



INTERNATIONAL MIGRATION AND CHANGE IN LAND USE IN BELLA ESPERANZA, VERACRUZ

[MIGRACIÓN INTERNACIONAL Y CAMBIO DE USO DEL SUELO EN BELLA ESPERANZA, VERACRUZ]

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SUMMARY

An increase in international migration from the State of Veracruz, Mexico, in the decade of the 1990s, mostly occurred as a result of the agricultural crisis in the rural sector. The state coffee producing sector proved to be no exception to the impact of the recurring crises, caused by the fall in the price of coffee grain in the international market. Many coffee growers migrated to the USA to stave off their own economic collapse. This investigation aimed to analyze the relationship between the process of international migration and change in land use in the communal landholding of Bella Esperanza, Veracruz. For this purpose, historic documentation, interviews with 21 coffee producing families -some of which included migrants-, interviews with key informants and geographical information systems were all used. The main change in land use entailed the substitution of shaded coffee plantations for sugarcane monoculture, implying deforestation. Urban expansion was shown to be incipient, in spite of the significant amount of money transfers directed towards housing construction and the proximity of this “ejido” or communal landholding to the cities of Xalapa and Coatepec. These changes are mainly associated with the crisis involving this commodity, but they have been exacerbated by emigration of family members, who were once in charge of coffee production.

Key words: *Coffea arabica* L.; rural; communal landholding; deforestation; urbanization.

INTRODUCTION

In Veracruz, Mexico, international migration intensified during the decades of 1990 and 2000. The state went from 27th place in 1997 to 4th place in 2002, in terms of federal states that sent the greatest number of migrants to the USA. This growing participation in migration was also reflected in the remittances sent home, as in the year 2002 \$200 million MXN were received, of which \$130 million MXN were invested in the state rural areas (Pérez, 2003). According to figures provided by INEGI (2011) for 2005, Veracruz

RESUMEN

El aumento de la migración internacional desde el estado de Veracruz, México, en la década de 1990, ocurrió sobre todo en el medio rural a raíz de la crisis agropecuaria. El sector cafetalero estatal no fue la excepción, a partir de las recurrentes crisis derivadas de la caída del precio del grano en el mercado internacional, varios cafeticultores recurrieron a la migración hacia EUA para enfrentar la quiebra económica. La presente investigación tuvo como objetivo analizar la relación entre el proceso migratorio internacional y el cambio de uso del suelo en el ejido de Bella Esperanza, Veracruz. Para ello, se utilizó la investigación histórica documental, una encuesta a 21 familias cafeticultoras con migrantes, entrevistas a informantes clave y sistemas de información geográfica. El principal cambio de uso del suelo fue la sustitución de cafetales bajo sombra por monocultivo de caña de azúcar, lo cual implica deforestación. El crecimiento de la mancha urbana resultó incipiente a pesar del importante porcentaje de remesas destinadas a la construcción de vivienda y la cercanía del ejido a las ciudades de Xalapa y Coatepec. Dichos cambios se asocian mayormente con la crisis de la cafecultura, pero se potencian cuando emigran los miembros encargados de manejar el cafetal.

Palabras clave: *Coffea arabica* L.; rural; ejido; deforestación; urbanización.

ranked fourth nationally (in absolute and relative numbers) in terms of Mexican population residing in the USA, as a total of 56 521 migrants were registered, accounting for 5.7 % of the national total for that year. Regarding the trend for remittances received in Veracruz, according to CONAPO (2010) in 1995, the state ranked 15th place nationally in terms of attracting remittances, totaling \$76 million USD, which represented 2.1 % of all remittances sent home to Mexico. In 2009, it ranked sixth with a total of \$1 294 million USD, representing 6.1 % of the national total.

The increase in international migration in Veracruz is especially common in rural areas, following the collapse of the agricultural sector, forcing a mass of rural producers to seek other economic alternatives outside their place of origin. The Veracruz coffee sector was no exception and because of the recurrent crises that led many growers to economic collapse, migration to the USA has become one of the most common economic strategies to be employed in coffee growing areas (Mestries, 2003).

The increase of international migration in coffee producing areas is a phenomenon that affects the productive, environmental, economic and socio-cultural aspects of these regions, hence the importance of studying it. The interest in investigating this massive migration from Veracruz is reflected in several studies (Anguiano, 2005; Córdova *et al.*, 2008). However, the relatively recent increase in migration from Veracruz is constantly and rapidly expanding to include the entire state, and shows no signs of reversal in the short term. Because of this, there is a need to elucidate little studied aspects such as its effects on the rural productive sector, from where most international migrants originate. Concerning products such as coffee, which has been very important in the national and state economy, it is essential to understand the impacts that migration flows are having on the growing areas and particularly to assess how the world coffee crisis has adversely affected the level of development of coffee regions in Mexico. Currently, a number of problems have been observed, such as job loss, abandonment of plantations and severe environmental impact resulting from tree cutting in coffee plantations, leading to changes in cultivation and urbanization, as well as a high incidence of pests and diseases that affect grain quality, resulting in low yields and a drastic fall in living standards for rural people who depend on coffee production (Martinez, 2004).

In the light of the coffee crisis and increased migration, shaded coffee plantations are being abandoned and replaced mainly with cash-crop monocultures such as sugarcane and also with housing, as mentioned in a number of studies (Nava-Tablada, 2009). However, these studies fail to address in depth, the issue of land use change as a result of international migration. Thus, there is a need to focus on this aspect of research in detail, using case studies to provide greater insight and to reveal the magnitude of the processes of land use change in coffee regions while analyzing their impact on future development.

López and Bocco (2006) state that only limited research exists employing geographic information systems (GIS) as tools for analyzing the impact of international migration on land use and resulting changes in the landscape. This is due to the difficulties

in accessing demographic, socioeconomic and biophysical information relating to specific geographic areas which refer to similar time periods, especially in the instance of small scale studies such as this one. These authors have carried out one of the few investigations in Mexico, which describes the implications of migration in terms of land coverage and change in land use in the Lake Cuitzeo basin in Michoacán, during the period 1970-2000, for which they used demographic and socioeconomic information and a GIS. Their main conclusions indicate the "transformation to waste land" of land abandoned by migrants that was previously used for agriculture, and the expansion of urban settlements. These changes are associated with processes that are "degrading" the territory with resulting damage to communities, towns and landscapes. However, for the analysis of migration, the authors relied solely on the statistics from the municipalities that comprise the lake and from these they made inferences relating to the spatial analysis of land use change, but there is a lack of fieldwork that would take into account more aspects in order to better understand the relationship between the two phenomena in question.

In this context, the objective of this study was to analyze the relationship between international migration and changes in land use in the communal landholding of Bella Esperanza, a municipality of Coatepec, in Veracruz, Mexico.

MATERIALS AND METHODS

The research was conducted in the Bella Esperanza communal landholding, in the town of Coatepec, Veracruz, Mexico, in an area where small producers with shaded coffee plantations predominate, in order to provide relevant information about international migration as people in this area appeared willing to answer the survey. Fieldwork was conducted in 2008 with expeditions to explore the problem and contact key informants. Afterwards, a survey was undertaken to record general information about all family members (both residents and migrants), describing details about migration and the perception of producers concerning the impact of migration on coffee production and the community. Units of study consisted of families engaged in shaded coffee production, with an account of international migration on the part of a family member. As there was no prior knowledge of the number of households with migrants (due to the lack of reliable statistical data), no sample size was set and identification of the households included in the study was carried out using the "Snow Ball" technique (Goodman, 1961). The number of families who completed the questionnaire was limited up to the moment when "saturation" occurred, i.e. when cases no longer contributed by adding new data and response patterns were repeated. Twenty-one

questionnaires were applied, preferably being answered by the family member who made the decisions concerning coffee production. Information about migrants was provided by the families who answered the questions. Data were analyzed with descriptive statistics using the Microsoft Office Excel 2007 program. The interviews of key informants recorded the historical evolution of migration in the community, the coffee crisis and change in land use, from the perspective of coffee growers. There were two in-depth interviews with people who had experienced the problems dealt with here.

Geographic information systems were used to assess the changes in land use in the community. Firstly the collection, classification and systematization of base material was carried out, including cartographic information, orthophotos, aerial photographs, maps, statistical information and historical background. Once the collected information had been systematized, we proceeded to generate a base map of the study area for the purpose of carrying out a deductive analysis using information from the most recently published satellite image indicating land use classified by three categories: urban, forest (including shaded coffee plantation) and agricultural monoculture with sugarcane. This identification was also carried out physically, once land use had been determined by GPS (MAGELLAN Professional) and defined points in the field were identified using a Google Earth image to identify similarities in terms of current use. Subsequently, an area of polygons was defined in order to obtain the first product in KMZ format for exportation, and this was imported using the Global Mapper software. This allowed us to obtain georeferenced data and Geodetic GEO80 UTM projection for subsequent comparative analysis with material obtained using ArcView software. This information was linked to databases containing census statistics.

The analysis of land use change was carried out using satellite imagery from Google Earth, as the high resolution makes it possible to distinguish the type of ground cover. For the study area, Google Earth provides two images from the years 2003 and 2007, which because of their high definition and absence of cloud cover, can be used for comparison. It should be stated that no images of the study area exist in Google Earth for previous years and the black and white orthophotos available from the National Institute of Statistics, Geography and Informatics (INEGI) do not have the resolution required for the identification of crop type; it is only possible to distinguish the type of ground cover. Aerial photographs of the study area for 1980 and 1995 were acquired from INEGI; the earliest of these could not be used due to poor definition and is only employed again in 1995 as a benchmark to compare land cover before and after the increase in migratory flow; according to the testimony of

informants, it was in the middle of the 1990s when international migration began in Bella Esperanza. Neither was there any statistical data concerning land use or crop type for each communal landholding in databases or publications from the INEGI. The lack of statistical information or quality geographic imagery is a constraint pointed out by López and Bocco (2006) for this type of study.

Description of the study area

The Bella Esperanza communal land holding is located to the southeast of the municipality of Coatepec and forms part of an agricultural corridor where there are 15,635 ha of coffee plantation, representing 11 % of the total crop growing area in the state (SAGARPA, 2007). Likewise, the region has a culture of coffee production dating from the late nineteenth century and is recognized in the international market for the quality of its grain, resulting from the optimal conditions for cultivation, in terms of altitude, climate and soil. The Bella Esperanza community (latitude 19°26'01" N, longitude 96°51'59" W; 1016 meters above sea level) is located in the mountainous central area of Veracruz State (Figure 1). The location falls within the area of influence of the metropolitan area of Xalapa (state capital) and is near Coatepec, another important urban area and capital of the municipality with the same name (INEGI, 2006). The climate is (A)C(FM) semi-warm humid with abundant rainfall in summer and annual rainfall varying between 1500 and 2000 mm, and with temperatures ranging between 10 and 24 °C (INEGI, 2006).

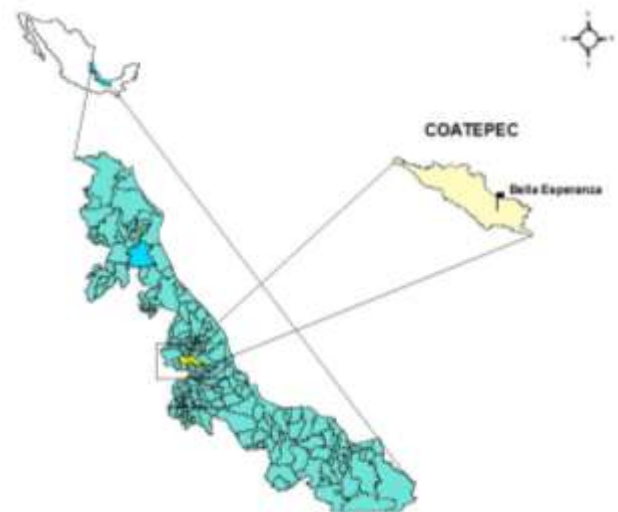


Figure 1. Location of study area, Bella Esperanza, Veracruz, Mexico.

Regarding land tenure, the communal landholding of Bella Esperanza obtained a final donation of 736.13 ha in 1931, which were distributed as follows: 680.84 ha as allotments, 11.38 ha as human settlement with title

deeds, and 33.90 ha as area of communal land use (RAN, 2012). INEGI (2011) indicated that by 2010, the population of Bella Esperanza totaled 1618 inhabitants, 50.8 % men and 49.2 % women. Today there are a total of 425 homes, each with an average of four people per household. Concerning social issues; 33.55 % of the population has no right to medical services, 3.83 % of people aged 15 or older are illiterate and the average level of schooling is 7.73 years (INEGI, 2011). In 2005, CONAPO (2006) indicated that living standards are low.

Land use in the communal landholding is mainly agricultural (coffee and sugarcane). Given the characteristics of the soil, it is ideal for forestry; however, it has been primarily adapted for shade-grown coffee, which replaced the natural landscape of cloud forest and in the last years the coffee plantations have been being replaced by sugarcane production (INEGI, 2006). Due to the proximity of Bella Esperanza to the cities of Xalapa and Coatepec, it is common for residents to have jobs in the service sector in these cities, to which they commute daily. Concerning migration, INEGI (2006) for the year 2000 only registered four people who lived in another federal entity and one in the USA.

RESULTS AND DISCUSSION

Migration and change to coffee production in Bella Esperanza

International migration in Bella Esperanza initiates and increases in the 1990s influenced by nearby communities such as Tuzamapan (where migration to the USA has been going on for longer), and the fall in coffee prices left many people without work (coffee crisis). The survey recorded data from 115 persons who were members of the participating families, 76.5 % of these remained in the community and 23.5 % were active male migrants who resided permanently outside the community. The predominance of males among migrants coincides with that found in other case studies in Veracruz (Córdova *et al.*, 2008). The average age of migrants was 31.4 years, with a concentration in the age range of 16 to 30 (59.3 %) and 31 to 50 years (37 %). That is, 96.3 % consist of working age population who migrate as laborers seeking better job opportunities and wages, agreeing with observations by Ramírez and González (2006) referring to coffee communities in the state of Puebla.

Regarding the occupation of migrants at the place of destination, the majority (96.3 %) undertake activities in the secondary and tertiary sectors (builders, gardeners, employees in restaurants and shops) compared to a small percentage (3.7 %) employed in the agricultural sector. This is consistent with Anguiano (2005), who indicates that migration is

mostly due to employment reasons, with the greatest number of migrants entering the secondary and tertiary sectors, because of their low rating as migrant labor, employed in activities that require no special training.

Concerning the destination of the migrants, 40.7 % were currently living in other Mexican states and 59.3 % were based in the USA, being the states of North Carolina and South Carolina the most frequent destinations. Apparently, the places for arrival are diversifying, consistent with Córdova *et al.* (2008).

Of the surveyed households, 95.2 % received remittances from the USA, destined to multiple uses, with the priority comprising household expenditure (food, clothing, medical and education expenses), home improvement and investment in agricultural production (purchase of land, inputs and payment of labor from outside the family). Remittances are spent primarily in household consumption and housing, but also function as a subsidy for replacing the missing work force to recreate the family production unit which is surviving precariously, but this has failed to re-instigate coffee production at a profitable level. Authors such as Yúnez-Naude (2002) agree that spending in family sustenance and improved housing are the main use for remittances, while investment in production is directed to hiring labor and inputs in order to replace the absent work force and subsidize production activity; however, in few cases does this represent a significant investment for reviving agriculture and making it profitable.

Of the migrants interviewed, 90.3 % indicated economic reasons (farming crisis, unemployment and lack of economic resources, and search for higher wages) as the motive for their first migration. There is consensus that economic motives are the most important (although not the only one) for the departure of migrants, especially when the employment and income situation in the place of origin is precarious (Aragon, 2006).

Of the households included in the study, 23.8 % mentioned that work has intensified for those who remain in the community (women, children and elderly), and 28.6 % indicated an increase in the hiring of laborers to replace the absent workforce, and these represent the main changes in the organization of family labor as a result of migration. This is consistent with the report by Martínez-Garza *et al.* (2010) for the dry tropical region in Central Veracruz, where because of the international migration of a member of the household, the labor force is reorganized to replace the laborer who has migrated.

Of the families interviewed, 23.8 % replaced coffee with sugarcane as a result of the low price of the coffee. It was apparent that this change to commercial

monoculture, although incipient, has accelerated and is almost irreversible. One informant said: "Once the coffee plants have been cut down to plant sugarcane, it is nearly impossible to recover the plants" because of the high economic costs and the time it takes for a coffee plant to become productive (3 to 4 years). Likewise, the demolition of shade coffee plantations results in environmental degradation. Besides this, 9.5 % of households ceased planting coffee due to the production crisis, the low price in the market and the absence of family members to tend the coffee plants. In other words, the pattern of crop cultivation has been affected by migration, but the change relates more to effects caused by the crisis in the coffee sector. In this regard, Nava and Marroni (2003) state that in the Mixteca area of Puebla, migration led to the abandonment of crops due to the shortage of family labor (due to limited physical capacity to participate in diversified agriculture), but also because of the national crisis affecting the agricultural sector.

As for changes in production technology, the absence of members who were in charge of farming has led to a gradual abandonment of coffee plantations, many of which receive no agronomic management. Concurring with these results, Mestries (2003) recognizes that international migration encourages producers to abandon the work of fertilizing and weeding coffee plantations in the Xalapa-Coatepec region, causing a drastic drop in yields as well as pest infestation.

Families were also questioned about the effects on the community resulting from increased migration. It emerged that the positive changes relating to households economic improvement (improvement of the house, living standard and public services, and vehicle or land purchase) are the most commented (84.1 % of respondents). Contrastingly, 15.9 % of the comments reported changes considered negative by respondents (family breakdown, labor shortages, loss of rural culture, intensification of work for those who remain behind), as they refer to issues that point to the degradation of the material, social and cultural base of coffee production in the community. In this regard, Nava and Marroni (2003) argue that migration has contradictory effects, as in the family context remittances promote a substantial improvement in the quality of life and consumption, whereas in the community there is deterioration of the economic and cultural base that sustains farming.

Regarding the process of urbanization and the way it relates to the remittances sent to build houses, this aspect is largely perceived as positive; 50 % consider improving housing as a benefit for the family, while only one respondent (2.3 %) perceived the growth of the urban area as a negative effect, as it is transforming what was once farmland into housing areas. In this context, surveys in rural areas discovered that although

remittances are invested in housing construction this has no significant effect on the growth of urban areas, as houses are not generally built on new ground, but rather the improvement is limited to remodeling and expanding the existing buildings.

Change in land use in Bella Esperanza

In this study, three forms of land use were identified: 1) forest (including shaded coffee plantations), 2) urban, and 3) cleared land (used for agriculture, mainly sugarcane). We identified two processes indicated in the survey and interviews: displacement of forest and shaded coffee replaced by sugarcane monoculture, along with the use of remittances for housing construction and a consequent saturation of the housing area (increased number of inhabitants per area), as well as a slight increase in urban area. Once uses had been established and identified, the polygons obtained were corroborated in the field using satellite images. Lastly, the percentages of surfaces covered by forestry-shaded coffee were obtained, in order to discover how they have evolved during the analyzed time period (1995-2003-2007), considering areas where tree cover has been removed as deforested (including both forest and shaded coffee plantations), destined for agriculture (mainly sugarcane).

Figure 2 indicates that in 1995 the communal landholding comprised a deforested area of 153.26 ha, and 210.59 ha in 2003, whereas a total area of 67.3 % retains its forestry or shaded coffee plantation. Meanwhile in 2007, 257.32 ha were identified as deforested with a decreased percentage of forest area and/or shade-grown coffee, which now represents 61 % of the total communal landholding area. That is, there is gradual loss in area of forest and shaded coffee, because in the period analyzed (1995-2007), 104.06 ha (14.13 % of total landholding area) had been deforested mainly for the introduction of sugarcane. Deforestation in the period 2003-2007 showed an annual rate of loss of forest cover of 1.74, and if it continues at this rate, it is to be expected that within five years the deforested area will represent 38 % of the total landholding area, and in 15 years, 45 %.

As for the relationship between urbanization and remittances (23.2 % of these are destined for housing construction), Figure 3 shows that in 1995 the urban area was 14.66 ha, in 2003 it was 15.60 ha, and in 2007 it increased to 17.37 ha, which represents an annual growth rate of 0.88. The slow growth of the urban area is in contrast with the saturation of the housing area (increased number of inhabitants per area), derived from the fact that new rooms were usually built to house the family of the children. Besides this, remittances are often used for remodeling the existing homes, but infrequently used to buy new land for housing.

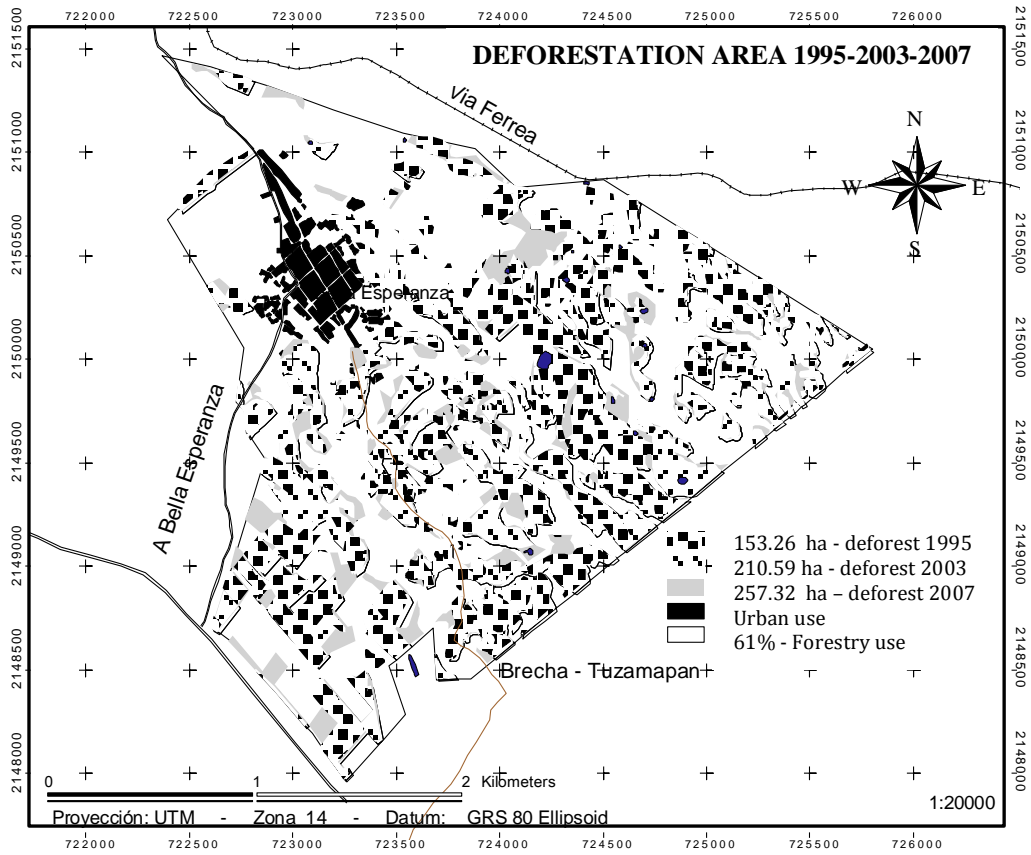


Figure 2. Deforestation in the Bella Esperanza communal landholding area, Veracruz, Mexico. 1995-2003-2007.

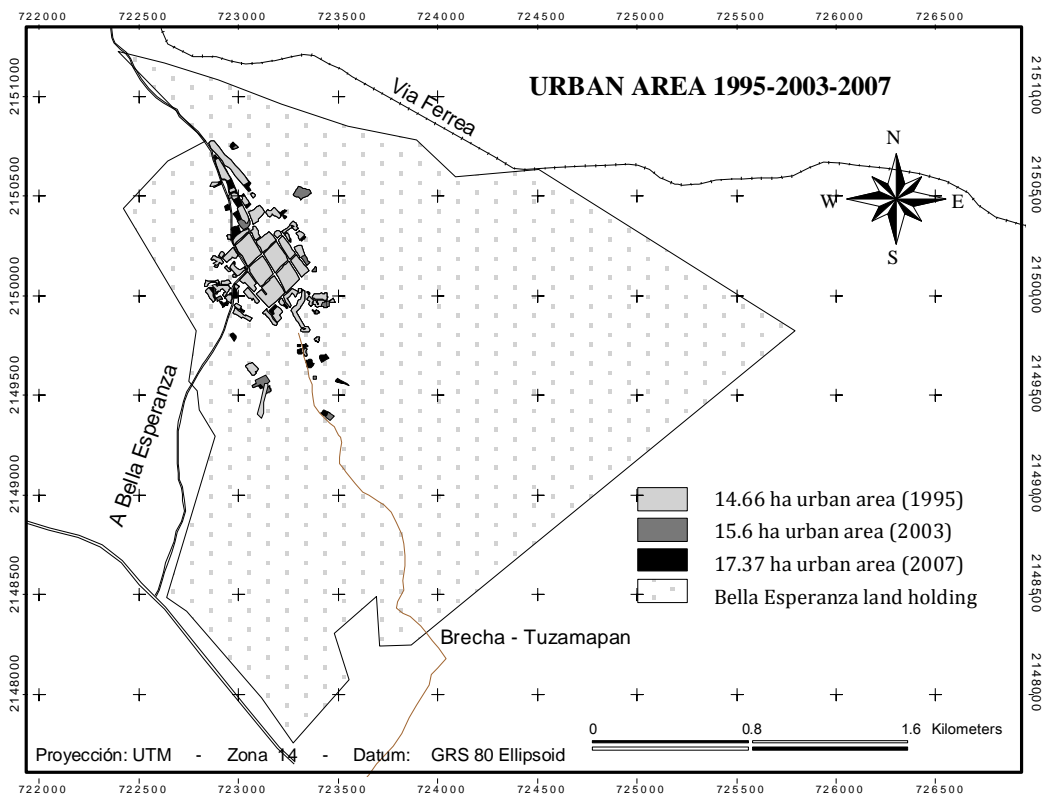


Figure 3. Growth of urban area in Bella Esperanza, Veracruz, Mexico. 1995-2003-2007.

Relationship between international migration and change in landuse

International migration in Bella Esperanza increased as a result of the production crisis caused by falling coffee prices in the international market, state withdrawal from the agricultural sector (privatization) and crisis in the Veracruz labor market (lack of jobs and low wages). The most important migratory flow is directed towards the USA, these migrants being generally working-age men, who leave for economic reasons and are inserted into low-skilled jobs in industry and services in urban areas of that country.

From 1990 onwards, Bella Esperanza experiences the desertion of working-age male population who emigrate to the USA following the first major coffee crisis (1990-1994), and international migration intensifies during the second coffee crisis (1998-2004) which was considered much more severe, so as reported in the survey, 80.6 % of migrants leave for the first time in the period between 2000-2008.

DISCUSSION

The other land use transformation of interest is the growth of the urban area in Bella Esperanza, detecting that this process is still in the early stages despite the large proportion of remittances that are used for housing construction (23.2 %), and the relative proximity of the communal landholding area to the cities of Xalapa and Coatepec. However, the apparent trends shown by neighboring communal landholding areas indicate that it is highly probable that conurbation of rural areas near these cities will occur and that housing developments will encroach upon agricultural land, affecting Bella Esperanza.

The results presented are consistent with those reported by Mestries (2003) in the central coffee region of Veracruz, where although most producers have not been willing or able to change their land use in the hope of an improvement in coffee prices, or for a lack of alternative products or resources, there has been a growing tendency to remove the coffee plantations in order to grow sugarcane. This causes serious environmental degradation, as trees that served as shade for coffee plantations are eradicated, contributing to loss of remnants of cloud forest. The increased dynamics in the land market are also notable, as more and more coffee plantations near the cities of Xalapa and Coatepec are being divided into lots to be sold as real estate.

Although the increase in international migration in Bella Esperanza parallels the increase in area planted with sugarcane, replacing shaded coffee plantations, this does not ensure that there is a direct correlation

The results referring to land use in Bella Esperanza, indicate that the main change is the replacement of shaded coffee plantations for sugarcane, which involves a process of deforestation. In this regard, although sugarcane is also facing a production and market crisis caused by the withdrawal of state subsidies, privatization of sugar mills and import of concentrated fructose, it still represents for the producers an alternative for family subsistence. Because sugar mills control almost the entire production process, the sugar growers earn a small but guaranteed amount of money, without having to invest much family labor or attention in the sugarcane plot. This applies even when sugar prices rise, as the production crisis is structural in origin and depends on international market fluctuations, so that prices experience periods of increase and recurrent falls. Similarly, rising prices are of little benefit to small producers, as most of the profits are for those who collect, process and market production (in this case the mill). A strong reason for opting to grow sugarcane (from the perspective of producers) is that this activity gives them access to Social Security, which implies health care and pension rights (Núñez, 2005). between these two variables, as the coffee crisis is an important factor for understanding these changes.

Thus, with restricted possibilities for maneuver in terms of the limited resources available, the fall in coffee prices, lack of access to credit and technical assistance, and limited management capacity, the coffee producers of Bella Esperanza responded with a short term perspective, in order to reduce the risk of financial failure in an uncertain situation. This has particularly promoted international migration, the adoption of commercial monoculture such as sugarcane production, representing an activity that despite all odds still provides them with economic and social benefit. However, this strategy implies high environmental costs (deforestation, land degradation, biodiversity loss and overexploitation of natural resources) that in the medium and long term can compromise their productive capacity and thus future development possibilities.

In other words, the decline of coffee production forces Bella Esperanza farmers to choose whether to risk trying new potentially feasible productive options which still have a small margin of profit (such as sugarcane), or to continue to invest their limited resources in coffee production, whose economic benefits are uncertain in the light of current national and international conditions, or to engage in emerging strategies such as emigrating to the USA ensuring the short-term survival of the family production unit, but with long-term disrupting effects, both in terms of the family production unit and the community.

CONCLUSION

The main change in land use in Bella Esperanza is the replacement of shaded coffee plantations, causing deforestation. Meanwhile, urban expansion is still incipient, despite the large proportion of remittances invested in housing construction (23.2 %) and the proximity of the communal landholding to the cities of Xalapa and Coatepec. Changing land use is more related to the crisis in the coffee sector than it is to migration, as the substitution of coffee for commercial monocultures such as sugarcane is mainly associated with the low price of coffee in the international market, but this transformation is exacerbated when families who once tended the coffee plantations migrate. This change is also influenced by government policies of state withdrawal, privatization of agriculture and the consequent increase in the economic vulnerability of small coffee producers. Although migration is not the cause of the decline in coffee production, it accelerates this process by decreasing family labor available for production of coffee, also influencing changes in the economic activities carried out by migrants who return to the community (they usually do not get involved in agricultural work again) taking up alternative jobs, as agriculture becomes less profitable.

Finally, the increase in international migration in Bella Esperanza, while coinciding with the increase in area planted with sugarcane gradually replacing the shaded coffee plantations, does not necessarily indicate that there is a direct relationship between these processes. The trigger for both phenomena is the coffee crisis, where international migration, together with changes in land use, constitutes interdependent phenomena that occur in parallel, reflecting new family production strategies for addressing the production crisis. Although the increase in international migration has an impact on land use, as it changes the dynamics inside the family farms, the coffee crisis is a more important factor for understanding these changes. In other words, the relationship between migration and change of land use cannot be simplified to a cause-effect relationship, as there are multiple effecting factors involved, making it complex.

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