A r T e S *Architecture, Technology and Sustainability, Vol. 02, 2022*

ISSN 2953-6499
Frequency: Quarterly
ijatsr@ug.edu.ec

University of Guayaquil

FAU

Partial plan based on the conservation of green areas and water bodies for the citadel "Peñón del Rio", Canton Durán Ecuador. (August 2022)

Jose Luis Viteri [1]

[1] Municipality of Milagro; ORCID 0000-0002-9323-2155; mailto:jviteri@gadmilagro.gob.ec

Received: June 1, 2022. Accepted: June 23, 2022.

***Abstract*— The Durán canton presents an accelerated growth of urban population which has generated the loss of natural habitats causing it to lack recreational and green areas where leisure activities can be developed; therefore, one of the areas that have more spaces available for the development of different proposals, is the citadel "Peñón del Río", which has vegetation cover. The objective of this study is to develop a Partial Land Use Management Plan based on the conservation of green areas and water bodies, containing a sustainable housing proposal and recreational areas with urban design strategies for environmental preservation. The analysis methodology that was used is field observation which allowed the identification of various plant species and urban characteristics of the study area, in addition to the zoning of the use of land for the conservation of green areas, water bodies, and recreational areas for the best use of space. On the other hand, a survey of citizens was carried out to determine the determination that merited the implementation of sports zones and recreational areas. Additionally, sustainable urban design strategies were established for housing development. As a result, a proposal is proposed where the inclusion of green areas in territorial planning, their friendly interaction with the population, and strategies for a sustainable project stand out. In conclusion, the data demonstrates the need for the sector and the population to have natural spaces that favor improving living conditions.**

Keywords: Partial plan 1; Urbanism 2; Green area 3

I. INTRODUCTION

THE recreational activities in cities are important for the development of neighborhoods and communities, this generates integration between people at a social and cultural level; it is important the implementation of green and recreational areas, offering benefits to citizens for the development of physical activities and leisure. Another characteristic that must be considered is the interaction of people with their external world, which is tied to the modalities of visual, auditory, olfactory, tactile, and kinesthetic perception. Although visual perception provides 80% of the information that comes from the outside world fundamental to apprehending the cohesion of urban complexes [1]. Therefore, the green areas to be projected will be focused on the sensitivity of the senses of the people who use the spaces, which must transmit calm and harmony; in addition, the sustainable housing proposal will use construction materials from the environment to generate the least impact. Possible towards the environment to be implanted. For the development of the study area, a Partial Plan must be implemented that aims at the urban regulation and detailed land management for the polygons of territorial intervention in urban land and rural land of urban expansion [2], given that the study area is surrounded by two same water bodies that are the Babahoyo River and "unnamed" estuary which house an important flora and fauna of the sector and regulate the microclimates of the sector. The study sector is located northwest of the Durán canton in the citadel Peñón del Río. It is in the urban area of the city where some residential buildings are concentrated, it also has extensive natural areas that are determined by qualitative analysis, and there is no program or project by the municipality to maintain these areas. Considering that in the canton there is a deficit of vegetation cover so it can be believed that there is a vulnerability in the creation of informal settlements considering that much of the growth of the canton occurs due to invasions of lands of private or public tenure and this sector could be affected if its land use is not regulated and determined specifically.

https://doi.org/10.53591/ArTeS.v2.i1.1798

II METHODOLOGY

For the research design, a quantitative and qualitative methodology was used with an exploratory approach that allows for diagnosis, analysis, and determining the different topographic and social characteristics of the site to be intervened through the field visit. In the first instance to analyze the needs of the population regarding the importance of the conservation of green areas and water resources of the sector. A quantitative tool such as the survey was used, and the sample size was obtained by applying the mathematical formula of the infinite population in which a confidence level of 95% was chosen where the population of the Durán canton is 315724 inhabitants resulting in 410 inhabitants to be registered. On the other hand, for the implementation of the survey, the web tool QuestionPro was used.

As a qualitative tool to determine the physical characteristics of the sector intervene, visual analysis sheets were used under the direct observation method, variables such as landscape elements (paths, edges, nodes, and milestones), infrastructure (A.A.P.P., A.A.S.S., electricity, telephony, and internet), types of topography (flat, undulating, hilly and mountainous), type of vegetation cover (grass, shrub, and forest), among others. Through this methodology, it will be possible to determine the strengths and weaknesses of the sector intervention.

A. Delimitationion of the study area

Durán is a canton of the province of Guayas, Ecuador located on the eastern edge of the river "Guayas", in front of the city of Guayaquil. It is connected to it by means f the bridge of the National Unity. It has a territorial extension of 341.87 square kilometers, an urban area has 90.24 km2, and a population density of 923.52, according to projections according to the Population and Housing Census carried out by INEC. [3]

The sector to be intervened is called citadel "Peñón del Río" and is located on the eastern margin of the lower Babahoyo 5 and a half kilometers northeast of the current town of Durán and 1 kilometer and a half east of the banks of the same river.

B. Estimation of existing plant and water resources

The natural habitat of the Citadel Peñón del Río has many plant species, for which it is established to make a tour and through the observation, technique establish the different species present in the area and tabulate the information with the help of QGIS software.

Additionally, all rivers and streams were surveyed by photogrammetric restitution on the study surface, also supported by QGIS software for tabulation and graphing of the data.

III. RESULTS.

A. Current status of the sector to intervene

Having collected all the information on the green areas and water bodies of the Peñón del Río hill, it was possible to determine the main and secondary roads. In addition, it was possible to observe the hill's degree of degradation and the views that can be obtained from this place.

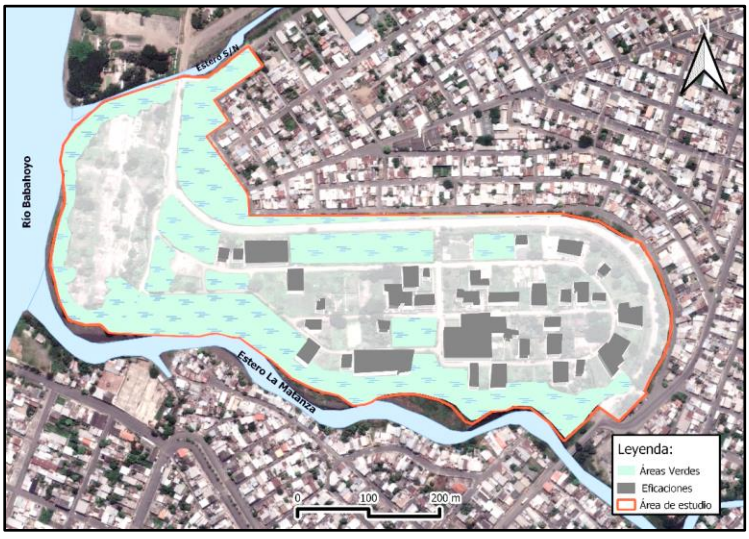

Fig. 1. Analysis of the sector to intervene. Source: Qgis – Google Earth

From the analysis of the methodologies used, the information obtained in the QGIS software was tabulated to graphically represent the current situation of the sector to be intervened, where the growth of the urban sprawl that affects the conservation of green areas and water resources is evidenced since this citadel in its urban plan lacks large spaces for the preservation of existing plant spaces (See Fig. 1).

B. Analysis of plant and water species in the area

Plant Species

In the collection of information in the sector, it was obtained: 6 types of trees were identified (see table 1). The information obtained in the QGIS software was tabulated to graphically represent the location and type of plant species in the sector (See Fig. 2).

TABLE I
PLANT SPECIES LOCATED IN THE CITADEL PEÑÓN DEL RÍO.

#	COMMON NAME	SCIENTIFIC NAME	ECOSYSTEM SERVICES
1	Male motto	Tecoma Stans	The wood is hard and used for poles, tool ropes, and firewood. Used as an ornamental.
2	Bototillo	Cochlospermun vitifolium	The wood is soft; it is used to make fruit crates. The infusion of the bark leaves is used to combat jaundice. (Motto 2005, Garcia 2006).
3	Algarrobo	Prosopis juliflora (Sw.) DC.	The wood is used for poles, carpentry, parquet, firewood, and charcoal. It is a species suitable for Agroforestry Systems (SAFs) and afforestation (Valverde 1998).
4	Guayacan	Tabebuia chrysantha (jacq.)	The wood is used for cabinetmaking, furniture, parquet, structures, and rural constructions. The infused flowers are used as a treatment for hepatitis. (Motto 2005).
5	Chirigua, chirigoyo, pasayo, jaile	Eriotheca ruisii schuman	The wood is soft; it is used for firewood, drawers, and handicrafts. The leaves, flowers, and fruits are fodder. Wool from the fruits is used for filling mattresses and pillows. Fruits are the preferred food of the Macaran (Velásquez 1998, González et al. 2005).
6	Ramón, chalú, pela caballo	Leucaena trichodes	It is used for firewood. Species are suitable for slope reforestation. However, the gum that pours the plant applied to any part of the scalp causes hair loss (Valverde 1998).

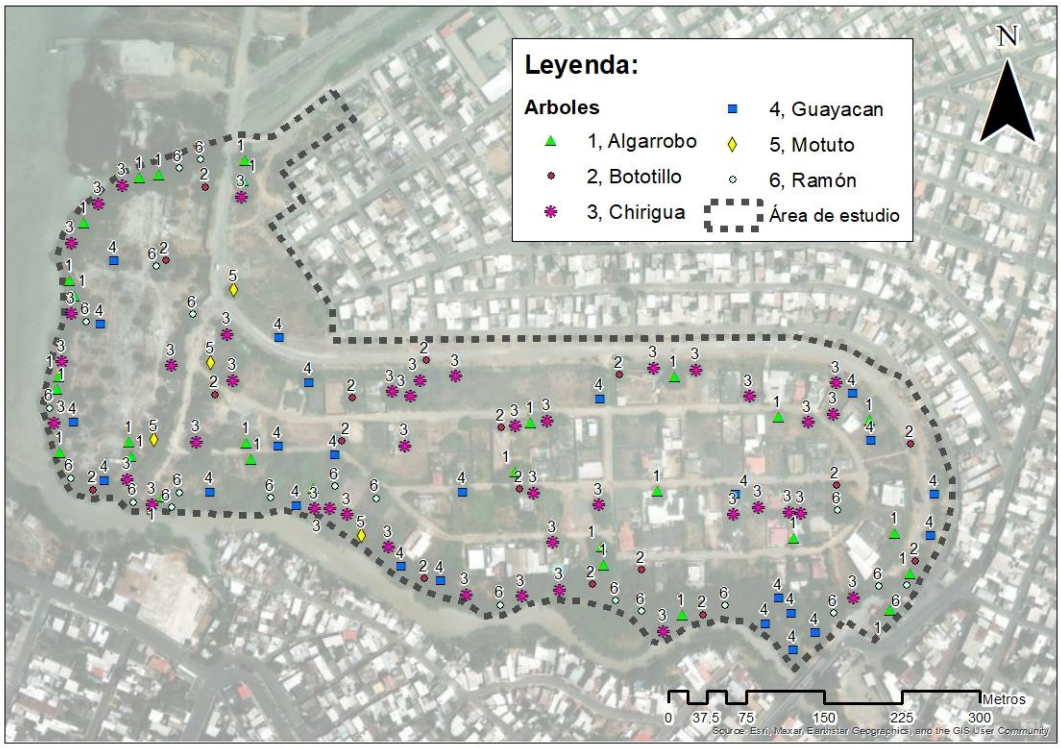

Fig. 2. Mapping of location and types of trees in the citadel Peñón del Río.
Source: Authors.

C. Analysis of the needs of the population of the study sector

For the analysis of the population under study, a survey was conducted in the Durán canton regarding the study sector in which the age range that predominates in the area was determined as between 20 and 30 years, where 52% indicate that they do not know green areas in the sector and basically in its entirety agree that the Durán canton requires tourist and recreational areas, therefore, a quantitative method (surveys) was used, having the following results (See Table II)

TABLE II
SURVEY RESULT. SOURCE: OWN ELABORATION

HOW OLD ARE YOU?	
Answer:	*Up to 19 years* - **28.16%**
	Between 20 and 30 - **38.83%**
	Between 31 to 40 - **14.56%**
	Between 41 to 50 - **6.8%**
	Between 51 to 60 - **10.68%**
	Over 60 years - **0.97%**
DO YOU KNOW THE FORESTS OR GREEN AREAS THAT THE DURÁN CANTON HAS?	
Answer:	*YES* - **47.96%**
	NO - **52.04%**
DO YOU THINK DURAN NEEDS TOURIST AND/OR RECREATIONAL AREAS?	
Answer:	*YES* - **99.05%**
	NO - **0.95%**
WHAT RECREATIONAL AREAS DO YOU THINK THE DURAN CANTON NEEDS?	
Answer:	Parks - **18.27%**
	Malecones - **11.54%**
	Sports courts - **13.46%**
	Natural forests - **33.65%**
	Green areas - **23.08%**

Water bodies

Numerous rivers and streams flow through the surface of the Duran canton formed by two main water bodies that are the Guayas River, Babahoyo River, and Yaguachi River; on the other hand, the study area borders three bodies of water (See fig. 3).

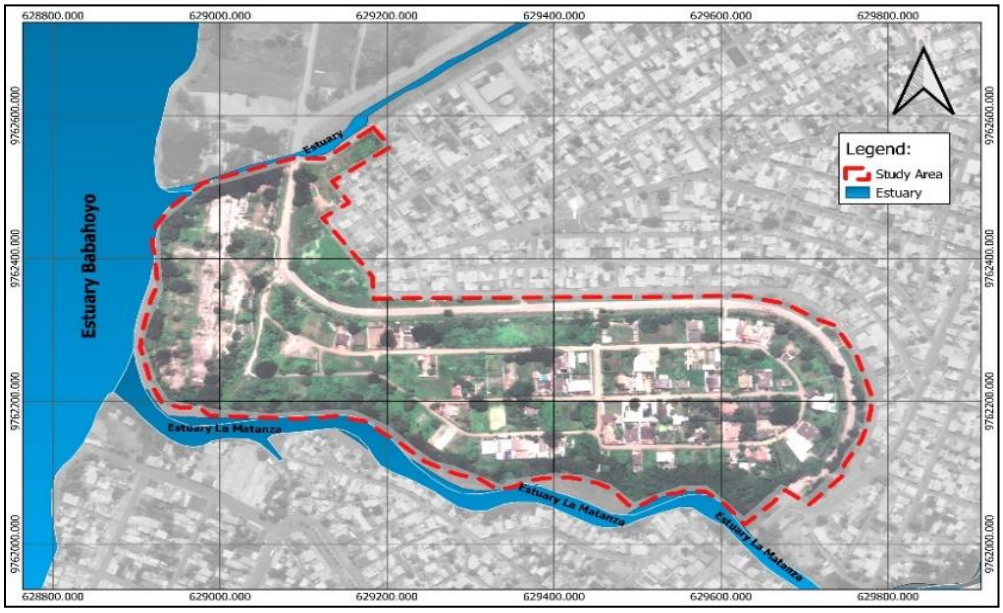

Fig. 3. Water bodies 1Source: Military Geographic Institute1

D. Proposals for intervention

With the diagnosis of the sector to intervene, it is intended to implement a partial Plan (see Fig. 4) based on the conservation of green areas and water bodies for the citadel "Peñón del Rio," Canton Durán Ecuador that considers the following parameters:

-Integrate the management of urban green areas and water resources in municipal urban development and planning projects such as housing programs.

-Promote the conservation of native species to the preservation of the biodiversity of the sector.

-Promote the conservation and management of water resources by implementing environmental health projects to maintain water quality.

-Create zoning of land use that promotes the conservation of green areas and water bodies and allows the creation of recreational areas for the best use of space.

-Establish sustainable urban design strategies for housing development in the sector.

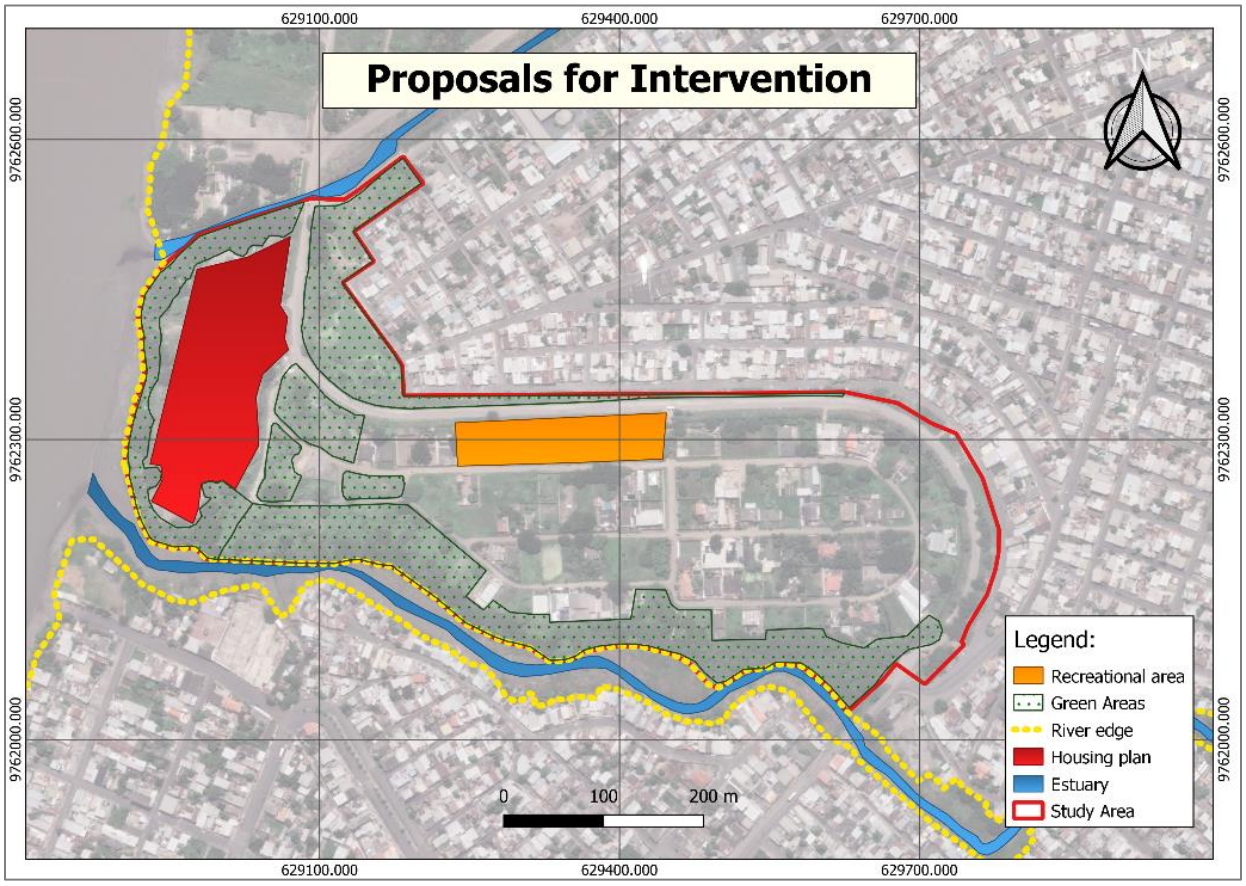

Fig.4. Mapping of intervention proposals in the citadel "Peñón del Río"
Source: Authors.

IV. CONCLUSION.

The citadel "Peñón del Río" is currently losing its vegetation cover and fauna, caused by several factors such as the accelerated growth of human settlements, which causes damage to the ecosystem of the area, loss of species of trees of “guayacanes” type, carob tree and displacement of wild animals to agricultural areas caused by the uncontrolled urban growth of the citadel.

The preparation of partial urban plans arises from the need to have a guideline that allows harmonizing actions at the territorial level; it is a document that defines urban management and development policies according to the needs of a specific territory and with the public, social and private action. Implementing a "Partial Plan based on the conservation of green areas and water bodies for the citadel "Peñón del Rio, Canton Durán Ecuador." The existing physical, topographic, and natural characteristics and configurations will be respected, establishing action polygons that value urban potential. With a zoning of the proposed land use, it seeks to conserve green areas by creating green public spaces that guarantee and connect green areas with the urban green fabric of Canton, improving the urban landscape and the quality of life of citizens. With sustainable urban design strategies for housing

development in the sector, it is sought to define the low-density residential use for the single-family housing unit considering a low commercial percentage. It seeks to promote the conservation of native species (See table I) by protecting and evaluating areas with natural spaces. It seeks to regulate urban growth in the sector by managing urban green areas and water resources in municipal urban development and planning projects such as housing programs.

REFERENCES

[1] Briceño-Avila, M. (2018). Paisaje urbano y espacio público como expresión de la vida cotidiana. Revista De Arquitectura (Bogotá), 20(2), 10–19.
[2] Asamblea Nacional del Ecuador. (2011). COOTAD. In Código Orgánico de Organización Territorial, Autonomía y Descentralización.
[3] Instituto Nacional de Estadísticas y Censos. (2016). Ecuador en cifras. Inec.
[4] Caicedo-Camposano, O., Dueñas-Alvarado, D., Franco-Rodríguez, J., & Triana-Tomalá, Á. (2019). Descripción y propuesta de manejo agroecológico de la subcuenca del río Babahoyo, Ecuador. Revista Killkana Técnica, 3(3).

José Luis Viteri. is an architect by profession born in the city of Milagro, Ecuador who began his university education at the University of Guayaquil where he focused his studies on urban planning and urban design and is currently pursuing a master's degree in Land Planning and Environmental Management.