



# CHAPTER 3. CONTEXT

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### 3.1 The State of Morelos

This thesis makes use of a research study that was conducted in 2006. As a result of that initial research, several aspects of Morelos were identified. The main objective behind this was to establish a connection between Morelos' social structure, infrastructure, regional parameters and waste processes; in order to find out whether its municipalities have reached their maximum potential when it comes to sustainable waste management practices.

The most important findings obtained at that time as well as updated information gained through recent literature review are outlined here. This is to provide a general background of the physical settings in which the municipality of Jiutepec is embedded.

The state of Morelos extends over 4,893 Km<sup>2</sup> and represents 0.25% of the total surface of the Mexican Republic (INEGI, 2006). It is one of Mexico's smallest entities. However, it has a strategic location south of Mexico City. It links the Mexican capital with the southern coast of the country, functioning as an important urban junction (Jean-Baptiste, Bidlingmaier 2007).

**Food stands in Morelos**

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Housing structure is homogeneous in the state. There are mostly single housing units built on one or two levels.



**Figure 2. Map of the Central Region of Mexico**



Morelos is an integral part of the geographical demarcation known as the Center Region of Mexico, which comprises 6 other distinctive territories. This region is known to be the most important economical and political hub of the country, which comprises over 32 millions inhabitants and generates about 41% of the Nation's monetary value.

**Figure 3. Maps of Morelos**

State of Morelos  
Political division &  
Infrastructure



State of Morelos  
Isotherm &  
Soil structure



The State of Morelos is divided in 7 regions with distinct economical and developmental features. The latest national statistics published in 2006, reveal a total population of 1,612,899 inhabitants living in 33 municipalities (see Municipalities, population and age groups of Morelos in Appendix).

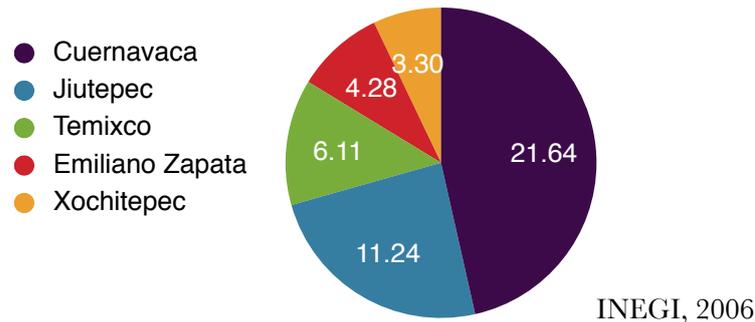
Among the state's most important features are its biodiversity and privileged climate. Morelos fluctuates from cool to semi-warm and warm depending on the region. It is extremely diverse and offers many advantages in terms of resources, varying from mountain areas with high altitude to sub-tropical regions. Its climate and stillness attract a considerable number of locals and foreign visitors making it a hub of leisure and enjoyment in Mexico's Central Region. Many residents of Mexico City and neighboring areas have a weekend home in the state.

Morelos's capital Cuernavaca (349,102 inhabitants), covering an area of 244.71km<sup>2</sup>, has an average temperature of 20°C. year round. It is known as "The City of the Eternal Spring". It is the political and economical center of Morelos and has a long tourism tradition. In Cuernavaca the reminiscence of a former hacienda life-style with a typical colonial architecture prevails in some of its buildings and courtyards. The perception of a human development embedded in a culture which revolves around earth and nature is still noticeable despite the challenges that the people of Morelos face due to the region's rapid and turbulent urbanization process.

The diagnosis published in Morelos' State Development Plan 2007-2012, reveals a state density of 325 hab. per km<sup>2</sup>. Morelos is ranked as the third densest region of the country, the national density average being 53 inhabitants per km<sup>2</sup>. In Morelos 86% of the population live in urban areas. The community is mostly concentrated in what is known as the Metropolitan Areas of Cuernavaca and Cuautla (2007).

The Region Cuernavaca which includes the municipalities of Cuernavaca, Jiutepec, Temixco Emiliano Zapata and Xochitepec is the most populated settlement of the state. Figure 4 shows the distribution of the population in the region.

**Figure 4. Percentage of population in the Cuernavaca Region**



Not only is the region surrounding Morelos' capital extremely compact, it also generates a high demand of basic services and infrastructure challenges. Furthermore, unplanned settlements proliferate, causing pressure to change or adjust the land use. This has other political and social consequences on the outskirts of the region. Small localities with less than 2,500 inhabitants are affected and many residents are forced to migrate to larger settlements.

**Table 4. Municipalities with the highest density rate**

region	municipalities	density hab. per km <sup>2</sup>
Cuernavaca	Jiutepec	3 683
	Cuernavaca	1 680
South	Zacatepec	1 175
Cuernavaca	Temixco	1 124
	Emiliano Zapata	1 063
Cuautla	Cuautla	1 043

**Table 5. Localities and population of Morelos**

no. of localities	population
1 273	1 - 2 499
39	2500 - 4 999
25	5 000 - 9 900
7	10 000 - 14 999
8	15 000 - 19 999
4	20 000 - 49 999
1	50 500 - 99 999
3	100 000 - 499 999

Plan Estatal de Desarrollo  
2007, INEGI 2006

One of the goals of the study on Morelos was to discern the main causes of particular circumstances which occurred in the fall of 2006. The people of Morelos (especially in the Cuernavaca Region) experienced a series of problems related with the disposal of their waste during the months of September and October 2006. Morelos made headlines in the national Mexican press. Images of obstructed roads with hundreds of garbage bags were made public. The pictures shown on the local news and other media sources, exposed numerous concerned residents protesting against local authorities and drawing attention on the seriousness of waste issues in the region. The following section provided further details on the issues of waste in the region.

### **3.2 Waste issues in Morelos**

#### **The Tetlama waste dump case**

The Tetlama waste dump issue erupted in October 2006. The subject rapidly expanded from a focal technical and environmental problem into a broad political and social issue involving a complex interaction of actors and interests.

A number of articles published headlines such as “Waste Dump of Death” (Balboa, 2006), “Morelos is Denounced For Waste” , “Local Authorities Do Not Act Against Environmental Damages in Alpuyecá” (Norandi, La Jornada newspaper, 2007) were exposed on a regular basis.

The main issues exposed in the media as well as reports of the events of 2006 reveal the following facts:

- The Tetlama Waste Dump located between the towns of Tetlama and Alpuyecá was utilized to accumulate the waste produced by the state’s capital and other 5 municipalities during the last 3 decades.
- Local residents living near the waste area officially requested its shut-down many years before.
- Serious health and respiratory problems were reported, children born in the area showed skin problems and other abnormalities.
- Environmental groups have reported a number of ecological hazards such as fauna and flora degradation, leachate and gas emissions.
- The Tetlama waste dump is known to extend on a large area. The literature and interviews indicate that the size of contaminated area varies from 10 to 20 hectares. Verification of the data was inconclusive.

- Actions to cease the waste transportation and to sanitize the area were slow, the authorities were unable to discontinue the use of the Tetlama waste dump.
- Protest and resistance movements from locals were initiated in March 2006 to pressure the waste dump's closure.
- In September 2006 the inhabitants of Alpuyeca blocked the way to the waste dump.
- Tetlama's abrupt closure had severe consequences on the public hygiene of cities in the Cuernavaca Region.
- The volume of garbage accumulated in the streets and public squares of Cuernavaca exceed the numbers of containers available.

### **Waste production in Morelos**

Official reports indicate that approximately 2,077Mg/da of municipal solid waste is produced in Morelos. The waste production per capita in the state is 1.3kg/hab. Municipalities which produce the highest volume of refuse are Cuernavaca 25%, Cuautla 19% Jiutepec 12%, Yautepec 5% and Jojutla 3%. According to the State Commission for Water and Natural Resources (CEAMA), the previously mentioned municipalities produce 64% of the total volume of solid waste generated in Morelos (2007). The state features an MSW composition of 50% of organic waste, 30% inorganic and 20% inorganic non-recyclable. (Secretaria de Servicios Públicos, Cuernavaca).

According to local authorities, Morelos' refuse is commonly disposed of in 26 official open dumps and 2 sanitary landfills located in Yecapixtla and Cuautla. The problem of Tetlama, which has attracted the attention of a large number of environmental activists, is causing irregular disposal sites to close. This consequently affects the costs of transportation for waste collectors who have to travel further away to dispose the waste in the remaining official sites. Consequently illegal dumps have increased. 70 illegal dumps have been identified in 2007. There is a total of 103 hectare designated as open dump area in Morelos (Anuario estadístico, Morelos 2006).

### **Ecological consequences in the region**

A number of concrete threats to the natural environment of Morelos are indicated in the reviewed literature. Policy documents, Instrument Programs and reports from environmental agencies, harmonized in their diagnosis on the local impact of waste, regarding the following aspects:

#### **Box 2. Ecological consequences of waste issues in Morelos**

Open dumps cause fires, leachate and gas emission to the surrounding areas.

The transportation of solid waste is affecting the natural environment through the emission of gas and particles in the atmosphere.

Illegal dumping near waste streams contaminates soils and rivers

Sewage water discharged near water flows is a mayor factor of water contamination

### 3.3 Criteria for selecting the municipality of Jiutepec as a case study

In the study on Morelos, The need for a detailed investigation on how waste management operates in one or several of its municipalities was exposed. After a careful assessment of the characteristics of each municipality, Jiutepec was chosen because it presented the most suitable elements for an in-depth study.

#### **Research condition**

Access to the facilities  
Established contacts  
for interviews with key experts

Moreover Jiutepec has very distinctive features, which made it worth studying. As the second most populated locality of Morelos, Jiutepec is a compact locality, which fits the profile of medium-sized cities with a rapid development pattern. It has the highest density rate in the state (Plan Estatal de Desarrollo 2007-2012, INEGI, 2006), a boosting economy, special infrastructure requirements and endemic natural assets.

Sanitary has been a traditional problem in this town and despite its privilege climate, Jiutepec's esthetic quality is deteriorating. The town lacks the charm that Morelos is so famous for, and many of its people are facing social and economical difficulties causing tension within their communities. Moreover, there are reports of environmental problems related to the contamination of water, lack of adequate sewage system in the town and traffic issues affecting the overall living quality of its residents.



neighborhoods with water shortage



Communities with low access to medical care



Area with sewage problems

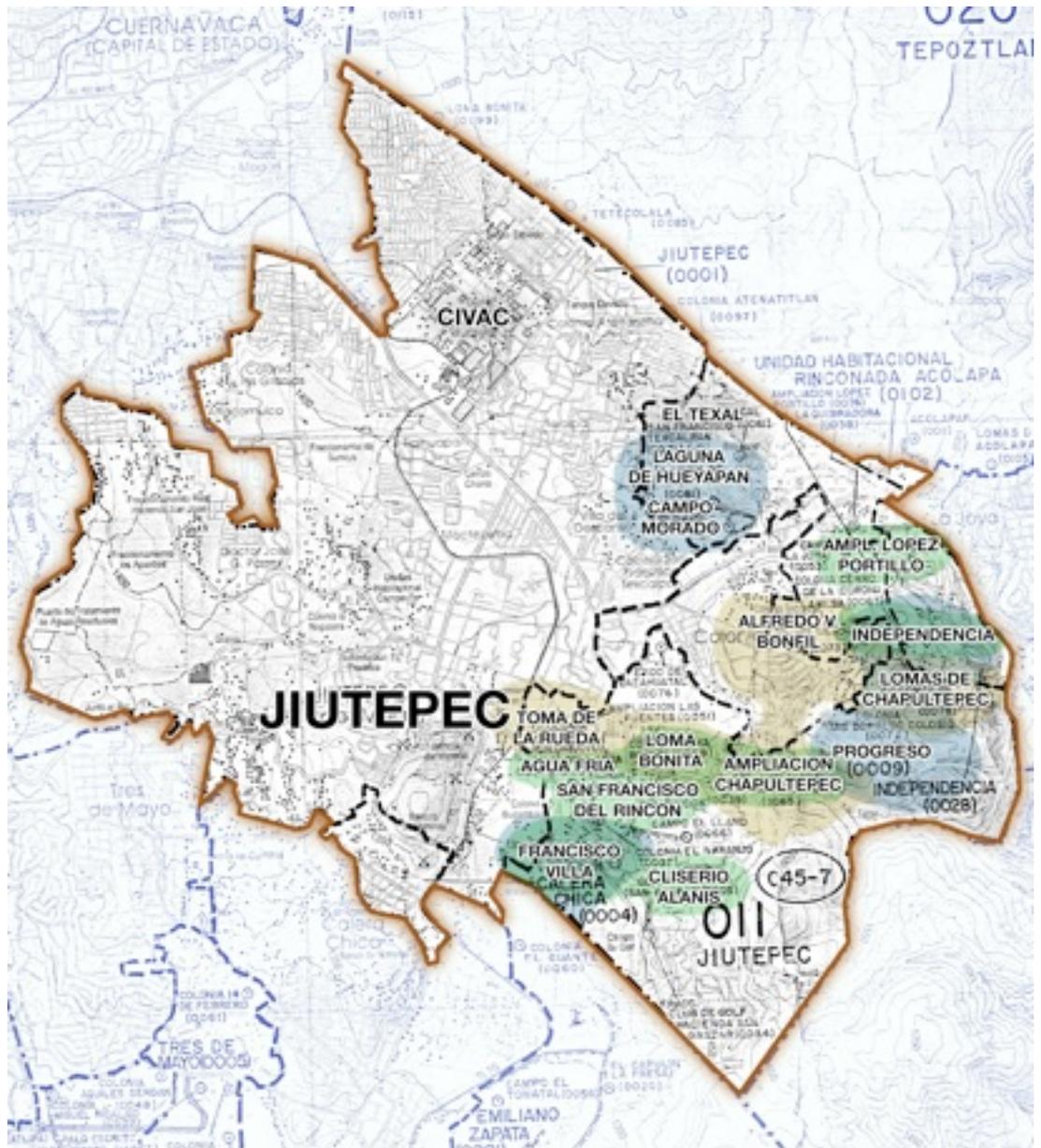


Figure 5. Map of Jiutepec