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Mexico
Case Study Report

“Environmental factors in Mexican migration: The cases of Chiapas and Tlaxcala”

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Subcontractor in Chiapas: Sara Hernández Herrera (questionnaires)
1. INTRODUCTION

Mexico is one of the most cited cases in migration studies, mainly due to its relatively long history of emigration towards the United States and the emergence of dense migration networks and transnational spaces between regions of origin and destination in both neighbouring countries. Therefore, nearly every single aspect of Mexican migration has been studied in the last decades. Nevertheless, the research on environmental migration or – more precisely – the impact of environmental degradation and climate change on internal and international migration flows originating in Mexico is still a field under exploration.

Some research has been done already, even though not all studies were implicitly on the link between environmental change and migration. In the late 1970’s, Fernando Medellin (1978) estimated that around 600,000 Mexicans were abandoning the countryside each year because of the inability to subsist in agriculture as formerly workable lands became unproductive due to desertification. A decade and a half later, the Mexican Commission of Arid Areas (Comisión Nacional de las Zonas Áridas, CONAZA) conducted an analysis of the state of desertification in Mexico, also taking into account the impact on migration from impoverished rural area which are affected by land degradation (CONAZA 1994). A report by David Campbell and Leonard Berry (2003) mentioned a range of 700,000 to 900,000 Mexicans who are leaving their lands year per year. Norman Myers called the tendency of abandoning degraded lands, together with other factors like population growth an “agricultural squeeze”. (Myers 1993: 141).

Also the US Commission on Immigration Reform assumed a linkage of environmental degradation and migration and therefore requested a study on unsustainable land and water use as a potential factor for Mexican migration to the United States. This study, carried out by a research team directed by Michelle Leighton-Schwartz and Jessica Notini (1994), came to the conclusion that further degradation of Mexican farmland would increase internal and international migration flows. The authors present some evidence that a part of the contemporary migration to the US is due to the impairment of farmlands, mainly increasing desertification. Temporary or permanent migration is used as strategy for additional family income. Similar findings were made by a follow-up study of the National Heritage Institute on desertification and migration in Mexico, which came to the conclusion that “there is a strong correlation between environmental stress, poverty and population pressure which can lead to migration” (NHI 1997). In a study on the role of household assets and the environment as determinants for Mexican migration to the United States, Alain de Janvry and others argue that environmental stress variables, like deforestation and population pressure on limited fertile lands, create an incentive to migrate (de Janvry et al. 1997: 17). Political measures against deforestation and land degradation would therefore be an effective measure to reduce incentives for migration.
Even though migration is not the main focus of his study, Thomas Homer-Dixon (1996) shows in his case-study on environmental scarcity and rebellion in Chiapas that land degradation in Chiapas, caused by deforestation and intensified through unsustainable agricultural practices and overgrazing, also had an impact on migration processes. Héctor Escobar, Bruno Sovilla and Jorge López (2006) analyzed the impacts of hurricane Mitch in selected regions of the Chiapas, taking into account the fragile economic context of Chiapas and the crisis in Mexican agriculture. Together with these socio-economic factors and insufficient state support, the devastating effects of Mitch became an additional reason for emigration. Also Daniel Villafuerte and María García (2006) argue that the effects of hurricane Mitch – and probably also of Stan – were an additional factor for emigration, besides the rural crisis since the 1980’s and the political and military conflict since the Zapatista rebellion in 1994.

In a study on female migrants in marginal suburbs of Mexico City, Úrsula Oswald Spring points out that desertification and environmental deterioration together with decreasing governmental support and increasing costs of production have caused massive migration from rural areas (Oswald 2006: 10). Sergio Saldaña-Zorrilla dedicates a subchapter on emigration as a response to disaster vulnerability in his comprehensive study on the socioeconomic vulnerability to natural disasters. According to him, losses from natural disasters exceed rural coping capacities. As state support for the countryside is insufficient, rural workers emigrate to urban centres or towards the United States (Saldaña-Zorilla 2007: 27 f.). He also points out that in the case of migration to the urban centers within Mexico, rural Mexicans often settle down in those areas which are prone to natural disasters.

This report is presenting results of field research which has been carried out in two regions of Mexico: the western part of the central Mexican state of Tlaxcala, especially the municipalities of Benito Juárez and Hueyotlipan – and the Sierra and Soconusco regions in the south-eastern state of Chiapas (municipalities of Motozintla, Huixtla, and Tapachula). The research has been conducted in the frame of the EU-research project “Environmental Change and Forced Migration Scenarios” (EACH-FOR), funded within the Sixth Framework Research Program of the European Commission. The responsible institution for the Mexican Case-Study is the Center on Migration, Citizenship and Development at the University of Bielefeld. The author wants to give his special thanks to collaborating researchers in Mexican partner institutions, above all to Hugo Ángeles, Martha Rojas and Carmen Fernández from the El Colegio de la Frontera Sur (ECOSUR) in Tapachula, and Fernando Herrera and Oscar Calderón from the Universidad Autónoma Metropolitana – Iztapalapa (UAM-I) in Mexico City. Their support has been of central importance for the realization of fieldwork in the selected regions.

1.1. Synthesis of context

Even though EACH-FOR is analyzing both, internal and international migration flows, it has to be underlined in the Mexican case that the public,
political and also scientific debate is mostly related to emigration from Mexican citizens to the United States of America. Therefore, the following description of the (socio-) economic, political and historical conditions has to include the development of the binational relations between the two neighbouring countries.

Mexican migration to the United States is strongly interlinked with economic and political trends and developments in the northern neighbour country. In times of economic growth, migration flows from Mexico to the US generally increase, in times of economic stagnation or even recession, migration flows decrease and roundups against migrants are instituted with higher frequency. Furthermore, the long history of Mexican migration has formed strong networks between regions of origin in Mexico and regions of destination in the US, which possess their own dynamic and foster further migration flows.

Not only do the “pull-factors” and networks on the US-side of the border always played (and still play) a role in the migratory relations; but also the socio-economic and political developments of Mexico, which since ever has been forming internal and international migration flows. Taking the GDP as an indicator, Mexico is the second-largest economy in Latin America (only Brazil has a higher GDP) and the 14th-largest economy worldwide (World Bank 2007). According to data from the Economic Commission for Latin America and the Caribbean (ECLAC/CEPAL), Mexican GDP was $839.5 billion USD in 2006 (at current market prices, ECLAC 2008: 89). Even so however, the economic growth did not lead to a significant improvement of life conditions for huge parts of the Mexican population.

After three decades of high economic growth (with annual growth rates of 6% or higher), characterized by the policy strategy of “import substitution industrialization”¹, the Mexican economy fell into a crisis in the 1970s, culminating in the declaration of insolvency and a cease in the payment of foreign debts in 1982. Since the presidency of Miguel de la Madrid (PRI, 1982-88) a new political elite occupied central positions of governmental dependencies, initiating a policy change towards a model of neoliberal economic policies (Unidad de análisis prospectivo, El Financiero 1993). The entrance of Mexico into the GATT (1986) and the negotiation process of the North American Free Trade Agreement (NAFTA) under president Carlos Salinas de Gortari (PRI, 1988-94) in the early 1990’s were central pieces of the new economic policy. NAFTA came into force on January 1st 1994. The same day, the Zapatista guerilla movement (EZLN) received global attention when they occupied the city centre of San Cristobal de las Casas in the southeastern state of Chiapas. The concurrence of these two events can be deemed as symptomatic of the socio-economic conditions in Mexico: on the one hand, free market policies and increasing participation in the global economy at the expense of the internal population. The other side is the civil movement which fought for an own place in the global market.

¹ The economic paradigm of “import substitution industrialization” (ISI) consists of a substitution of foreign imports through domestic production. This development strategy of protectionism and state interventions for the support of domestic industry has been the dominant paradigm in most “Third World” countries from the 1940s to the early 1980s (above all in Latin America).
market is taking place, while on the other hand poverty and inequality in broad sectors of the Mexican society prevail and lead to a state of insecurity.

Since the NAFTA came into effect, the social and economic division lines within Mexico (North-South; urban-rural; rich-poor; mestizo majority - indigenous minority etc.) became even more pronounced. While northern Mexico and greater urban centres indeed experienced some market-induced economic growth (as in the so-called Maquiladora-Industry, but partially also in the services sector), the rural areas – above all in southern and south-eastern Mexico – were not able to compete with the US-American agrobusiness. One of the clearest symbols of the structural inequality within NAFTA is the increase in the import of corn (maíz) from the United States to Mexico. This is notable given that corn has been a main product of Mexican agriculture – and a major component of the daily Mexican diet – for centuries. Corn is the main source of income for about 8% of the total population or 40% of those Mexicans who are working in agriculture (Raghavan 2000). A study commissioned by Oxfam and the WWF points out that the planned transition period for the liberalization of corn imports was planned for 15 years, but in reality was compressed to about 30 months, which meant an extremely high pressure for small-scale farmers in Mexico (Nadal 2000: 31). Since the early 1980’s, Mexican agriculture experienced a profound crisis. Market opening and deregulation of the economy were accompanied by the elimination of state subsidies for Mexican farmers (Villafuerte & García 2006: 104). Above all small producers were heavily affected by this policy change. As a consequence, poverty increased. Poverty figures vary from source to source and according to the method of measurement. According to the World Bank, 57% of the rural population lives in conditions of poverty, and 28% in extreme poverty (World Bank 2004). In its country report on Mexico, the Social Watch points out that poverty reduction measures only were able to re-establish the same poverty levels prior to the economic crisis in the mid 1990’s (Social Watch 2008).

1.1.1. Political context

Mexico is a federal republic (Estados Unidos Mexicanos = United Mexican States) and a presidential democracy, with a strong executive (presidential elections based on popular vote every six years, no re-election possible), a two-chamber parliament (senate and congress) as legislative control instance and a judiciary with growing influence in the political process. For over 70 years (from 1929 to 2000), the country has been ruled by one single party: the Institutional Revolutionary Party (PRI). Only since the late 1980s other parties like the conservative National Action Party (PAN) and the center-left Party of the Democratic Revolution (PRD) have gained elections on the municipal and state level. A benchmark in the political history of Mexico has been the elections of 2000, when oppositional PAN candidate Vicente Fox Quesada won the presidential elections with a popular vote of 42%. Nevertheless, when president Fox (2000-06) came to power, the ruling PAN

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2 Even though under different names: National Revolutionary Party (PNR) from 1929 to 1938; Party of the Mexican Revolution (PRM) from 1938 to 1946; since 1946: PRI
could not count on an absolute majority in the two chambers of the parliament, which resulted in a strategic alliance with the ex-ruling party PRI in most central issues of the policymaking process. This alliance is also enduring under the current presidency of Felipe Calderón Hinojosa (PAN).

Irregularities and conflict are still part of many electoral processes – the most prominent case has been the presidential election of 2006, when supporters of PRD candidate Andrés Manuel López Obrador, formerly major of Mexico City, accused the federal authorities of electoral fraud and demanded a recount of all votes. As only a partial recount was granted by the electoral court, the movement around Obrador declared him as “legitimate president” and still does not recognize Calderón as president of Mexico. The political conflict between PRD and allied parties on the one side and PAN and PRI on the other has recently been aggravated due to the debate on privatization of the state-owned oil company PEMEX. On the state-level, the PRI is still the dominating party, governing 18 out of 32 states, followed by the PAN (8 states) and the PRD (6 states).

Corruption is another major problem (not only) in Mexican politics. The payment of bribes to policymakers is a commonly spread way to ensure the backing of private interests through the political class. There are also evidences for bribes of drug cartels towards state authorities (commonly called “narcopolítica”). Drug cartels are in fact controlling several regions of the country and are often interlinked with local and regional authorities.

1.2. Brief overview of environmental problems

The central problems of environmental degradation in Mexico are mainly interlinked with the degrading quality of soil and insufficient availability of water. Deforestation, intensive agricultural production, salinization and other factors led to soil degradation and desertification. According to a governmental report, 85% of the Mexican territory is affected by soil erosion (CONAZA 1994: 78, 94). 17% of all land has been classified as totally eroded, 31% is in accelerated state of erosion, and 38% show signs of incipient erosion (Oropeza-Mota et al. 2004). In the fragile arid and semi-arid ecosystems of northern and north-western Mexico more than 60% of the land is considered to be in a total or accelerated state of erosion. Furthermore, former fertile lands in the mountainous regions of central Mexico and in the tropical south and southeast of Mexico are increasingly exposed to soil degradation, which is mainly due to the – both legal and illegal – cutting down of vast forest areas. This contributes to changes in regional rainfall patterns, producing a vicious circle of decreasing precipitation and increasing desertification. The pollution of soils, water and air is another striking problem, mostly in and around urban centres.

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3 The difference between Obrador and Calderón was as low as 0,58% in the popular vote (after a partial recount of votes).
4 This will be discussed in more detail in section 3
Mexican climatic zones span from the hot, dry conditions of the north-western Sonoran desert (annual average rainfall less than 100 mm) to the wet, tropical conditions that characterize the forest regions of southern and south-eastern Mexico, predominantly in the Chiapas and the Gulf coast states of Tabasco and Veracruz (average annual rainfall can reach 2,000mm or even more) (see map 2 in Annex). According to data of Mexico’s National Meteorological Service (SMN), drought periods are getting longer and more extreme in several regions of the country. This trend does not only affect the arid and semi-arid regions of the North and Northwest, but also regions in the South, which historically have been more humid. Another phenomenon is the shifting of rainfall periods, as the example in the field study region of Tlaxcala shows. While the rainfall period used to start in March, presently the rainfall starts about a month later. In the case of the traditional product of corn, this means that the harvest period shifted from June to late July or even August.\(^5\) In other regions the trend seems to be the other way round: due to the higher frequency of tropical storms, the amount of heavy rains has increased in some regions of south-eastern states like Chiapas and Tabasco. The following graph shows the change in rainfall patterns of two selected communities in the regions of research. In the case of Belisario Dominguez (Chiapas) an increase of rainfall can be observed since the mid-1990’s – even though the heavy rainfalls during the path of hurricane Stan (October 2005) are not included in these graphs.

**Graph 1: Rainfall in Belisario Dominguez/Motozintla (Chiapas), 1962-2001 (in mm)**

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\(^5\) see also field research finding in section 3
In the case of Hueyotlipan (Tlaxcala), the rainfall pattern has, in contrast, decreased. Unfortunately, these graphs are only slightly indicative as the rainfall figures of the SMN are partially incomplete (several months without data).

As stated above, deforestation is another central problem in Mexico. According to the Ministry for the Environment and Natural Resources (SEMARNAT), Mexico has lost around 1.1 million hectares of forest per year from 1993 to 2000. Therefore, Mexico ranks second place worldwide in its deforestation levels, just behind Brazil. The south-eastern state of Campeche lost already 100% of its forests (200 tsd. ha), Tabasco 58%, Yucatán 35% (272 tsd. ha), Querétaro 30% (44 tsd. ha) and Veracruz 22% or 270 tsd. Hectares (WRM 2002). If this trend continues, Mexico will loose all of its tropical forests – covering now around 30 million hectares – in the next 52 years. Other types of forests, now covering around 33 million hectares, would disappear in about 122 years. Main causes for the disappearance of the forests are for fuel, burning, logging – and above all the increased use of land for agriculture and cattle, which is partially also due to the changes in the economic model (market liberalization, free trade agreements etc.).

Wise and Gallagher showed in their research that trade shifts under NAFTA have had destructive impacts for the environment:

> The surge in U.S. exports has put added pressure on poor corn farmers in Mexico. This has caused not only increased poverty and out-migration, but also threatens the rich stock of plant biodiversity cultivated by Mexico's traditional farmers and relied on as a public good by the world's crop breeders. [...] The rise in U.S. corn production has provided a stimulus to some of the most environmentally destructive agricultural practices in the United States. Corn is very chemical-intensive, both in terms of fertilizers and pesticides. Recent expansions of corn production
have taken place in some of the drier states, necessitating irrigation at unsustainable levels. It has also encouraged the recent rise in the cultivation of genetically modified corn, as the product is particularly designed to resist pests that are more prevalent in dry conditions. In effect, the U.S. is serving as a ‘pollution haven’ for corn, with more environmentally destructive U.S. practices supplanting more sustainable practices in Mexico.”
(Wise & Gallagher 2002)

Instead of an upward harmonization of environmental standards – which in fact is part of a NAFTA side agreement – environmental degradation was accelerating since the implementation of free-trade policies in the mid eighties. Between 1985 and 1999, rural soil erosion grew by 89%, solid waste by 108% and air pollution by 97%. The economic costs of environmental degradation have been estimated by the Mexican government to be around 10% of annual GDP (Wise & Gallagher 2002).

Besides the processes of slow-onset environmental degradation, many regions of Mexico are frequently hit by natural hazards, like hurricanes, earthquakes and floods. Hurricanes and other tropical storms are the most significant type of disasters, in terms of economic damage and the number of people affected (see table 1). This is due to the geographic location of Mexico, being on the path of hurricanes coming from both sides, the Pacific Ocean and the Gulf of Mexico as well as the Caribbean Sea. Since the second half of the 1990s, the frequency of hurricanes and other tropical storms has increased above all in the south-eastern states (Yucatan Peninsula, Chiapas). Recent hurricanes which caused massive destruction include Mitch (1998), Stan and Wilma (both 2005). In the case of south-eastern Mexico, hurricanes and other tropical storms frequently lead to inundations and landslides, also fostered by deforestation and soil erosion in hillside regions.

Table 1: Summary of Top 5 Natural Disasters in Mexico (1900-2008)

<table>
<thead>
<tr>
<th>Event</th>
<th># events</th>
<th>Killed</th>
<th>Affected</th>
<th>Damage USD (1.000)</th>
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<tr>
<td>Storms</td>
<td>72</td>
<td>5,052</td>
<td>6,451,31</td>
<td>15,310,81</td>
</tr>
<tr>
<td>Earthquakes</td>
<td>27</td>
<td>10,677</td>
<td>2,556,57</td>
<td>4,691,000</td>
</tr>
<tr>
<td>Floods</td>
<td>49</td>
<td>4,103</td>
<td>3,167,34</td>
<td>4,533,400</td>
</tr>
<tr>
<td>Droughts</td>
<td>6</td>
<td>1,120</td>
<td>161,908</td>
<td>1,610,000</td>
</tr>
<tr>
<td>Volcanoes</td>
<td>10</td>
<td></td>
<td></td>
<td>117,000</td>
</tr>
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</table>

Source: EM-DAT: The OFDA/CRED International Disaster Database, www.emdat.be - Université catholique de Louvain – Brussels; accessed on 06.05.2008
The highest number of killed people by natural hazards has been registered by earthquakes, which is mainly due to the 1985 Mexico City earthquake (19.9.1985), when according to governmental statistics over 9,000 people were killed, 30,000 injured and around 100,000 left homeless. The Seismological Service at the National Autonomous University (UNAM) estimates the number of killed people as high as around 40,000 (SSN 2007). An analysis of population statistics show that the 1985 earthquake also resulted in a lower rural-urban immigration from the Mexican countryside to Mexico City and some out-migration from Mexico City (Alscher 2001: 41). While in 1980 the total population of the Federal District (= Mexico City) reached more than 8.8 million people, this figures decreased to 8.2 million in 1990. This was the first time in modern history that a decrease of the total population of Mexico City has been registered.6

Floods also caused high damages in some Mexican regions. The most recent and internationally well-known case is the 2007 Tabasco flood, caused by the tropical storm Noel in the Caribbean Sea. After several days of heavy rains in Tabasco and the neighbouring state of Chiapas, the river arms of the Grijalva caused inundations in some municipalities. On October 29th the Federal Commission of Electricity (CFE) announced a partial emptying of the Peñitas Dam in Chiapas and of other dams in northern Chiapas the day after, adding more than 2,000 m$^3$ water per second to the Grijalva river.7 Together with continuing heavy rainfall, the water masses led to the inundation of about 80% of the state of Tabasco, including the capital city Villahermosa. According to EM-DAT, around 1.6 million people were affected by the flooding and an economic damage of 3 billion US Dollar was counted. The heavy rainfalls and the partial opening of dams were not the only reasons for the huge inundations. Deforestation in both states, Chiapas and Tabasco, the lowering of sediments through the massive exploitation of oil fields in Tabasco and the non-fulfilment of promised public investments in the hydrological system were other important factors.

Another environmental challenge for several coastal regions of Mexico is the probability of a sea-level rise. UNAM-researchers Mario Ortíz and Ana Méndez (1999, 2004) show that certain low lying areas of the Gulf Coast and the Caribbean are especially vulnerable to sea-level rise (see map 3 in Annex). Above all in the case of the lowlands of Tabasco such scenarios are highly critical as vast areas (up to 40-50 m inland) would be affected. This is also the most populated of the vulnerable areas, with Villahermosa as big city (615,000 habitants) within the area of risk.

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6 It also may be argued that the growth of Mexico City within the administrative has reached its limits, as the population of the surrounding municipalities in the Estado de México (federal state neighbouring D.F. to the west, north and east) has increased heavily in the last three decades.

1.3. Brief overview of migration processes

Emigration from Mexico is overwhelmingly directed towards the United States (other international migration flows are close to insignificant) and strongly interlinked to the respective economic, social and political conditions in both countries, Mexico and the USA. The history of Mexican migration to the US goes back as far as to the mid-19th century. After the Mexican-American War (1846-48), Mexico lost about 40% of its former territory, which constitutes since then the US-American Southwest.8 Thousands of Mexican families stayed in their villages located since then on US territory and became the basis for first cross-border social networks.9 In the late 19th and early 20th century, Mexican migrant workers were employed in the construction of railways, mining and agriculture in the Southwest. Nevertheless, Mexican emigration to the US was still on a very low level, mainly due to the dependency of the majority of Mexicans towards the landowners (hacendados). In the first decade of the 20th century, shortly before the Mexican Revolution (1910-17/20),10 the economic and agrarian modernization uprooted parts of the rural population, which served as a precondition for the revolution but also led to a potential of (former) peasants willing to leave their communities.

The fights of the revolutionary years, accompanied by economic and social instability, as well as the post-revolutionary conflicts created hardships in rural Mexico. In this context, emigration to the USA became an attractive option. Around 730,000 Mexicans migrated to the US from 1900 to 1930. In addition to the push-factor of the Mexican Revolution, several pull-factors in the US also contributed to a growth of Mexican migration. Among the key pull factors was the growth in the plantation economy and new jobs in the industrial and service sector in the Southwest. Mexicans were perceived as ideal agricultural workforce, mainly because of the low geographical distance, which facilitated both, recruitment and deportation of migrant workers.11 The 1920s witnessed large-scale emigration from Mexico to the US and a diversification of employment opportunities, with an increasing share of Mexicans in the industrial sector. As the economy began to suffer in the course of the economic crisis after the stock crash in 1929, massive deportation campaigns against Mexicans (and Mexican-American) were realized. About half a million Mexicans left the US voluntarily or forced during the economic crisis.

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8 With the Treaty of Guadalupe Hidalgo, signed on 2.2.1848, Mexico ceded the present-day states of California, Nevada, Utah and parts of Arizona, Colorado, New Mexico and Wyoming to the United States (receiving in return a payment of 15 Mio. US$). Background of the war was the secession of Texas in 1836, which has not been recognized by the Mexican government. Texas joined the US in 1845.

9 Descendents of the Mexican settlers in the Southwest shaped the phrasing: “We did not cross the borders, the borders crossed us”. (Solnit 1997, in Alscher 2001: 22)

10 It is difficult to define the end of the Mexican Revolution: in 1917 the Mexican Constitution has been approved, but from a strictly military standpoint it ended with the death of the Constitutional Army’s leader Venustiano Carranzo in 1920 and the ascension to power of general Álvaro Obregón. Nevertheless, the following years were still characterized by social and political conflicts as the Cristero Wars from 1926 to 1929.

11 James Cockroft labeled this policy as principle of the “revolving door” (Dunn 1996: 11).
With the entrance of the United States into the Second World War, economic growth in the US took off and foreign labour force was needed more than ever. US-employers sent recruiters to Mexico, a process which became formalized with the signature of the so-called bracero-agreement (signed 4.8.1942)\textsuperscript{12}. This program laid the basis for a further consolidation of dense migration networks between regions of origin in Mexico and regions of destination in the US. In the 22 years of its existence, about 4.6 million contracts were issued. Considering however that many bracero workers came to the US repeatedly, the total number of benefited Mexican workers is estimated between 1-2 million (Martin/Midgley 1994: 19).

A recession of the US economy after the Korean War led to another massive deportation campaign – the so-called Operation Wetback in 1954. Several hundred of thousands Mexicans were deported or forced to leave. In the following decades, Mexican emigration towards the north experienced a continuous growth. This was partially due to political reforms in the US. The 1965 amendment of the 1952 Immigration and Nationality Act, abolishing the regional quota system, favoured those migrants who already had family members living in the States. The 1986 Immigration Reform and Control Act, which legalized around 3 million undocumented migrants (among them 2,3 million Mexicans) through agricultural worker programs. The economic and demographic context in Mexico contributed to further migration flows. In the 1970s, the economic model of import-substitution industrialization (ISI) slipped into a crisis, which culminated in the debt crisis of 1982. Furthermore, the Mexican population grew steadily and with high growth rates (2.8-3.5%) from the 1940s up to the 1970s. The growth of population, together with the economic stagnation led to a saturation of labour markets and increased the attractiveness of migrating towards the north. This went together with a change of paradigm of Mexican government officials, who in former decades of growth emphasized the negative impacts of emigration (loss of qualified workforce). Since the 70s however, policy makers began to view emigration as an escape valve, reducing pressure on labour markets and infrastructure – while at the same time gaining additional financial inflows via remittances (see graph 3).

\textsuperscript{12} official name: Mexican Farm Worker Program, 1942-1964
The reduced possibilities to immigrate legally to the United States led to a change of migration patterns, fostering undocumented migration – which in the Mexican case mainly signifies the illegal crossing of the borderline. This increase is clearly reflected in the detention statistics of the US Border Patrol, even though these statistics only reflect a small part of reality. The number of detained undocumented migrants was around 110,000 in 1965, more than doubled to 284,000 in 1969, surpassed one million in 1979 and reached a preliminary peak in 1986 with nearly 1.8 million detentions (Calavita 1992: 217). The overwhelming majority of undocumented migrants detained by the Border Patrol was (and still is) of Mexican nationality. The steady increase of undocumented migration led to the implementation of border protection programs since the mid-1990s (Gatekeeper, Hold the Line, Safeguard etc.), including the construction of physical barriers on the borderline.

It is interesting to note that only a few months after the construction of a first border fence between San Diego/USA and Tijuana/Mexico (since March 1993), the North American Free Trade Agreement (NAFTA) entered into force (1.1.1994). While NAFTA promotes a liberalization of the free movement of capital, services and goods, border fences and walls have been erected in order to contain – or at least shift – flows of unwanted migration of labour force, which also led to an increase of border deaths (Andreas 2000, Cornelius 2001). The images of border fences and walls at the US-Mexican borderline on the one side and the growing trade but also security relations between both neighbour countries on the other are symptomatic for the paradoxical binational relation.

Table 2 shows the development of Mexican emigration to the United States as part of the population of Mexican origin. While the first column shows the total population of Mexican origin (= population born in Mexico + 2\textsuperscript{nd}, 3\textsuperscript{rd} and higher generation born in the US), the second column reflects the development of Mexican migration to the United States. It becomes obvious that the growth of Mexican migration was especially high in the 1970s (in 1980 nearly three
times more Mexican-born compared to 1970), which concurs with the above mentioned economic crisis and the population pressure in that decade.

Table 2: Population of Mexican origin in the USA 1900-2007 (in thousands)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>born in Mexico</th>
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<tbody>
<tr>
<td>1900</td>
<td>463</td>
<td>103</td>
</tr>
<tr>
<td>1910</td>
<td>718</td>
<td>222</td>
</tr>
<tr>
<td>1920</td>
<td>1210</td>
<td>480</td>
</tr>
<tr>
<td>1930</td>
<td>1729</td>
<td>640</td>
</tr>
<tr>
<td>1940</td>
<td>1904</td>
<td>377</td>
</tr>
<tr>
<td>1950</td>
<td>2573</td>
<td>451</td>
</tr>
<tr>
<td>1960</td>
<td>3671</td>
<td>576</td>
</tr>
<tr>
<td>1970</td>
<td>5422</td>
<td>788</td>
</tr>
<tr>
<td>1980</td>
<td>9071</td>
<td>2199</td>
</tr>
<tr>
<td>1990</td>
<td>14094</td>
<td>4447</td>
</tr>
<tr>
<td>2000</td>
<td>23208</td>
<td>8072</td>
</tr>
<tr>
<td>2007</td>
<td>30266</td>
<td>11812</td>
</tr>
</tbody>
</table>


While Mexican migration from the 1940s to 1960s was mainly concentrated on some regions in Northern and Central Western Mexico, i.e. those regions which strongly participated in the Bracero-program, the patterns became more diverse in the course of the last four decades. Nowadays, Mexican migrants come from every single corner of the country. The diversification of Mexican emigration is mainly due to economic downturns in the 1970s (crisis of ISI model), 1980s (crisis of Mexican agriculture) and 1990s (peso-shock 1994), which affected large parts of the population. Together with the already existing networks and the negative impacts of free trade for rural areas, migration became a seemingly attractive option for large parts of the population. Nearly all Mexican families have some relatives living in the United States. In many municipalities, the share of those households receiving remittances is between 20% and 25, in some even 40% or higher.
Even though reception of remittances may be a useful indicator for the extent of migration, it is difficult to break down the intensity of migration processes to the subnational level. In the official migration statistics from National Population Council, the statistics seem to lag behind the social reality. States like the two selected for field research – Chiapas and Tlaxcala – still appear as regions with low rates of emigration, even though all interview partners painted a different picture according to the statistics. In the case of Tlaxcala, only the municipality of Hueytitlan is labelled with a “high grade of migratory intensity”, in the case of Chiapas, all municipalities are marked as “low” or “very low” regarding the intensity of migration (CONAPO 2002).

The picture gets different when comparing data from the 2000 general census with the 2005 population census (conteo de población y vivienda 2005). A clear example is the municipality of Motozintla, one of the municipalities which were heavily affected by hurricanes Mitch (1998) and Stan (2005). From 2000 to 2005, the total population of Motozintla decreased by 3%, the male population even by 5%. This drop in total population can only be explained by emigration as other municipalities in the same state, but not affected by the hurricanes, did experience a regular population growth. Other municipalities with a male population decrease of more than 5% are Acatepahua, Amatenango de la Frontera, Bella Vista, Chiapilla, Escuintla, Huehuetán, Mapastepec, Ostucacán, and Unión Juárez (INEGI 2000, 2005) – most of them located in the Soconusco and Sierra region of Chiapas, where hurricane Stan had the strongest impact (see table 3).

Breaking down the figures to an even smaller level, i.e. communities within the municipality, the population change between 2000 and 2005 becomes even more obvious. In the three municipalities which were visited during the fieldwork (Huixtla, Motozintla, and Tapachula), dozens of communities had a decrease of population in the period 2000-2005, while the same communities still experienced an average population increase in the period 1995-2005. In several cases, the loss of population was higher than 50%, while the average population growth in the state of Chiapas has been around 10% in the five years from 2000 to 2005 (nationwide 5.9%). Some communities were not even mentioned anymore in the 2005 population counting – which may be due to purely statistical reasons (communities with less than 3 houses are not disaggregated), but also to problems of accessibility after the path of Stan, or in the worst case due to the fact that the community just disappeared during the storm and flooding. Mapping the communities with a population decrease, a clear parallel with the most affected areas becomes obvious. It is important to mention, that in the case of Chiapas, the 2005 census procedure was prolonged, due to the difficulties to reach remote communities after the path of hurricane Stan in early October 2005. As the timeframe between the destructions caused by the storm and the undertaking of the survey is very short (6 weeks), it is questionable, in which extent the impact of Stan may be reflected in the 2005 data. The following table gives an overview on

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population figures of those municipalities which were considered to be some of the most affected by hurricane Stan (FONHAPO 2007: 5 ff.; see also maps 4, 5a & 5b in Annex):

Table 3: Population change in selected municipalities affected by Hurricane Stan, 1995 to 2005, state of Chiapas

<table>
<thead>
<tr>
<th>Municipio</th>
<th>1995</th>
<th>2000</th>
<th>2005</th>
<th>Dif. 00-05 (%)</th>
<th>Dif. 95-00 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>tota</td>
<td>ma</td>
<td>fem</td>
<td>sc.</td>
<td>I</td>
</tr>
<tr>
<td>Acapetahu</td>
<td>Soco</td>
<td>25, 13, 12</td>
<td>25, 12, 12</td>
<td>24, 11, 12</td>
<td>3.9</td>
</tr>
<tr>
<td></td>
<td>n.</td>
<td>647 156 491</td>
<td>154 721 433</td>
<td>165 993 172</td>
<td>%  %</td>
</tr>
<tr>
<td>Amatenan</td>
<td>Sierra</td>
<td>23, 11, 11</td>
<td>26, 13, 12</td>
<td>25, 12, 13</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>n.</td>
<td>200 731 469</td>
<td>094 116 978</td>
<td>346 186 160</td>
<td>%  %</td>
</tr>
<tr>
<td>Bella Vista</td>
<td>Sierra</td>
<td>16, 8.6 8.1</td>
<td>18, 9.1 9.1</td>
<td>17, 8.5 8.9</td>
<td>3.6</td>
</tr>
<tr>
<td></td>
<td>n.</td>
<td>803 07 96</td>
<td>205 02 03</td>
<td>553 99 54</td>
<td>%  %</td>
</tr>
<tr>
<td>Escuintla</td>
<td>Soco</td>
<td>26, 13, 13</td>
<td>28, 13, 14</td>
<td>27, 13, 14</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>n.</td>
<td>282 241 041</td>
<td>064 929 135</td>
<td>364 244 120</td>
<td>%  %</td>
</tr>
<tr>
<td>Huehuetán</td>
<td>Soco</td>
<td>30, 15, 15</td>
<td>31, 15, 15</td>
<td>30, 14, 15</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>n.</td>
<td>356 316 040</td>
<td>464 597 867</td>
<td>450 720 730</td>
<td>%  %</td>
</tr>
<tr>
<td>Huixtla</td>
<td>Soco</td>
<td>47, 23, 24</td>
<td>48, 23, 24</td>
<td>47, 23, 24</td>
<td>1.1</td>
</tr>
<tr>
<td></td>
<td>n.</td>
<td>644 533 111</td>
<td>476 896 580</td>
<td>953 101 852</td>
<td>%  %</td>
</tr>
<tr>
<td>Mapastepec</td>
<td>Soco</td>
<td>39, 20, 19</td>
<td>39, 19, 19</td>
<td>37, 18, 19</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>n.</td>
<td>293 080 213</td>
<td>055 715 340</td>
<td>945 623 322</td>
<td>%  %</td>
</tr>
<tr>
<td>Motozintla</td>
<td>Sierra</td>
<td>53, 27, 26</td>
<td>59, 30, 29</td>
<td>58, 28, 29</td>
<td>2.9</td>
</tr>
<tr>
<td>Unión</td>
<td>Soco</td>
<td>12, 6.5 6.2</td>
<td>13, 6.9 6.9</td>
<td>13, 6.5 6.9</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>n.</td>
<td>835 57 78</td>
<td>934 63 71</td>
<td>459 32 27</td>
<td>%  %</td>
</tr>
<tr>
<td>Villa</td>
<td>Fraile</td>
<td>63, 32, 30</td>
<td>68, 34, 34</td>
<td>67, 33, 34</td>
<td>1.3</td>
</tr>
<tr>
<td>Corzo</td>
<td>s.</td>
<td>351 367 984</td>
<td>685 656 029</td>
<td>814 460 354</td>
<td>%  %</td>
</tr>
</tbody>
</table>

Socon.= Soconusco; Frailes. = Frailesca

Source: own calculations on the basis of INEGI 1995, 2000, and 2005

In the case of Tlaxcala, the analysis of population data from INEGI also shows some contrast to the CONAPO data. As mentioned, only Hueyotlipan has been classified by CONAPO as municipality with a high intensity of emigration. At the community level it is above all San Simeón Xipetzinco which experienced a high decrease of population between 2000 and 2005.
Several other communities show high differences between changes of male and female population; with a decrease of male population and an increase of female population – which is an indicator for emigration. But while the decrease of male population in the whole municipality of Hueyotlipan has been only -1.35% between 2000 and 2005; this figure has been much higher in other municipalities, such as San Lucas Tecopilco (-13.1%), Panotla (-8.9%), San Jerónimo Zacualpan (-6.7%), and Atlangatepec (-3.2%), which are classified as municipalities with low or very low migration intensity by CONAPO. The relatively low decrease registered by the population counting in Hueyotlipan may be attributed to the fact that a high share of emigration from this municipality is only temporary, on the basis of labour agreements with the United States and Canada. This means that migrants are still residing in their community of origin for several months per year and therefore are also counted as residents.

Even though the decrease of rainfall as well as the increase in out-migration has started in the 1990’s in the case of Tlaxcala, a clear linkage can not be drawn on the basis of statistics, as the data sets are too sparse for that purpose (no annual migration data available on community or municipal level). As will be shown in the section on results from the fieldwork, not only the environmental change, but also other factors played – and still play – an important role in the increase of emigration from several regions within the state of Tlaxcala.

2. METHODS

2.1. Justification of the selection

Two regions have been selected for the Mexican case-study: (1) communities affected by tropical storms in the regions of Soconusco and Sierra, located in the south-eastern state of Chiapas as well as (2) the western part of the central Mexican state of Tlaxcala (see map). The selection of both cases was based on the review of literature and on talks with academics in Mexico, above all at the Universidad Autónoma Nacional de México (UNAM)\textsuperscript{15}, the Universidad Autónoma Metropolitana Iztapalapa (UAM-I)\textsuperscript{16} – both based in Mexico City – and the Colegio de la Frontera Sur (ECOSUR) in Tapachula/Chiapas.\textsuperscript{17}

Chiapas is one of the poorest federal states in Mexico, with the lowest GDP per capita (27,698 MXN of 2004) and the lowest HDI (0.72 compared to a national HDI of 0.8 in 2006) (PNUD 2007). But despite of the bad performance regarding socio-economic indicators, Chiapas is not one of the “traditional” regions of emigration within Mexico. While migration from central-

\textsuperscript{14} A detailed description of the labour agreement, the participation of Tlaxcaltecans and the social and labour conditions within the Mexican-Canadian labour agreement can be found in Binford 2002.
\textsuperscript{15} Expert talks with Carlos Gay (climate studies) and Oralia Oropeza Orozco (geography) in spring 2007
\textsuperscript{16} Expert talks with Fernando Herrera and Oscar Calderón (migration studies) in spring 2007
\textsuperscript{17} Expert talks with Hugo Ángeles Cruz, Martha Wiesner Rojas and Carmen Fernández (migration studies) in Sept. 2007
western and northern Mexico has been a tradition for many decades, emigration from Chiapas and other states of the Mexican south and southeast is a relatively new phenomenon, starting in the late 1980’s and accelerating in the course of the 1990’s. Mexican researchers mainly refer to the crisis of agriculture since the 1980’s and the violent conflicts after the Zapatista rebellion since 1994 as main factors for the growing migration outflow from Chiapas (Escobar et al. 2006, Villafuerte & García 2006).

The Chiapas is also an environmental hotspot. Located on the route of many tropical storms, the Mexican southeast is frequently suffering the consequences of meteorological depressions. Hurricanes like Mitch (1998) or Stan (2005) had devastating impacts on the socio-economic structure of several regions within the state of Chiapas. One of the most affected areas has been the regions of Soconusco in the coastal plain and Sierra (mountainous region), which have been selected for the field research. The impacts of tropical storms have even become worse in the last decades due to problems of human-induced environmental degradation such as deforestation and soil degradation which led to a higher vulnerability in the case of heavy rainfalls, especially to a higher frequency and stronger impacts of inundations. According to experts, about 76% of the forest coverage in Chiapas is degraded (Greenpeace 2005).

The other selected case, western Tlaxcala in central Mexico, is on the 24th rank among the 32 Mexican states regarding human development (PNUD 2007: 23). Agricultural production in Tlaxcala depends heavily on rainfall patterns, which have changed in the course of the last two decades. According to researchers of the National Autonomous University (UNAM), Tlaxcala has experienced the highest levels of desertification nationwide due to the intensive use of soil. The state is also considered to be notably vulnerable to the effects of climate change (Hernández et al. 2003: 36). Even though Tlaxcala is not a traditional region of emigration, out-migration from this area has increased since the 1980’s, first to the Mexico City metropolitan area, and later – in the course of the 1990’s – also to the United States, especially to Southern California, Idaho, and Wyoming (Calderón 2006, Herrera 2005), but also to Canada (Binford 2002). One of the push-factors has been (and still is) the increasing land degradation, resulting in lower productivity of the agriculture lands and a decrease of family income for those depending on the primary sector. Given these factors, I felt both the regions of Soconusco and Sierra, located in the south-eastern state of Chiapas as well as the western part of the central Mexican state of Tlaxcala to be appropriate case studies for my research.

2.2. Discussion of methods

The methods used during the fieldwork were mainly based on the following standardized scheme: in a first step, expert interviews with academics (mostly

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18 Heine (2003: 243) shows that the soil erosion in Tlaxcala has historical roots going as far back as the pre-Columbian period, concluding that land-use change – not drought conditions – has been the major driver of environmental change.
in Mexico City, but also in Tapachula, Chiapas) were conducted in order to get a first overview and to facilitate the selection of specific regions. Most of the expert interviews with academics were held in the form of informal conversations, only few of these talks have been recorded. The next steps consisted of contacting key persons in the selected regions, via e-mail and/or telephone. In both cases, Chiapas and Tlaxcala, the support of Mexican partner institutions proved to be very helpful.

The third step in fieldwork has been the realization of fieldtrips to affected regions. Previously contacted key persons (as local researchers, NGO activists) helped in the identification of those communities which are specially affected by environmental degradation and where emigration can be observed. In most visited communities, the commissioners of the “ejido” (comisariado ejidal) proved to be of central importance. These commissioners shared their knowledge of social, economic and environmental problems in their communities. They also helped in identifying and contacting interviewees.

The fourth and final step was the application of the standardized EACH-FOR questionnaires and the undertaking of qualitative interviews with non-migrants. While in Tlaxcala most interview partners were willing to cooperate, in the case of some communities in Chiapas the interviewers were confronted with a certain degree of reserve and distance by potential and actual interviewees.

A major problem in the application of the questionnaires was the fact that the subcontracted interviewer in Chiapas started her work with an older version of the non-migrant questionnaire, which led to some gaps in the filling-out of the questionnaires (some questions were referring to a “former place of residence”, which did not apply for those interviewed persons who stayed in their community). This led to the lamentable situation that subcontractors left out some questions as they thought that these were only for interviewees who have also lived in other places before. The questions related to the distance of public services (Q18 Migrant Questionnaire, version 4.1.08) were apparently interpreted in different ways by subcontractors – in some cases the answers were left in blank (because of the above mentioned problem referring to places of “former residence”), in other cases the distances were measured in kilometres or in time.

3. FIELDWORK FINDINGS & ANALYSIS

The fieldwork carried out in two different regions of Mexico shows some telling indicators for environmental-induced migration, but also makes clear that it is difficult to find out the exact role of environmental migration as a push-factor within the broad spectrum of other, above all socio-economic, conditions

19 Commonly owned land for agricultural production, based on the Mexican Revolution (1910-1917/20) and the Agrarian Reform (1934); protected by the Mexican constitution until 1992.
which contribute to the growth of internal and international migration. The
selected cases, Soconusco and Sierra in Chiapas and the other western
municipalities of the state of Tlaxcala, show clear differences in the
importance of environmental factors regarding the decision to migrate.

In the case of the analyzed areas in southern Chiapas (communities in the
coastal municipality of Huixtla, in the mountain municipality of Motozintla and
in the urban municipality of Tapachula), the impact of both, slow-onset
environmental degradation as well as natural hazards, for migration
processes can be clearly seen. According to several interviews, people were
already planning to leave their communities before hurricane Mitch (1998) and
then hurricane Stan (2005) passed through their region, but the severe
destruction caused by these hurricanes accelerated the decision to migrate as
the economic basis of many families was totally destroyed after the path of
the hurricanes.20

When hurricane Stan passed through Chiapas, many habitants of the area
were surprised by the strength of its impact. Small rivers turned into torrential
streams, demolishing houses, infrastructure and plantations. The following
quotes from interviewed villagers illustrate the impact of Stan in their
communities:

We were absolutely isolated, there were no signals, neither
telephone nor electricity, nothing. Only after about one month,
electricity came back, it was a very hard time“ (Julieta, 51 years,
Belisario Dominguez)

“The river took away our homes, our properties; we also were
close to being taken away. My two children were asleep when
the storm came… and if I would not have realized it, they also
would have been taken away by the river“ (Claudio, 53 years,
Belisario Dominguez)

“The torrential river took away my entire house. This here, from
my mother, was buried by mud. The house of my brother was
also taken away by the river; mine has disappeared completely.
[.] Everything has been demolished. We were rescued with a
rope. Thereafter everything was covered by mud, buried. [.] In
this quarter, four streets were washed away – before the storm
here were houses – up to there. We used to live in the fourth
street – now we live in the first street. (Maria, 62 years,
Tapachula)

But when asking the villagers on migration, most respondents underline that
they have no other place to go. Also the age of the interviewees plays an
important role in the decision to migrate. In small communities like Toliman or
Villahermosa (Motozintla, not Tabasco), most young people already left in the
last couple of years. The older ones prefer to stay in their villages and
continue with their activities. Those with relatives abroad receive remittances,

20 Interview with Hugo Ángeles, ECOSUR Tapachula
which has become an important source of income in the affected areas. Asked about what would have to happen in order to migrate, the typical answer was that the house and/or the lands/plantations would have to disappear.

Regarding governmental support, most villagers in all three areas (mountains, coastal plains and suburban shantytowns) expressed their critique towards the state institutions. Even though some pointed out that they received some financial or material help for reconstruction, most criticized that governmental help came far too late or even not at all. The following quotes illustrate some opinions among the villagers:

“Actually, the authorities are not present over here, they don’t care about us. They don’t come, they don’t check the situation over here – and they don’t see that we are living in an area of risks.” (Yolanda, 34 years, Belisario Dominguez)

“Well, they helped us a bit with construction material: cement, battens, lime... the rest we had to do on our own. In total, they gave us 11,000 Pesos of construction material [around 800 Euro], but what can you do with that? We had to pay the big share on our own” (Maria, 62 Jahre, Tapachula)

“Over here nothing is happening. Just look, we already have been there [with the authorities] in order to move something – than they told us that they would repair the sewage system, but until today nobody came.” (Francesca, 32 years, Tapachula)

“A representative from our village went by foot to Huixtla and he also wanted to phone to Tuxtla [the capital of Chiapas], because food provisions came from there. He wanted to inform them what has happened over here. We were totally isolated over here.” (Julieta, 51 years, Belisario Dominguez)

“The government only comes when the disaster has already happened. They come and see how the situation is, that’s all. They don’t do anything for prevention. We wanted a protection wall for the river – and the government tells us that the project is there, but nothing has happened. [...] We did not even get electricity and potable water from the government. The water which we use here comes from the finca over there, the tenant gave us permission to use it, otherwise we would not have anything.” (Manuel, 40, Belisario Dominguez)

“They say that a lot of support has been given to us... but it is obvious that the support did not arrive in our hands, even though we have been the affected. The support went to those, who did not have to suffer as we did, those who live in the city, who have cars and things like this.” (Antonio, 53, Belisario Dominguez)

Representatives of the villages in the affected areas complained about the lack of governmental support. The municipal agent (agente municipal) of Belisario Dominguez (Motozintla) narrated the history of his village after the
path of hurricane Stan. While soldiers were sent to the accessible regions, mainly urban areas, the population of remote areas had to organize themselves. Some villages were isolated for more than a week. Only a week after Stan, President Vicente Fox (National Action Party, PAN) announced 7.5 billion Pesos (690 mio. US$) state support for the reconstruction of affected areas; not only for Chiapas, but also for other affected states.\textsuperscript{21} In protest, about half a year after the path of Stan, villagers of Belisario Domínguez organized a blockade of the federal route between Huixtla and Motozintla, an import transit connection between Tapachula and the inlands of Chiapas. In reaction to the blockade, governmental representatives signed a resolution for the reconstruction of the infrastructure. Since nothing happened in the following months, villagers again blocked the street in May 2006. The state authorities reacted quickly by sending 400 policemen who dissolved the demonstration with the use of violence. (La Jornada, 17.5.2006).\textsuperscript{22} Several local leaders were apprehended and transferred to a prison in Huixtla. Only after long negotiation, the detained were released and talks on reconstruction were reinitiated.

\textit{We realized periodic meetings for the evaluation; we made an inventory of our needs in different areas: electricity, streets, health, and food. We systematized this and developed a priority list, but suddenly there was no money – or the money has just been on the paper… However, the reconstruction of Cancún was very quick, but over here, it's rather drop by drop.} (Ernesto San Martín, municipal agent in Belisario Domínguez, interview realized by Stefan Alscher in November 2007).

This quote shows the discontent with governmental actions after Stan in Chiapas and also refers to the different reaction of the state in the case of hurricane Wilma in Quintana Roo (Cancún and surroundings). While state support in the case of Chiapas was slow and sparse, it was fast and abundant in the case of the tourist zone of Quintana Roo. As soon as the hurricane left Cancún, President Fox visited the area and announced a financial support of around 2.3 billion US$ - more than three times higher than in the case of Stan, where the support was distributed among several states. Further funds were liberated quickly to restore the infrastructure of Cancún and other tourist destination, as well as for the recovery of the beaches of Cancún, which have been washed away during the path of Wilma.\textsuperscript{23}

Another problem mentioned by several villagers was the assignation of houses for environmentally displaced persons. Governmental authorities built houses in the municipality of Tuzantán for those who lost their homes during hurricane Stan. Some villagers complained that the assignation of houses was not regulated in a fair manner, but most complained about the conditions of these houses. Even two years after the path of Stan, electricity was not connected, the sewage system was very basic and some houses already

\textsuperscript{21} Just some days before this announcement, Fox admitted that a minimum of 20 billion Pesos would be necessary for reconstruction.
\textsuperscript{22} " Damnificados de Chiapas piden obras y les responden con toletes", La Jornada, 17.10.2006
\textsuperscript{23} The Belgian enterprise Jan de Nul received about 24 Mio. US$ for the beach recovery.
presented cracks in walls and ceiling. For these reasons, several interviewees stated that they would rather not accept the houses but live with other family members, closer to their community of origin.

In several communities, deforestation and soil erosion was an aggravating factor when hurricanes or other tropical storms are passing by. The mountain region in southern Chiapas used to be covered by dense forests, which also served as a protection against extreme weather events. In those areas where deforestation took place, devastation after the passing by of tropical storms is more extreme than in those areas with intact forests. A major problem of deforested hills is the high risk of massive landslides; in some cases whole villages were buried under the masses of mud. Landslides also are a substantial threat for local agriculture as plantations have been buried by mud after heavy rainfalls.

The findings from the qualitative interviews with villagers and local agents are also supported by the questionnaires. A total of 39 questionnaires have been applied in different communities in the municipalities of Huixtla, Motozintla, Tapachula, and Tuzantán of which 20 were “migrant questionnaires” and 19 “non-migrant questionnaires”. The vast majority of respondents acknowledge that environmental problems have affected their livelihood – and also see a relation between environmental degradation and migration. 19 out of 20 migrants stated that environmental problems affected their decision to move, mainly because of sudden natural disasters. Among the non-migrants, sudden natural disasters and unreliable harvest were identified as main reason for migration.

Other factors also played an important role, such as the agricultural crisis since the 1980’s and the negative impacts of free trade policies for rural Mexico. The decline of prices for agricultural products, here above all in the case of coffee, together with the elimination of state subsidies and growing competition from abroad led to a sharp decrease of family income in rural areas. Resultingly, families began sending younger family members abroad, either to other regions within Mexico or to the United States.

Data from the EMIF (Encuesta sobre Migración en la Frontera Norte de México) and the MMP (Mexican Migration Project) show a clear increase of emigration from Chiapas since the late 1990’s. While migrants from Chiapas only represented around one percent or less of those captured by the EMIF survey (“migrants coming from the south”), they already represented 4.6% of the total in the EMIF survey of 2002/2003. This increase becomes even clearer when looking at those migrants who are looking to emigrate to the US: less than one percent until 2000 up to 7.2% in 2002/2003 (COLEF/CONAPO 2006).

In the case of western Tlaxcala, the relationship between environmental degradation and migration is not as obvious as in the case of Chiapas. Most interviewees, migrants as well as non-migrants, emphasized that their lands still are of “good quality”. Low prices for their agricultural products, division of
lands through heritage and missing interest of the younger generation for agriculture were seen as main problems. But in the course of the interviewing process, the majority of interviewees were complaining about the shifting of rainfall periods, which results in a decrease of harvests and therefore in lower earnings. Some also admitted that intensive techniques of modern agriculture led to soil degradation. Leaders of peasant organizations expressed concern on the degrading quality of soils in the region. When asked about the emigration of young villagers, NGO leaders concurred with the interviewed peasants that the younger generation is looking for alternative work than in agriculture, but also stressed the point that this is also linked with low earnings in agricultural production, resulting partially from the shifting of rainfall periods. Therefore, the linkage of environmental degradation and migration can be characterized as indirect in this case. The following quotes give an impression of the problems that the villagers are confronting:

“Look, I have four children; they all left the village after completing secondary school. They don’t see any future in agriculture, so they are looking for other opportunities. But I understand them, I have five hectares of land, so when I’m not here anymore and my land is divided by four, what can my kids do with such small land portions? That’s not enough to survive.” (Don Pedro, 61 years, Hueyotlipan)

“In former times, rain started earlier, in late February or March. Now it’s already April and it just started to rain. The whole process of sowing and harvesting is postponed now, and our profit is decreasing. It has really become hard to survive as a small farmer.” (Juan, 53 years, Benito Juárez)

“First it did not rain at all – and now, just a few days ago, it was raining and hailing far too much, I think it was the tail of a “norte” (tropical storm). Big parts of my farmlands are inundated now – and I just sowed corn a few weeks ago, so this sow is lost. We get some money back from our agricultural insurance, but that’s not enough to compensate our loss. Seems that the climate has gone mad over here.” (Manuel, 48 years, Benito Juárez)

“The government is doing nothing for us. They have eliminated most subsidies, so when our harvest is bad, we have to rely on ourselves. Many of us had to leave, to Canada or the United States. I went several times to Canada in the 1990’s; in a temporary program. The money I made there, good money - not Pesos, was a big help for my family over here. Without that source it would have become extremely difficult.” (José, 56 years, Benito Juárez)

“My grandfather has worked on our lands, my father – and so do I. But times have changed. Everything is getting more expensive, but we are getting the same price for corn as we did 10 years ago. That’s not fair. Furthermore, the rain is coming later now, so that we produce less. The only solution is to go away, at least for a while. Each year I’m working for 3 to 5
months in Wyoming. That's my main source of income. But leaving my village forever? No, I was raised here and here I will stay." (Miguel, 45 years, Hueyotlipan)

Summarizing the statements, emigration is a strategy for income diversification. This diversification is gaining more and more importance, as the villagers are confronting a set of adverse conditions, such as low market prices for their products, elimination of state support – and environmental factors such as soil erosion and change in rainfall patterns. It's interesting to note that one interviewee mentioned inundated farmlands. This may sound paradox at first sight, but is in fact a real problem for the villagers. If heavy rains come after a long period of drought or just after sowing the first plants, the impact for the farmers becomes hazardous as the fertile cap of the soil is washed away. Finally, also the use of modern agriculture aggravated the problems in the two selected communities in western Tlaxcala. The Ejido-commissioners of Benito Juárez and Hueyotlipan shared the view that the use of heavy machines and chemical fertilizers led to a higher risk of soil degradation. On the other hand, these machines and fertilizers are perceived as a requirement in order to be able to compete on the market – a vicious circle for the farmers of Mexico.

The results from the questionnaires show similar arguments than the qualitative interviews with local farmers. 15 questionnaires have been applied in the municipal centres of Benito Juárez and Hueyotlipan, of which 8 were “migrant questionnaires” and 7 “non-migrant questionnaires”. In both groups, environmental problems are not seen as a major reason for emigration, only a third of all respondents (5 out of 15) saw a linkage between environmental degradation and migration, either in their own decision to move or in the migration decision of other villagers. It is rather the critical situation in small-scale agriculture, characterized by high prices for machinery or fertilizers, low prices for their products on the market and elimination of state support, which is perceived as main driving force for migration. Those who identified environmental problems in their area mentioned unreliable harvests as major problem, mainly due to changing rainfall patterns. 13 out of 15 of respondents have family members who migrated, mainly to the United States (8 out of 15). In the municipality of Hueyotlipan, the migration network to Jackson Hole in Wyoming, already identified in contributions of Fernando Herrera and Oscar Calderón (cf. Herrera 2005, Calderón 2006), has been confirmed in the sample of questionnaires as primary destination of migrants (6 out of 8). Another important destination is Canada. From both selected communities, a temporary migration within the frame of the binational labour agreement PTAT\textsuperscript{24} is reflected in the sample: out of the 15 respondents, 4 have migration experience or family members in Canada. Other destinations of migrants are Mexico City (3) and Spain (2), the latter in form of construction workers from Benito Juárez. Temporary migration is not only a typical pattern for the participants of the PTAT program, but also for those migrants who are going

\textsuperscript{24} \textit{PTAT = Programa de Trabajadores Agrícolas Temporales México-Canadá} [Seasonal Agricultural Workers Program Mexico-Canada]
seasonally to Jackson Hole / Wyoming and nearby communities in Idaho on the basis of H2A visas. The temporary migration to Canada or Wyoming & Idaho constitutes an important additional source of income for many families and is also used for investments in agriculture at home in Tlaxcala.

4. CONCLUSIONS AND FUTURE RESEARCH

This report shows that there is a linkage between environmental degradation and migration in the analyzed regions of Mexico. In the case of Chiapas, the hazardous impacts of hurricane Mitch in 1998 and Stan in 2005 had a "trigger-effect" for internal and international migration. In Tlaxcala, soil erosion and changing rainfall patterns serve as an additional push-factor for emigration. In both cases, a set of other factors is of crucial importance for explaining migration, above all the crisis of Mexican agriculture, growing international competition, missing state support and low prices for agricultural products. Nevertheless, environmental conditions also play a central role as they are the basis for agricultural production. Both states are recent emigration states within Mexico. Importantly, young villagers, predominately men but also women, see emigration as the most viable option. In many cases, emigration serves as a strategy of income diversification; remittances are mainly used for the basic needs of the remaining family members. Some interviewed villagers complained about the social impacts of emigration as family structures are threatened.

It also has been shown that Mexico is confronting severe problems of environmental degradation. Processes of slow-onset degradation as deforestation, soil erosion and desertification affect large parts of the country. Many regions are also frequently hit by natural disasters, such as hurricanes, other tropical storms, earthquakes and floods. The impacts of these disasters are aggravated by deforestation. For some coastal regions, the probable sea-level rise is a serious threat.

The Mexican government has an organized and nationwide structure for disaster prevention and response. Large scale evacuations did work well in the case of several hurricanes, which have even been recognized by the United Nations. Nevertheless, reconstruction of affected regions is varying from region to region, mainly due to economic interests (priority for tourist areas). The general problem of unequal development is also reflected in disaster prevention and response. On the international level, Mexico plays an active role in debates on climate change. It has been one of the first countries in presenting the third national communication within the UN Framework Convention on Climate Change (INE 2006).

It is obvious that this report only reflects a small part of the reality, having selected just a few communities within two regions of Mexico. The number of applied questionnaires definitively is not sufficient for representative findings. Further research would be necessary in order to reflect the social reality and

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25 Interview with Julia Martinez, INE, 07.04.2008
to obtain more evidence on the linkage between environmental change and migration processes. This research should focus also on other regions in Mexico, for example those which already reached a high grade of desertification or those which have a longer history of emigration. Another interesting point should be research in the state of Tabasco, where large parts of the state have been inundated during the floods in 2007 and where the risk of further inundations due to erosion and sea-level rise is very high. Through this study, we just saw the tip of the iceberg – the other parts are still left to investigate.
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ANNEX: Maps and Pictures

Map 1: Mexico / regions of field research (Tlaxcala and Soconusco)

Source: original map taken from http://www.nativenetworks.si.edu/images/map_mexico.gif; edited by the author
Map 2: Precipitation in Mexico (accumulated), period 1941-2002

Source: Servicio Meteorológico Nacional; access: 28.04.2008

Map 3: Regions affected by sea-level-rise

Source: Ortíz, M. / Méndez, A.; in: Gay 2006
Map 4: Areas affected by hurricane Stan (October 2005), state of Chiapas

Source: Gobierno de Chiapas (red areas are affected areas, red spots affected communities; note the concentration of red spots in the surrounding of Tapachula)
Map 5a: Population change in the state of Chiapas, 2000-2005 (municipal level), total population

Map 5b: Population change in the state of Chiapas, 2000-2005, only male population

Source: own calculations on the basis of INEGI 2000 and 2005
Pictures 1a & 1b: Hurricanes Stan (Chiapas) and Wilma (Cancun, Q.R.) in October 2005

Source: El Universal

Pictures 2a & 2b: Mexico City Earthquake on September 19th 1985

Source: International Telecommunication Union (ITU)

Pictures 3a & 3b: Inundations in Villahermosa during the 2007 Tabasco Flood

Source: El Universal, 04.11.2007
Pictures 4a & 4b: Images from fieldwork area in Chiapas

Left: shantytown on the riverbank of Rio Coatán, Tapachula; Right: travel agencies in Huixtla offering trips to Tijuana (US-Mexican border, 3,900 km away), pictures taken in autumn 2007 and winter 2007/08 by Sara Hernández Herrera

Pictures 5a – 5d: Houses for environmentally displaced persons, “Fraccionamiento Rural La Flor” / Tuzantán, Chiapas

Photos taken by Sara Hernández Herrera in January 2008 (note on the second picture that electricity is not connected; CFE stands for Federal Commission on Electricity. The fourth picture shows the sewage system “Fosaplas”).
Pictures 6a – 6d: Dry lands and inundations in Benito Juárez, Tlaxcala

*Photos taken by Stefan Alschler in April (above) and June (below) 2008*