

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

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The NAFTA Context

The paper begins by placing NAFTA in the context of globalization and Mexico in the context of NAFTA. Despite the fact that Mexico holds trade surpluses with Canada and the United States, the balance of trade in the agricultural sector has continued to worsen—to US\$5 billion in 2002. This is likely due in part to the difference in agricultural subsidies across the continent—it is reported that whereas US farmers receive on average US\$21,000 a year in subsidies, Mexican farmers receive US\$700. The number of people employed in the sector, as well as the sector's contribution to GDP, has also been decreasing since NAFTA came into force.

The Hermosillo Coast

The Hermosillo Coast or “La Costa” is found at the western extremity of the Sonoran Desert and is marked by a notable diversity of flora and fauna. Between 1945 and 1953 it was transformed by one of the most ambitious agricultural modernization projects in Mexico. The creation of Irrigation District 51 led to the drilling of almost five hundred deep wells, the clearing of tens of thousands of hectares and the opening up of communication to La Costa, thus forming the basis of the production of high-value horticultural crops. Agricultural production has changed a great deal over the past century. Whereas in the first decades of the century 80 percent of agricultural land was dedicated to wheat and cotton, these crops now comprise only 20 percent. Fruits and horticultural crops have risen from occupying 20 percent of the agricultural area to 46 percent, using 25 percent of the water, generating 65 percent of the revenues, and using 60 percent of (primarily migrant) agriculture labor (as opposed to grains that use 38 percent of the water, generate only 10 percent of the revenues, and create 7 percent of the jobs, with 54 percent of the area devoted to them). This expansion has taken place because of the profitability of these crops; technological innovation; the use of agrochemical inputs; investment in productive infrastructure, enabled by financing and commercialization programs; and the use of water for irrigation from aquifers.

The Aquifers

The use of water for irrigation has had an important impact on local aquifers. Since 1967 static subterranean water levels have dropped in some places by up to 70 meters, so that some areas are being affected by saline intrusion into the aquifers. Concern over the amount of water being used from the aquifers has led to a number of studies since the late 1960s.

The official annual recharge rate of fresh water into the aquifers was estimated in 1968 at 350 million cubic meters per year, a number that was used to help manage the subterranean resource. A more recent study that came out in 2000 has suggested that the actual recharge rate is 150 million cubic meters per year. A report by the same authors of the 2000 study, have also reported that the saline water front is moving inland increasingly quickly and is now found 35 kilometers within district 51. Official numbers report that actual water removal is around 400 million cubic meters per year, but others have estimated actual withdrawal rates to be around 600 million. The future result of the current use rates, warns the National Water Commission, will be the further dropping of water tables, the reduction in possible extraction rates, and increased salinization of aquifers.

The author believes that the change in the governance of these underground resources will make it difficult to adequately control withdrawals from these aquifers. In 1993, after 40 years of

federal control over the aquifers, the administration of the aquifers was concessioned by the National Water Commission as a result of the national water law of 1992, to the Users Association of Irrigation District 51. This organization, created for the farmers of the district, and (it is maintained by the author) which is dominated by a few of the wealthiest families of La Costa, received extraction rights of 409 million cubic meters per year for the next 20 years in 1993. With this concession they were the first producers in the country to have received a concession for national subterranean waters.

A particularity of this concession is that only the association, and not the individual producers, has rights to this water. The allocation and administration of rights is thus handled by the General Assembly of Associates. This discretionary system of water rights allocation has led to an unprecedented market in land and water rights.

It is reported that this has benefited primarily large export-oriented producers, at the cost of the gradual abandonment of agricultural activity of traditional “social organizations” (tenant farmers and ejidal producers), with the land and water use becoming more and more concentrated in the hands of fewer producers. Large producers have also been able to benefit because of agreements made with multinational companies to attract investment, obtain market access, and build capacity; and the ability to take advantage of government programs. This has resulted in the development of a sophisticated and high-quality, export-oriented production system not available to smaller individual and ejidal producers.

Of the 495 wells in the district, 405 are allocated to private producers and 90 to tenant and ejidal farmers. One-third of the tenant farmers, and all of the ejidal farmers, do not use their allocations. These allocations, if not used, are sold to operating farmers. The result is that private agriculture makes up 86 percent of the water extractions on La Costa. Thus, despite the fact that there are fewer and fewer producers and more abandoned wells, water consumption has remained steady and salinization has continued. Not only has production been concentrated into the hands of fewer producers, but evidence is provided that production has been concentrated along familial lines. For example, eight families are said to control half of all grape production in the region and three family names account for one-fifth of grape production. It is estimated that fifteen large families control around one-third of the most profitable production on La Costa, while 270 small and medium producers try to compete.

Government programs (such as the *Programa Alianza para el Campo*) are seen to have exacerbated this situation by providing subsidies for investment, thus helping the larger farmers better able to make investments.

Other Environmental Effects

The productive complex of La Costa has been based not only on irrigation, but also on high energy technological production packages whose inputs often come from a handful of foreign companies (11 agrochemical companies represent 78 percent of the Mexican market). In particular, there has been the increasing use of pesticides. This use has been regulated at the federal level by various agencies and departments at different times. With NAFTA it was necessary for Mexico to meet certain health standards which led to the creation of a state-level committee for the safe management and use of pesticides, fertilizers and toxic substances (*Comité Estatal de Seguridad para el Manejo y Uso de Plaguicidas—Coesplafest*), a committee made up of several departments, and various other stakeholders. This organization had control over import and agrochemical use authorizations, and was charged with the development of pesticide inventories and registers. In practice, however, it is reported that the organization lacked the coordination necessary to take on its tasks. One problem identified in this respect is in the control

of the disposal of pesticide containers. Whereas in the southern part of the state, a number of government agencies reached an agreement on the management and collection of 68 tonnes of pesticide containers, there is no system of management of toxic residuals in La Costa.

Agrochemicals have many health effects, but establishing the number of people affected and cases attributable to agrochemicals is reported to be difficult due to under-reporting caused by: human error, intentional under-reporting and technological problems (e.g., lack of analytical laboratories). As well, most studies focus on the southern part of the state. Problems associated with agrochemicals, apart from human health, including water and soil contamination, bioaccumulation and loss of biodiversity are said to be found in La Costa.

93 percent of irrigated lands are treated with fertilizer and three quarters are treated with pesticides. The state of Sonora reports that 266.6 tonnes of pesticides are applied in La Costa, a figure that the author believes underestimates actual application rates. These pesticides come (for the most part) from foreign companies and are wide-application pesticides that target many different pests. NAFTA removed tariffs from agrochemicals, and agrochemical companies are not required to report their commercial activities. However, with information provided from individual companies, the author reports that in 2000, total sales in this region amounted to 183 million pesos. Since 2002, companies are now required to provide information on the agrochemicals they sell to the Secretary of Public Health; however, proper processing of this information is impossible because of lack of sufficient resources.

In the past several years, due to the high costs of agrochemical inputs and increasing health restrictions, production patterns are changing. These changes involve the use of more specific herbicides, whereby producers try to decrease the frequency and size of applications of insecticides on foliage, trying to break infestation cycles by getting rid of host plants; as well as starting to adopt the concept of integrated pest management. Moreover, given the increasing demand for “green” goods in their export markets, agrochemical companies have begun developing biologically-based pest-control compounds.

(This study does not distinguish between effects since NAFTA came into force and effects due to it).