Assessing Urban Containment Policies for Managing the Urban Growth of Santa Tecla City, El Salvador

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ABSTRACT

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Managing urban growth is one of the most challenging tasks planners have to do especially when cities are spatially constrained. Generally, the containment of a city is based on the allocation of land needed to satisfy the demand based on the city’s growth goals. This thesis assesses the potential containment of Santa Tecla city following this traditional approach of sizing the containment policy based on the city’s growth trends, but it also considers the land suitability, and the administrative capacity of the municipality to enforce the policy. As a result, this study contributes to the development of a methodology in which growth management is assessed with an integrated approach.

Approved: _____________________________________________________________

Nancy R. Bain

Emeritus Professor of Geography
Esta tesis esta dedicada a Dios, mis padres, mi hermano Miguel, Diego, Andres y Bryan por su sacrificio, amor y apoyo.

This thesis is dedicated to God, my parents, my brother Miguel, Diego, Andres, and Bryan for their sacrifice, love, and support.
ACKNOWLEDGMENTS

My Special thanks to Dr Nancy Bain, Dr. Margaret Pearce, and Dr Dina López for their invaluable guidance, support, and encouragement.

I also thanks my friends, Ing Willian Marroquin, Ing José Cepeda, Arq Luis Reyes, and Ing Laura Gil for their support and help.
### TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>3</td>
</tr>
<tr>
<td>Dedication</td>
<td>4</td>
</tr>
<tr>
<td>Acknowledgments</td>
<td>5</td>
</tr>
<tr>
<td>List of tables</td>
<td>8</td>
</tr>
<tr>
<td>List of figures</td>
<td>9</td>
</tr>
<tr>
<td>Chapter one: Conceptualization</td>
<td>10</td>
</tr>
<tr>
<td> Introduction</td>
<td>10</td>
</tr>
<tr>
<td> Study area</td>
<td>13</td>
</tr>
<tr>
<td> Physical environment</td>
<td>16</td>
</tr>
<tr>
<td> Socio-economic environment</td>
<td>30</td>
</tr>
<tr>
<td> Research questions</td>
<td>37</td>
</tr>
<tr>
<td> Methodology</td>
<td>37</td>
</tr>
<tr>
<td> Chapter outline</td>
<td>38</td>
</tr>
<tr>
<td>Chapter two: Literature review</td>
<td>40</td>
</tr>
<tr>
<td> Urban containment policies (UCP)</td>
<td>40</td>
</tr>
<tr>
<td> Differentiating growth management from urban containment policies</td>
<td>40</td>
</tr>
<tr>
<td> Goals of urban containment policies</td>
<td>42</td>
</tr>
<tr>
<td> Further consequences from the implementation of UCP</td>
<td>43</td>
</tr>
<tr>
<td> Analyzing urban containment policies</td>
<td>44</td>
</tr>
</tbody>
</table>
Greenbelts ........................................................................................................ 45
Cost and benefits from greenbelts................................................................. 51
Urban Growth Boundaries (UGB)................................................................. 54
Cost and benefits from urban growth boundaries ..................................... 59
Setting the stage, planning’s legal framework in El Salvador .................... 61
Environmental law of El Salvador .............................................................. 62
Law of natural protected areas ................................................................. 64
Special laws regarding land use planning and management in El Salvador
................................................................................................................... 66
Chapter Three: Characterization of Santa Tecla ........................................... 74
   Basic description of the municipality ..................................................... 74
   Urban evolution of Santa Tecla .............................................................. 81
   Summary ............................................................................................... 91
Chapter Four: Assessing potential containment .......................................... 94
   Estimation of the rate of growth of Santa Tecla .................................... 94
   Estimating the suitability of the land ................................................... 100
   Assessing Santa Tecla administrative capacities .................................. 107
   Summary ............................................................................................. 110
Chapter five: Conclusions ......................................................................... 114
References ............................................................................................... 118
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1</td>
<td>Average precipitation</td>
<td>17</td>
</tr>
<tr>
<td>Table 2</td>
<td>Life zones</td>
<td>19</td>
</tr>
<tr>
<td>Table 3</td>
<td>Land classification based on cultivable capacity</td>
<td>22</td>
</tr>
<tr>
<td>Table 4</td>
<td>Evolution of extra-legal subdivisions and slums: 1968-1992</td>
<td>24</td>
</tr>
<tr>
<td>Table 5</td>
<td>Most populated cities in El Salvador</td>
<td>31</td>
</tr>
<tr>
<td>Table 6</td>
<td>Type of transportation in the MASS</td>
<td>33</td>
</tr>
<tr>
<td>Table 7</td>
<td>General information of Santa Tecla</td>
<td>91</td>
</tr>
<tr>
<td>Table 8</td>
<td>Urban and population growth</td>
<td>99</td>
</tr>
<tr>
<td>Table 9</td>
<td>Urban and population growth rates</td>
<td>112</td>
</tr>
</tbody>
</table>
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Image of the urbanization of El Balsamo mountain range</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>Location of the study area, the municipality of Santa Tecla and the MASS</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Levels of precipitation</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>Life zones</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>Land classification based on cultivable capacity</td>
<td>23</td>
</tr>
<tr>
<td>6</td>
<td>High class subdivisions built in the northern hillside of El Balsamo mountain range in the municipality of Antiguo Cuscatlan</td>
<td>25</td>
</tr>
<tr>
<td>7</td>
<td>Topography showing the elevations surrounding the MASS</td>
<td>26</td>
</tr>
<tr>
<td>8</td>
<td>Hydrological regions and rivers</td>
<td>28</td>
</tr>
<tr>
<td>9</td>
<td>Underground water distributions</td>
<td>29</td>
</tr>
<tr>
<td>10</td>
<td>Land uses in the study area</td>
<td>34</td>
</tr>
<tr>
<td>11</td>
<td>Population density in the MASS and surrounding municipalities</td>
<td>36</td>
</tr>
<tr>
<td>12</td>
<td>Seoul’s greenbelt</td>
<td>49</td>
</tr>
<tr>
<td>13</td>
<td>British greenbelt system</td>
<td>51</td>
</tr>
<tr>
<td>14</td>
<td>Projected population from 2002 – 2010</td>
<td>76</td>
</tr>
<tr>
<td>15</td>
<td>Population’s pyramid by sex</td>
<td>77</td>
</tr>
<tr>
<td>16</td>
<td>Urban evolution of Santa Tecla within 1854 – 1952</td>
<td>85</td>
</tr>
<tr>
<td>17</td>
<td>Urban evolution of Santa Tecla within 1953 – 1995</td>
<td>89</td>
</tr>
<tr>
<td>18</td>
<td>Land suitability for urban development</td>
<td>104</td>
</tr>
<tr>
<td>19</td>
<td>Land use ordinance</td>
<td>105</td>
</tr>
</tbody>
</table>
CHAPTER ONE: CONCEPTUALIZATION

Introduction

Managing urban growth has never been an easy task to do. This is due to the fact that managing growth involves more than analyzing data, understanding urban processes, and applying successful models. Generally, a management plan is defined as a set of policies and actions that foster the growth of cities, regions, and communities. Nevertheless, in many cases planners and urban administrators underestimate the effects that a management plan may have. This is significantly important because growth management tools can positively and/or negatively affect the city, and most importantly, the lives of the residents. Therefore, it is fundamental to understand the dynamics affecting urban growth, and to contextualize the management tools, especially when they are applied in territories already spatial, ecological, and structural constrained.

Around the world many cities are spatially constrained. Salvadoran cities are not the exception, especially due to the geographic and population constraints the country possesses. First, El Salvador is the smallest country in the American continent. According to official reports, its area is approximately 22,000 square kilometers (MARN, standing for Ministerio del Medio Ambiente y Recursos Naturales), which is approximately the same as the state of Massachusetts (CIA). Moreover, the national census elaborated in 1992 accounts a population of approximately 6 million inhabitants, from which approximately 1.5 million live in the metropolitan area of the capital, San Salvador (Ministerio del Medio Ambiente y Recursos Naturales). As result, San Salvador and its surrounding municipalities have become a metropolitan area which accounts 72 square
kilometers and has a population density of 20,700 inhabitants per square kilometer. The pressure that the metropolitan area produces in the rural areas and surrounding ecosystems creates serious threats.

In recent years, the Metropolitan Area of San Salvador (MASS) was affected by several disasters which may have been aggravated by the lack of growth management. For example in 1982 a lahars\(^1\) came down from the top of the Quezaltepeque Volcano (also known as San Salvador volcano) and affected the northern part of the San Salvador’s metropolitan area. Unofficial sources report that this event provoked at least 600 hundred deaths (Villalobos, 2002). In 2001, the southeastern part of the city of Santa Tecla, which is one of the cities in the metropolitan area, was affected by a landslide in one of the hillsides of El Balsamo mountain range. This time the event caused at least 500 deaths and erased a residential sector in just a few minutes.

The landslide which severely damaged Santa Tecla fueled the argument about relationship between urbanization and risks. Many people blame the lack of regulations of residential projects in the already urbanized valley where the MASS is located. It is noticeable how these settlements have transformed the hillsides of the Balsamo mountain range and the San Salvador Volcano (Figure 1.1). As a consequence of the saturation and degradation of flat areas, the upper classes have migrated to hills taking advantage of the privileged view and isolation that these elevations represent. These “privileged” houses and subdivisions have being blamed for the Balsamo’s landslide and the progressive

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\(^{1}\) The Indonesian term lahars is used to describe a geological phenomenon characterized by a flow of water, rock fragments, and other debris coming down the slopes of volcanoes or hills (USGS).
degradation of Santa Tecla’s environment. For this reason Santa Tecla’s council has been engaged with the regulation on the city’s development.

Since the landslide changed the face of Santa Tecla, the municipality has made many efforts to restrict the construction in areas considered as susceptible to natural hazards. For example, it tried to designate the Balsamo mountain range as natural reserve. This proposal was rejected under the argument that the physical and ecological characteristics of the range are neither unique nor represented a higher risk than other regions of the country. Afterwards, the municipality promulgated a development limit based on the geological risks that the mountain range and volcano represents. However, it is uncertain if this effort will really control growth due to the political influence of the landowners.

This research is intended to explore potential utility of containment policy for the city of Santa Tecla. In order to determine containment potential, such policies are going to be analyzed through the cross comparison of cases. Then, the legal framework will be

Figure 1. Image of the urbanization of El Balsamo Mountain Range closet o the limit Antiguo Cuscatlan-Santa Tecla (Photo: Ana Mojica)
established through the review of the legislation underpinning the land use planning and the urban growth control in the MASS. Afterwards, the urban evolution of the city will be used to determine the growth tendency of the city. Later, the suitability of the land is going to be estimated producing the available and suitable room for the city to grow. Finally, the potentiality of the containment policies is going to be assessed.

The following chapters, then, present the insights of the legal system driving urban planning in the metropolitan area of San Salvador; in addition to present the process behind of Santa Tecla’s growth. Finally, this discusses the potential containment of Santa Tecla. This research requires the understanding of how the city has grown, in order to project how it might do it in the future. Moreover, this understanding will help to explore how urban containment policies might affect the city’s growth. Therefore, this research is intended to present not only findings on urban growth in Santa Tecla but also to assess urban containment policies considering the legal and spatial context of Santa Tecla.

**Study area**

For this research, the study area is Santa Tecla and its surrounding area which are located in El Salvador, Central America. In order to understand the dynamics affecting Santa Tecla’s growth, it is fundamental to characterize the city and its location. The growth of Santa Tecla city, the study area, occurs in the metropolitan area of the capital, San Salvador, a major urban center with great influence over its peripheral cities. Currently a suburb, Santa Tecla was originally established in 1854 to be the new capital of the country. Indeed, Santa Tecla functioned as capital for about three years before the
political power returned to San Salvador. For this reason, its official name was Nueva San Salvador or New San Salvador although Salvadorans popularly referred to it as Santa Tecla until 2003 when the popular name was adopted as official. Although the power returned to the old capital, Santa Tecla remained as an important pole of development.

Geographically, Santa Tecla is located in the western portion of the central valley of El Salvador, the Zalcoatitan Valley. Located around $89^\circ 15' 45"$ W, $13^\circ 44' 47"$ N and $89^\circ 23' 58"$ W, $13^\circ 32' 22"$ N (IGN, 1982), Santa Tecla is surrounded to the north by the Quezaltepeque volcano, to the north east by the municipality of San Salvador, to the south east by the municipality of Antiguo Cuscatlan, and to the south-west by the Balsamo mountain range. Due to reasons already mentioned, the study area extents beyond Santa Tecla’s municipal limit covering 936 square kilometers (361.39 square miles), which is approximately 0.042% of El Salvador’s total area. In order to have a better understanding of the geographic context of Santa Tecla, this rectangular area (presented in Figure 2) almost covers the totality of San Salvador’s metropolitan area, and partially covers the landforms surrounding the valley.

This location was selected basically due to the fact that Santa Tecla’s urban evolution has been highly influenced by its strategic position. Santa Tecla is strategically located within San Salvador, La Libertad pier, and the western Acajutla pier. As a consequence, the Nueva San Salvador would remain connected to the old center of power and the major commercial gateways of that time (Alcaldía Municipal de Santa Tecla, 2003). More importantly, the new capital will preserve its relative centrality with respect of the rest of the country.
Figure 2 Location of the Study area, the municipality of Santa Tecla, and the MASS.
Nevertheless, understanding the conditions, under which Santa Tecla grows, requires more information than just framing a study area. Therefore, the characterization must include the description of the physical and socio-economic environments. The physical environment comprises the physical characteristics and resources of the area such as geographic location, climate, topography, vegetation, soils, and rivers. The socio-economic environment, on the other hand, includes population densities and tendencies, land uses, economic activities, and infrastructure.

**Physical environment**

The geographic location has contributed to the explosive growth of the area. Indeed, the climate, vegetation, topography, soils types, soil permeability, and hydrology have defined the area’s capability and attractiveness. The following sections describe those characteristics. In so doing, the assets of the area will be introduced.

The weather conditions of the area are mostly related to the latitude at which the country is located. Due to its location, topography, proximity to the sea, and the circulation of two system of high and permanent pressure (Bermudas and the Tropical convergence zone system), the region has two clear seasons (IGN, 1982). The first one, from October through April, is dry with scarce rain (VMVDU, 2000). The second season, from May through September, is humid with constant rain and warm temperatures of approximately 22°C - 28°C (IGN, 1982). These conditions enhance the agricultural production of fertile soils produced by volcanic activity. In addition, the warm temperatures produce a comfortable environment.
As presented in Figure 3, precipitation level in the area is relatively high, and is divided in 5 zones. According to this Map, the area receiving more rain, an average of more than 2400cc per year, is located to the south approximately 4.47 miles from Santa Tecla. While the MASS experiences the four precipitation intensities illustrated in Figure 3, most of Santa Tecla receives an average of 1800 to 2000 cc a year. This constitutes one of the major assets of the city because it has relatively more rain than the capital but less than the mountains surrounding it. As a result, the mountain range receives more rain favoring the vegetation growing in the hillsides thus moderating the temperature of the city down to approximately $22^\circ$ - $28^\circ$ year around (IGN, 1982). Table 1 summarizes the main facts of the precipitation zones covering the area.

Table 1

<table>
<thead>
<tr>
<th>ID</th>
<th>Average Precipitation</th>
<th>Area (Square miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1600 – 1800</td>
<td>72.08</td>
</tr>
<tr>
<td>2</td>
<td>1800 – 2000</td>
<td>134.51</td>
</tr>
<tr>
<td>3</td>
<td>2000 – 2200</td>
<td>29.84</td>
</tr>
<tr>
<td>4</td>
<td>&gt; 2400</td>
<td>6.11</td>
</tr>
</tbody>
</table>

The average precipitation is an important factor affecting the occurrence of landslides. This is due to the fact that the concentrations of water in potential failure planes increase the risk of landslides (Cammerat et al, 2005). As a result, the surrounding elevations represent a risk for the subdivisions located close or on hillsides.

The climatic characteristics of the region and its topography also have produced four life zones. As Figure 4 presents, most of the study area corresponds to a subtropical moist forest. The municipality of Santa Tecla comprises the following life zone as: the northern part of the municipality, which includes part of the crater of the Quezaltepeque volcano, corresponds to a subtropical wet forest. And the central section has a subtropical moist forest. The southern part of the municipality has two life zones: tropical wet forest and subtropical moist forest with transitions to dry forest. The specific characteristics of these zones regarding precipitation and temperature are summarized in Table 2.

<table>
<thead>
<tr>
<th>Life zone</th>
<th>Elevation (masl)</th>
<th>Range annual temperature (°F)</th>
<th>Average annual precipitation (cc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subtropical moist forest with transition to pre-moist forest</td>
<td>200 – 550</td>
<td>71 – 84</td>
<td>Approx. 1700</td>
</tr>
<tr>
<td>Subtropical moist forest</td>
<td>800 – 1200</td>
<td>61 – 84</td>
<td>1800 – 1900</td>
</tr>
<tr>
<td>Subtropical west forest</td>
<td>1200 – 1800</td>
<td>50 – 61</td>
<td>Approx. 1900</td>
</tr>
<tr>
<td>Tropical forest</td>
<td>1800 – 2700</td>
<td>50 – 61</td>
<td>Approx. 2400</td>
</tr>
</tbody>
</table>

Regarding agriculture, Figure 5 presents the classification of lands based on its agricultural capacity. Such classification was done using the classification scheme of the United States Department of Agriculture based on the percentage of slope, effective depth, and the susceptibility to erosion. The result, which was published in 1997 (MARN, 2000), presents eight types of land whose description is summarized in Table 3. According to information presented in Figure 5, approximately 25% of the area under study could support intensive agriculture. However, the most important finding of this map is the fact that, those areas which can be used for crops are in fact used for urban land. From this, it is possible to conclude that this region will lose important agricultural land if suburban expansion is not controlled.

Unfortunately, there are not official measurements of the hectares of agricultural land lost to urbanization. A relative indicator is the change of the urban-rural population structure especially in the peripheral municipalities (Lungo & Baires, 1996). The relationship urban-rural population, in the MASS as a unit, has remained constant since 1961 (85% urban population, 15% rural population) (Lungo & Baires, 1996). However, in Soyapango which is the most populated municipality in the region, rural population changed from 57.28% in 1950 to 8.17% in 1992 (Lungo & Baires, 1996).
### Table 3

*Land Classification Based on Cultivable Capacity*

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>Few use limitations. These type of land require careful management practices and moderated conservation practices.</td>
</tr>
<tr>
<td>III</td>
<td>Lands with some limitations for intensive crops. These lands require especial conservation practices and works, which could be expensive and hard to apply.</td>
</tr>
<tr>
<td>IV</td>
<td>Lands with severe limitations for selecting the crops. This land requires careful management practices and works which could be expensive and hard to apply.</td>
</tr>
<tr>
<td>V</td>
<td>Lands with severe limitations for intensive crops. Limitations can be corrected, but their cost made them impossible to apply.</td>
</tr>
<tr>
<td>VI</td>
<td>Lands with severe limitations which make them cultivable. As a result, these lands are up to orchids, forests, and grasslands. Nevertheless, these lands require conservation and management practices.</td>
</tr>
<tr>
<td>VII</td>
<td>Lands inadequate for crops and vegetation. These lands are very steep, and the depth of the effective soil made them inadequate for any crop or tree</td>
</tr>
<tr>
<td>VIII</td>
<td>Lands restricted for agricultural uses. These lands are up to forestry and wildlife protection.</td>
</tr>
</tbody>
</table>

Source: Ministerio del Medio Ambiente y Recursos Naturales, 2000
Figure 5 Classification of land based on its cultivable capacity
Another method used to infer the conversion of agricultural into urban land is the number of “colonias ilegales” or extra-legal subdivisions (Lungo & Baires, 1996). The 1980s’ political conflict in the country provoked a major population migration towards urban centers, especially the MASS. This unprecedented urban growth struck the municipalities which were not able to provide and maintain the basic services of their residents. As a result, more than half went to live in extra-legal settlements or high density populated slums (The World Bank Group, 2001). Table 1.4 presents the evolution of extra-legal subdivisions and slums in the MASS between 1968 and 1992.

Table 4


<table>
<thead>
<tr>
<th></th>
<th>1968</th>
<th>1974</th>
<th>1992</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra-legal subdivisions</td>
<td>-</td>
<td>380</td>
<td>498</td>
</tr>
<tr>
<td>Slums</td>
<td>31</td>
<td>-</td>
<td>293</td>
</tr>
</tbody>
</table>


The second physical element shaping the study area is the relief. As mentioned before, the study area comprises part the valley of San Salvador as well as part of the San Andres valley, which is one of the most agricultural productive areas of the country. Regarding this research, one of the most important features of the area’s landscape is the mountains and elevations separating these valleys (Figure 7). Based on the fact that in
recent years flat areas have become more and more crowded, these elevations constitute the one of the greatest points of interest in the area. Taking advantage of the view and “isolation” provided by these elevations, the upper class has moved onto these hills (Figure 6). In so doing, these “McMansion” sorts of subdivisions are contributing to the destruction of the surrounding ecosystems.

*Figure 6* High class subdivisions built in the northern hillside of El Balsamo mountain range in the municipality of Antiguo Cuscatlan (Photo: Ana Mojica)
Figure 7 Map of topography showing the different elevations surrounding the MASS
Regarding hydrology, the approximately 1200 streams comprised by this study area are distributed in sixteen river basins which are grouped in three major hydrographic regions (Figure 8). In general, the study area is bisected by two major hydrographic regions recognized as macro basins. The northern region corresponds to the Lempa’s river basin which is one of the most important rivers in the country. The southern region is a compound of river basins which are the result of the intricate topography resulting from the mountain range and discharge to the Pacific Ocean. That constitutes one of the major assets of the area, but one that could be severely damaged if urban growth is not properly managed.

In general, the study area is divided in four types of underground water bodies. As presented in Figure 9, the study area has mainly seasonally available water in the shallow aquifers. Indeed, this type of water constitutes approximately 62% of the study area. For this reason, the bigger urban places in the area are located to the north, where the water is generally abundant. These areas surrounding the volcano are the ones classified as areas with underground water generally abundant. Resulting from this “abundant” water, Santa Tecla and a part of San Salvador are located there. Finally, the north of the study area has scarce water. This area corresponds to the San Salvador volcano and the existence of scarce water on the area could be the result of the circulation of the water infiltrated by the volcano to other water bodies. Finally, the study area has approximately less than 1% of underground water locally abundant.
Figure 8 Hydrological regions and rivers
Figure 9: Underground water distributions
Due to data constraints, this research do not present specific data related to the volumes of recharge and discharge of the hydrographic areas described above. This is due to the fact that the study area of this research is not consistent with the areal units used by the National Administration of Aqueducts and Sewers (ANDA standing for Administración Nacional de Acueductos y Alcantarillados). Nevertheless, this office reports that during 2005 in the MASS there was an annual production of potable water of 191.9 millions cubic meters (ANDA, 2005, p. 2). From this production, the MASS consumed approximately 147.1 millions of cubic meters (ANDA, 2005, p.1). This means that only 14 municipalities of the study area consume approximately 272 cubic meters per second. This represents a major threat not only for agriculture but for the provision of potable water to the MASS and its surrounding areas due to the aquifers capacity to receive water.

Socio-economic environment

As well as many cities around the world, El Salvador does not have a classical single primate city\(^2\), rather than that it has a set of primate cities which are concentrated around the capital of the country. This urban structure is presented in the study area. The apparent primate city is, indeed, a metropolitan area comprising municipal capitals and cities. From these set of urban centers, seven of them are ranked by the United Nations among the largest cities in the country (Table 5) and three of them (San Salvador, Apopa, and Soyapango) are the largest ones (OPAMSS, 2004). Nevertheless, San Salvador (the

\(^2\) A primate city is that one which has the double population than the next largest city
capital of the country) concentrates the cultural, political, and economic primacy in the country.

Table 5

*Most Populated Cities in El Salvador*

<table>
<thead>
<tr>
<th>City name</th>
<th>Total population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahuachapan</td>
<td>105015</td>
</tr>
<tr>
<td>Apopa</td>
<td>163974</td>
</tr>
<tr>
<td>Ciudad Delgado</td>
<td>149394</td>
</tr>
<tr>
<td>Ilopango</td>
<td>127434</td>
</tr>
<tr>
<td>Mejicanos</td>
<td>185204</td>
</tr>
<tr>
<td>Santa Tecla</td>
<td>152723</td>
</tr>
<tr>
<td>San Salvador</td>
<td>473372</td>
</tr>
<tr>
<td>Santa Ana</td>
<td>245048</td>
</tr>
<tr>
<td>San Martin</td>
<td>101086</td>
</tr>
<tr>
<td>San Miguel</td>
<td>233036</td>
</tr>
<tr>
<td>Soyapango</td>
<td>283598</td>
</tr>
</tbody>
</table>

Cities comprised by the MASS


In general, the study area comprises approximately 35 municipalities. With an extension of 929.19km², this total area has a population of approximately 2.26 millions representing about 35% of the total population of the country. The population density of
the area is approximately 2432 people per square kilometer most of them living in urban areas. The electric power coverage in the area is approximately 98%, while the access to potable water is about 90% and the sewer coverage is about 70% (OPAMSS, 2004). These high levels are mainly the result of the primacy of the area over other urban centers in the country.

Despite the fact that the study area comprises more urban centers, the centrality and primacy of the metropolitan area eclipses the rest of cities turning them into satellite cities. As a result of the political concentration of power in the capital, the MASS’ economic activity represents 55% of the GPD of El Salvador (OPAMSS, 2004) converting the area in the major hub of employment, marketing, education, and health. This reality creates an interdependency where only 24% of the population work where they live, and generally provoking that the total number of trips to the MASS is 2.5 millions per day. Indeed, just San Salvador attracts 60% of the trips of morning’s rush hour (OPAMSS, 2004).

Resulting from this mobility, the rate of car ownership in the peripheral cities exceeds the MASS in its totality. According to planning indicators, the rate of car ownership in Santa Tecla, and Antiguo Cuscatlán reaches the 250%; in the MASS, on the other hand, is just 120%. Indeed, from the morning trips to San Salvador 70% have their origin in the 13 surrounding municipalities (OPAMSS, 2004). Nevertheless, 30% of the trips are done using private cars and 70% are done using public transportation (OPAMSS, 2004). As presented in Table 6 around 60% of the rides to San Salvador are done using
either buses or shuttles, and in 44% of the rides passengers take a second unit to get to their destinations.

Table 6

*Type of transportation in the MASS*

<table>
<thead>
<tr>
<th>Type of transportation</th>
<th>Rides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus</td>
<td>39</td>
</tr>
<tr>
<td>More than a bus to get the destination</td>
<td>21</td>
</tr>
<tr>
<td>Shuttle</td>
<td>9</td>
</tr>
<tr>
<td>Private car (rider)</td>
<td>22</td>
</tr>
<tr>
<td>Private car (passenger)</td>
<td>7</td>
</tr>
<tr>
<td>Others (Taxi, bicycle, motorcycle, walking)</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Oficina de Planificación del Area Metropolitana de San Salvador, 2004

Regarding land use, the study area still is predominantly rural (Figure10). In spite of the high density of people living in urban areas, still 38% of the study area is covered by coffee plantations. Indeed, only 17% of the area under investigation corresponds to urban areas. Even tough this seems promising, urban areas are consuming available land really quickly and without control (Lungo et al., 1996). In fact, the MASS duplicated its extension between 1966 and 1996 (OPAMSS). Finally, grasslands and forest cover approximately 71 square kilometers which is equivalent to 7.59% of the total area. This figure is really alarming because the next area providing environmental services are the coffee plantations which are subject to international trade trends that could force their owners to replace coffee with some other use more likely urban use.
The final component of this socio-economic environment is the demographic trends of the area. As presented in Figure 11, the municipalities with higher population densities are San Salvador, Soyapango, Mejicanos, and Cuscatancingo. As mentioned before, San Salvador and Soyapango are two of the largest cities in the country. Nevertheless, the centrality of the MASS is making that the satellite cities suffer a great pressure because people are migrating to the capital. Indeed, at the same time El Salvador’s population increased 42% between 1971 and 1992; MASS’ population was duplicated in the same period of time reaching in 1992 a population density of 1668 people per square mile. Nowadays, this population density is nearly the 2432 persons per square kilometer.

This is one of the major justifications for this research. The lack of growth regulation has provoked that new subdivisions are being created in the closest, but not necessarily the most optimal, places surrounding the main core, San Salvador. Creating containment policies that consider the area’s growth tendency could lead to a win-win situation in which development is not completely discouraged; indeed if possible, it could be reoriented towards target areas and other underdeveloped areas. Nevertheless, the transportation issue described above has to be carefully considered because growth outside of the MASS’ limit could make the traffic conditions even worse.
Figure 11 Population density in the MASS and surrounding municipalities
Research questions

This research is intended to explore the applicability of urban containment policies to control the growth of Santa Tecla. Therefore, this research will address the following questions:

1. In which direction can the city grow?
2. Is there a more suitable area for growth?
3. If there is land available to growth, what are the containment policies that could be applied in this city and control its growth?
4. Where those containment policies should be enacted?

Methodology

The detailed evaluation of the applicability of urban containment policies to manage the growth of Santa Tecla comprises three important tasks: understanding the containment policies and their potentialities and limitations, identifying the city’s growth tendency and its land availability, and then based on that tendency and availability discovering where the containment policies could go if there is more room to safely grow.

First of all, it is fundamental to understand how the containment policies work. Previous research has been done to understand what has made a policy to fail or succeed. Bengston and Yeun studied the case of Seoul’s greenbelt to explore if this policy has or not reach its goal of containing the explosive growth of Seoul (2006). Nelson and Dawkins (2004) on the other hand have studied the American approaches regarding the use of urban growth boundaries to explore the myriad of variations created in the United
State to control sprawl. These researches have revealed which are the characteristics and conditions in which the policies have succeeded or fail.

Then, understanding the way in which the city has grown is the basis to project in which direction the city could grow. In so doing, the containment policies could be designed based on the understanding of the city’s growth instead of where the officials see the potentialities to growth, or where they see city in the future. For example, Knaap and Hopkins (2001) have explored the use of an inventory approach to size the city. These are the cases where officials determine the growth limit mainly based on the rate of land consumption. In this research, the approach is based on the growth tendency as well as the growth suitability. If the city has already consumed the suitable land, then, the conclusion would be that city has to focus its efforts on revitalizing inner city areas.

Finally, based on the growth tendency and land availability, the containment policies would be outlined. Although tendency and availability are important limitations, another condition for outlining a policy will be the local context. For Example, Bengston and Yeun identified that one important reason for the Seoul’s greenbelt to succeed was the vertical and centralized system ruling Korea at the moment when the policy was adopted and implemented. Therefore, the characteristic on the Salvadoran system will reveal if one policy or another is outlined. From this, the final recommendations and conclusions will be drawn.

Chapter outline

In order to answer the research questions, this document has been organized as follow. The present chapter constitutes the conceptualization of the research. Here where
introduced not only the reason and questions that the following chapters will answer, but also it introduced a general picture of the area where the research is going to be developed. Chapter two complements the present chapter because a literature review is developed. There, the theoretical framework of this research is set because the containment policies are defined as well as the model used to project the urban growth. In so doing, the basis to evaluate containment policies for managing the growth of Santa Tecla is established.

Chapters three and four focus on Santa Tecla’s growth. Chapter three explores the historical evolution of the city as well as the local approaches towards managing the growth. As a result, this chapter will provide the historical data which is going to be used to elaborate the model of growth tendency in addition to explore the context and characteristics of the system which would foster the policies. Chapter four, on the other hand, explains the findings of the suitability layer as well as the growth model highlighting where the containment policies could go. With this, the questions of this research will be answered providing the ground for chapter five in which the findings of all the chapters are integrated.
CHAPTER TWO: LITERATURE REVIEW

Urban containment policies (UCP)

For centuries, urban planners have been dealing with the conversion of farm land and natural areas into urban land. In spite of all the experience gained in Europe managing urban growth with urban containment policies (UCP)\(^3\), in America this approach is practically new. In 2004 Arthur Nelson and Casey Dawkins explored more than 100 cases of American cities which are managing growth using UCP. Of course, establishing a difference between growth management and UCP still is material for debate. For this reason, before a detailed exploration of UCP, it is important to differentiate management growth from UCP as well as review the research done regarding the effects that, in general, UCP can produce. As a result, this review of UCP has as introductory part which includes a definition of both terms as well as some of the effects explored by scholars.

_Differentiating growth management from urban containment policies._

In order to analyze the UCP applied by American cities, Arthur Nelson and Casey Dawkins establish the difference between growth management and UCP. They found that growth management encompasses several techniques to attain growth and land use distribution accordingly to smart growth principles and goals (2004 p 2). Bengston et al, also state that growth management is a set of government actions intended to manage growth by controlling the location, quality and time of development (2004, p 273). In

\(^3\) Three types of urban containment policies can be clearly identified: greenbelts, growth boundaries, and service boundaries (Bengston & Yeun, 2006).
short, growth management is those policies and regulations guiding development (Fodor, 1999 p 106).

Urban containment, on the other hand, is defined by Burby et al. as a set of rules and public incentives that are intended to constrain sprawl and promote infill development (2001, p 476). In fact, UCP are designed to confine growth which otherwise can have negative effects on the economy, environment, and social relationships of a city (Burby et al, 2001, p 476). Moreover, UCP promotes high density development in specific areas inside urban boundaries and to discourage such development outside of the urban limits (Wassmer, 2006, p 477).

In addition to the limits imposed over development by UCP themselves, usually these policies are also complemented by urban service provision policies (Nelson and Dawkins, 2004 p 2). With this, managing the extension and improvement of infrastructure results in a cost-effective provision of services (Nelson and Dawkins, 2004 p 2). As a result, growth within the urban growth boundary can be done based on phasing services according to development suitability, proximity to existing public facilities, contiguity to existing development, and others (Nelson and Dawkins, 2004 p 2).

Nevertheless, both UCP and service provision areas have to consider the provision of sufficient land in order to satisfy the market’s demand (Nelson and Dawkins, 2004 p 2); otherwise, an early demand for resizing of the UCP may occur due to insufficient provisioning of land for adequate density and intensity and increasing the land and housing price (Nelson and Dawkins, 2004 p 2). If on the other hand, the land provided exceeds the projected demand or if the provided areas do not have the adequate
density or intensity, then the purposes of encouraging compact and contiguous
development may not be accomplished (Nelson and Dawkins, 2004 p 2).

Although UCP are intended to manage growth within certain limits, they are also
complemented by regulations or policies to manage growth beyond of their limit. Outside
the urban containment limit, land is generally restricted to resource uses and to very low-
density residential development. The extension of utilities, especially wastewater
service, is generally prohibited outside the boundary. Within urban containment
boundaries, development may be encouraged with density bonuses and, occasionally
discouraged with minimum density requirements. Land within an urban containment
boundary but outside the city limits is often subject to agreements governing
development standards.

**Goals of Urban containment policies**

The outcomes pursued by UCPs come from experiencing with the consequences
of uncontained growth (Burby et al. 2001, p 476). For example, the fact that jobs and tax
revenue is drawn outside of cities makes difficult to the city to provide efficient public
services (Burby et al, 2001, p 477). Therefore, the obvious goal of UCPs in this case is to
keep tax revenues within limits of the cities (Burby et al, 2001, p 477). In addition,
unconfined growth leaves the poor residents and minorities remain in the inner city while
upper classes move out to surrounding suburbs (Burby et al, 2001, p 477). As result, the
implementation of an UCP would promote city and neighborhood social and racial equity
and stability (Burby et al, 2001, p 477). Finally, sprawl\(^4\) also has environmental

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\(^4\) “Sprawl is defined as a low density, scattered, automobile dependent, either residential or nonresidential
development consuming large tracks of farm land and natural areas” (Bengston et al, 2003 p 271).
consequences such as over consumption of energy with expanded travels from the suburbs to the city, elimination of green open space that otherwise would provide environmental services, recreation, or agricultural uses (Burby et al, 2001, p 477). The natural outcome produced by an UCP will be the reduction of energy consumption and the preservation of green open spaces outside of cities (Burby et al, 2001, p 477).

Further consequences from the implementation of UCP

Despite the fact that UCP are intended to use effectively the space and the resources, there also could be some negative consequences from their implementation. These negative consequences may include higher land prices, lower environmental quality, and lower life quality due to the reduction of the personal space (Burby et al, 2001, p 477). In addition, scarce buildable land and high land values would produce higher pressures on hazardous lands and segregation based on income. This is due to the fact that hazardous lands could become “affordable” and available land (Burby et al, 2001, p 478). However, these consequences are not inevitable (Nelson et al, 2004, p 426). In fact, they are not directly the result of the implementation of UCPs; indeed, they are the result of poorly designed or weak policies (Burby et al, 2001, p 484).

Then in order to reduce those consequences, it is important to make some considerations at initial phases of the UCPs design process. First, it is important to consider that growth has to be managed in such a way that the available land is not depleted before meeting the temporal goals of the program. This can be done either way by setting timetables accordingly to realistic urban growth projections or by rationalizing the areas in which development is desired to occur. Also, it is fundamental to include
incentives to promote infill and redevelopment in order to make the UCPs effective. These incentives are used to direct development to areas that are already urbanized, and it would not required additional funding to provide them with services. Additionally, it is important to included hazard mitigation plans at the moment of designing containment programs. This will minimized the exposure to natural hazards.

**Analyzing urban containment policies**

Due to the potentialities of UCP to control growth and the needs of the study area for adopting policies focused on preventing the depletion of the resources and the improving the quality of life of the residents, two UCP are going to be explored, greenbelts and urban growth boundaries (UGB). First of all, Bengston & Yeun define greenbelts as physical barriers conceived to stop the expansion of cities (2006). In addition, greenbelts consist of green open space, forest, or farm land, in which development is highly regulated or not allowed (Bengston & Yeun, 2006). The creation of a greenbelt can be done through the acquisition of land, acquisition of development rights, or by the enforcement of highly restricted use over private property (Bengston & Yeun, 2006).

Urban growth boundaries, on the other hand, are physical or legal lines drawn to separate urban areas from farm or natural ones (Fodor, 1999 p 124). UGB can have important results controlling city’s growth if there is an effective coordination between the governments administrating the urban land and the rural lands (Fodor, 1999 p 124). According to Bengston and Yeun, zoning is an auxiliary tool to enforce an urban growth boundary (2006). In addition, these authors identify an important difference between a
greenbelt and an urban growth boundary. Bengston and Yeun explain that the urban growth boundaries are flexible limits which can be expanded depending on the growth goals of the governments (2006). A variation of the urban growth boundary is the urban service boundary. This boundary is the more flexible one, and as its name implies, an urban service boundary separates the areas in which services such as sewer and water are not supplied from those where they are provided (Bengston & Yeun, 2006).

Urban service boundaries are used to contain development because they are related to public ordinances that prohibit development in zones where basic services are not provided. However, Dearborn and Gygi, (1993), Poradek, (1997) says that the disadvantage of this type of policy is that they are easily adjusted according to political pressure to accommodate new developments, and because they are not accompanied with strict regulations to limit development beyond the boundary (Bengston and Youn, 2006). In order to have a better understanding of the urban growth boundaries under evaluation, these are explored in detail in the following sections through the analysis of study cases.

**Greenbelts**

**London and Seoul greenbelts**

Before analyzing the London’s metropolitan greenbelt, it is important to explore the historical, social, and economic context which leads to the establishment of this policy. London has a long history related to urban containment policies, green spaces and gardens. After Queen Elizabeth’s creation of the first greenbelt in 1580, the density around London was restricted by James I and the parliament to one new building for each four acres (DOE, 1988). In the nineteenth century, British economy was based on
factories which were located close to coal mines (Amati, 2005, p. 9). However, the increasing use of electric power made possible that those factories moved from energy to market orientations (Amati, 2005, p. 9). The industrialized London was attempted to be shaped through open or green spaces (Cohen, 1994, p. 2).

Despite the fact that the establishment of a “green girdle” was proposed in 1891 by Meath and William Bull, Ebenezer Howard’s “Garden cities,” which was published in 1898, is considered the beginning of a new era for the urban planning for London and other cities around the world. Howard developed a new concept of town in which the prevention of urban sprawl and the consumption of fertile agricultural land were especially considered (Berkman, 1972, p. 94). He described cities surrounded by gardens (Cohen, 1994, p. 2). Those cities would have a “manageable” size to make them efficient and clean. Eventually, Howard’s principles were materialized in the town of Letchworth, in 1903 and Welwyn in 1919, both located close to London (Berkman, 1972, p. 94).

The early years of the British urban containment approaches in the twentieth century were focused on monitoring the garden-city prototypes (Cohen, 1994, p. 4), and implementing Howard’s principles over every territory controlled by the British Empire (Cohen, 1994, p. 4). After the World War I, Londoners were concerned about the ways to manage the urban growth (Cohen, 1994, p. 4). They considered that despite the fact that the city suffered war and industrialization, the countryside was practically intact. They though something was necessary to keep it like that. As a result, British planners designed a net of parks surrounding London; as Bull proposed before, to separate the city from the country and provide at the same time space for leisure activities. By 1930, they
were acquiring land as part of that “greenbelt.” However, World War II would not only change the world history, but also change the management of London’s urban growth.

After World War II, the mission of the British government was to rebuild, including the quality of life of the city (Cohen, 1994, p. 7). Despite the fact that there were previous attempts to create a greenbelt; the proposals did not have a clear objective (Cohen, 1994, p. 5). Was it protecting rural land? Was it containing urban growth? Was it providing green space? The reconstruction after the war provided the perfect opportunity for creating regulatory measurements to implement a reformed greenbelt proposal. This time, a new element was added to the equation because London did not have a physical barrier against sprawl. Therefore, a greenbelt would be a perfect barrier. Taking advantage of the post-war reconstruction, Town and Country Planning Act restricted land uses (DOE, 1962, p. 4). The enforcement tool was a strict system of development where every new project needed the direct authorization of the government (Cohen, 1994, p. 8). As a result, no land had to be bought; the government just would add private land to the land acquired during the ‘thirties. A greenbelt around London was finally implemented in 1947 (DOE, 1962, p. 4).

The case of Korea offers a different perspective due to the fact that its context differs from London’s. Korea is the Asian country with the most vigorous growth in the twentieth century. In fact, David Bengston and Yeo-Chang Youn cite Song (2003) who states that Korea’s economy was the second world highest economy from 1965-99. The World Bank ranked Korea as eleventh amid the world nations with the highest Gross
Domestic Product due to fact is transformation from an agricultural-base economy to an industrial-base economy (as cited in Bengston and Yeun, 2006).

That economic growth was accompanied by population growth and rural-urban migration (Bengston and Yeun, 2006). According to the United Nations Development Program, Seoul, which had an annual growth rate of 7.6%, was the fastest growing city in the world from 1950 through 1975. In fact, Seoul’s population increased from 1 million in 1950 to more than 6.8 million in 1975 (Bengston and Yeun, 2006). With its impressive population and economic growth, Seoul revised its expansion. In 1971, a greenbelt system was introduced as part of a National Comprehensive Physical Plan during the administration of the authoritarian president Park Chung Hee (Bae, 1998, p.2). According to Lee, the creation of the Town Planning Act is considered the law which finally implemented the greenbelt (as cited in Bengston & Yeun, 2006).

Seven are the objectives that Bae identifies as the main objectives to create and maintain a greenbelt around Seoul (1998). Those principles included: reduce population and industrial growth in Seoul; reduce and eliminate illegal suburban towns; discourage sprawl and separate the city from satellite cities such as Incheon, Suwon, and Euijeongbu; prevent development approaching to North Korea; control land speculation; protect farmland; and finally create and develop an environmental protected area to provide ecological services to the Seoul and its metropolitan area. Kang believes that some of those objectives have not been achieved (as cited in Bae, 1998). The accomplishment of such objectives will be discussed later in the costs and benefits section.
Seoul’s greenbelt has 1566.8 square kilometers, and was developed in four phases (Bae, 1998). The greenbelt, in its first phase, covered 463.8 square kilometers, and it had a width of between one to nine kilometers (Bae, 1998). After the first greenbelt designation, speculative development started occurring in the hinterlands of Anyang; therefore, this area was added to the greenbelt in its second phase. That addition increase greenbelt’s area in 86.8 square kilometers (Bae, 1998). The fourth and final phase added 247.6 square kilometers extending its width to forty kilometers from Seoul’s core (Bae, 1998). Figure 12 illustrates the total extension of Seoul’s greenbelt.

The transition to a civilian republic brought winds of change over the management of the greenbelt (Bengston & Yeun, 2006). According to Lee and Linneman (1998), the permanence and invariability of the greenbelt in the last thirty years came from the prohibitions of the discussion of the problems during Park’s regimen (as cited in Bengston & Yeun, 2006). After Park died in 1979, the subsequent military governments retained Park’s policy (Bengston & Yeun, 2006). However, with the change to a civilian government, landowners started to show their opposition to this policy. Indeed, as soon Kim Dae Jung won the presidency, a National Committee for Greenbelt policy Reform was formed in early 1998 (Bengston & Yeun, 2006). Choe reports that after almost a year of work; the committee finally presented its report in November 1998(2004).

The reports recommended several changes to the policy, and generated controversy the same day of its publishing. The committee advices cited by Bengston and Yeun included; first, the greenbelt should remain as a control policy, but some zones might be released using zoning regulations to control their development (2006). Second, in about the fourteen greenbelts around the country including Seoul’s, the boundaries of such greenbelt should be redrawn based on local environment considerations. Third, land speculation should be prevented in zones were the greenbelt would be relaxed or eliminated. Fourth, in lands were the restriction would remain, the landowners should be compensated for the lost of their development rights. And fifth, communities located inside the remaining greenbelts should have special permissions for new developments. As a result of these recommendations, a controversy started, and included an
investigation of the committee to clarify their transparency and impartiality (Bengston & Yeun, 2006).

**Cost and benefits from greenbelts**

Greenbelts, as most urban policies, carry benefits and costs to the social system. In London’s case, its history reveals that the greenbelts can limit urban development. In fact, by 1955 the greenbelt approach was applied to other cities in UK due to its early success controlling London’s growth (Figure 13). Nevertheless, according to Elson there is little evidence to prove that it has helped to the urban regeneration, an important element to achieve sustainable cities (as cited in Amati, 2005, p. 6). In addition, the fact that London has kept a “compact” size has reduced the use of cars; nevertheless, it has promoted development outside the greenbelt. As a result longest journeys are needed to reach London’s core.

The mixed success of the greenbelt can also be measured by the unfair distribution of benefits (Amati, 2004, p. 6). For example, the greenbelt has proven to be a generator of avoidable poverty (Amati, 2004, p. 18). This is due to the fact that limiting the developable land, the greenbelt also controls price housing, as Amati shows citing previous researches (2005, p. 18). As a result, the price for enjoying the green space around London is paid by residents through higher house prices (Amati, 2004, p. 18). This at the same time benefits landowners and home owners on the urban rings of the greenbelt because it guarantees that house prices of their properties will be the higher. As a result, they defend the permanence of the greenbelt and block any proposal of development. In addition, London greenbelt which intended to protect the British countryside has had a negative impact over the environment (Amati, 2004, p. 19). The development of villages and small towns outside the greenbelt has led to increase the use of cars to commute from there to London’s core (Amati, 2005, p. 19). However, this issue could not be discussed due to fact that issue has not been thoroughly studied.

In the case of Seoul’s greenbelt, studies report cost and benefits based on its economic costs (Bengston and Yeun, 2006) rather than evaluate social and environmental costs and benefits. Therefore, this section will include some estimation of the possible social and environmental benefits of this case.

Despite the fact that the greenbelt is not the only responsible for the increasing housing and commuting prices, it is one of the most important. For example, Kim et al estimated that the relaxation of the greenbelt inner ring would decrease the house prices
by 2.7% (1986). In addition, Choi estimated that if the greenbelt would have been eliminated by 1987, the prices outside the belt would have fallen by 7.5% (1994).

According to Son and Kim the greenbelt was the main responsible for the scarcity of developable land (1998). However, Hannah et al. (1993) discovered that the misdistribution of developable land made by the government is co-responsible for the high land and house prices. In addition, several studies have found that the high commuting prices are one of the most social costs related to Seoul’s greenbelt. Indeed, Kim (1993) estimated that the commuting prices in about 365000000000 won/yr, in the late 1980s.

Not many studies have analyzed the benefits of the Greenbelt of Seoul (Bengston and Yeun, 2006). However, greenbelts in general have proven they provide benefits such as amenity values, fiscal savings, and a wide range of ecosystem services. For example, Bae et al (2003) discovered that the proximity to the greenbelt was much important than the proximity to a highway to determine the residential property value. Fiscal savings has not been studied in Seoul’s case. Nevertheless, according to Burchell et al. (1998, 2002) empirical literature has shown that higher development densities are related to lower infrastructure costs. Finally, despite the fact that there is no studies about the environmental benefits of the greenbelt in Seoul, some scholars such as Yokohary et al (1994) have found that farm land and forests provide at least 26 ecological services to cities. Flood control, summer heat regulation, endangered species habitat, air pollution reduction, and water quality and quantity improvement are counted as some of the ecological services provided by greenbelts.
Urban growth boundaries (UGB)

Portland and Riyadh urban growth boundary

Portland’s UGB is a model among American efforts regarding growth management; as a result cities around the United States are adapting Portland’s experience. The context which underpins Portland’s UGB reveals the successful formula of this approach, public support, a regional government, and coordination between the state and local governments. Indeed, Portland’s experience is the result of 25 years of having the UGB in place (Fodor, 1999, p 125), and it is the result of a regional agency work which has effectively coordinate the growth of 24 areas comprised by the metropolitan area of Oregon (Fodor, 1999, p 114). This is partially attributed to the direct election of the officers which form the council of the regional agency coordinating the local governments (Fodor, 1999, p 114). Indeed, this agency is the only U.S. agency whose officers are directly elected by the public (Fodor, 1999, p 114).

The roots of the Oregonian experienced dates from the late 1960s and early 1970s (Rohse, 1987 p 3). In 1969, the first attempt to control growth is generated by a set of ten planning standards applicable to the entire state (Rohse, 1987, p 3). In addition, the Oregonian legislature also included a requirement for all local governments to develop comprehensive plans (Rohse, 1987, p 3). Nevertheless, this first attempt was damped by the lack of state funds destined for the creation of such plans (Rohse, 1987, p 3). In addition, this legislation did not consider which agency would administer the planning standards (Rohse, 1987, p 3). As a result, in 1973 this flaw was corrected by the creation of the Land Conservation and Development Commission (LCDC); moreover, it created
the procedure for this agency to approve and oversee the comprehensive plans in order to accomplish with the state goals (Abbot, 1983, p 251). In short, the Bill 100 which created the LCDC started Portland’s growth management success.

Although Portland’s metropolitan area has become famous due to its UGB, the concept was originated in Salem metropolitan area (Nelson & Moore, 1993, p 294). This early UGB was originated of Salem’s effort to protect farm land from conversion to urban uses (Nelson & Moore, 1993, p 294). Based on this early intent, the LCDC included among its goals the adoption of UGB is order to accomplish an orderly and efficient development (Nelson & Moore, 1993, p 294). From there, the prime goal of Portland’s UGB is not to stop growth but to control it (Nelson. 1994, p 26).

Based on this goal then, the land was classified as urban, urbanizable, and agricultural or low density land. Using the development goals and the provision of public services, the LCDC classified the land as urban when already developed and also where the infrastructure is provided (Nelson. 1994, p 27). Accordingly, “urbanizable” land is already served by public services and is adjacent to high density development (Nelson. 1994, p 27). Finally, agricultural or low density land is land where development is allowed to be that low and it will not be densely developed later (Nelson. 1994, p 27). This classification was intended for directing development towards those already developed areas, keeping urbanizable land developed accordingly to a tight timetable, and preventing from converting rural land into urbanizable or urban land (Nelson. 1994, p 27).
Although this form of management is not exclusive from Oregon, it is a model for the entire country. Based on an intergovernmental approach, the local governments, monitored by state government, have the power to use taxes, fees, zoning, and urban service programming for guiding development within the UGB (Knaap & Nelson, 1992, p 40). Under the state law, development outside of the boundary is forbidden (Knaap & Nelson, 1992 p 40). As a result, the state and the local governments enforce the UGB through well-designed development rules (Knaap & Nelson, 1992, p 40). This characteristic makes the Portland approach unique among American efforts.

The case of the Riyadh’s UGB offers a contrasting experience compared to Portland’s. Riyadh is the capital of the Kingdom of Saudi Arabia. This city has a population of 4.5 million inhabitants and it was characterized as a walled town surrounded by mud communities. Nevertheless, this agricultural city of Islamic values was deeply transformed by an economic and political reform (Mubarak, 2004, p 573). With this transformation, a new urban design and regulations were introduced (Mubarak, 2004, p 573). Nonetheless, the kingdom’s central administration remains after petroleum extraction transformed the economy and with this the architectural tradition of Riyadh (Mubarak, 2004, p 573). This combination introduced sprawl, a phenomenon unknown for this mid-eastern city (Mubarak, 2004, p 573). During the 1970s the traditional courtyard was replaced by detached subdivisions or suburban villages (Mubarak, 2004, p 576).

Varying from the American decentralized administration, the Riyadh planning administration remains heavily controlled by the central government (Mubarak, 2004, p
As a result, the planning decisions remain adopted by the central government instead of the municipalities which depend economically and authoritatively on the central Ministry of Municipal and Rural Affairs (Mubarak, 2004, p 569). As a result, the peripheral sub-municipalities have limited powers (Mubarak, 2004, p 573). The municipalities were used to deal with an assemblage of neighborhoods which were defined by familiar, ethnical, tribal and religious links controlled by officials appointed by the central government (Mubarak, 2004, p 577). These authorities were not familiar with the service demanding and land consuming suburban villages and the ways to control their growth.

In order to manage the explosive growth of Riyadh, the Kingdom adopted master plans which mirrored the western planning approaches. In 1973 the council of minister adopted the first master plan (Mubarak, 2004, p 580). This plan was more a technical paper rater than a realistic program; it was focused on creating economically and efficient urban centers. Therefore, the plan was focused on a simple grid structure, an easy to control modular framework based on the projections of the population and economic growth (Mubarak, 2004, p 581). As a result, the plan was arranged on super-blocks which resulted on a segregated city defined by income (Mubarak, 2004, p 581). This master plan oriented towards increasing the living standards and projecting the economic prosperity of the country led to an unprecedented urban sprawl (Mubarak, 2004, p 582).

This unprecedented urban growth, which was produced by the increasing tendency to live in detached houses and the real estate boom, led to the need for a new plan. This second intent which was completed in 1982 updated the first master plan; as a
result, new subdivisions were approved (Mubarak, 2004, p 582). Even though the second plan was intended to deal with the overwhelming sprawl, the result form this intent was more leapfrogging development as well as the scattered and low density residential development (Mubarak, 2004, p 583). In short, the planning approaches similar to western zoning plans led to more sprawl.

Sprawl continued during the 1980s. For this reason, the council of ministers adopted an UGB (Mubarak, 2004, p 583) in order to curb the leapfrog and low density development. The land within the UGB was phased according to three limits: urban limit I, urban limit II, and urban environs phase (Mubarak, 2004, p 583). Development will be allowed within each area accordingly to a time table; for example, subdivision were allowed within limit I until 1995, then development were allowed within the next level since 1995 until 2005 (Mubarak, 2004, p 576). Although the UGB was intended to reduce the pace of the urban growth, it was not complemented by additional planning tools which could introduce different growth patterns (Mubarak, 2004, p 584). Moreover, this intent was as simplistic as the previous ones. The UGB and its phases were mainly calculated based on economic and growth figures. Indeed, these approaches poorly incorporated other variables such as the physical variables of the region, variables which also influence urban growth.

As a matter of fact, the success of the Riyadh’s UGB was mostly attributed to externalities rather than the effectiveness of its enforcement. Indeed, the sprawl continued outside of the limits where development was allowed (Mubarak, 2004, p 588). If sprawl has decreased its pace, it is not because the enforcement of the UGB; it has been the
result of slowing the petroleum boom of the previous decades (Mubarak, 2004, p 584).

An important lessons learned from this case is the fact that the centrality of the
government displace local governments in their function of urban managers.

Local governments which are usually the first contact and are the ones dealing
with the needs of urban centers in this case are displaced and limited in their functions.
Therefore, the design process for the planning tools lacks the local knowledge resulting in
over simplistic and unrealistic plans. In addition, the limited power conferred to the local
government limit their administrative functions, their capacity to raise funds, and their
capacity to enforce policies even if they did not participate in their design. This is
particularly important when it comes to containment policies because local governments
are the architects which encourage development in some areas and discourage in others.
In order to play this role, they need not only funds, but also the power to do it.

Cost and benefits from urban growth boundaries

At this point it is important to remember that urban growth boundaries are flexible
tools to guide development. Even though UGB can be physical boundaries, they can be
resized accordingly to the goals and objectives of the government implementing it.
Unlike greenbelts, UGB are intended to manage growth instead of containing it within
a green “wall.” Nevertheless, in order to prevent the negative effects already discussed,
special attention has to be paid at the moment of sizing the UGB. For example, in the
case of Portland the state legislation require that every UGB has to be large enough to
supply the needs for housing, recreation, commerce, industry and any other land use until
the year when the UGB would be evaluated (Knaap & Nelson, 1992, p 40). More
importantly, too little urban land may produce land inflation (Knaap & Nelson, 1992, p 41) and also may take development away to areas with lesser or null limitations (Fodor, 1999, p 114). Similarly, too much land may not promote high density development (Knaap & Nelson, 1992, p 41). Again, sizing an UGB is a key point for which the urban development rate and tendency are fundamental (Knaap & Nelson, 1992, p 41).

Another spillover of UGB is the disappearance of affordable housing. The disappearance of affordable housing may be a transitional effect of the restriction of available land (Staley & Mildner, 1999 p 2). This is basically the result of altering the housing stock by restricting the supply of low-price land (Nelson et al. 2004, p 426). In addition, this housing alteration has also influenced the housing decisions too. Since houses are more expensive due to the limitations in land supply, homebuyers has experienced a “substitution” effect (Staley & Mildner, 1999 p 7). By limiting the land supply, homebuyers are choosing to buy smaller lots, and then UGB are changing the housing decisions of homebuyers (Staley & Mildner, 1999 p 7). Portland offers an example of this effect. There research has found that homebuyers have traded lot size for house size; in other words, they buy bigger houses on smaller lots (Staley & Mildner, 1999 p 8).

The case of Portland offers more lessons that are important to review. First of all it is important to highlight that UGB may achieve a higher density development; nonetheless, the land constraint imposed by the phasing development may also result in higher land and house prices (Staley & Mildner, 1999 p 10). As mentioned before land constraint may influence the home-buyers decisions (Staley & Mildner, 1999 p 10).
addition, UGB encourages the creation of groups opposing the expansion or modification of the UGB (Staley & Mildner, 1999 p 10). Nevertheless, the position of these groups may change as the consequences from the enforcement of the UGB arise (Staley & Mildner, 1999 p 10). As years pass and the UGB remains in place, more effects may appear and more conclusions can be made.

**Setting the stage, planning’s legal framework in El Salvador**

To understand and analyze the laws and policies affecting the environment and urban planning in El Salvador, it is important to understand its legal system. Understanding the way how the system is structured in this country, it would clarify the interpretation of how laws are made, interpreted, amended, and implemented as well as the mechanism to adopt the environmental and planning policies. In El Salvador, the Political Constitution establishes the structure and confers the authority to administrate the laws ruling the country. The Constitution, enacted in December 20, 1983, establishes the Salvadoran government as a democratic, republican, and representative institution whose power comes from the people, who are represented by political parties, and is implemented by three branches: the executive, legislative, and judicial (Government of El Salvador, 1983).

The legislative body is in the Salvadoran system in charge to approve and amend laws. Therefore, in order to pass a bill, this has to be approved by an absolute majority of the legislative body. After its approval, the bill has to be sent to the President within the next ten days of its approval. The President can either order its official publication or veto it. When the bill is vetoed, the assembly can override the veto with two thirds of the total
votes cast. If the veto is overridden, the President has to sign the bill and order its publication.

In order to meet the Constitution command which states that Salvadorans’ welfare is the main purpose of the Salvadoran government (Government of El Salvador, 1983), it was issued the law of the environment. This legislation is important for this research because it may used to justify the creation of a greenbelt. In addition, Salvadoran legislature has approved some other laws intended to improve Salvadorans quality of life, especially in urban areas. These laws are reviewed in this research because it is crucial to understand the power the municipality has to control and manage its development.

**Environmental law of El Salvador**

The first Article of the Constitution of El Salvador makes the government responsible for the welfare of Salvadoran citizens. According to the initial considerations of the environmental law, the Constitution also mandates the protection, conservation, and improvement of the environment and the natural resources through special laws (Government of El Salvador, 1998). Based on these constitutional fundaments, the President proposed through his Minister of the Environment the special law of the environment.

This law through the 3rd Article and the Chapter I of the Special dispositions authorizes the Ministry of the Environment and Natural Resources (MARN) as the institution in charge to enforce the law (Government of El Salvador, 1998). According to the decree, the Ministry is in charge to design and revise the rules and special laws that have to be obeyed by industry and every institution realizing activities that affect the
environment and the natural resources (Government of El Salvador, 1998). The Chapter also authorizes the ministry to delegate certain functions in other governmental institutions (Government of El Salvador, 1998).

The environmental law states in the 2nd Article, letter e, that this law has as main principles to prevent and foreseen the damages of the environment. In addition, the law includes in the 2nd Article letter j that the use of the natural resources has to be done using the principle of effectiveness (Government of El Salvador, 1998). Therefore, the law in the 4th Article mandates that every public or private institution have to include in every action or plan an environmental component (Government of El Salvador, 1998). As a result, municipalities and other public or private institutions have include in their plan and projects an environmental component explaining how the resources are going to be used or affected.

The environmental law also orders through the 14th Article that every land management plan has to consider certain criteria (Government of El Salvador, 1998). These criteria includes an economic evaluation of the environmental services produced by the ecosystems in the area to be managed (61st Article); a characterization of such ecosystems including their natural and cultural resources making emphasis on the potential use of the land using the watersheds as basic units of analysis; and finally, both stability and instability between the human settlements and the ecosystems (Government of El Salvador, 1998).

According to the 17th Article of the environmental law, these criteria have to be the base on which formulate management plans (Government of El Salvador, 1998). This
Article also empowers the Ministry to evaluate the impacts that the characterization highlights (Government of El Salvador, 1998), and based on this evaluation the Ministry has to issue recommendations and outlines that have to be followed by the proposer (Government of El Salvador, 1998).

Additionally, the environmental impact evaluation is the basis to issue a permit (Government of El Salvador, 1998). The 21st Article of this special law also mandates the elaboration of special impact assessments to every human activity that foresees negative impacts in the environment (Government of El Salvador, 1998) such as that produced by building public or private premises, urbanizations, agricultural infrastructure, etc. This assessment is used as well to provide the permit to execute such activities (Government of El Salvador, 1998).

Another relevant article of this law is the article 78th. This article allows the MARN as responsible for managing and overseeing the system of protected areas. In spite of the management powers of the MARN, the areas meeting specific requirements can only be included in the system by the legislative body (Government of El Salvador, 2003).

**Law of natural protected areas**

This law is intended to protect the biodiversity of the country (Government of El Salvador, 2005). According to this law, all the public or private properties which have not been extensively affected by human, that have significant biodiversity, and that provided environmental services to a community form the system of natural protected areas. Wetlands, lakes, lagoons, craters, lavas are some of the ecosystems considered as
patrimony of the country; therefore in order to preserve them they are included into the system of protected areas (Government of El Salvador, 2005). The areas meeting these requirements are incorporated into the system by the legislative body.

According to the article 11\textsuperscript{th} of this law, private and public institutions may propose an area to include in the system (Government of El Salvador, 2005). Nevertheless, the areas have to be clearly located, their resources have to be evaluated to determine their uniqueness and state, and the property has to be legally register in order to be incorporated to the system (Government of El Salvador, 2005). If any of these requirements is not met, especially the evaluation the resources and state of the area, it is not incorporated.

Even though these areas have special protection, there are certain uses which are allowed to be in the area. For example, low density population is allowed only if the dwellings were built before the induction of the area into the system, and no major improvements may be done to these settlements (Government of El Salvador, 2005). In addition, the area may be declared a natural park, reserve, ecological park, terrestrial or marine landscape, management area, natural monument, protected area with managed resources, and protection and restoration area (Government of El Salvador, 2005). The area may be used for recreation activities only if area is not deteriorated (Government of El Salvador, 2005). In that case, if funds are raised from those activities, such funds belong to the legal owner of the property (Government of El Salvador, 2005).

After the landslide in 2001, the Santa Tecla proposed the inclusion of El Balsamo mountain range as a protected natural area. The municipality justified this designation by
the geological risks the mountain range represents. Nonetheless, the characterization of the area did not reveal any unique ecosystem present in the area, they are important, but they can be found in other areas of the country. As a result, the ministry rejected this proposal.

It is clear that regarding the environmental management, the decision making is still centralized in the central government. Although every Salvadoran may propose the induction of an area into the protected areas system, is the legislative body which decides. In spite of the need for technical support, this body has to make its decision. This decision may be influenced, as in the case of Riyadh, by the economic and development goals of the government. In consequence, the municipality of Santa Tecla does not have the authority to declare an area untouchable due its environmental relevance. As a result, the municipality may not have as an alternative the creation of a greenbelt. Although it is clear that the volcano and the mountain range provide important environmental services to Santa Tecla, they are not unique and endangered ecosystems that have to be protected.

*Special laws regarding land use planning and management in El Salvador*

Although the antecedents of urban planning in El Salvador dates from the 1950s, the legislation ruling this issue is not that extensive as the environmental one. It seems that in order to meet all the treaties that the country is engaged with, the government issued this law. Nonetheless, the land use planning in the country has mainly focused on building construction regulation rather than managing and guiding development. Just recently this approach has been gained momentum; as a result, master plans boomed. These master plans mirrored mostly European experiences with land use planning. The
reason is that European NGOs were providing technical support and funds; and most importantly, they lack the coordination of any central authority. For this reason in the 1990s the central government started to design the National Land Use Planning Bill which is pending to approval. This section will explore the legislation behind land use planning in El Salvador.

*Law of Urbanism and Construction*

When it comes to the public administration and management of urban and rural land, the authority is conferred by a set of laws some of them especially created for specific urban centers. Since 1951, the authority came from the Law of Urbanism and Construction, but most specifically, from its rule which was intended to control and manage the galloping pace of urban development.

According to the second article of the rule of the law of urbanism and construction, every activity oriented towards planning, executing, and controlling any subdivision in El Salvador has to be in accordance with this law, unless the municipalities or group of municipalities have their own rule for it (Government of El Salvador, 1951). The same article confers the authority to oversee and enforce this law to the Vice-Minister of Housing and Urban Development (VMVDU acronym for Vice-Ministerio de Vivienda y Desarrollo Urbano).

The third article of this rule defines what urbanizable and nonurbanizable land is. Urbanizable land lies or not beside already urban land, but it has the conditions for urban development (Government of El Salvador, 1991). Unfortunately, this rule does not define which those conditions are. Later on, the 42nd article states a criterion for defining urban
land, urbanizable land, and rural land in absence of a local plan serving such purpose. This criterion says that all land is going to be urban or urbanizable if it lies within the area of influence of urban center, but it has not been declared as a forest or agricultural reserve (Government of El Salvador, 1991). Unfortunately again, this criterion is too general opening a window of opportunity to build in lands which do not have the physical conditions to support the pressure provoked by urban activities.

Besides a detailed definition of the criteria that new suburbanization has to meet in terms of dimensions, materials, and other construction specifications; this law classified urbanizable land accordingly to its location. As a result, the 42nd article defines four types of localizations: L1 is the location assigned to settlements with high urban pressure or with more than 50,000 inhabitants (Government of El Salvador, 1991). Location L2 corresponds to locations in settlements with less than 50,000 inhabitants or areas with lesser urban pressure (Government of El Salvador, 1991). Location L3 is assigned to the outskirts of settlements or areas without urban pressure (Government of El Salvador, 1991). Finally, Location L4 corresponds to ecological and natural reserves (Government of El Salvador, 1991). The 43rd article establishes that the allowed densities for the above locations are going to be defined by the local governments (Government of El Salvador, 1991).
The Municipal code

As mentioned before, municipalities may design and enforce their own plan. This authority also comes from the Municipal Code enacted in 1986. This code establishes in its second article that the municipality as the primary unit of the state’s political organization (Government of El Salvador, 2000). Territorially, the municipalities are divided in cantons which are the smallest spatial units. Cantons, on the other hand, comprise settlements known as hamlets. These small spatial units do not have political authority, and they depend administratively from the municipalities. Regarding the spatial administration, the fourth article confers to the municipality the authority to create, adapt, approve, and enforce development plans for urban and rural areas (Government of El Salvador, 2000). In addition, the same article authorizes municipalities to promote and manage the development of industrial, commercial, agricultural, and craft services.

More importantly, the code confers to the municipal council the authority to manage development. According to the 30th article and 206th article of the Constitution, municipalities are enabled to issue ordinances, rules, and agreements in order to manage their territory (Government of El Salvador, 2000). This article enables municipalities to establish agreements with other municipalities and institutions, and it authorizes them to create decentralized municipal institutions to oversee the administration of the territory (Government of El Salvador, 2000). In addition to the capacity of the municipalities to create decentralized institutions, one of the most important attributes of municipalities is their capacity to expropriate land.
According to the 138th article, any time the municipal council agrees to acquire totally or partially a lot for the construction of a public or social amenity; the municipality is able to acquire such land (Government of El Salvador, 2000). As it is stated in this article, the acquisition of land could be done either voluntarily or by force. Once the municipality publicly noticed its intention to acquire specific tracks of land, the owners of such land is able to present a written note accepting to voluntarily sell their properties (Government of El Salvador, 2000). In order to pay the owner for its property, an appraiser from the General Direction of Budget is in charge to assess the value of the property; afterwards, the council has to agree in the price which may not exceed more than 50% of the price assessed by the appraiser (Government of El Salvador, 2000). In the case that the owner does not sell its property, the municipality may sue him in a civil court or in a first instance court (Government of El Salvador, 2000).

The nature of the expropriation is based on the type landownership established in the constitution, the private property. The article 103rd recognizes and guarantees the private property as type of ownership (Government of el Salvador, 1983). Although, it clarifies that the rights to exploit underground resources remains as state property, and only the state may grant their exploitation (Government of El Salvador, 1983). Due to its category of private land, the 22nd article of the Constitution states that the Salvadoran citizens have the power to donate, sell, and inherit their properties (Government of El Salvador, 1983). In addition, the same article allows Salvadorans to transfer their properties according to their will, validating their right to write a will to transfer properties (Government of El Salvador, 1983).
The Constitution also commands that the state recognize, guarantee, and promote private ownership over rustic land. Even though the Constitution guarantees land’s private ownership, it also establishes a limit to the extension of land a person may own (Government of El Salvador, 1983). According to 105th article, a parson is allowed to own 245 hectares, but if the landowner possesses more land than that he or she is allowed to freely divide, rent, or transfer the portion of land which exceeds the lawful amount (Government of El Salvador, 1983). Nevertheless, the Constitution also allows landowners to divide the excess of land and register such land separately (Government of El Salvador, 1983).

The law for the development and planning of the metropolitan area of San Salvador and the surrounding municipalities

In addition to the municipal code, and based on the capability of municipalities to ally within each other in order to manage administration issues, a law was issued to deal with the galloping growth of the MASS. This law is known as the law for the development and planning of the metropolitan area of San Salvador and the surrounding municipalities (Government of El Salvador, 1994). According to the first article of this law, its purpose is to rule the development and planning of the MASS through the effective use of the resource of area as well as the available planning tools (Government of El Salvador, 1994). In general, this law establishes the structure, criteria, and procedures that have to be follow in order to manage the growth of the capital and its metropolitan area.
In order to accomplish its objectives, this law mandates the creation of several institutions which are going to be in charge of different functions. First of all, this law creates the council of the MASS or COAMSS, acronym for Council of Majors of Metropolitan Area of San Salvador. This council is in charge to propose and approve the development and planning policies, coordinate through the Planning Office of the MASS or OPAMSS (acronym for Oficina de Planificacion del Area Metropolitana de San Salvador), which is also created by this law, the proposal of municipal and state sectional plans, approve technical rules regarding the land use, collaborate altogether with the municipalities for enforcing the development and planning law, and solve all the issues that are not consider by such law (Government of el Salvador, 1994).

According to this law, any natural or legal person may create a partial plan which may include modifications to the MASS master plan if this modifications benefit the area (Government of el Salvador, 1994). Each plan, this law commands, has to include all the general dispositions oriented towards the restoration and preservation of the ecological stability, ecological and economical planning, the integration of any historical, architectural, or cultural landmark of green and public areas; preservation policies to protect the existing green areas, limitations to the establishment of activities that are considered hazardous, limitations over housing and industrial areas considering the expansion of housing areas and the effects that industrial ones can have over them, limitations for urbanizing areas that are considered to have limited development, and conservation policies for areas considered as non-urbanizable areas (Government of el Salvador, 1994).
Regarding areas of limited development or non-urbanizable, this law states the criteria for this type of areas. First of all, this law states that every partial plan prepared for any municipality of the MASS has to include a technical study to support the limited development or to ban the development of an area (Government of el Salvador, 1994). The articles from 38th through 39th declare limited development areas those that affect or pollute the underground water system, those that protect forests and improve the air quality, those that can preserve the ecological biodiversity, and those areas that positively influence the reduction of vehicle mobility dependency. Finally, the law commands that the proposal for declaring an area in this category has to be justified by the appropriate study (Government of el Salvador, 1994).

From these laws, it is possible to conclude that Salvadoran municipalities have certain independence regarding land use and development planning. This independence is conditioned by the administrative and economic structures of the municipalities which still are not properly organized to face the transformations of their territories. As a result, even though they have the power to create their own planning instruments, most of the time they do not have either the funds or the capacity to enforce them. This is extremely important especially in cities such as Santa Tecla which has dealt with the pressure generated by San Salvador and its peripheral cities.
CHAPTER THREE: CHARACTERIZATION OF SANTA TECLA

Basic description of the Municipality

Santa Tecla is the administrative capital of the central department of La Libertad. This municipality is surrounded by twelve municipalities, ten of them corresponding to the department of La Libertad and two of them to the department of San Salvador. As a result, Santa Tecla is surrounding to the north by Nejapa (San Salvador), Colón, San Juan Opico, and Quezaltepeque; to the east, the municipality is surrounded by San Salvador (San Salvador), Antiguo Cuscatlán, Nuevo Cuscatlán, San José Villanueva y Zaragoza. To the south, Santa Tecla limits with La Libertad and to the west with Talnique y Comasagua (Figure 11).

The internal division of the municipality has changed due to internal migration and the effects of the earthquakes of 2001. According to official reports, Santa Tecla was divided in 14 cantons and 46 hamlets (IGN, 1982). Nowadays, two out of those 14 cantons are uninhabited, another two has being incorporated to the city of Santa Tecla, and the remaining ten are still inhabited (Alcaldía Municipal de Santa Tecla, 2003). At the same time, the number of hamlets has increased from 46 to 51 (Alcaldía Municipal de Santa Tecla, 2003).

The total population of these hamlets is equivalent to 15% of the population of the municipality (Alcaldía Municipal de Santa Tecla, 2003). Most of this population is located in the central part of the municipality which is where urban expansion is occurring. As a result, the hamlets of El Sacazil, El Limón, and Las Granadillas which are located
surrounding Santa Tecla city are the ones where most population is concentrated (Alcadía Municipal de Santa Tecla, 2001). Although the most populated hamlets are located around the urban area, the most populated hamlets are located to the north in the hills of the volcano (Alcadía Municipal de Santa Tecla, 2003). This could be the result of the coffee plantations which still is one of the most important employment sources in rural areas. Unfortunately, most of the population living in rural areas is not covered with the primary services such as potable water, electric power, sewage, and waste recollection creating the typical problems associated with urban expansion into rural areas (Alcadía Municipal de Santa Tecla, 2003).

According to official reports, the municipality of Santa Tecla has a total population of 113,698 inhabitants (DIGESTYC, 1992). From this total, 86% of the total of inhabitants live in urban areas, and the rest approximately 15,406 live in rural areas (DIGESTYC, 1992). Municipal reports projected 50,500 more inhabitants for 2002 (Alcadía Municipal de Santa Tecla, 2003). The same reports estimate that the population’s rate of growth is approximately 3.65 which is the average not only for the municipality but for the department of La Libertad (Alcadía Municipal de Santa Tecla, 2003). Nonetheless, Figure 14 shows municipality’s projected population which was made estimating a yearly growth rate of 3.2 percent resulting in an increment of 25.9 percent by 2010 (Alcadía Municipal de Santa Tecla, 2003).
An important characteristic of the population of Santa Tecla is its age structure. The age of the population reflects demographic dynamics in the municipality; Figure 15 shows the population distribution according to intervals of age. From this graph it is possible to define Santa Tecla’s population as a young population because it is mainly concentrated in the lower intervals of age, and Tecla is a dormitory city due to fact the most of them works outside of the municipality (Alcadía Municipal de Santa Tecla, 2003).

*Figure 14*  Projected population from 2002 - 2010. Source: V Censo Nacional de Población y IV de Vivienda 1992. Ministerio de Economía.
In this regard, the economically active population is an important portion of the total population. According to municipal reports, 46 percent of the population living in the municipality is considered as economically active (Alcadía Municipal de Santa Tecla, 2003). These reports count that four, out ten persons older than ten years old, are engaged in work (Alcadía Municipal de Santa Tecla, 2003). This figure represents 54% of the population counting both employed and unemployed (Alcadía Municipal de Santa Tecla, 2003). Although there is a not a distinction between employed and unemployed population, there are records of the economically active people by gender. Official reports indicate that from the total economically active population 67 percent are women.

Figure 15 Population’s pyramid by sex. Source: V Censo Nacional de Población y IV de Vivienda 1992. Ministerio de Economía.
In terms of employment, the municipality has a small proportion of the employment of the MASS. Indeed, it is reported that the municipality has just 6.3 percent of the employment of the MASS; this is not surprising due to the fact that San Salvador concentrates most of employment of the areas. Indeed, the low concentration of employment is reflected in the proportion of population who work and reside in the municipality. According to official reports, only seven percent of residents of Santa Tecla live and work in the municipality (Alcaldía Municipal de Santa Tecla, 2003). As a result, the city is considered as a dormitory city composed of 92 urbanizations units known as colonies and 18 communities in process of development (Alcaldía Municipal de Santa Tecla, 2003).

The connectivity of Santa Tecla is mostly through a network of paved roads (Alcaldía Municipal de Santa Tecla, 2003). The major movement is done through the Pan-American Highway which connects the city of Santa Tecla with San Salvador and the western region of the country (Alcaldía Municipal de Santa Tecla, 2003). Other important connections are within Santa Tecla city and the municipalities of Zaragoza and La Libertad located to the south of the municipality (Alcaldía Municipal de Santa Tecla, 2003). Although the main connections are paved roads, the internal connection with cantons and hamlets is mostly done through rustic roads; some of them are just passable during summer season. This situation affects the development of the rural communities of the municipality due to the transportation limits on mobilization of persons, supplies, and services (Alcaldía Municipal de Santa Tecla, 2003).
This situation is crucial for the development of the municipality because the agricultural production remains as one of the economic supports of the territory. In fact, 60% of the territory is used to produce coffee (Alcadía Municipal de Santa Tecla, 2003). These coffee plantations benefit for the municipality not only in terms of economy but also in environmental terms especially because they are concentrated in the hills of the Quzaltepeque volcano which is one of the major precipitation collectors in the region. Nevertheless, in the last 10 years the municipality reports an increase in the urbanization of agricultural land (Alcadía Municipal de Santa Tecla, 2003). This transformation has been the result of internal migration and the fluctuations in coffee’s price (Alcaldía Municipal de Santa Tecla, 2001). This has exerted pressure for transforming agricultural land into urban land (Alcadía Municipal de Santa Tecla, 2003). As a result, many people dedicated to agricultural activities have changed their occupation not without increasing the proportion of unemployed workers (Alcadía Municipal de Santa Tecla, 2003).

Another important factor in the municipality is its service coverage. In terms of provision of potable water, the municipality reports the coverage of this service is 89% in urban areas (Alcadía Municipal de Santa Tecla, 2003). In the rural area on the other hand, the coverage of water varies with some rural areas without water provision (Alcaldía Municipal de Santa Tecla, 2003). As a result, 1556 houses out 3191 carried water from springs, 852 from wells, and 209 carried their water from closer rivers (Alcaldía Municipal de Santa Tecla, 2003). Regarding electric power, the coverage is larger. In the urban area the coverage is approximately 98 percent, and in the rural area is
approximately 69 percent (Alcaldía Municipal de Santa Tecla, 2003). At hamlet level, only 16 out 51 do not have electric power (Alcaldía Municipal de Santa Tecla, 2003).

In terms of sewage service, most of the population in urban areas is served with sewage. Indeed, the last national census reports that in urban areas 22300 houses have sewage collection available (Alcaldía Municipal de Santa Tecla, 2003). In urban areas, 1110 houses still have latrines (Alcaldía Municipal de Santa Tecla, 2003). In rural areas, only 79 houses are connected to sewage system; 1778 houses have latrines, and 1044 houses do not have even latrines (Alcaldía Municipal de Santa Tecla, 2003).

With respect of social services, most hospitals and higher level schools are located in Santa Tecla city. Regarding the health system most of the services are provided by the Ministry of Health (Alcaldía Municipal de Santa Tecla, 2003). This ministry has in the municipality one general hospital which helps approximately 200000 patients who reside in the municipality and the department. In addition, the city has two health units (relatively small clinics), and six health houses (Alcaldía Municipal de Santa Tecla, 2003). From these sources, the 1992 census reports a rate of mortality among children of approximately 13.39 percent (Alcaldía Municipal de Santa Tecla, 2003).

Regarding school coverage, there are 104 centers. From these centers, 34 are public and 70 are private schools (Alcaldía Municipal de Santa Tecla, 2003). This coverage relates to a population between five and 19 years old serving only approximately 46.2% (Alcaldía Municipal de Santa Tecla, 2003). This is a relatively low coverage considering that the population in this municipality is increasing at a galloping pace.
Urban evolution of Santa Tecla

To understand the growth tendency of Santa Tecla, it is important to make a historical review of its development. In order to do that, seven periods are presented. This review will explore the consolidation of the city, its transformation, and ultimate absorption into the metropolitan area of San Salvador. At the end, this review will reveal the basics of the city’s growth.

Santa Tecla was founded to be the new capital of the country because an earthquake destroyed the capital in April 1854 (Alcadía Municipal de Santa Tecla, 2003). Santa Tecla replaced the old capital in later 1854, and its political organization began with the creation of Nueva San Salvador, the capital of the department of La Libertad (Alcadía Municipal de Santa Tecla, 2003). Although the original idea was to relocate the capital, the legal and political functions of the capital were never transferred to Santa Tecla (Alcadía Municipal de Santa Tecla, 2003). As a result, the capital returned to San Salvador in 1859 (Alcadía Municipal de Santa Tecla, 2003).

Its location was selected due to several reasons. First of all it was strategically located within San Salvador and La Libertad Pier (Alcadía Municipal de Santa Tecla, 2003). As a result, the new capital could not lose the connection to the major commercial gateway of that time. In addition, the fact that the new location was located just 12 km away from the old capital kept the centrality of the administrative core of the country. Additionally to the major centers of activities of that time, the topographic and climatic characteristics, reviewed in Chapter 1, favored this location (Alcadía Municipal de Santa Tecla, 2003). Indeed, Santa Tecla has been an important hub, always related to San
Salvador (Alcaldía Municipal de Santa Tecla, 2003). It has always been a trade point due to its location between San Salvador, La Libertad Pier, and the west.

From the very beginning the city was planned. The early years of the city mostly a residential city which was following the traditional grid design of the Spaniard colonial cities (Alcaldía Municipal de Santa Tecla). The newly designed city included five neighborhoods (Alcaldía Municipal de Santa Tecla). These neighborhoods were mostly designated for private residents separated from the peasants’ houses and crop fields by a road called la Ronda. In addition, the city’s design was highly influenced by French urban traditions. As a result, the public spaces mirrored the monumentality of French cities (Alcaldía Municipal de Santa Tecla).

The first important period of urban development is from its foundation to 1884. This period is characterized by the consolidation of the city as a trade hub (Alcaldía Municipal de Santa Tecla, 2003). This consolidation resulted from developments of the stagecoach era in transportation (Alcaldía Municipal de Santa Tecla). Since then, the relationship San Salvador-Santa Tecla-West has been strong (Alcaldía Municipal de Santa Tecla, 2003). Economically, indigo was supplanted by coffee as basis for the economy (Alcaldía Municipal de Santa Tecla). In this period of consolidation, the urban population increased five-fold in 25 years to nearly 10,000 inhabitants (Alcaldía Municipal de Santa Tecla).

The next remarkable period of development started late in the nineteenth century and ended close to the mid twentieth century. This period starts with the abolition of the common lands or “ejidos” where peasants had their houses and crops (Alcaldía Municipal
de Santa Tecla). Even though common lands were nationally repealed in 1882, it is 1897 when municipal councils had to sell all the common lands. As a result, coffee plantations are consolidated into the main use of the land as well as the main source of employment (Alcaldía Municipal de Santa Tecla). This drove the development of the city (Alcaldía Municipal de Santa Tecla). In addition, the introduction of the automobile in 1903 consolidated the position of Santa Tecla on the national map.

The influence of coffee plantations over the land use continues because these plantations determined the location of the new subdivisions (Alcaldía Municipal de Santa Tecla). The fluctuation of the coffee’s price during the 1930s caused the landowners to release their land for new urban development (Alcaldía Municipal de Santa Tecla). In addition to coffee, the area became an educational pole (Alcaldía Municipal de Santa Tecla) competing with the capital. These developments promoted the internal migration. As a result, after 80 years the urban population was approximately 20,000 inhabitants, nearly 69% of the total population of the municipality (Alcaldía Municipal de Santa Tecla).

The next period correspond to the decade 1942-1952 when the city consolidated its position as a major educational center. Indeed, the city has the major concentration of schools in the country (Alcaldía Municipal de Santa Tecla). In addition, the highly regulated urban form started to reflect the pressure it was facing as this period experienced major growth towards the open lands to the west instead of the earlier pattern of growth to the east, towards San Salvador (Alcaldía Municipal de Santa Tecla). Figure 16 presents a progression of the growth of the city. It is important to highlight that even
though the growth towards the west is significant, especially because that growth phase included the first subdivision designed for lower income buyers (Alcaldía Municipal de Santa Tecla), it is not as significant as the growth towards San Salvador.

In demographic terms, this period also presents an important moment. After almost a century from its foundation, the city of Santa Tecla is ranked as the second most populated municipality of the MASS (Alcaldía Municipal de Santa Tecla). There was an increase in the urban density before 1951 from 35 inhabitants per square kilometer to 250 inhabitants per square kilometer after 1951 (Alcaldía Municipal de Santa Tecla).
Figure 16 Urban evolution of Santa Tecla within 1854 - 1952
The following 12 years presents the second regional effort to regulate the growth of the MASS. In 1969 it is presented the METROPLAN 80 whose strategy was to promote the development of the peripheral areas of the MASS (Alcaldía Municipal de Santa Tecla). This plan considered the timely low-density development of such areas in order to give an alternative to the increasing degradation and saturation of the downtown (Alcaldía Municipal de Santa Tecla). In addition, private initiatives developed projects mostly focused on low-income housing. As a result, the Fundación Salvadoreña de Desarrollo y Vivienda Minima (FUNDASAL) built the first subdivision for low income class (Alcaldía Municipal de Santa Tecla, 2001). At the end of this period, the total population was approximately 73,000 inhabitants most (56 500 inhabitants) living in urban areas (Alcaldía Municipal de Santa Tecla). This means that after 30 years the population was three times bigger than in 1950.

In the next period (1981-1986), Santa Tecla is highly influenced by the political instability experienced in the country. The “lost decade” as is popularly known the decade in which the country experienced a bloody war. The direct effects this conflict was less negative here than in other urban areas; nevertheless, the municipality received a good number of displaced people. Even though there are not an official number of displaced people, some estimations report approximately 500,000 displaced persons (Alcaldía Municipal de Santa Tecla). Thus, the destruction of infrastructure, and the reorientation of funds which were assigned to the regulation MASS’ growth meant the lost of the achievements of METROPLAN 80 (Alcaldía Municipal de Santa Tecla, 2001).
Due to the deterioration of the quality life, cities experienced a process of invasion and succession. Even though this process started during the 1970s, it is more evident during the period 1980-1986 due to the increase of the violence and insecurity produced by the political instability (Alcaldía Municipal de Santa Tecla). Consequently, upper class left the downtowns and went to live in gated communities and condominiums (Alcaldía Municipal de Santa Tecla). As a result, Santa Tecla’s downtown experienced an aging process (Alcaldía Municipal de Santa Tecla). The lower class and old segments of the population pyramid came to live in the houses left behind by upper classes (Alcaldía Municipal de Santa Tecla). Nevertheless, despite the instability, Santa Tecla kept its residential attractiveness (Alcaldía Municipal de Santa Tecla).

The last period of analysis corresponds to the years 1987 to 1995. This is one of the most influential periods regarding the urban development of the Santa Tecla. First of all, the war ended and the capital recovered from an earthquake. This historical moment was an opportunity to analyze the conditions of urban development. This evaluation revealed that cities have been expanding without any effective regulation and enforcement of the laws (Alcaldía Municipal de Santa Tecla). As a result, a new plan is conceived, the METROPLAN 2000.

This plan is intended to manage and guide the galloping growth of the MASS. The plan was especially significant for Santa Tecla because the city was facing the pressure exerted by the migration of upper classes from San Salvador and other cities (Alcaldía Municipal de Santa Tecla). The growth provoked by this migration is depicted in Figure 17 which presents the evolution of the city from 1953 to 1995. This map
reflects a city of 98,000 inhabitants, nearly 87% of the total population of the municipality (Alcaldía Municipal de Santa Tecla).

Many changes have happened after 1995, but data is not yet available to analyze this period. Nevertheless, it is important to highlight that in 1997 a new plan for the MASS was presented. This new plan titled Master Plan for the Urban Development of the MASS (PLAMADUR-AMSSA standing for Plan Maestro de Desarrollo Urbano del Area Metropolitana de San Salvador Ampliada) is an extensive plan whose enforcement has being more than a challenge. Consequently, municipalities such as Nejapa and Santa Tecla have been designing their planning tools.

Santa Tecla has being engaged with preserving its environment, and those efforts have been focused on protecting and managing the environment. As a result, the municipality has been working with different institutions to design a plan which could help them to improve the quality life of the city. Nonetheless, such plans are mostly focused on risk and environmental management rather than land use planning. In spite of this, this approaches have produced a general zoning plan complemented with a development limit delineated based on the geological risks of the municipality.
Figure 17 Urban evolution of Santa Tecla within 1953 - 1995
Two of the three ordinances promulgated by the municipality include general planning zones. The first effort dated from 1989, it is an ordinance to protect and preserve the renewable resources. This ordinance created the guidelines to preserve and protect the natural resources to ensure a clean environment for the residents of Santa Tecla. The second ordinance was promulgated in 1998, and it proposed a temporary banning for building permits in the hillsides of the mountain range (Geologos del mundo, 2004, p 33). This ordinance, introduced the first zoning plan which includes three development zones: maximum protection area restricting development in non-urbanizable land, restricted development type one, and restricted development type two (Geologos del mundo, 2004, p 34). Unfortunately, the ordinance did not include the description or map of distribution of such land. The second zone was a restricted development area type one, and the third zone a restricted development area type two; nevertheless it not included a description of the uses allowed in those areas. The third ordinance was promulgated in 1998. This ordinance updated the temporary banning adding a zone of agricultural development and a zone of eco-tourism development. Unfortunately, this research did not have access to zoning maps of these ordinances.

In addition to these ordinances, in early 2006 a zoning proposal was presented. This proposal was based on a geological risk study in which the zones of the last ordinance were updated according to findings of a geological risk assessment. The zoning map of this research is going to be further analyzed in Chapter Four in order to assess the available land.
Summary

The municipality of Santa Tecla is the administrative head of the central department of La Libertad. It was founded to be the new capital of the country; nowadays, it is one of the 14 municipalities forming the MASS. The proximity to the capital has turned this city into a dormitory city. Spatially, the city of San Salvador has absorbed this city provoking the deterioration of the environment and the surrounding ecosystems. A general description of the municipality is summarized in table 3.1.

Table 7

*General information of Santa Tecla*

<table>
<thead>
<tr>
<th>Extension</th>
<th>112.2 km²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>113,698 inhabitants</td>
</tr>
<tr>
<td>Urban population</td>
<td>86%</td>
</tr>
<tr>
<td>Gender rate</td>
<td>54% are women</td>
</tr>
<tr>
<td>Population growth rate</td>
<td>3.65%</td>
</tr>
<tr>
<td>Population age</td>
<td>41% from 10 – 29 yrs old</td>
</tr>
<tr>
<td>Political administration</td>
<td>14 cantons, 51 hamlets</td>
</tr>
<tr>
<td>Economic activities</td>
<td>Agriculture, commerce, industry</td>
</tr>
<tr>
<td>School coverage</td>
<td>47%</td>
</tr>
<tr>
<td>Health system</td>
<td>1 general hospital, 2 health units</td>
</tr>
<tr>
<td>Potable water coverage</td>
<td>89% in the urban area</td>
</tr>
<tr>
<td>Road network</td>
<td>80% paved roads</td>
</tr>
</tbody>
</table>

Source: Alcaldia Municipal de Santa Tecla, 2001
The evolution of the city started in 1854. The city was designed with Spanish and French influences. The municipal administration was instituted in 1856. Its location was determined based on its relative centrality with respect to the rest of the country, and it was strategically located between the old capital and La Libertad pier, the main commercial gateway of the time. Indeed, the consolidation of the city resulted from the improvement of the communication networks and the introduction of coffee as basis of the economy.

The urban growth of the city has been strongly related to the coffee. With the abolition of common lands coffee plantations were consolidated. Later, the location of these plantations determined the location of new subdivisions. In addition to drive development, coffee was, and still is one the most important, sources of employment. This resulted into an internal migration. The development produced by the fluctuation of the coffee prices propitiated the consolidation of Santa Tecla as an educational pole. Demographically, in approximately 100 years, the population changed from 1000 to 19000 inhabitants.

The greater urban growth occurred from 1968 through 1995. During this period, three different plans were designed to regulate the growth of the MASS. The strategy of the first plan was to promote the development of peripheral cities. Therefore, it considered a timely low-density development of these cities. The second plan was designed to control the growth of the MASS; nevertheless, this plan did not reach its goals. Finally, in 1997 a new plan was conceived, this one administrated by a regional
council, the COAMSS. Unfortunately, this plan has not been fully implemented. Santa Tecla, then, has promulgated ordinances which include general zoning plans.
CHAPTER FOUR: ASSESSING POTENTIAL CONTAINMENT

Besides the characterization already presented, this chapter assesses other issues regarding the potential containment of Santa Tecla. Although previous chapters have depicted the general characteristics, conditions, and forces affecting Santa Tecla’s growth; it is fundamental to estimate its rate of growth as well as its historical tendency of growth in order to infer the direction that future growth and the potential for its containment. Some zones are more likely to be urbanized than others; therefore, the estimation of rate of growth will report the approximate land conversion rate, an important figure for designing the city’s urban growth management plan.

For a city without spatial and administrative constraints that may be enough for planning its containment; in this case, it is necessary to add the constraints posed by the land suitability for urban development and the capacity of the municipality to enforce a containment policy. Therefore, an estimation of potential suitable land is going to be introduced in this chapter. Then, the enforcement capacity is going to be assessed based on the powers conferred and the structural organization of the city’s administration. Finally, based on Santa Tecla’s characteristics, growth rate, growth tendency, land suitability and enforcement capacity the potential containment is going to be assessed.

Estimation of the rate of growth of Santa Tecla

In spite of its designation as new capital of El Salvador and its strategic location, Santa Tecla did not have an explosive growth in its early years. In 1854, five years after of its foundation, the city covered slightly more than a quarter of square kilometer. Twenty five years later due to an annual growth of approximately 4% in both urban
development and population, the urban area was approximately 1.13 square kilometers mainly concentrated around the original settlement, but with a clear tendency towards the north (Figure 11). This relative slow and concentrated growth of this period could have been the result of the fact that the city was never consolidated as new capital.

This growth tendency was soon changed probably by structural and economic transformations posed by the elimination of the common lands in the nineteenth century, the consolidation of the coffee plantations which later were partially converted in suburbanizations, and the consolidation of the city as educational pole for the country. As a result, the city in 1967, more than a century after its foundation, had an extension of 3.38 square kilometers which represent an annual growth of approximately 0.9% while the population grew 4%. In terms of growth trend, Santa Tecla mainly grew towards Antiguo Cuscatlan, but also representatively towards the west. This growth was mainly leaded by the Pan-American highway which bisected the country (and Santa Tecla) connecting it with Guatemala, Nicaragua and with port of Acajutla which is by this time the major gateway of the country.

Although the city was already an important destination, its consolidation is clearer in the following 33 years. In fact, by 1980 the city had grown approximately 1.37 square kilometers which represents approximately 105,385 square meters of new urban areas per year or an annual growth 7.3 %. This grow is almost equal to the annual population growth which was of approximately 7.7%. In this period, Santa Tecla new urban areas were developed closer to the limit with the municipality of Antiguo Cuscatlan contributing to merge Santa Tecla’s urban area with San Salvador area of influence.
In spite of the tragic events that shook El Salvador during the 1980s, for Santa Tecla this decade is characterized by its historical growth rates. First, the political instability lived in El Salvador during the 1980s contributed to the rural-urban migration for which Santa Tecla was already an attractive destination. Also, despite its proximity to San Salvador, a key target in the conflict, Santa Tecla was not severely affected neither by protests or armed confrontations. As a result, in just five years the city expanded approximately 1.63 square kilometers representing an annual growth of approximately 16.67%, one of the highest rates in its history.

Then, nine years after an earthquake, which devastated San Salvador, almost unaffected Santa Tecla, the city grew 1.96 square kilometers at an annual rate of approximately 9.1%. This growth represents 217000 square meters of new development per year. In terms of growth tendency, these fifteen years are characterized by an almost continuous growth to the east and north sides which almost completely merged the urban areas of Santa Tecla and Antiguo Cuscatlán.

Estimating the growth rate of Santa Tecla would not be completed without considering its growth in the present century, but before introducing it, it is necessary an important observation. Due to data constraints, the growth in the present century will be considered only as reference instead of being used to estimate the average annual growth. This is because the municipality did not provide a map showing the “actual” urban extension. However, such growth is going to be estimated using a land use coverage issued in 2003 by the Instituto Geographico Nacional (IGN, 1982). Due to the fact that this coverage was elaborated using a different scale than the one used in the earlier
periods, its comparison will not be accurate. As a result, the estimation of the average annual growth of the city will be calculated only with the data from earlier periods, but strongly using last growth as a reference to infer its future growth and tendency.

Due to the fact that in the 1980s and earlier 1990s Santa Tecla nearly expanded its urban area to nearby Antiguo Cuscatlan, its growth between 1995 and 2003 is characterized by a new growth tendency. During this period, Santa Tecla consolidated its growth towards the north filling up some gaps from previous subdivisions. However, the new trend became new subdivisions on the northern hillside of El Balsamo mountain range. This development was later the center of a bitter argument due to the catastrophic effects of a landslide which buried almost an entire neighborhood and its inhabitants. In addition, the development of the southern hillside of the mountain range is also increasing. This development is located especially close to the road which connects the MASS with the old La Libertad Port that has been consolidated as an important tourist and leisure spot. In summary, in about eight years the city grew 3.12 square kilometers which is equivalent to an annual growth of approximately 21.4%.

After this review, the average growth rate of Santa Tecla can be estimated. In order to do it, the periods of growth have been summarized in Table 4.1. From this, it is clear than the Santa Tecla has experienced the most explosive growth since 1952 to the date. Indeed, in these 47 years the city has grown approximately five and a half square kilometers; this means that the city more than doubled the size that its urban area had after its first century. In general, this represents an average annual growth of approximately 2.13% which is twice as big as the average of the previous one hundred
years which was approximately 0.92%. Moreover, this annual growth can be translated as an annual land consumption of 17706.16 square meters.

This may not represent an impressive consumption of land; however, what is important is its location in a naturally contained valley. More importantly, considering that map 4 shows most of the land surrounding Santa Tecla as potentially good for agriculture, this land consumption rate represents a loss of agricultural land. More importantly, it represents an important loss of the limited resources of the country. In other words, the MASS is losing land that could be potentially used for producing food. Nevertheless, this seems to be an endless conflict due to the fact that land characteristics such as small slope degrees are the same which make that land attractive for both uses. Unfortunately, when it comes to the benefits that agricultural uses report versus the urbanization’s ones, most of the times landowners are going to subdivide the land despite its agricultural productivity.

In terms of population, in the same 47-year the municipality’s population has grown on an average rate of approximately 2.2%. The municipality’s population growth in the last four decades can be translated as an annual growth of approximately 6431 new inhabitants. This average growth is almost 9 times bigger than its average growth during the first century which was approximately of 737 new inhabitants per year. However, it is important to highlight that both figures are generalizations of the real growth pattern and they are not considering externalities such as the war, migration to the United States, and the maquila’s boom which provoked larger relocations in certain periods. In spite of this fact, in the last four decades the city has approximately growing 2.75 square meters per
every new inhabitant. This shows how overcrowded the city is and the pressure to approve more development projects.

Table 8

Urban and population growth

<table>
<thead>
<tr>
<th>Period</th>
<th>Relative growth (km²)</th>
<th>Annual growth (m²)</th>
<th>Total area (km²)</th>
<th>Population growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1854-1859</td>
<td>-</td>
<td>-</td>
<td>0.27</td>
<td>-</td>
</tr>
<tr>
<td>1860-1884</td>
<td>0.86</td>
<td>35833</td>
<td>1.13</td>
<td>6293</td>
</tr>
<tr>
<td>1885-1941</td>
<td>0.95</td>
<td>16666.67</td>
<td>2.08</td>
<td>19438</td>
</tr>
<tr>
<td>1942-1952</td>
<td>0.28</td>
<td>28000</td>
<td>2.36</td>
<td>1085</td>
</tr>
<tr>
<td>1953-1967</td>
<td>1.02</td>
<td>85714.28</td>
<td>3.38</td>
<td>11110</td>
</tr>
<tr>
<td>1968-1980</td>
<td>1.37</td>
<td>114166.67</td>
<td>4.75</td>
<td>31731</td>
</tr>
<tr>
<td>1987-1995</td>
<td>1.96</td>
<td>217777.78</td>
<td>8.34</td>
<td>38000</td>
</tr>
<tr>
<td>1996-2000</td>
<td>2.41</td>
<td>602500</td>
<td>11.25</td>
<td>56514(estimt.)</td>
</tr>
</tbody>
</table>

Source: Alcaldia Municipal de Santa Tecla, 2001

In spite of its impressive growth in the last 47 years, Santa Tecla remains “compact.” This may have been the result of the strong influence of the “damero” or grid system used to design the city. As Map 3.1 shows, the city followed its original pattern until approximately the 1940s and 1950s. Thereafter, the city has been growing irregularly perhaps following the land market and housing offers and demands and along the growing road network. Due to lack of information regarding this topic, a potential
explanation is the driving forces behind Santa Tecla’s growth. In any case, most new developments tend to be relatively closed to Santa Tecla’s urban core, and excepting high income subdivisions, they preserve the neighborhood typology of the core city characterized by compact designs, walker-friendly, and mixed use.

However, an undeniable fact is the lack of a conscious municipal growth management plan to regulate the large tracks of land being urbanized. In spite of the efforts to manage the growth of the MASS, Santa Tecla has not elaborated a plan to manage its growth. Then, the obligatory question is: what has it made Santa Tecla’s growth “compact” in absence of a management plan? Is it the natural containment of the city posed by the surrounding mountain range and volcano? Although the answer of these questions may be found in the following section when the land availability is discussed, the city is increasingly growing towards-and-in the hillsides. As a result, there still prevails the need for policies intended to manage its growth. Therefore, one of the questions of this research remains unanswered, and that is, which is the potential containment for Santa Tecla’s growth.

**Estimating the suitability of the land**

Determining which areas are suitable or not to be built is one of the most important assessments that have to be done for a growth management plan. This is due to the fact that a growth management plan has to provide enough land to satisfy the market’s demands, promote an effective use of land, and prevent increased pressures over hazardous areas. The latter, in the case of Santa Tecla, is one of the most important aspects to prevent because of its geological risks. In any case, establishing the suitability
of land to foster urban development requires evaluating the physical and cultural characteristic of the area. These suitable soils are the base to delineate growth management plans because they constitute the land which is still available for future growth.

Contrary to other countries which have developed a general criteria to determine land’s suitability, El Salvador has not developed this management tool. Indeed in El Salvador, the Ministry of Public Infrastructure (MOP standing for the Spanish Ministerio de Obras Publicas) or OPAMSS, in the case of the MASS issues building permits based on individual evaluations of the mechanical properties of the soils. If an area where a construction is plan does not meet the mechanical conditions for it, soil treatments are recommended. In so doing, technically almost every place is suitable for development. Nevertheless, from the environmental and risks perspective suitability is a key component of management.

In this case, suitability is going to be done with the criteria used in the United States to make a general estimation of the land suitability for new subdivisions. As a result, this model based on slope, flood plains, soil permeability, endangered species environments, and cultural or archeological sites plus an adaptation to include the geological risks determines the general suitability of area. Due to the fact that archeological or cultural sites and endangered species environments are not registered in the area and the country has not have soil permeability data, suitability will be limited to slope, flood plains, and soil susceptibility to land slides.
After adapting the model to determine the suitability, certain criteria were established to determine which were those characteristics or conditions which make the land not suitable for development. For example, only areas with slopes less than 15% were considered as suitable. This is due to the fact that the areas characterized by this slopes less than 15% are considered as flat or plain areas in which the susceptibility to landslides is low (Geologos del Mundo, 2004, p 63). This criterion is also based on the assumption that urban development would occur in flatten areas due to people’s preference to live in flat areas rather than steep hillsides (Zhongwei, 2003, p 40).

In addition, those areas outside of flood plains were considered as potentially suitable. In the case of geological risks, the areas considered as suitable for urban development are those whose susceptibility to landslides is low or null. However, with respect to susceptibility to landslides, the additional considerations of earthquakes and volcanic eruptions as triggers to landslides are going to be included when the growth management plan is proposed. Due to the fact that this is not part of the scope of this research, those considerations will be included only as recommendations to be included in the last chapter of this document.

The result of combining all the criteria is presented in Figure 17. According to this composition, Santa Tecla has little expansion room; only 0.5 square kilometers are still available and are suitable for development. These results also show that by 2002 the city had 4.85 square kilometers built over non-suitable land. Moreover, this result contrasts with a general zoning ordinance proposed in 2006 which delimits growth area the north and to the west. This zoning seems to be, as Figure 18 shows, drawn based on
the municipality’s intended land use and growth. More importantly instead of land suitability, the ordinance looks like an adaptation of a planning formula or a planning tendency rather than the result of urban and physical analysis.

Santa Tecla officers had worked to justify technically the city’s plans. Using the power conferred by the Municipal code, they initially issued two ordinances previously discussed in Chapter 3. However the landslide of January 2001 opened a window of opportunity to use geological risks to justify a development ban for the mountain range. Product of this new opportunity, Geologos del Mundo, a Spanish NGO, and a student from University of Waterloo, Richard Grzesik, developed hazard risks evaluations and natural resources management plans. The former elaborated two geological evaluations: one for the northern side of El Balsamo mountain range and for the volcano southern hillside; the later built over the Mountain range natural resources.
Figure 18 Land suitability for urban development
In the case of Grzesik, he elaborated a resources management plan. The purpose of this plan was to detail the resources of the mountain range; in doing so, it would provide the theoretical justification to include El Balsamo in the system of protected areas. However, the environmental and the natural protected areas laws states that an area can be incorporated in the existing system of protected areas only if it contains unique ecosystems, endangered ecosystems or habitats or whenever it provides environmental services which could not be provided otherwise. The MARN, the entity in charge of enforcing these laws, rejected the proposal because the ecosystem is not unique. Indeed, El Balsamo ecosystem is primary constituted by coffee plantations which can be found in other zones of the country; moreover, the resources listed by Grzesik are not considered endangered species.

Figure 19 Land use regulating ordinance. Source: Alcaldia Municipal de Santa Tecla
The second approach to ban development in the southern part of the city was based on geological risks the mountain range poses over Santa Tecla. In spite of the studies of Geologos del Mundo and the ones developed by the National Secretariat of Territorial Studies (SNET standing for the Spanish Secretaria Nacional de Estudios Territoriales), this approach was also rejected based on the fact that its vulnerability was not higher than other areas of the country not even other zones of the MASS. SNET officers explain that declaring El Balsamo as a protected area underpinned by its geological characteristics would mean including in the protected areas system all the zones with similar characteristics. Moreover, considering the lack of resources and the fact that the mountain range is owned by a few rich and powerful landowners, this challenge is not one that authorities would eagerly take.

As a result, the municipality officers revisited the management of the city and specially the mountain range using land use planning. In 2006 the Geologos del Mundo proposed a “High risk area” based on the geological evaluations of the northern hillside of the mountain range and the southern hillside of the Quezaltepeque volcano. This risk area would update the proposed land use plan of the municipality. The land use plan is basically following pre-established formulas based on generalized zones such as housing, industrial, buffers, restricted development, maximum protection, plus an area of maximum geological risks. Nevertheless, this plan is highly technical and lack the more holistic analysis than a growth management plan requires. Then the question is what is going to happen with the constant migration wanting to live close to San Salvador?
Despite the fact that geological risks such as susceptibility to land slides exert a fundamental role for land management and that even in this research suitability map was built based mostly on risks, they should not be a merely justification for any plan. Analyzing Geologos’ proposal, they delineate their study area as the urban limit established by the municipality, so a question is why are Geologos not considering the already urbanized area into their evaluation in order to examine the conditions of the underground? Do they disagree with the susceptibility map developed by the central administration which characterized part of Santa Tecla’s urban area as susceptible to landslides? Is this a political decision to go against the central administration which is rejecting the municipality’s proposals for the mountain range and then justifying the plans based on the municipal goals?

Despite the fact that these questions may seem unrelated to the topic of this section and research, the use of a more detailed susceptibility to landslides map could change the results achieved with this research suitability map. This is due to fact that the susceptibility used may have been the extrapolation of rural observations. If this does not change the potential containment has to be adapted to other policies for revitalizing the urban area, although the forces behind growth, especially, landowners would push to continue urbanizing hazardous areas.

**Assessing Santa Tecla administrative capacities.**

Despite the fact that this research will not go over delineating a specific potential containment due to the results of the suitability map, it is important to analyze the administrative capacities of the municipality. This is fundamental because municipality
will still need to manage the pressure to urbanize land outside of the current perimeter of the city and at the same time revitalize and attract investments for urban areas. It is clear that city would undergo the same pressure for curbing growth as if they were applying a containment policy. For this reason, this analysis has to be done.

The situation of Santa Tecla is fairly similar to implementing a greenbelt. This is due to the fact that a greenbelt is the more restrictive policy and Santa Tecla does not have more room to grow. According to the containment cases analyzed, a local government implementing highly restrictive policies as the greenbelt has to have a centralized administration of the territory. This provides them with almost full power over the territory. These types of administrations are traditionally almost unchallenged due to the type of their power which is generally characterized by central power and central control. Monarchies and military regimes have somehow succeed with this policies until they decided to open them to changes. However, this is not the case of Santa Tecla which does not even count with a planning department or officers. This is one of the most important components to consolidate the administration of the territory especially in “extreme” conditions of Santa Tecla. As a result, if the city wants to effectively manage its growth, it has to create, at least, the basic structure to deal with the management of the existing urban area and its “growth.”

This leads the analysis to next important, an always critical issue: economic resources. It is not a secret the constant fight of the Salvadoran local governments for increasing the grant provided by the central government. This situation is exacerbated by the fact that municipalities, and Santa Tecla is not the exception, has a limited tax
collection. This make it to rely in local and international loans as well as in the assistance provided by NGOs and other public and private institutions interested in solving land management issues. Nevertheless, the key question is: how to enforce a plan without the reliable administrative and economic tools? Moreover, who and how are the current ordinances enforced?

The Municipality has elaborated a set of ordinances and a land use plan, but it has not developed the enforcement framework. Despite the fact that the country and the MASS have a body of laws (municipal code, law for the development and planning of the metropolitan area of San Salvador) intended to regularize urban development, little has been done to build the enforcement framework. The municipality has issued its own ordinances, but where are the rules and logistics which would enforce those ordinances?

In other words, if an area is designated as for restricted development, where the incentives and “game rules” are defined and established so the area is successfully developed in accordance to the ordinance. The lack of this rules and logistics produces that the regulations become a body of “death laws” which are almost never applied. Indeed, creating more ordinances with “good intentions” is not enough if they are not accompanied with its respective enforcement tools to translate them in action. Otherwise, they will remain as political statements easily refuted by partisan interests.

This “weakness” in the formulation and implementation of management “ordinances” become critical in a polarized political environment. The “extreme” partisanship of the politics in El Salvador turns this in perfect “disposable” ordinances if they have not been embraced by the citizens. The only way to achieve this embracement
is going beyond the “good intentions” and the political propaganda; they need “visible” results in order not to become in pure political material. Moreover, without embracement the public participation may decline, and it may become in a partisan issue.

Finally, public participation leads to another important element which is the participation of landowners. In the case of greenbelts, landowners did not challenge the central decision or did not have the spaces to do so. In the case of Santa Tecla, the municipality does not have a tight control of landowners. As a result, landowners do not follow the municipal ordinances all the time, turning the land development and management a bigger challenge. Then, in order to curb growth with limited resources the relationship municipality-landowners have to be more settled. Otherwise the city has to keep dealing with potentially disastrous decisions leading to more buried neighborhoods.

**Summary**

The municipality of Santa Tecla had a relative controlled growth in its early years. A century after its foundation, Santa Tecla was a relatively consolidated city, and with it a new period of growth begun. The “tightness” of the damero or grid design which was defining the shape the city was soon transformed by more irregular subdivisions, some of them away from the central downtown. The general growth trend of this second century is characterized by mostly adding subdivisions towards the north ad west. As a result, an almost compact Santa Tecla city finally reached the municipal limit practically merging with Antiguo Cuscatlan urban area. In recent years tough, this trend has slightly changed towards the development of the northern hillside of El Balsamo and the southern hillside
of the Quezaltepeque volcano. In doing so, their ecosystems and stability have been severely affected.

The transformation of Santa Tecla may have been the result of the population growth which in the second century of the city reached an average annual rate growth of 2.2%. This rate has been faced with the urbanization of approximately 2.75 square meters per every new inhabitant at year in the last 47 years. Despite the over simplification of this figures, they represent the pressure the city has been facing. Table 4.2 shows a detailed and comparative summary of the urban and population growth. If this growth is not curbed and the population growth does not change, Santa Tecla would consume approximately 17706.16 square meters of mostly fertile and susceptible to landslides land. Indeed, if official estimations which project a population growth of 3.2% for the next years leading a population of 213430 inhabitants in the year 2010 (Ministerio of Economia, 1992) are correct, Santa Tecla will consume approximately 120769 square kilometers by year 2010.

In a non-naturally constraint situation, those figure could have been used to build the land offer for a UGB or a greenbelt. However in the case of Santa Tecla that is just a revealing figure of what management has to be faced. Another critical aspect of the assessment of potential containment was the land suitability of the study area. Due to fact that El Salvador does criteria to assess land suitability, the American model, based on slope, flood plains, soil permeability, endangered species environments, and cultural or archeological sites, was adapted to include the susceptibility to landslides. The results of this model reported that the city has approximately 0.5 square kilometers of land suitable
for development. These results also showed that by 2002 the city had already 4.85 square kilometers built over non-suitable land. These results refute a general zoning ordinance which delimits growth area the north and to the west.

Table 9

*Urban and population growth rates*

<table>
<thead>
<tr>
<th>Period</th>
<th>Annual urban rate</th>
<th>Annual growth rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1854-1859</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1860-1884</td>
<td>4</td>
<td>4.17</td>
</tr>
<tr>
<td>1885-1941</td>
<td>1.78</td>
<td>1.77</td>
</tr>
<tr>
<td>1942-1952</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>1953-1967</td>
<td>7.14</td>
<td>8.4</td>
</tr>
<tr>
<td>1968-1980</td>
<td>8.33</td>
<td>8.33</td>
</tr>
<tr>
<td>1981-1986</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>1987-1995</td>
<td>12.5</td>
<td>12.5</td>
</tr>
<tr>
<td>1996-2000</td>
<td>20</td>
<td>25</td>
</tr>
</tbody>
</table>

Source: Alcaldia Municipal de Santa Tecla, 2001

Based on these results, the quest for potential containment was transformed in an evaluation of what issues the municipality has to overcome for curbing growth. First of all, in spite of the power conferred by the municipal code and the AMSS planning law, Santa Tecla does not have the central power and control to enforce a highly restrictive
policy which emulates the restricted situation of the city. In addition, this evaluation highlights that even if the city were not already constrained, the municipality does not count with the economical and administrative reliance to enforce neither a containment policies nor the existing ordinances. Moreover, the laws and ordinances have not been accompanied by appropriate implementation and logistic tools to apply them. As a result, despite the lack of unit in charge of the land management, the municipality does not have the enforcement framework to turn into action their plans.

This weakness may exacerbate the lack of public support and participation. In highly polarized country this may be used as a political instrument in detriment of the greatest good. Finally, this leads to the landowner’s participation. In the case were restrictive polices as greenbelts were successfully implemented, landowners either agree or did not have space to oppose the policy. In the case of Santa Tecla in which landowners most of the time overcome the rules, a concerted plan should be pursued in order to prevent more disastrous events.
CHAPTER FIVE: CONCLUSIONS

Initially, this research was intended to assess the potential containment of the city of Santa Tecla. Following the conventional forecasting of land demand in which land is allocated to satisfy such demand (Knaap and Hopkins, 2001, p 315), the project estimated the average growth rate of the city. In addition to the growth rate, the growth tendency was assessed in order to predict next urbanization areas. Finally, a land suitability map indicated suitable areas which would be used in the future allocations. This analysis reported not really surprising news; the Santa Tecla city has almost depleted its suitable land. In other words, the city does not have suitable room to grow.

In spite of this result, it cannot be concluded that the city will or has to completely stop its growth. This is mostly due to the fact that the city’s growth has been particularly driven by its population growth. Historically, the city was founded to be the new capital of the country in April 1854 (Alcadía Municipal de Santa Tecla, 2001). Its attractiveness to internal migrants was due first to its consolidation as trade hub, later as coffee producer, then as educational pole, and recently as a dormitory city for workers which mostly work in other cities of the MASS (Alcadía Municipal de Santa Tecla, 2001).

However, in general Santa Tecla has been experiencing a similar growth trend to those in the United States. In it, as population grows urbanization increases more than the population; the growth of area greatly exceeds the growth in population. The main difference, then, is their total area and the hazards posed on this growth. In consequence, if the Santa Tecla city’s population has been growing at an annual average growth rate of
2.13% in the last 47 years, then best way to curb growth is not promoting it (Fodor, 1999, p 107). What has to be done to curb urban growth is actually curbing population growth. How population can be curbed, however, is a topic for a new research.

The implementation of a containment policy also cannot be recommended given several factors. First, the obvious recommendation should be the creation of a greenbelt due to its highly restrictive nature. In this context, Santa Tecla’s local government lacks the legal autonomy and power to enforce a physical growth limit. This is due to the fact that although the legal framework enables each government to create or adapt land management plans, they are not coordinated. This means the management has to be designed within the limits set by the central laws and regulation which are also not coordinated. As a consequence, if a greenbelt or buffer zone is implemented, the gaps between the local and the central legislation can be used to defy and challenge the local ordinances. This situation can be solved by amending the laws so the local governments can have more autonomy.

More importantly the Salvadoran “planning” laws do not consider figures in which, as in the case of greenbelts, landowners’ rights are severely reduced, acquired by the government, or centrally controlled. For example in the cases of greenbelts in Seoul and London, the land belongs mostly to the state and it decides its uses. In the case of El Salvador, the planning legislation reserves the acquisition of land for building social or communal amenities. The only law approving reserved units is the natural protected areas, but the units it creates have different purposes that constrict an urban development.
Second, the law of natural protected areas cannot be used to justify the creation of a buffer area around Santa Tecla because the ecosystems are neither catalogued as unique nor endangered. Indeed, the ecosystems surrounding Santa Tecla are mostly constituted by coffee plantations which still are producing and that can be found in other parts of the country. In addition, the intensive use that coffee production signifies disqualifies the area for becoming a natural protected area. Moreover, due to economic constraints, the law does not claim, buy, or transfer property rights. Indeed, in the case of protected areas, the property rights remain for the landowners but with a restriction for activities that are yet undefined. As a result, the idea of using the natural protected areas law to create a greenbelt of buffer is discarded, unless the law is amended.

Third, the environmental law also cannot be used for creating a buffer zone because this law is intended to prevent the damages of human activities in the natural resources. This does not mean that they can stop the activities, but they regulate to reduce the impacts on the environment. At least that is the spirit of the law although in almost ten years after it was enacted, it only just recently closed a car battery factory due to lead contamination in surrounding areas (La Prensa Grafica, 2007). More importantly, this environmental law, as well as the law of natural protected areas has been mostly the result of the pressure exerted by international organizations and governments. As a result, these laws mirror foreign models, and have been poorly adapted to the environmental reality and context of country where the term “uniqueness” can be misused to justify environmental degradation.
Finally, should Santa Tecla’s officers decided to implement either a greenbelt or an UGB, the municipality does not have the capacity to enforce it. This mostly based on the reduced economic and administrative infrastructure the municipality has. Indeed, Santa Tecla does not have the economic power to face the acquisition of large tracks. The tax recollection in the country in general is reduced, as a result, municipality has to rely on the central government budget or in international aid or loans to implement and improve the projects and services they provided. On the other hand, the municipality has not developed a clear framework to enforce current ordinances. As a result, the way to enforce them is ambiguous or does not exist. Then, it is imperative to change the legal framework as well as to build the administrative framework so municipalities can have more autonomy and can better enforce their ordinances. In doing so, the Santa Tecla could reach its management goals of providing a better life standard for its citizens in spite of the hazards that future growth will face.

Despite how negative these results may look, this approach can be applied to further analysis of the MASS and other cities in the country. Due to the fact that the land suitability assessment revealed that further growth is going to occur in hazardous areas, land use and growth management plans can be designed based on an integrated approach in which growth is analyzed considering the risks this growth has to face. However, more research has to be done to create a standard for estimating the land suitability for urban development. In so doing, the methodology used in this research can be easily applied not only for designing growth and land use plans, but also for designing new subdivisions.
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DOE (Department of the Environment, United Kingdom). (1962). *The green belts.* London: HMSO.


