - 12 month average peso/dollar exchange rate for 1980 was 23.25

PESO-DOLLAR EXCHANGE RATE 1930 - 1982  
(In U.S. \$ units)

Year /1		Year /1		Year /2	
1930	2.006	1960	12.491	1976	August 19.95
1931	2.467	1961	12.491	1977	December 22.74
1932	3.492	1962	12.491	1978	December 22.73
1933	3.464	1963	12.491	1979	December 22.80
1934	3.605	1964	12.491	1980	December 23.25
				1981	December 26.23
		1950	8.643		
1935	3.560	1951	8.649	1982	January 26.47
1936	3.602	1952	8.630		February 31.74
1937	3.604	1953	8.615		March 45.37
1938	4.520	1954	11.047		April 46.15
1939	5.181				May 46.90
		1965	12.491		June 47.71
1940	5.392	1966	12.491		July 48.59
1941	4.869	1967	12.491		August 90.18
1942	4.862	1968	12.491		September 101.86
1943	4.860	1969	12.491		October 109.83
1944	4.859				November 130.61
		1970	12.491		December 147.35
1945	4.859	1971	12.491		
1946	4.859	1972	12.500	1983	December 161.35
1947	4.860	1973	12.500	1984	December 210.70
1948	5.320	1974	12.500	1985	December 454.00
1949	7.924	1975	12.500	1986	February 773.00
					December 950.00
1955	12.491			1987	February 1049.00
1956	12.491				March 1100.00
1957	12.491				April 1195.00
1958	12.491				August 1450.00
1959	12.491			1988	December 2275.00

/1 Source: United States Federal Reserve Bulletin 1930 - 1975 (12 month average)

/2 Source: Banco de Comercio de Baja California 1988

APPENDIX B

## VEGETABLE EXPORTS FROM THE MEXICALI VALLEY

YEAR	1982	1983	1984	1985	1986	1987
volume (kgs)						
garlic	899992	1114700	1160494	376543	1453302	2211995
celery	0	0	3900	2625	20763	304308
betabel	21586	96424	105782	63185	167471	98795
broccoli	0	17075	388833	45516	603971	816736
squash	0	375761	584677	1070515	421585	548150
pumpkin	7443571	4674673	9335323	5262319	7899043	7883900
onion	309868	5087047	2562732	3245075	3201641	8962141
scallions	15441257	19045041	20755863	27948867	21224722	8962141
cilantro	772014	4603655	5987117	7481393	12528484	5916298
cabbage	0	141770	512017	303798	228759	2239074
cauli flower	13133	161	0	35000	17211	23363
chayote	3178	19570	67724	193837	170549	697866
peas	270502	1199933	797341	796771	1306303	1015664
green pepper	270037	2478788	7093450	0	3664746	15546264
dried pepper	19465	3850	0	3442489	0	0
green beans	19044	248229	201615	355819	206409	626287
spinach	27788	347924	675376	132099	556814	549393
beans	0	0	0	546256	0	16866
lettuce	2051589	3443394	4536257	3402246	3609740	2782970
mustard	99052	193750	379154	99863	255875	129871
melon	298768	292042	1061427	1615352	3404094	1249379
turnip	79125	115785	154363	163253	263141	432917
napa	0	975	33256	0	596795	304470
cucumber	675525	107500	320922	1102239	3092053	3297455
parsley	34990	463798	656527	312478	411765	385087
quelite	108273	206330	488742	176415	32073	548193
radish	2809489	5343859	6475626	5626184	8263867	7096393
rapini	0	0	23430	33146	469107	879846
watermelon	1467980	260963	1150680	0	363634	1204087
tomato (ground)	27528422	36274335	70658045	51591212	43950715	101147267
tomatillo	108840	784207	3628806	10543095	3342089	6240303
carrots	0	282080	96488	111777	34403	28442
TOTAL	60773088	87248633	139773067	126300363	122231324	132137551

Source: Horticultural Inspection Agency (Vegetal Sanidad)

VEGETABLE IMPORTS INTO THE HEXICAL VALLEY

YEAR	1982	1983	1984	1985	1986	1987
garlic	0	213719	2455	26301	19534	157193
celery	0	0	615712	575363	225727	514368
betabel	0	0	0	0	0	0
brucoli	0	4600	6350	10484	35636	59370
squash	0	0	0	0	0	0
pumpkin	3962	0	0	0	0	0
onion	23825	119010	648285	1285447	511508	987843
scallions	0	0	0	0	0	0
cilantro	0	0	113	199	0	0
cabbage	102	1250	0	100	0	0
cauliflower	9	2200	4900	9560	4973	16640
chayote	0	6000	0	0	0	0
peas	0	0	42344	59102	49650	46810
green pepper	0	0	3000	3733	22638	280046
dried pepper	0	0	0	0	0	0
green beans	0	500	0	50	0	1660
spinach	15	0	0	0	0	3164
beans	0	0	0	0	0	0
lettuce	0	6050	4570	350	3050	48874
mustard	0	0	0	0	0	0
mellon	1004	4600	0	0	0	201637
turnip	0	0	871	600	0	1525
napa	0	6955	62092	64060	19410	26602
papa	6085	48270	0	0	0	0
cucumber	10604	6700	39912	2000	0	11
parsley	0	390	0	0	44	943
puerro	0	0	0	1572	0	0
quelite	0	0	0	0	0	0
radish	6106	0	0	0	0	9775
rapim	0	0	0	0	0	0
watermelon	1099	0	0	0	0	114
tomato (ground)	3350	0	0	0	0	0
tomatillo	0	0	0	0	0	0
carrots	64104	19400	0	11810	0	3673
TOTAL	120295	439644	1430644	2050731	891567	2360248

Source: Horticultural Inspection Agency (Vegetal Sanidad)

UTILIZATION OF PRODUCTION COSTS BETWEEN THE MEXICALI AND IMPERIAL VALLEYS  
1985 - 1986 CYCLE (IN U.S. DOLLARS)

CROP	COST PER HECTARE			YIELD (TON/HA.)			PRICE PER UNIT		
	Imperial	Mexicali	DIFFERENCE	Imperial	Mexicali	DIFFERENCE	Imperial	Mexicali	DIFFERENCE
Wheat	1002	297	705	6.8	4.5	2.3	165	116	49
Cotton	2837.49	614.2	2223.3	6.2	4.14	2.1	385	249	136
Rifalfa	1808.98	264.1	1544.9	22.3	4.14	9.8	90	52.8	37.2
Asparagus	11150	2968	8102	3.12	3.4	-0.8	1972.02	2040.7	-68.68

Source: UC Cooperative Extension and Banamex

## BIBLIOGRAPHY

## A. Published Sources

- City of Mexicali, In-Bond or Maquiladora Industry Handbook 10th Edition, 1988. Industrial Development Commission of Mexicali.
- Dos Santos, Theotonio. "The Structure of Dependence", American Economic Review (May), 1970, pp. 231-236.
- Farrell, Mike. "The Economy of Baja California" in Peter L. Reich, ed., Statistical Abstract of the United States-Mexico Borderlands. Statistical Abstract of Latin America Supplement 9. Los Angeles: University of California, Los Angeles, Latin American Center Publications, 1984.
- Goldberg, Ray A. Agribusiness Management for Developing Countries-Latin America, Cambridge, MA: Ballinger Press, 1974.
- Government of Baja California. Estadística de Frutas y Hortalizas, Ciclos 1970 - 1985, Secretaria de Agricultura Y Recursos Hidraulicos, Subdelegacion de Planeacion Programa de Estudios, Meteorologia y Estadística. Mexicali.
- Informe de Produccion Agricola, Ciclos 1970 - 1985, Secretaria de Agricultura Y Recursos Hidraulicos, Distrito de Riego #14, Rio Colorado - Zona Valle Mexicali, Jefatura de Estadística.
- Manual de Estadísticas Basicas del Estado de Baja California. Delegacion de la Secretaria de Programacion y Presupuesto. Mexicali, 1983.
- Imperial County, Guide Lines to Production Costs and Practices - Vegetable Crops. Cooperative Extension, University of California, El Centro, 1987.
- Ladman, Jerry. "The Development of the Mexicali Regional Economy: An Example of Export Propelled Growth." Occasional Paper #11, Bureau of Business & Economic Research, College of Business Administration. Tempe: Arizona State University, 1975.
- Mares, David. "Agricultural Trade: Domestic Interests and Transnational Relations" in Jorge I. Dominguez, ed. Mexico's Political Economy: Challenges at Home and Abroad. London: Sage Publications, 1982.

Mauleon, Jose Ramon. "Politiclas Nacionales y Agricultura en la Frontera: Estudio Comparativo de Baja California y Pais Vasco," Estudios Fronterizos #10 - 11, Vol. IV, May - August, September -December, 1986, pp. 97 - 128.

Mexico, Secretaria de la Economia Nacional, Direccion General de Estadistica. Censo General de Poblacion, III - X, Estado de Baja California. Mexico, D.F. 1920 - 1983.

-----Comision Nacional de los Salarios Minimos. Salarios Minimos 1978 - 1988. Mexico, D.F.

-----Instituto de Estadistica Geografica e Informatica (INEGI) y Secretaria de Programacion Y Presupuesto (SPP). Sistema de Cuentas Nacionales de Mexico: Estructura Economica Regional Producto Interno Bruto por Entidad Federativa 1970, 1975, 1980. Mexico, D.F.

Montano, Jorge Garcia. "Diagnostico de Largo Plazo de la Economia de Baja California, 1950 - 1980." Working Papers in Economic Studies, #4. Tijuana: Autonomous University of Baja California, 1987.

North, Douglas. "Location Theory and Regional Economic Growth." Journal of Political Economy. June, 1955, pp. 243-258.

Rama, Ruth. "Do Transnational Agribusiness Firms Encourage the Agriculture of Developing Countries? The Mexican Experience", International Social Science Journal, UNESCO, volume XXXVII, no. 3, 1985, pp. 331-343.

Richardson, Harry. Regional Economics. New York: Praeger Publishers, 1969.

State of California, Imperial County - Annual Planning Information 1988-1989. San Diego, Employment Development Department, May, 1988.

Whiteford, Scott. "Troubled Waters: The Regional Impact of Foreign Investment and State Capital in the Mexicali Valley" in Ina Rosenthal-Urey, ed. Regional Impacts of U.S.-Mexican Relations. Monograph Series #16, Center for U.S.-Mexican Studies, University of California, San Diego, 1986.

## B. Interviews

Agundez, Edward. Area Farm Advisor for the University of California Cooperative Extension. El Centro, CA, December, 1988 - April, 1989.

- Calleros, Ingeniero Jesus Roman. Researcher at the Colegio de la Frontera Norte, Mexicali. December 1988 - January 1989.
- Evans, Linda. Administrator of Commodity Inspection and Regulation Section of the Imperial County Agricultural Commissioner's Office. El Centro, April, 1989.
- Heredia, Licenciado Jesus Ruiz. Resource Librarian for the Secretaria de Programacion y Presupuesto, Delegacion Regional de Baja California, Mexicali. December, 1988 - April, 1989.
- Morris, Kevin. Administrator in charge of vegetable reports for Market News, El Centro office. El Centro, April, 1989.
- Quiñones, Licenciado Luis A. Vizcarra. Director of the Program for Meteorological and Statistical Studies for the Baja California State Delegation of the Secretary for Agriculture and Hydraulic Resources (SARH), Mexicali. December, 1988 - April 1989.
- Stamatis, M. G. Marta Maldonado. Researcher at the Autonomous University of Baja California, Mexicali. December, 1988 - January, 1989.



## REFERENCES

- Batra, Roger. "Capitalism and the Peasantry in Mexico." Latin American Perspectives: Mexico in the Eighties, issue 32 (Winter 1982): volume IX, number 1, pp. 36-47.
- Barkin, David and Gustavo Esteva. "Social Conflict and Inflation in Mexico." Latin American Perspectives: Mexico in the Eighties, issue 32 (Winter 1982): volume IX, number 1, pp. 48-63.
- Chavez, Adolfo. Food Distribution, Consumption, and Price Policies in Mexico, in Giorgio Solimano and Lance Taylor, editors, Food Price Policies and Nutrition in Latin America. The United Nations University, 1980.
- del Castillo, Gustavo and Rosario Barajas de Vega. U.S.-Mexican Agricultural Relations: The Upper Limits of Linkage Formation, in William P. Browne and Don F. Hadwiger, editors, World Food Policies: Toward Agricultural Interdependence. Boulder, CO: Lynne Rienner Publishers, 1986.
- Frank, Andre Gunder. The Development of Underdevelopment. New York: Monthly Review, 1966.
- Fox, Jonathan. Popular Participation and Access to Food: Mexico's Community Food Councils, 1979-1986. Forthcoming in: Scott Whiteford and Ann Ferguson, editors, Food security and Hunger in Central America and Mexico. Boulder: Westview Press, 1988.
- Johnston, Bruce F. and Peter Kilby. Agricultural and Structural Transformation: Economic Strategies in Late-Developing Countries, New York: Oxford University Press, 1975.
- Moore-Lappe, Frances and Joseph Collins. Food First: Beyond the Myth of Food Scarcity. New York: Ballantine Books, 1979.
- Redclift, Michael. Development Policymaking in Mexico: the SAM. London: University of London Press, 1981.
- Roberts, K. Michael, C. Michael Schwartz, Michael S. Stohl and Harry R. Targ. The Policy Consequences of the Green Revolution: The Latin American Case, in William P. Browne and Don F. Hadwiger, editors, World Food Policies: Toward Agricultural Interdependence. Boulder, CO: Lynne Rienner Publishers, 1986.

Sanderson, Steven E. The Complex No-Policy Option: U.S. Agricultural Relations With Mexico. Paper presented at the Binational Consultation on U.S.-Mexican Agricultural Relations, San Diego, February 25-27, 1981.

-----The Receding Frontier: Aspects of the Internationalization of U.S.-Mexican Agricultural Production and Their Implications for Bilateral Relations in the 1980's. Working papers in U.S.-Mexican Studies, number 15. La Jolla: University of California Press, 1981.

-----The Transformation of Mexican Agriculture: International Structure and the Politics of Rural Change. Princeton, NJ: Princeton University Press, 1986.

Vogeler, Ingolf. The Myth of the Family Farm: Agribusiness Dominance of U.S. Agriculture. Boulder, CO: Westview Press, 1981.