

TRADE LIBERALIZATION AND AGRICULTURE

How did NAFTA affect the Mexican corn industry?

INTRODUCTION

NAFTA, or the North American Free Trade Agreement, took effect on January 1, 1994 and progressively eliminated most trade and investment barriers between the United States, Mexico, and Canada. Since NAFTA was implemented, agricultural trade between these three countries has more than doubled (1).

Critics have pointed out that, while trade tariffs were eliminated, government agricultural subsidies remain. For commodity crops such as corn, US government subsidies are significantly larger than Mexican subsidies. The United States has significant impact on the international price of corn because the US is the largest producer and exporter of the crop. However, due to large government subsidies, the production cost of corn for US farmers is much higher than the international price of corn. When the Mexican government eliminated the import tariff on corn after NAFTA was implemented, Mexican corn imports increased significantly and the domestic price of corn decreased (2).

In this analysis, I assess how trade liberalization through NAFTA affected Mexican corn production. By looking at state-level data of corn harvest area, production quantity, production value, and yield, I created a scale that indicates overall positive or negative change in the corn industry after NAFTA was implemented.



METHODOLOGY

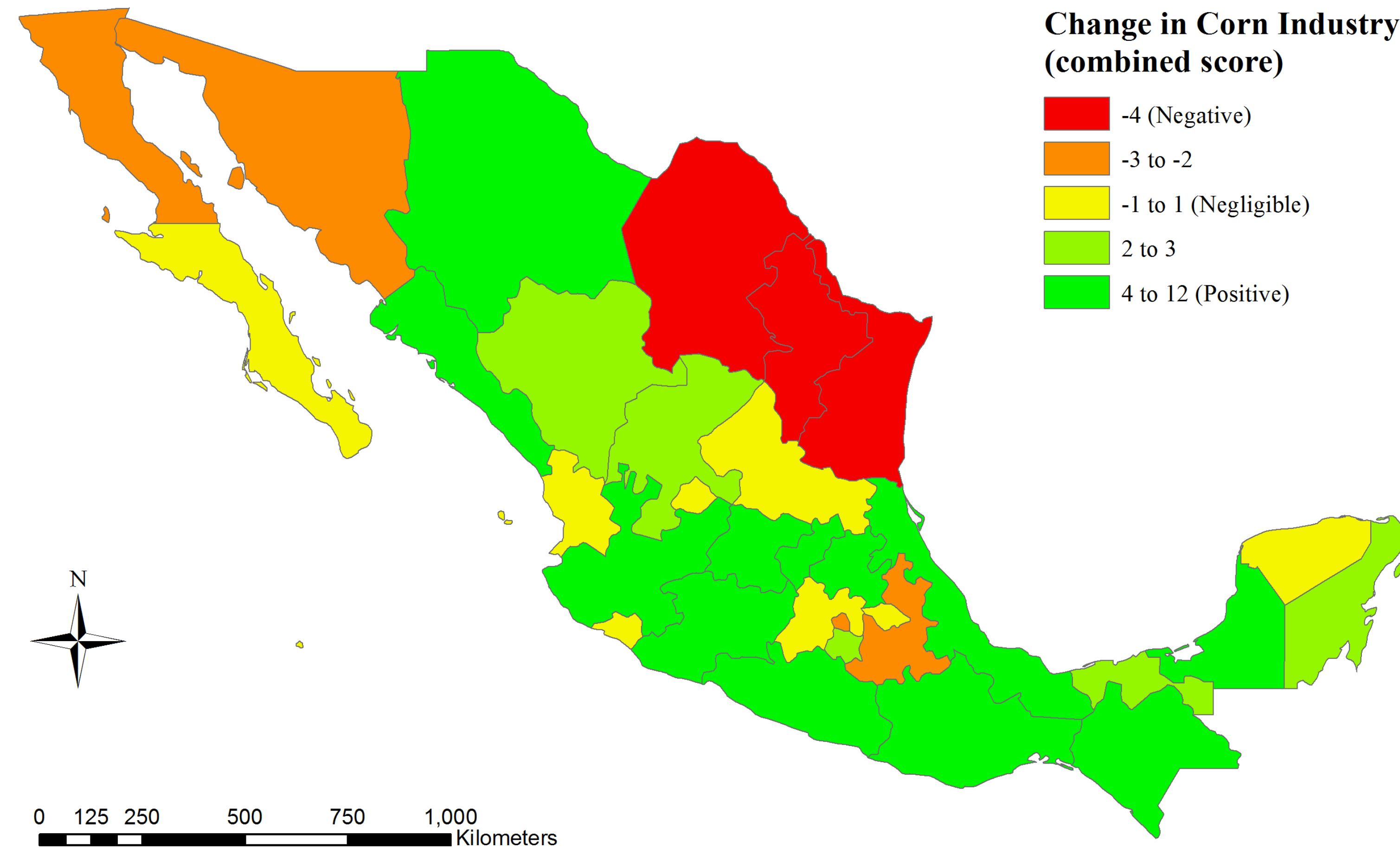
In this analysis, I utilized datasets about Mexican corn production by year and by state for the years 1990 to 2010. The variables examined include harvest area, measured in hectares; production quantity, measured in tons; production value, measured in thousands of Mexican pesos; and yield, measured in tons per hectare. I displayed these variables spatially through a shapefile of Mexico's federal states. I averaged the by-year values for each variable over four ranges of years: 1990-94, 1995-99, 2000-04, and 2005-10. Then, I calculated the change in each variable between the 1990-04 and 2005-10 and displayed these changes in four choropleth maps. The changes in each variable between these two time periods are illustrated in the series of small maps, where red indicates an average decrease, green indicates an average increase, and yellow indicates little or no change.

Next, I ranked the change in each variable by state between 1990-94 and 2005-10 on a scale from -3 to 3. For each variable, a negative value indicated a negative change in that variable, a positive value indicated a positive change, and a zero value indicated little or no change. Then, I averaged the four rankings for each state to create a cumulative rank score. This cumulative rank score indicated the magnitude of overall positive or negative change in the Mexican corn industry between the two time periods. The cumulative rank scores are illustrated in the large choropleth map, where red indicates a negative change, green indicates a positive change, and yellow indicates little or no change.

Finally, I displayed the country-wide changes by year in each of the four variables in a graph using Microsoft Excel in order to compare country-level and state-level changes.

References

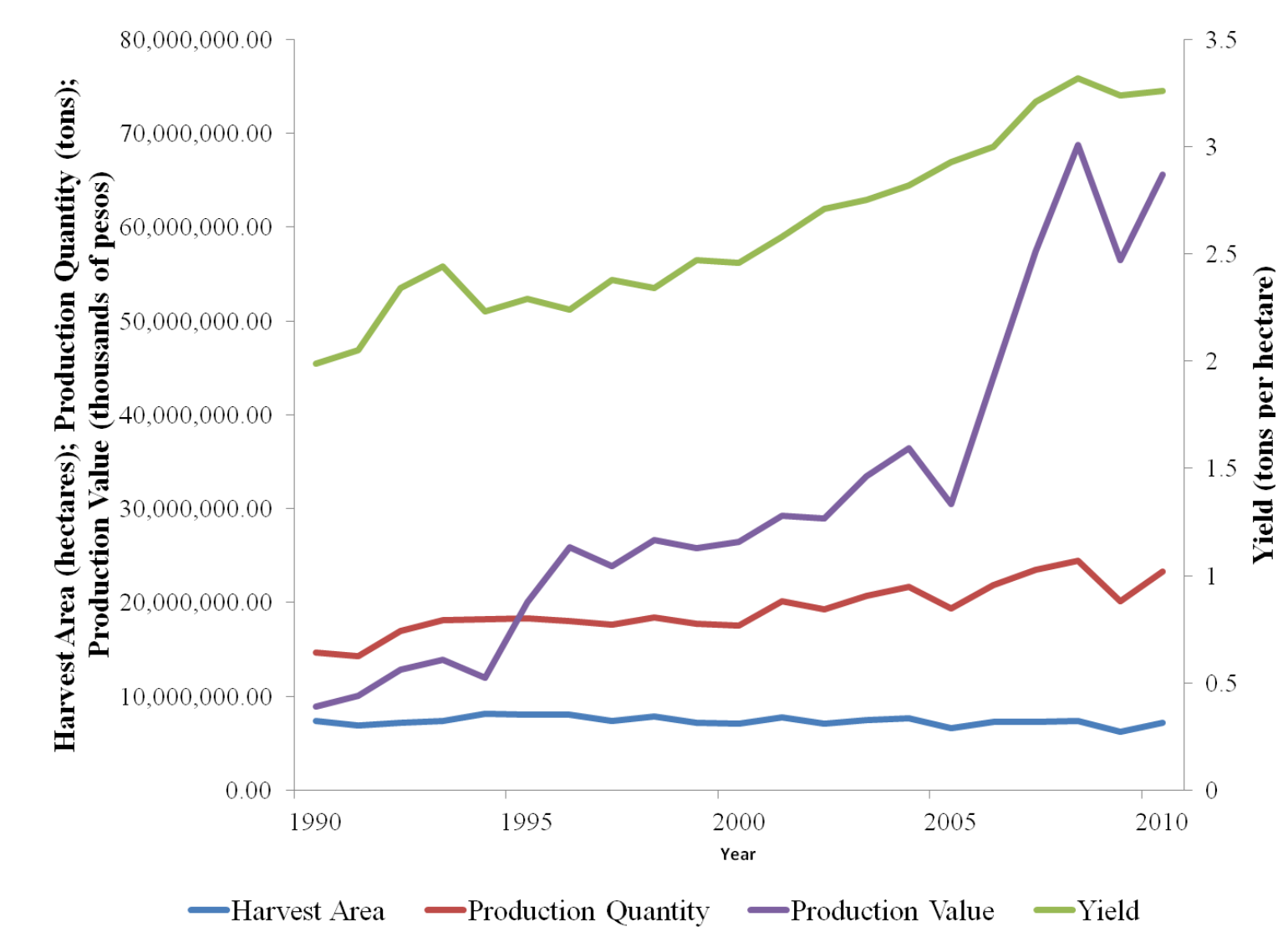
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RESULTS

The analysis indicates that changes in area harvested, production quantity, production value, and yield of corn were variable between regions and states within Mexico between 1990-94 and 2005-10. The area harvested stayed approximately the same country-wide during this period. However, there were large decreases in Sonora, Chihuahua, Tamaulipas, Jalisco, Zacatecas, Guanajuato, Mexico, and Puebla, and large increases in Campeche, Oaxaca, and Sinaloa. Production quantity increased slightly country-wide during this period, though this increase was not geographically uniform. There was a large decrease in Tamaulipas and large increases in Sinaloa, Jalisco, Michoacán, Guanajuato, Guerrero, and Veracruz. Production value increased significantly country-wide. Many states experienced very little change in production value, and there were large increases in Sinaloa and Jalisco. Yield also increased significantly country-wide. Most states experienced either a small decrease or no change in yield, and there was a large increase in yield in Sinaloa.

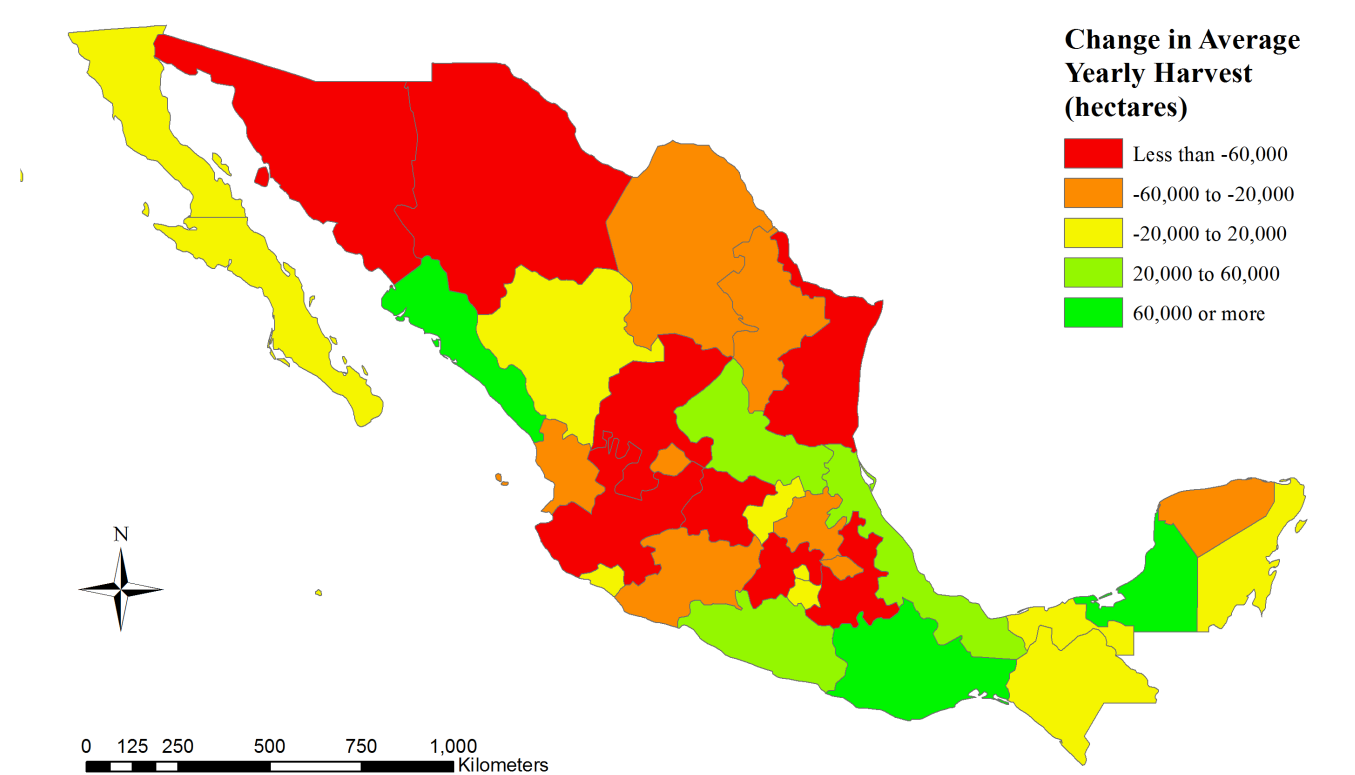
Overall, the most negative changes in the corn industry were seen in the northeastern states of Coahuila, Nuevo Leon, and Tamaulipas, and the most positive changes were seen in Chihuahua, Sinaloa, Jalisco, Michoacán, Guanajuato, Queretaro, Hidalgo, Guerrero, Veracruz, Oaxaca, Chiapas, and Campeche. Though there was overall positive change or no change in the variables measured on a country-wide scale, this analysis shows that the change in the Mexican corn industry between these two periods was far from uniform across the different states. Still, some critics point to Sinaloa and Jalisco, where there are many large industrial corn growers, as the main beneficiaries of trade liberalization (3). However, this analysis shows improvements in corn production in many other states as well.



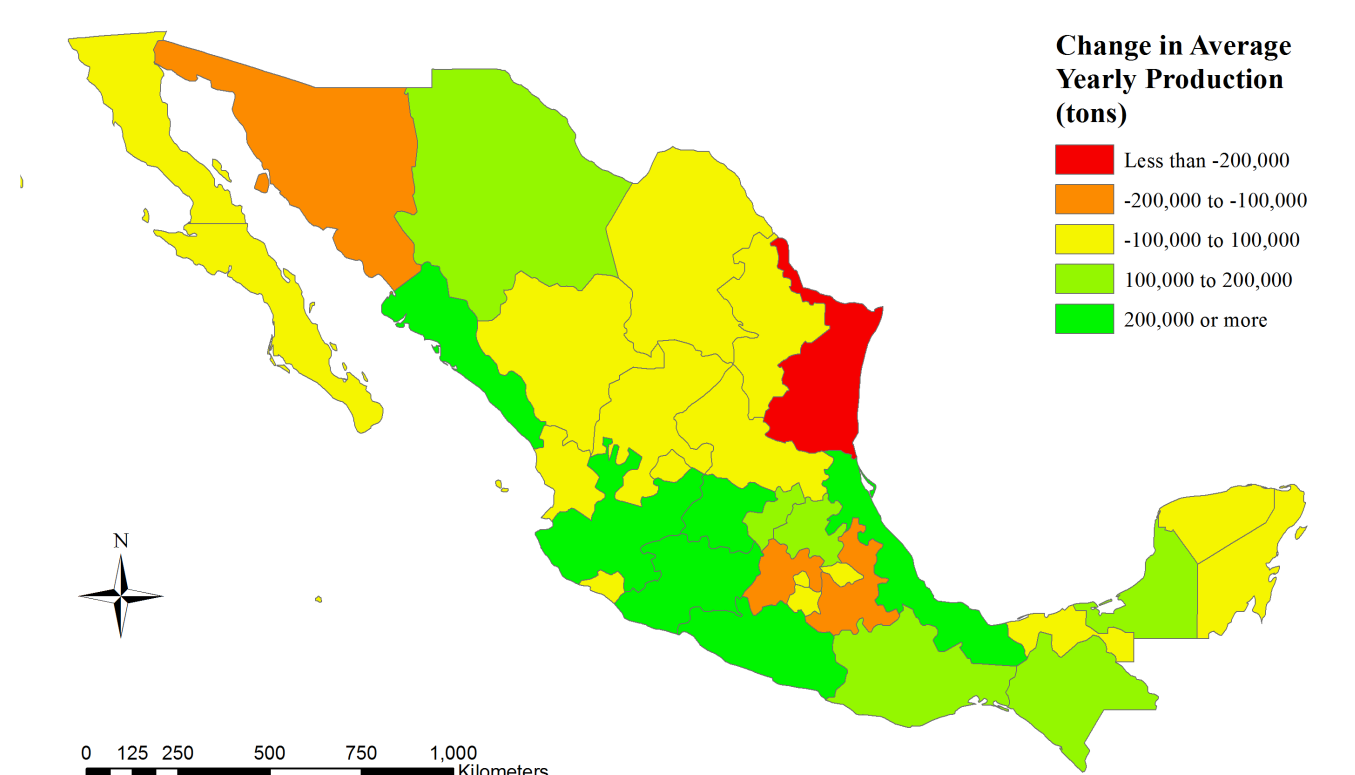
LIMITATIONS

There are some limitations to this analysis. The four variables chosen only portray effects on Mexican corn production. For a more robust analysis of industry-wide effects, one might include other variables, such as farmer income; proportion of farm income from off-farm sources; number of corn farmers; number of subsistence, smallholder, and indigenous farmers; and access to credit, loans, and subsidies. In addition, it would be interesting to repeat this analysis for other agricultural products that are commonly traded with the United States, such as fruits, vegetables, sugar, and meat.

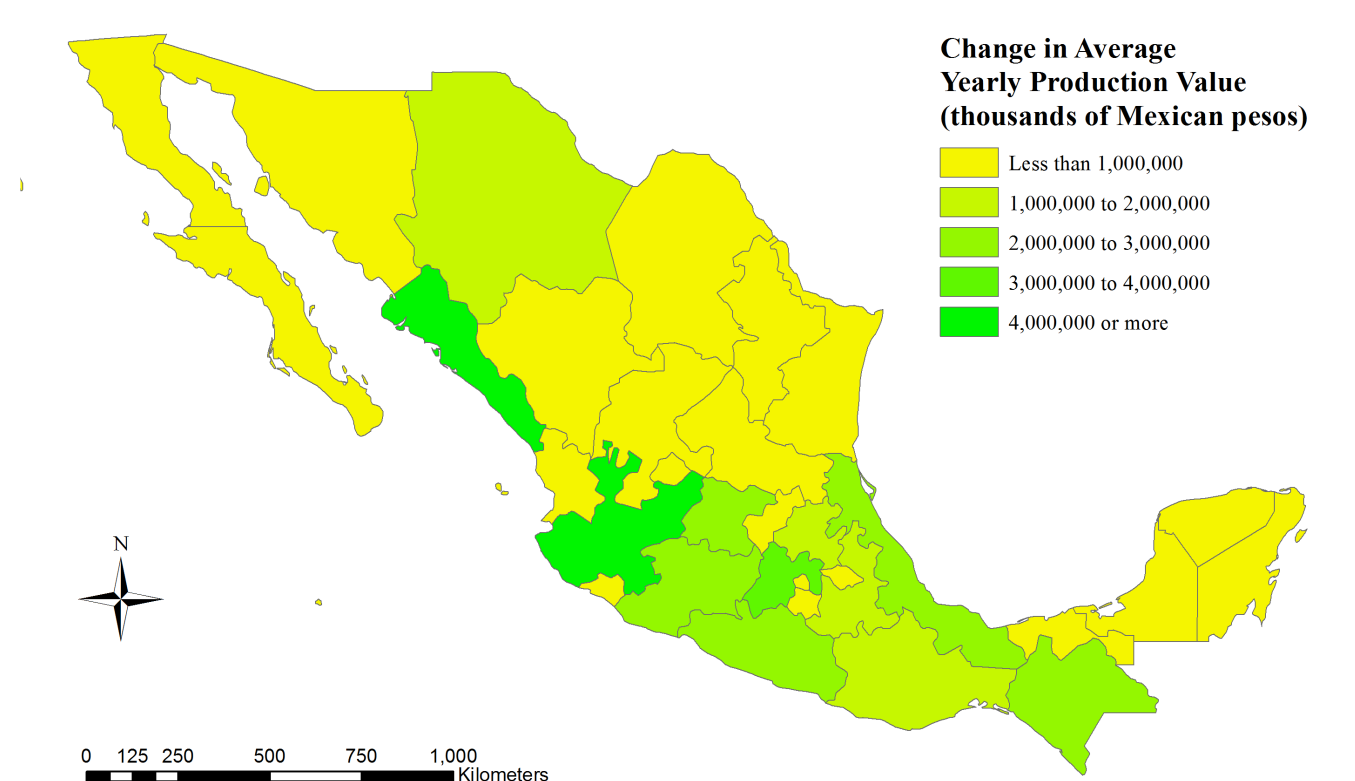
HARVEST AREA



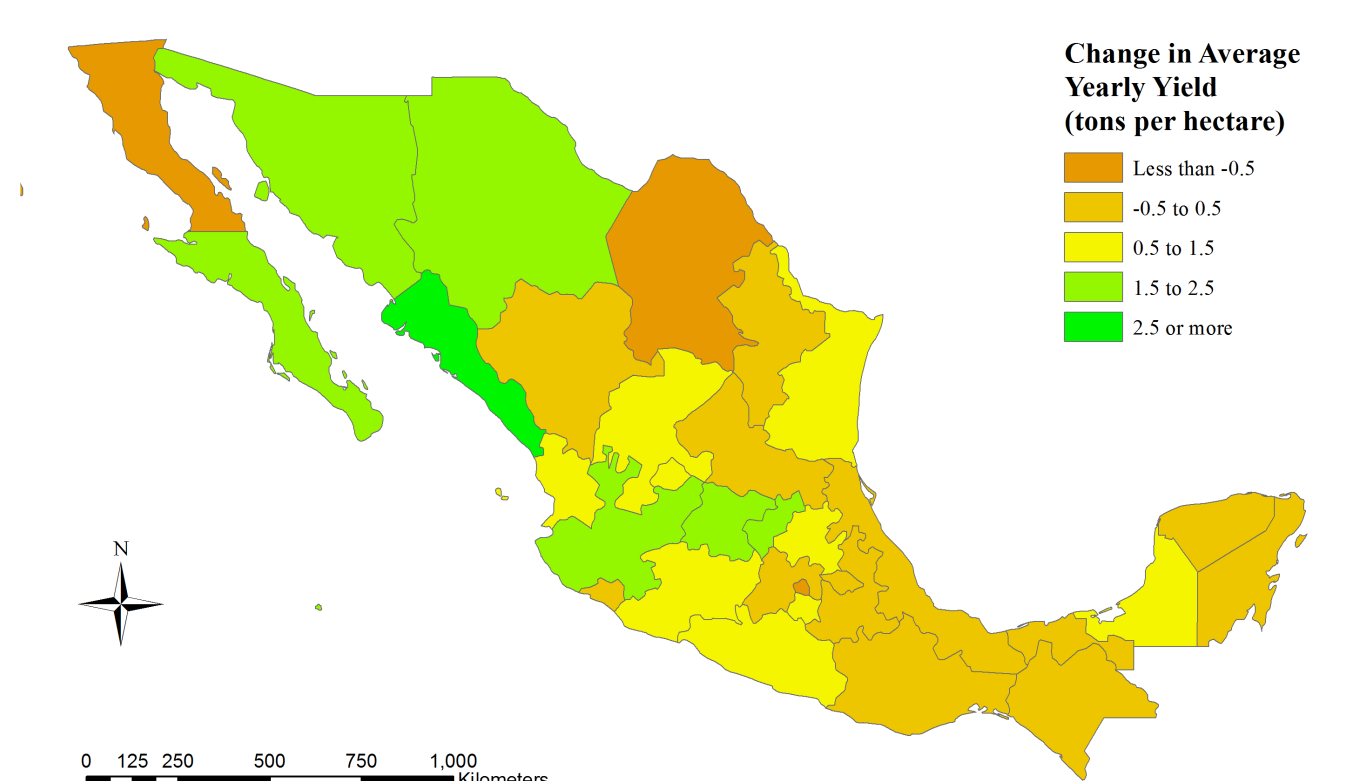
PRODUCTION QUANTITY



PRODUCTION VALUE



YIELD



Elena Martinez
April 30, 2014
Fundamentals of GIS
Coordinate System: WGS 1984
Scale: 1:15,000,000
Shapefile Source: GeoData@Tufts
Data Source: Servicio de Información
Agroalimentaria y Pesquera,
Estados Unidos Mexicanos

