Metropolitan area-Magical town
Case study within Chiapas, Mexico

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Introduction
There are 56 metropolitan areas in Mexico, one of them is the one of Tuxtla Gutiérrez, conformed by this same city and that of Chiapa de Corzo [1]. In the case of the State of Chiapas, the urbanization process has been relatively recent, with few urban conglomerates, the state capital standing out with 537 102 inhabitants and Chiapa de Corzo with 45 077 inhabitants [2]. The latter was declared as Area of Historic Monuments Heritage of the Nation on 2000, and the main characters in its tradicional annual feast (La Fiesta Grande), the Parachicos, were declared as Intangible Cultural Heritage of Humanity by UNESCO on November 16, 2010. This city has also been proposed as a Magical Town according to the rules of the Secretariat of Tourism of Mexico. The Tuxtla Gutiérrez Metropolitan Area Land-Use Plan was developed by the authors under an agreement between the College of the Southern Border (Ecosur) and the Infrastructure Secretariat of the State of Chiapas.

Delimitation of the study area
The polygonal of the Tuxtla Gutiérrez Metropolitan Area (TGMA) was defined based on natural, social, economic and political criteria. The geomorphological criteria was favored for its objectivity in defining the physical structure and natural function of the territory, and for been a component which spatially conducts the urban development under the framework of the Land-use and Ecological Planning. The authors considered the inclusion of the city of Berriozábal given its proximity and connection with the studied metropolitan area.

The TGMA has an approximate area of 252.32 km² (25 232 hectares or 62 350 acres). Map 1.
General methodological structure

The Tuxtla Gutiérrez Metropolitan Area Land-Use Plan (TGMALUP) analyzed the natural, socio-cultural, economic, legal and political subsystems of the study area, considering the methodological guidelines for the country's Land-Use Planning [3]; the Ecological Program for Territorial Planning [4]; the Ecological and Territorial Municipal Planning [5]; the Municipal Urban Development Planning [6]; the guide for Municipal Development Planning [7] and the methodological guide for the development of the Metropolitan or Suburb Areas Land-Use Plans or Programs of the Social Development Secretariat [8].

The territorial characterization allowed us to develop taxonomical classifications through landscape units that led us to know the structure, composition and ecological functionality of the territory, for which we used the theoretical and methodological principles of Complex Physical Geography [9-12]. The landscape was defined as a territorial system integrated by natural and anthropogenic elements socially conditioned. The study examines the population density and the growth dynamics, the population structure by age, the spatial distribution of population, the projections and growth trends and migration processes that affect the urbanization process. The main economic variables studied were: the economically active population (EAP) by income and by the distribution; the primary, secondary and tertiary sectors of economy; basic employment indicators; and the impact of the current structure of supply chains in the territorial development in the ZMTG was also studied, as well as the sustainability of the current territorial structure.

According to the normativity for this kind of studies, the presentation of the project was realized in three stages: 1) preliminary progress; 2) completion of the diagnosis; and 3) in August of 2011 the model of the land use planning will be presented. These presentations were held before different federal, state and municipal institutions, professional colleges and citizen advisory boards of the three cities involved in the TGMALUP, in 9 workshops and 15 meetings.
Results

The TGMA is located in a context of terrestrial systems formed by mountains, hills, terraces, foothills and valleys, the latter system being occupied by cities within a natural surrounding of woods and forests. The altitude of the area varies from 380 to 1200 meters above sea level. The prevailing climate is warm subhumid with summer rains. The metropolitan area is primarily immersed in the Sabinal River Basin, fed by 21 streams, forming a complex and diverse territory with the presence of 12 landscape units of first order and 76 second-order ecosystem units. It is an urban area of high biodiversity and attractive landscape with the presence of the Cañón del Sumidero National Park, natural icon of Chiapas.

This natural setting represents a vulnerability condition to human settlements, their infrastructure and equipment, due to the existing environmental problems caused by the mismanagement of its resources and ecosystems, highlighting the deforestation on slopes. The TGMA is also a seismic zone with two major flaws, one south and one north, which represent a danger and risk to the housing construction at these sites, due to the landslides, mudslides and subsidences. Another risk scenario is in the history of floodings in the cities of Tuxtla Gutiérrez, Chiapa de Corzo and Berriozábal. Due to deforestation of the watershed, solid waste accumulates in its path and the settlements on its banks.

The environmental impact is complemented by the generation of solid waste (560 tonnes per day), lack of sanitary landfills in the cities of Chiapa de Corzo and Berriozábal; the pollution of the basin and its tributaries, and the existence of 42 banks of sand extraction. Air pollution, in particular that generated by the use of vehicles should be evaluated, as well as the impact of climate change on the TGMA. The TGMA is part of the non-Mayan territory of Chiapas and is immersed in the Zoque and Chiapanec territory, cultures with strong cultural identity for their festivals, traditions, rituals, food, medicinal and ornamental resources, conditions that must be valued for its contribution to the urban and rural development.

The growth rate of the TGMA is of 2.06, one of the highest in the state, because it contains the capital city and thus concentrates regional equipment and infrastructure. This development generates employment and educational opportunities. The demographic prevalence of population under 14 years (34.32%) is worrisome because of the present and future demand for educational, cultural, health and recreation facilities, as well as future requirements for employment, housing and infrastructure opportunities and of economic growth.

The whole TGMA presents a low rate of marginalization at the state level, yet when broken down by sub-zones, the perspective is different. In the northeast of the capital of the state, there is a concentration of slums with poor infrastructure and equipment, being sites of social and organizational risk. The south-west area (New Tuxtla) is under a dynamic process of transformation, due to historically be a rural area, later a suburban zone and with strong trends towards urbanization, but still with several shortages of equipment. The eastern of Tuxtla Gutiérrez is under a dynamic process of development, and it concentrates regional equipment in conjunction with the suburbs of Chiapa de Corzo, due to the construction of housing
complexes that together promote more than 13 000 homes (potentially 65 000 more inhabitants).

The TGMA economic system is diverse; it combines aspects of the primary sector production from the state capital, with the enormous potential of agriculture on the banks of the Grijalva River in Chiapa de Corzo, and the cultural and genetic base of the orchards of Berriozábal, which drive the city’s urban agriculture. The industry, scarce in this area, has been reactivated predominantly with sand mining and construction. In the vicinity of the metropolitan area there are two of the largest hydroelectric complexes in the country, which boosted the population and economic growth of the state capital since 1970. The agricultural industry is expanding, as well as the dairy industry.

The Land-Use Plan proposes various politics and strategies focused on the strengths and weaknesses of the territory in order to promote the regional-municipal development, and move towards urban sustainability. The main strategies are based on: 1) territorial and environmental planning: planning and communication, protection and conservation, restoration and use of natural resources; 2) urban development: re-densification and promotion of a polycentric metropolitan area, risk management, development of cultural areas and public spaces and 3) economic development: support to rural production, agribusiness and economic development of the metropolitan area.

Conclusions

When the preliminary progresses were presented, the main observations to the study were focused on the limitation (due to diverse causes) to address in depth the many topics regarding the natural, social and economic spheres, but above all, the limitation to integrate these three from a territorial perspective, considering the land use assessment, the socioeconomic and regional development, and the functional integration of the territorial system.

Recommendations

It is proposed to the Secretariat of Infrastructure to conduct a public consultation so the TGMALUP can acquire legality and avoid future challenges to the territorial zoning determined by it.

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References
