

Aquifers and Agrochemicals in a Border Region: NAFTA Challenges and Opportunities for Mexican Agriculture

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The implementation of the North American Free Trade Agreement has markedly revitalized the framework of relations between Mexico and the United States. Among the major topics in the complex bilateral agenda are issues related to trade between the two countries, and also the impact of market liberalization on the present and future state of environmental sustainability.

The farming sectors of both countries have been particularly affected by the Agreement, given that, in general terms, NAFTA has meant the gradual opening of the Mexican grain market to American exports in exchange for the opening of the American market to Mexican exports of fruits and vegetables. While the Agreement's final impact will only become apparent once the tariff abolition process has concluded in 2009, it is foreseeable, given the economic disparity between the two countries, that the net result will not only include a further weakening of Mexican agriculture, but also a growing trade deficit and, consequently, a deepening of Mexico's economic dependency.

The processes of economic liberalization and the opening of markets experienced by the farming sector, which began with the signing of the agreements stipulated in NAFTA, have brought about transformations in the economic organization of the region, as well as environmental impacts due to exhaustive use of the area's natural resources. As for the latter, these are mainly related to the extraction of hydraulic reserves from aquifers and the extensive use of agrochemical products in the cultivation of various export crops destined for American markets.

Throughout a little over the past half century of its history, the farming region of La Costa de Hermosillo, located in the border state of Sonora, has demonstrated an marked dynamism in adapting to the various transformations which have affected rural areas. As such, it is an ideal region for studying the modernization policies aimed at revitalizing Mexican agriculture.

Due to the economic conversion processes instituted in the irrigated areas of La Costa de Hermosillo in recent years, this region now accounts for 57 per cent of the state's horticultural and fruit production. This enables it to generate 59 per cent of the total value of the state's exports in this sector and to directly employ around seven thousand workers a year. This entire transformation has been based on the intensive utilization of over one hundred types of pesticides and fertilizers, and the extraction of around 500,000 cubic meters of water a year.

The present paper attempts to develop an analysis of the principal business strategies developed by the different types of farming enterprises present in La Costa. These strategies have led to differentiation in the use of natural resources, particularly in relation to the exploitation of groundwater reserves and the use of agrochemical products.

This will make it possible to identify in greater detail the environmental impacts resulting from trade liberalization policies in a region with the following characteristics: a high level of technological development; viability based on the exploitation of a natural resource that is becoming increasingly scarce and degraded due to farming activity; and a high degree of integration with commercial networks connected with external markets.

In recent years, the search for a model of economic profitability that would generate comparative advantages in a continent-wide context has led the farming sector to shift largely from the traditional cultivation of grains and fibers, which for decades had predominated in La Costa, toward the cultivation of fruits and vegetables. Hence, a process of complete transformation of the region's economic structure has been accomplished, which not only implies new relations between social actors and the state, but also a marked intensification in the exploitation of natural resources.

These new phenomena reflect the broader adoption of border-area technological models, growing labor force specialization and a differentiated capacity to participate in international markets.

However, a new paradigm is now proving relevant to all of these factors: the degree of environmental sustainability of an agricultural model based on the exhaustive exploitation of underground hydraulic reserves and the growing utilization of biochemical substances that entail high health risks. This issue, minimized for years, will no doubt further complicate the question of regional development in the context of an open economy.

As foreseen, the coming into force of NAFTA has resulted in new standards of integration of those agricultural areas characterized by state-of-the-art modernization. Recent trends in La Costa are a clear demonstration of this type of integration.

Several factors have converted La Costa into an ideal region for the implementation of the most advanced border-area model of modern agriculture, a model that is open to the forces of capital. These include a new pattern of export-oriented cultivation, the creation of strategic associations between producers and financial and commercial actors from diverse regions of the country and abroad, and the institution of a land and water rights market that is unprecedented in the region.

In this framework, new trends may be observed in the area's production systems—reflecting the changes in the crops sown, i.e., mainly in favor of fruits and vegetables—such as the adoption of more efficient methods of irrigation and safer plant protection systems. In addition, a process of selection amongst rural economic units is apparent that clearly reflects the extent of social heterogeneity in the region.

This process of differentiation amongst the area's producers has led to the gradual elimination of a large number of farmers who were unable to continue farming due to problems of decapitalization. Simultaneously, concentration is occurring at different levels amongst the remaining producers. In some cases this concentration is characterized by processes of capital accumulation that tend to sharpen the degree of polarization in the area's agrarian structure.

To conduct this research, statistics on the irrigated areas of La Costa de Hermosillo have been compiled and analyzed that relate to the area's evolution in land and water ownership changes, patterns of production, final markets and production and marketing relationships. Furthermore, historical studies on the region have been reviewed, as have plat books and maps illustrating the regional transformations in recent years.

The study has also involved open-ended interviews with various officials involved in policies related to the exploitation of aquifers and with researchers who have investigated this issue, and on-site visits to farms and informal conversations with social sector leaders and private sector

representatives in order to compare points of view concerning the prospects faced by the different associations of farmers present in La Costa. Furthermore, the Census of Users has been reviewed to identify the distribution of water rights in the area.

Special interest has been given to regulation governing the use of toxic substances. Information pertaining to the production, sales, distribution and consumption networks of the agrochemical products utilized in the region has been compiled and organized, as has information on the disposal and final confinement of packaging and containers.

We analyze the impact that the new international trade rules have had on fossil groundwater reserves, as well as the direct and collateral effects of the exhaustive utilization of the chemical substances that enable the production of crops destined for the American and Canadian markets in fresh produce or for the canned and processed foods industries of both countries. The means employed includes document analysis, direct field work and the organization of a binational forum with the participation of agents active around this issue, including NGOs and governmental, private sector and academic institutions from the states of Baja California, Sonora, Chihuahua, Texas, New Mexico, Arizona and California.

This paper seeks to contribute to the defining of policies that consider models of sustainable use of aquifers, as well as the regulated use of pesticides and fertilizers, from a perspective based on environmentally sound regional development that is also economically sound and socially equitable.