

Matching development and conservation in a rural community of Mexico

**Gómez B. M.A., M.A. Mijangos C., E Salcedo S. P. Saldaña F.
and S. Rodriguez T.**

Introduction

At present, decisions made in the past in terms of natural protected areas or land for flora and fauna conservation are either limiting the development in some areas or fragmenting the biological corridors in others. Updated and geo-referenced information is needed to deal with both issues: conservation and development, and to allocate resources in an efficient manner. Nowadays, neither environmental authorities nor municipal agencies or inhabitants have enough, real data and criteria to stop civil works or to promote local or regional sustainable development. Nevertheless, during the preparation of EIS's is evident that every time more governmental agencies are making available geo-referenced information (www.ine.gob.mx; www.conabio.gob.mx; www.conanp.gob.mx). This information is generally available at broad scales 1:250 000 (INEGI, INE, CONAGUA, 2007) with few examples at lower levels like micro-basin or municipalities. In order to reach opportune decisions and deal with governmental budget allocation in time, it is important to promote and improve the use of this information by local and municipal public agencies (Sotelo y Jurado, 2007).

This paper describes an EIS case study for a drinking water project located in a former well preserved forest, now converted in the suburban area of a town with 37,000 inhabitants. Reviewing protected areas polygons and its significance for conservation and connectivity are needed to improve environmental protection and to promote development at local and regional levels. It is really imperative to count on spatial and temporal information to reach better decisions.

Currently, available data and management procedures exhibit important gaps in pursuing local welfare, development and conservation. From the point of view of promoting green economies adopting GIS technologies, updating data, and developing capacity building for professional communicators are important cornerstones.

Project background

Following the conventional procedure to allocate public funds on hydraulic infrastructure, the centralized and regional water agencies in Mexico explore the needs, of rural towns (mainly large and medium size ones) to prepare the yearly hydrological infrastructure expenses program. Previously local authorities have been requested to prepare their technical and economical proposals, including the site selection to submit their projects for budget authorization. EIS and its resolution by the Ministry of Environment have been set as one requirement for getting the inclusion in the national expenses program. As the EIS preparation commonly begins at the end of

project's feasibility study, when the site has been selected, there is no chance to look for alternative sites to avoid damage in well conserved areas.

The Xicotepec de Juárez community growth was accelerated from 1970 to 1995 (fig 1)

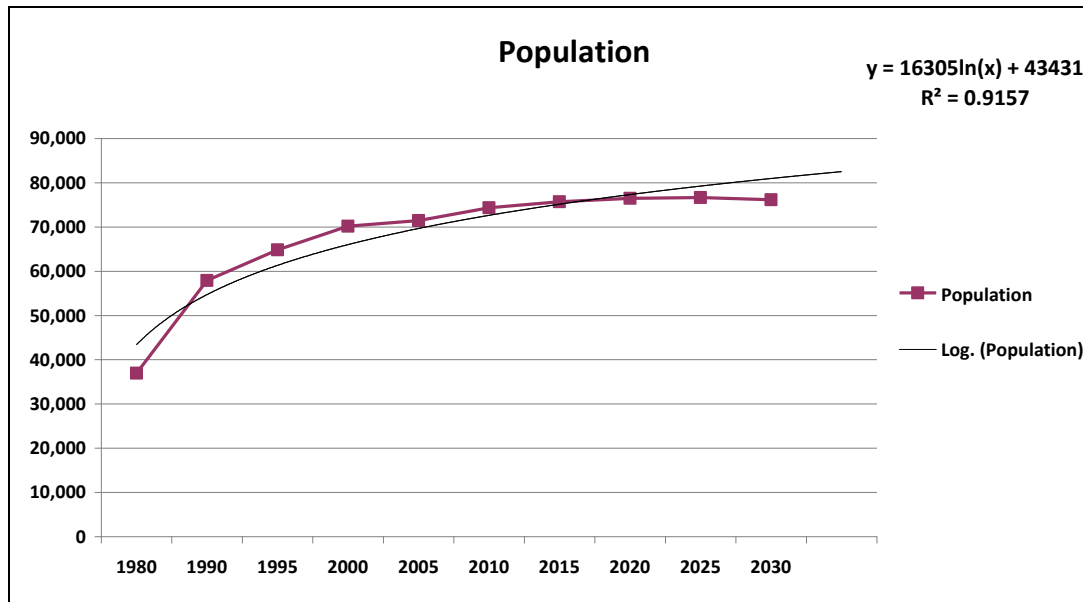


Figure 1. Population growth and trends

The hydraulic infrastructure coverage is of 80% for drinking water, using an old pipeline system donated by the main oil company in Mexico Pemex. The town has a partial sewage system and no wastewater treatment plant.

Project site and location

The project is located in the mountainous northern part of the Puebla State in central Mexico (figure 2).

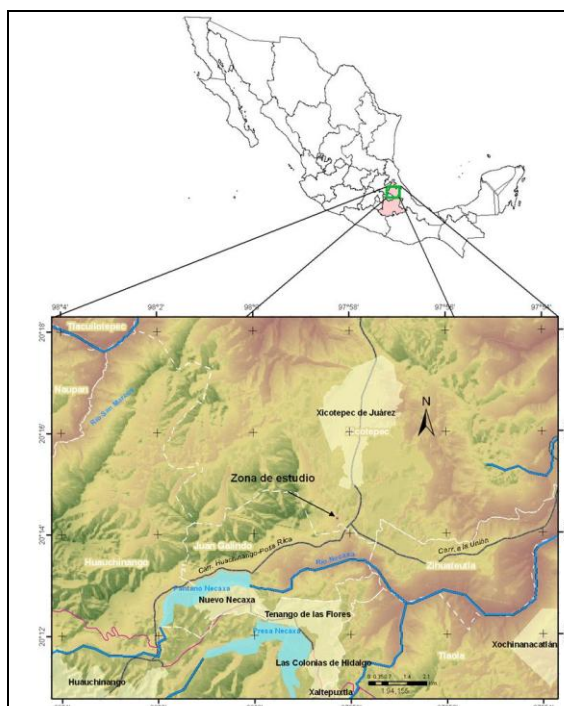


Figure 2. Site location

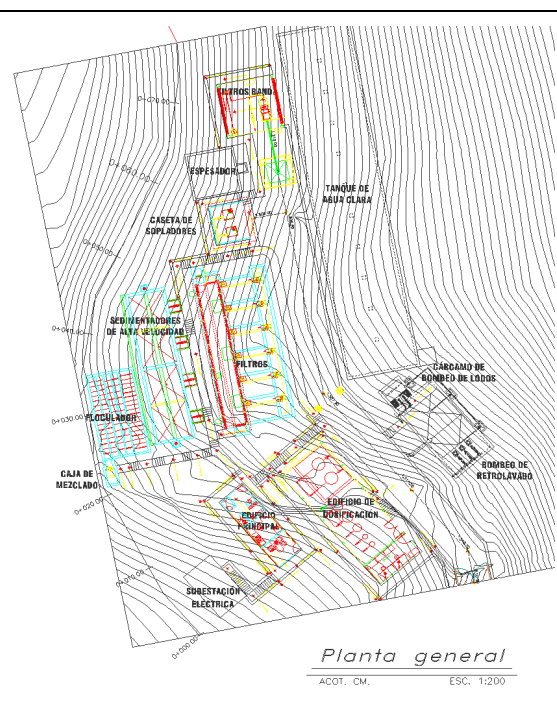


Figure 3. Civil works layout

The land needed for the water drinking plant was estimated in one hectare, although just half of this plot was acquired due to the elevated price reached under its demand by local authorities. Thus, in spite of its slope nearly of 45%, a tremendous effort was made to allocate all works in the plot (figure 3). For this reason it was difficult to avoid cutting the *Liquidambar macrophylla* Oerst trees distributed in this plot (figure 4 and photo 1).

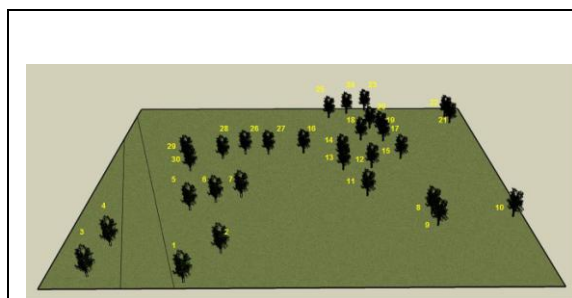


Figure 4. Trees distribution in the plot

Photo 1. *Liquidambar macrophylla* Oerst

Environmental regulations vs conservation

During the EIS integration, the site was recognized in the limits of the urban corridor for commerce and services of the Sustainable Urban Development Plan of the Xicotepec de Juárez town (figure 5). The plot was also in the limits of an Area for Protection of Natural Resources regulated by the National Commission of Protected Areas in Mexico (Conanp) (figure 6).

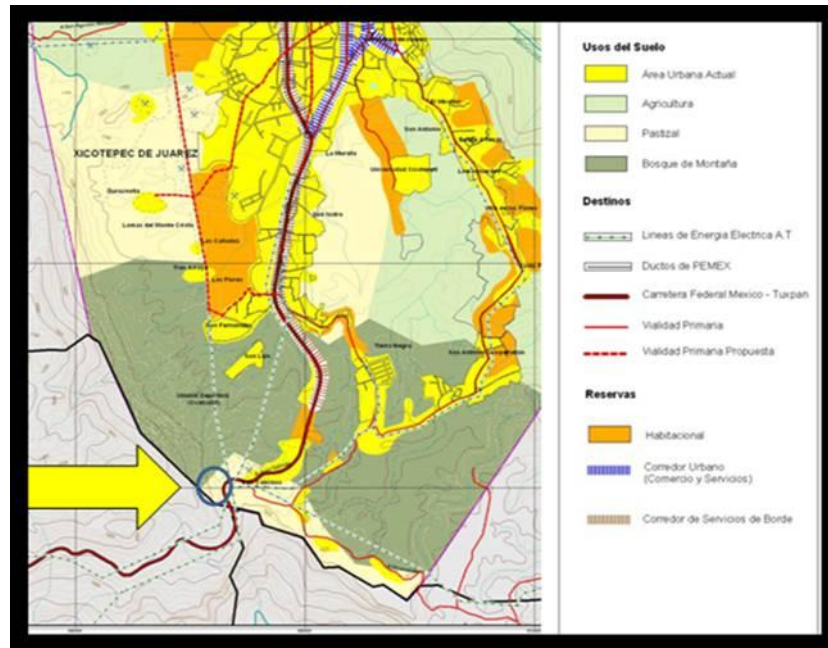
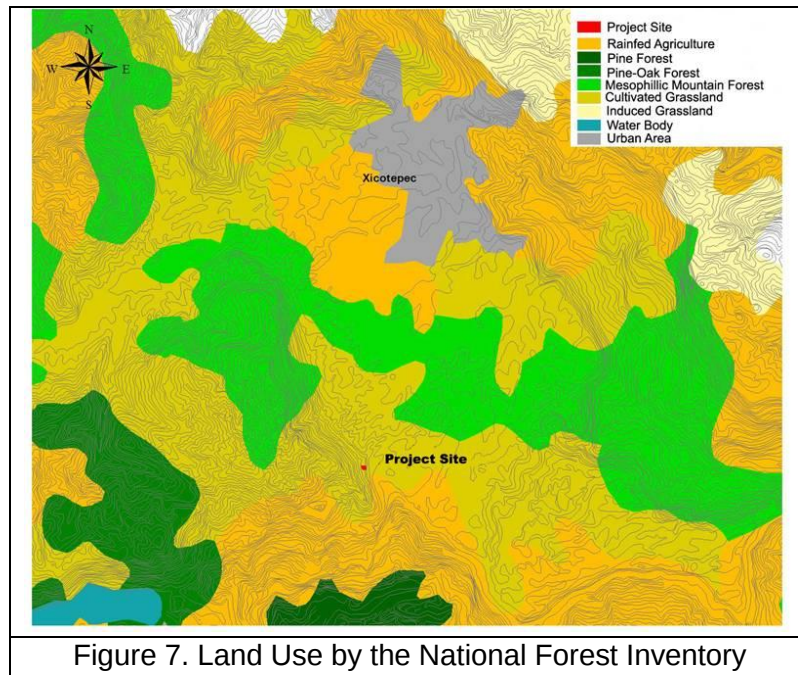


Figure 5. Sustainable Urban Development Plan land classification



Figure 6. Area for Protection of Natural Resources (Conanp)

In the past, due to its former well preserved Mesophillic Mountain Forest, the area was decreed as a protected forest area of the Necaxa River Basin on October 20th in 1938. On September 9th in 2002 it was re-classified as the mentioned protected area for natural resources by Conanp. Nowadays, according to the National Forest Inventory the lower part, where the project is located, is classified as cultivated and induced grazing areas (Forestry National Commission Conafor— (Figure 7).



On the other hand, on February 2, 2008 most of the Necaxa River Basin was classified as a Ramsar site, under the denomination of “System of reservoirs and biological corridors of the Necaxa River Hydrographic Basin” (Ramsar, 2010).

Besides, according with the National Commission for the Conservation and Use of Biodiversity (Conabio) the area belongs to the Terrestrial Priority Area 102 and the Hydrologic priority Area “Tecolutla River Basin” with important features for biological conservation.

Regards to the *Liquidambar* tree ecological importance for the Mexican biodiversity, Conabio and Conafor has classified the specie *Liquidambar macrophylla* Oerst as a tree used for protection and restoration purposes; for agro forestry activities and in urban areas. It is a cultivated tree without a protection status and native from the Atlantic region of North America.

EIS integration

Following EIA Federal and State laws, this Project was under the State review, authorization and surveillance process. Therefore, according to the new EIA specific State regulation (issued on May 6th, 2009) all the information require being geo-referred, including the trees to be retired from the plot, but municipalities and local water agencies do not have expertise on this issue.

Due to the plot small dimensions and tree density the compensation scheme was agreed as a reforestation in the higher lands devoted to preservation. In these higher lands, owners are under an environmental services payment scheme for protecting forest for carbon capture and hydrological recharge. Therefore, recovering trees and forest connectivity there were seen more costly and environmental effective.

Conclusions

In many states and municipalities working on behalf sustainable development is mainly related to the application of their land use, urban planning and environmental, regulations. Therefore, it is needed to update and match former decrees and statutory conservation guidelines to meet twofold strategies: connecting ecosystems and greening development. Local authorities and engineering consultants who are developing infrastructure projects need to be aware of the bylaw ordinances as earlier as possible to consider them from the projects' site selection to their EIA analysis and authorization. The main objectives should be focus on pursuing more realistic and tangible conservation results. In this project, even with concurrent regulations, forest preservation and the resulting biological terrestrial and aquatic corridors are being impacted and confined to high lands, but at least with specific conservation goals.

Ongoing review and adjustments of the land use is also needed for leading urban development and for avoiding forest and landscape fragmentation. Unfortunately, in many places not all the conservation criteria has been understood and applied during the decision making process. Nowadays, a lot of data and research results available from governmental agencies and institutions are not known by local or municipal water and land use authorities (Gerrisen, 1998). The continuous historical and spatial analysis is an important issue to bring conservation to a more realistic practice.

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Websites:

Conafor.- Sistema Nacional de Información Forestal www.conafor.gob.mx

Conabio.- Biodiversidad Mexicana, Regiones Terrestres Prioritarias, Regiones Hidrológicas Prioritarias. Geo-información. www.conabio.gob.mx

Conanp .- Sistema Nacional de Áreas Naturales Protegidas. www.conanp.gob.mx

INE.- Sistema de Consulta de Cuencas Hidrográficas de México .- www.ine.gob.mx

INEGI.- Instituto Nacional de Estadística, Geografía e Informática. - www.inegi.gob.mx

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