INTEGRAL WATER MANAGEMENT, ORIENTED TO THE RENOVATION AND URBAN - ARCHITECTONIC SUSTAINABLE PLANNING, OF THE EL PALOMAR DEVELOPMENT

F Córdova¹, J Gleason², A Rojas², G Carvajal², M. Campos²
¹University of Guadalajara, fcordova@cuaad.udg.mx
²University of Guadalajara

Abstract

The present work describes of general way to the Project of Integral Water Management, Oriented to the Renovation And Urban - Architectonic Sustainable Planning, of the El Palomar Development at Municipality of Tlajomulco de Zúñiga, Jalisco, Mexico. “El Palomar Development” is an area of high economic level in the Metropolitan Zone of Guadalajara and belongs to “La Primavera” Forest and it is at the upstream of the “El Ahogado” basin which is a sub-basin of the Lerma-Santiago River. This last basin is the most important in western of México.

Even though it is a zone of high risk, this is closely related to environmental and urban problematic of “El Ahogado” basin. The proposal tries to establish the general strategies that contribute on the one hand with the improvement of their urban infrastructure and house orienting it to the renovation of their distribution system, to solutions of local cleaning and the rainwater harvesting to urban and local level; and by another hand to the conservation of the “La Primavera” Forest by means of the development of a green spaces public system of which it’ll take advantage of the landscaping potential that generates by smalls rainwater micro basin systems at urban level.

Introduction

The present work proposes a general structure for the project of Integral Water Management, Oriented to the Renovation and Urban - Architectonic Sustainable Planning, of the El Palomar Development at the Municipality of Tlajomulco de Zúñiga, Jalisco, Mexico. In that sense the document establishes three sections by means of which it tries to establish the general structure of the project:

1. The preliminary information raises the economic importance, dynamic of population increase and a general description of the environmental pressures of the Co-urban zone of Guadalajara that is the urban region where finds the proposal.
2. The general description for urban and environmental problematic, associated with the water that takes place in the basin “El Ahogado” of which comprises “El Palomar” Development.
3. The strategies and action lines proposed with the purpose of generating alternatives for renovation and urban-architectonic planning oriented to the sustainability.

The methodological approach, comes from to connect the metropolitan problems with those appear at local level, but in a way that local solutions would be placed strategically by their geographic position or importance in the environmental urban interaction of the city, increasing the effects and synergies that makes possible broader alternatives of solution of urban-environmental in the general context of the metropolitan zone.

History and importance of Conurban Zone of Guadalajara,

The Conurban Zone of Guadalajara (CZG) is located in Jalisco state which is in the center region to the West of Mexico and represents one of the greater urban concentrations of the
country. As a urban sprawl is integrated at the moment by four central municipalities (Guadalajara, Zapopan, Tlaquepaque, Tonalá) that integrate the Urban Area of Guadalajara and in its periphery there are other four metropolitan municipalities (Tlajomulco, El Salto, Juanacatlan and Ixtlahuacán de los Membrillos) which display different degrees of conurbation.

The municipalities of El Salto and Tlajomulco de Zúñiga present phenomena of urban continuity very marked with respect to the metropolitan area and in a lesser grade the municipalities of Juanacatlan and Ixtlahuacán de los Membrillos.

On the other hand, most of the economic activities of Jalisco state are concentrated in the CZG. A clear example is that it concentrates 73% of the occupied personnel and 61% of the establishments of works of the state.

The sector of commerce and services is the most developed economic activity in the CZG with a 67.6% of the population, 31.3% that dedicates to the industry and the 0.9% to agriculture and cattle ranch.

It is important to stand out that in the last 30 years until year 2000:

- The population of the metropolitan area has increased a little more of twice (of 1’480.472 to 3’458.667 inhabitants).
- The urbanized surface has increased three and a half times in the same period average of (13.020 to 46.276 hectares).
- If every year it has this growth, it would be incorporated to the metropolitan area of Guadalajara an annual average of 1.108 hectares of urbanized area.

In the case of the metropolitan municipalities the phenomenon is still more dramatic, because since 1970 to 1995 they have tripled his population; this has meant a strong demand of urban infrastructure, house, public services, equipment, green spaces, water and transport, to mention some.

From the environmental perspective, the impact that the urban growth has had is also very important. In the CMG, it has concentrated environmental problems such as:

• Inadequate water use (waste, leakages, old distribution systems)
• Contamination of superficial water bodies generated by residual waters without
treatment.
• Contamination of water by inadequate disposition of the municipal solid remainders,
agrarian-chemistries and industrial processes.
• Over exploitation of aquifers.
• Obstruction of water bodies.
• Ground erosion by construction of new urban developments.
• Floods by underflow or obstruction of water channels.
• Loss of vegetation by excessive cutting or fires.
• Contamination to the atmosphere by combustion of vehicles, gases and dust of
industrial processes.
• Impact to the calmness of the population by scents of the drainage system and water
bodies.
• Impact to the perceptual environment by deterioration of vegetation and ground,
besides the inadequate disposition of solid remainders.

**Environmental and urban problematic in the basin of "El Ahogado"
**

The CZG maintains a narrow relationship with two very important ecological surroundings
for the region. In a one way we refer the ravine of Huentitán-Oblatos by which the Santiago
river runs and it belongs to river basin Lerma - Santiago, which is the most important in the
center-west region of the country, in the other hand we refer to “La Primavera” Forest, with a
natural area of 36,000 hectares declared Natural Area Protected (NAP) by decree in the
Official Newspaper of the Federation of the March 6, 1980, and that constitutes the main
wooded area of the CZG.

Both surroundings maintain a narrow correlation through the urban spot, since the Ravine is
natural drain of the ZCG, which one of its geographic limits is “La Primavera” Forest. One of
the basins which tie the “La Primavera” Forest and the Santiago river is the river basin called
“El Ahogado”, which represents their natural drain, that crosses the metropolitan
municipalities of Tlajomulco de Zúñiga, Tlaquepaque and El Salto. The basin of “El
Ahogado” is integrated by four sub river basins7:

• Las Pintas Dam
• El Ahogado Dam
• El Cuervo-El Guayabo-El molino Dams
• Arroyo Seco

As a particularity, in the basin of “El Ahogado” has been generated urban, social and
environmental phenomenon very complex, that it involves communities of high economic
level in the high parts of the basin (limiting with the “La Primavera”), such as the case of “El
Palomar” Development (the Palomar), and in the low parts, new urban developments mainly

---

7 Consejo de la Zona Metropolitana de Guadalajara, et al. Programa de Mejoramiento Urbano de la Cuenca del
of social interest, which coexist in fragmented way with irregular settlements of a very low economic level. “El Palomar” is located in the high part of the sub-basin of the Arroyo Seco.

The River basin of "El Ahogado", in general displays problems such as:

- Floods of urban settlements in low and flat areas of the river basin.
- Contamination of channels and water bodies.
- Invasion of channels and water bodies.
- Lack of an administration and adequate environmental urban management in the local, municipal and metropolitan levels.
- Very ample socioeconomic breach that makes coexist residential urban settlements of high economic level with others in extreme poverty.

The main causes associated with this problematic are:

- Not planned growth, in terms of changes in use of ground, lack of urban infrastructure, obstruction of dams by non legal developments caused by the real estate speculation and/or the social pressure.
- Incapacity for the administration and urban-environmental management at local, municipal and metropolitan level, by lack of resources and suitable instruments of administration and management.

The most evident consequences are:

- Loss of areas of great agricultural potential and great difficulty to drain.
- Insalubrious status due to the mixture of pluvial water with residual waters.
- Zones of great problematic urban associated with risk of floods, lack of infrastructure and services, growth derived by the real estate speculation and the social pressure, inefficiency of the public authority in the administration and urban and environmental management.

Strategies of Hydraulic Management at Architectonic Urban level in the “El Palomar” Division

“El Palomar” is located in the municipality of Tlajomulco de Zúñiga of Jalisco State, on the Lopez Mateos avenue. Their limits are following: to the North with Ciudad Bugambilias Development, to the south with the Horizontal Condominium Santa Anita, to the east with “Los Tulipanes” Development and to the west with “La Primavera” Forest. It is located on three reliefs of “El Cerro del Tajo”. It is in four sub-basins, there are two rainy season streams. One of them is located the “Bosque Mágico” where the people use for entrainment. The total population of “El Palomar” is 4,136 inhabitants and 993 inhabited houses and 961 lots to construct.

---

8 Ibid.
9 Ibid.
10 Ibid.
11 Ibid.
They were identified like main problems of the Palomar:\[13\]:

- Irregular water availability in the development, mainly in the highest parts during dry season.
- Lack of control systems for construction of storm and sewage drainage.
- Erosion of the ground in rains mainly in the “Bosque Mágico”
- Absence of public spaces and entrainment areas due to invaded channels.
- Invasion of channels caused by the urbanization.
- Floods in low zones of the development and the bordering developments.
- Risk by fires in the high zones of the development, mainly at the time of dry season.
- Urban infrastructure of distribution and water cleaning with 30 years of antiquity.
- Higher water consumption in the Golf Camp.

The proposal in the matter of Hydraulic Management at Architectonic Urban level, relates the solution of the problems in the high part of the river basin, which can avoid undesirable effects in the low part. As such way the settlements of high economic level would collaborate equitably and actively in the problems solution in the river basin of “El Ahogado”, contributing on the one hand with the improvement of its urban infrastructure and house orienting it to the renovation of its water distribution system, to solutions of local cleaning and rainwater harvesting at urban and local level; and by another one to the conservation of the “La Primavera” by means of the development a system of public green spaces who could take advantage of the landscaping potential that they generates small pond systems at urban level.

In that sense, one of the greater area of opportunity as public green space is “Bosque Mágico”, that is located in a gorge. It constitutes an important natural space for “El Palomar”, whose its main value is in the conservation of a natural channel that keeps a tie ecological niche to the “La Primavera” Forest. However, at the present time, it displays human interventions, which have modified their natural structure. The impacts of these modifications would have to generate linked actions to serious studies and sustainable design of the referred area, with the purpose of promoting the sustainable development of the “Bosque Mágico”.

The objectives of the proposal are:

- To diminish as far as possible the velocity of runoff through small catchment systems in house and small ponds.
- To establish the new construction rules for new and existing house, through internal normative instruments of the development, that allow the implementation of systems for hydraulic resources, in terms of rainwater harvesting and local cleaning.
- To promote a program of investment and conversion for the catchment systems of hydraulic resources, in terms of rainwater harvesting and local cleaning for new and existing house.
- To establish improvement strategies of the present hydraulic infrastructure for an efficient use of the water.
- To establish the strategies allowing the separation of the stormwater and sewage drainage to urban level.

\[13\] Ibid.
To promote the citizen participation for cooperation and coordination of planning strategies for the growth of the development in short, medium and long term, thus contributing to the creation of links for internal collaboration between the external neighbors of “El Palomar” and with other developments.

To implement norms of well-taken care and prevention of the “El Palomar” Development for the inhabitants.

The proposal is integrated by two stages, for the first stage is contemplated like temporary limit a year, and it considers the development of:

- Master Plan (quantitative-parametric approach)
  - Planimetry
  - Technical document
  - Lists of credits

Figure 1. Urban Proposal

- Zones of Relaxation and Safekeeping Draining
- Possible Capturing Pluvial Water Pots
- Viewpoints
- Line Splitter of Zones
Main Drainings

- Pilot Project of sustainable house (integral management of resources)
  - Rehabilitation of a constructed house.
  - Development of a new house

- Pilot Project for adjustment of the internal norm of construction towards a sustainable approach
  - Urban furniture.
  - Systems of Signs.
  - Water Integral Management.
  - Treatment of solid remainders.
  - Alternative Energies.
  - Landscape.

For the second stage, that would take two years it sets out:

1. Urban-environmental integral project - of the “El Palomar” Development, that would include the urban engineering of detail and a cost model.
2. The update of the partial and district plan of urban development, which orients a clear normative scheme in favor of options like they are included in the proposal.
3. The update of the construction regulation of the Municipality of Tlajomulco de Zúñiga, incorporating aspects that allow the implementation of catchment systems for hydraulic resources, in terms of rainwater harvesting and local cleaning.

Besides, instruments set out by means of which the proposal would operate, in this case they are:

1. From the academic perspective
   a. Agreement between University Center of Art, Architecture and Design and “El Palomar” Development.
   b. Participation of students from architecture, urbanism and civil engineering degree through social service.
   c. The integration of post grade thesis in urbanism and environmental management.
2. The association with the municipal, state and federal authorities for the investment, management and control of the proposal.
3. The association with other neighboring divisions that could generate a correlation with the project.
4. The search for international association in terms of technical consultant's office and investment that support the proposal.

Conclusions
The CZG synthesizes an urban and an environmental complex problematic. It has a process of urban growth which assumes predator aspects of environment, putting in risk its competitiveness at national and global level, as well as urban area, hitting negatively the quality of life of its inhabitants in the short, medium and long term. “El Palomar” reflects the dynamics of urban conflicts, becoming an important link of a chain of negative environmental and urban events that affect an ample urban zone. However, “El Palomar” represents an opportunity to involve in a shared common process of urban and environmental
regeneration of the river basin “El Ahogado” to a social group of high economic level that has been indifferent to the problematic one that occurs downstream of the basin.

References