

Territorial Occupation in the Coastal Strip and the Environmental Sustainability of the Wetland Ecosystem of Huanchaco-Peru

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Abstract:- Results of the “occupation of the coastal territory on the environmental sustainability of the wetlands of Huanchaco-Perú” are presented. The work was carried out on base of the management and processing satellite images, georeferenced databases that serve to obtain past and present information, the method used relates different sources of information from the databases of the District Municipality of Huanchaco with remote sensing images from Google Earth. The results show accelerated growth of the mainly urban population, settled on the coast in detriment of adjacent áreas characterized by precaurious basic.

Keywords:- Territorial Occupation, Coastal Strip, Wetlands Ecosystems.

I. INTRODUCTION

The phrase that “coastal ecosystems are destroyed ten times tan forests” is a reality. The pressure on coastal ecosystems is largely motivated by the accelerated increase in population along these areas of the entire planet. “This means transformation if not destruction of mangroves, marshes and dunes, and of underwater grasslands and corals”, said Carlos Duarte. Among the pollution that comes from human settlements, plus the large amounts of nitrogen that arrive from intensive crops, **seagrass beds and coral reefs are reduced year after year:** it is estimated that these two ecosystems disappear 5% and 9% per year (Catalán Deus, 2007). To these statements must be added the destruction of coastal wetlands by anthropic activities such as urban expansion and erosion. What is worrying is that the trend of this destruction is to intensify as it is estimated that by 2050, 70% of the world’s population will live in cities and will be more extensive especially in the developing countries of Asia, Africa and Latin America (Onu-Hábitat, 2012). Much of the urbanization phenomenon observed on a world scale is closely related to the growth rate of the urban population in less developed countries (MARÍA DE ANDRÉS y J. M. BARRAGÁN, 2016).

It is alarming what is recorded in Spain, where a ranking of coastal destruction was established and showed that the Mediterranean is the region most affected. The three communities that lead the destruction of coastal ecosystems due to urbanizations are Catalunya, which has the highest percentage of urbanized coastal area: 26.4%, the Valenciana community occupies second place, with 23.1% of its coastline degraded, and in third place is Andalucía with 15.4%. Furthermore, looking only at the beaches, the worst provinces are Barcelona and Malaga with 83.6% and Alicante with 80.3%, of their beach line surrounded by cement (PALOMA NUCHE, 2018). All this is nothing more than confirmation of the lack of political commitment, the weakening of the public administration and the absence of generalized social consensus turned out to be the main problems for the continuity of programs such as Integrated Coastal Management avoid this destructive phenomenon (ROBERT FÉVRE y J. R. DADON, 2011).

Urban expansion is associated with urbanization, which is a process that has a base on a certain model of occupation of the geographic space, which undoubtedly exerts pressure on ecosystems and their services, as is the particular case of coastal wetland ecosystems. The ecosystem services provided by wetlands are known as resources of ecological and economic importance (BOCANEGRA, 2005). However, in recent decades it has been observed the accelerated growth of coastal cities with obvious negative consequences on coastal marine ecosystems, such as marsh.

Wetlands are known for mitigating so-called natural disasters, such as floods and tsunamis. In addition, they contribute to post-disaster resilience. However, very little is known about the importance of wetlands as a resource that sustains the economy of populations of ancestral origin, such as the fishermen in “caballito de totora” who use the marsh to cultivate the “cattail” that is the raw material for the manufacture of

their boats (Bocanegra y Veneros, 2020). El Balsar de Huanchaco is a unique wetland on the Peruvian coast, due to its artificial carácter, which had a surface area of 46,72 ha with 160 pools, where the “cattail” (*Scirpus californicus*) is cultivated. From this plant, the fishermen built the “caballito de totora”, which allows them to go to the sea for capturing resources with small scale fishing, which constitutes an important source of economic incomes for their subsistence.

The value of the raft resides in the high primary productivity of the reed. The Huanchaco plots have a dry biomass productivity of 29,6 MT/ha/year. Considering that it is a system that requires a minimum of manpower, the investment is small. It could probably be considered among the most bioproductive unfertilized systems on the planet. Although its biological diversity is relatively low compared to other coastal wetlands, the beaches of Huanchaco serve both as a rookery and as a place of passage for migratory birds, on their migration route along the Pacific coast of South America. The “balsar” is managed rationally and steadily. This activity, which favors the development of artisanal fishing for fishermen in the region, constitutes an important source of economic resources for the subsistence of the Huanchaco residents (Pulido, 1996).

Despite the importance of the wetlands or “cattails” of Huanchaco, with the passage of time, they have been reduced and largely destroyed, it is from the year 2000 that a loss of this ecosystem is observed due to coastal erosion (Bocanegra y Veneros, 2020, Pulido, 1996, Bocanegra., 2013), aggravated by the coastal urban expansion that is the subject of this research. In this framework, the objective of this study is to provide information that serves as a basis for scientists, managers and politicians of the need to undertake urgent measures to regulate urban growth to stop its negative impact on natural spaces and to make proposals to promote coastal sustainable and resilient that consider the important of natural ecosystems.

II. MATERIAL AND METHODS

The study was located in the coastal area of the Huanchaco spa (Región La libertad, Perú), between the coordinates: Latitude: -8.08 longitude: -79.1206 latitudes 8°4'48” south longitude 79°7'14” west. Huanchaco is located on the shores of the Pacific Ocean 78 km southeast of the historic center of Trujillo (Atlas Ambiental de Trujillo, 2003).

The work was carried out on the basis of the management and processing of satellite images, georeferenced databases that serve to obtain past and present information. The methodology used took as reference (Barragán and María de Andrés) which consisted of in:

a. To obtain, organize and analyze the information in the databases between 1945 and 2017, information from national population censuses.

b. Identify and describe from the interpretation of Google Earth images, and visits “in situ” agglomerations of urban centers with respect to their geographical location, type of hábitat, associated ecosystems,

c. Georeference the agglomerations or urban nuclei analyzing the relationship with the wetland ecosystem.

III. RESULTS

1. **Population and urban settlement:** Huanchaco is one of the districts of Trujillo (Perú), with a strong population growth. From the 70s the population begins to grow exponentially, going from 780 inhabitants in 1940 to 53 731 inhabitants in 2017 (Figure 1).

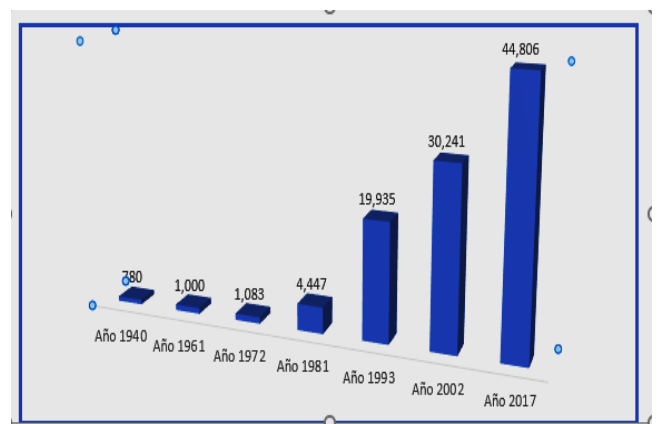


Figure 1. Graphical representation of population growth in the Huanchaco district from 1940 to 2017.

2. **The occupation of the territory:** The Huanchaco spa over time shows the phenomenon of urban expansion and urban growth, a fact that has implied the growing occupation of the territory without taking into account the surrounding ecosystems. One of the first urban center settled in the year 1913, where a small number of houses can be seen located in front of the pier or pier- The occupation of the territory is systematic and sustained to the north, south and east over time (Figure 2).

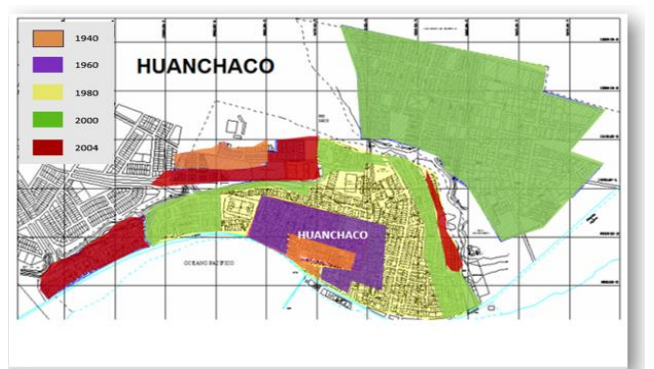


Figure 2. View of the occupation of the territory by the coastal urban expansion in Huanchaco.

3- Spatial transformations of the wetland ecosystem environment: The occupation of the territory that has meant the reduction of the wetland ecosystem (Figures 5 and 6), to the point of placing it in a space at critical levels. The wetland ecosystem has not only been not conserved and protected, but it is threatened and fenced off by changes in land use, including cliffs.

María De Andrés.2016), changes in land use on the coast due to the continuous urbanization of the coast, constitutes a matter of special importance, which is the case of Huanchaco is evidenced by the reduction of the wetland ecosystem due to coastal erosion (Bocanegra, 2012, 2013) and by unplanned urban expansión. This fact confirms what was pointed out by Saginot (Saginot, 1996), who states that the contradictions that are generated in society are projected in the geographical space as perceptible material conditions. Each area that has a specific use corresponds to an economic logic, particularly profitability. This statement applies to what happens on the Huanchaco coast, where natural ecosystems such as wetlands still coexist with housing opportunities, and activities such as sun and beach tourism. For fishermen of ancestral origin, the wetland or “raft” is a source of raw material to make their boats with which they develop their local subsistence economy, that constitutes a nature, cultural, and economic resource of heritage. For residents and foreign investors, it constitutes a resource of economic value and high profitability due to the advantages of the location of the coastal marine strip. This confirms what David Harvey mentioned, the land, as a geographical space, possesses merchandise properties, has use value and exchange value. The urban phenomenon that develops in the coastal strip of Huanchaco evidences this affirmation.



Figure 3. View of the wetlands ecosystem (“totoraes”) of Huanchaco without occupation of territory, year 1969.



Figure 4. View of the environment of the Huanchaco wetlands ecosystem (“totoraes”) where the occupation of the territory is observed, year 2020.

DISCUSSION

The basic characteristics of urban settlement and occupation of the territory in the Huanchaco coast can be defined from the reduction of coastal ecosystems, such as the wetlands known as “totoraes” or “rafts” that provide environmental services and constitute natural heritage and cultural. In addition to their ecological function, they are filter feeders and allow the “reed” to be cultivated as raw material for making the vessel of ancestral origin, such as the “caballito de totora” (Bocanegra, 2005). According to Barragán (Barragán y

On the other hand, it is known that demographic growth originates a constant pressure on the litoral space, mainly due to urban development, as reported for the coast of Spain (Paloma Nuche, 2018). This phenomenon is also evidenced in the reduction of the number and area of the ecosystem of wetlands or “totoraes” in Huanchaco (Figs. 3 y 4), despite the great importance of the coastal wetland from the environment point of view and from a perspective socioeconomic situation, the facts show that it is, in short, the circle of unsustainability that development patterns present in the coastal strip of Huanchaco. The unplanned urban development pattern in Huanchaco causes an increase in the pressures exerted on the coastline and especially on the ecosystem of wetlands or “rafts”, “totoraes”. Therefore, according to Arenas (Arenas, 2012), integrated management mechanisms are needed to face ecological and socioeconomic problems. Among them, the construction of houses, tourism, transport routes that are related to urban expansión on the coast stand out. In this framework, it is necessary to assume individual and collective commitments to reduce vulnerability, threats or dangers in the fase of risk scenarios where two specific conditions are combined: habitable spaces with limited bearing capacity, and a self-motivated local community as mentioned by Monti (Monti y Escofet, 2008), who studied the urban occupation of coastal spaces in Patagonia, or as the case of the southern coast of Atacama (Chile) where Consuelo de Castro et al. (Consuelo, C. et al. 2010) highlight the presence of geosites that constitute a resource of heritage importance with potential for the conservation and

support of sustainable tourism activities in the Atacama Region. Vulnerability in this case is associated with the occurrence of natural hazards due to seismicity and tsunamis, mass removal and alluvial flows. On the other hand, it is necessary to incorporate the recommendations of the Un-Habitat. (2000) in the sense that due to the significant levels of urbanization that countries reach today, there is a tendency to understand and manage all or most of the habitat issues as a 'city themes'.

CONCLUSIONS

The coastal area of Huanchaco represents an important potential to focus population policies towards that area, as long as its ecosystems are preserved and it tries to preserve a balance between the population and the environment that surrounds it, especially with wetlands or "rafts", "cattails" that constitute a natural and cultural heritage. The different economic activities such as construction and housing, tourism, surfing, raising small animals among others that are carried out in the coastal strip of Huanchaco have caused changes and have transformed natural coast spaces into urbanized ones. The coastal urban settlement to the north, south and east is generating an imbalance in the wetlands ecosystem and changes in land uses, showing a land occupation pattern that reflects a progressive and high population density and a reduction of the wetland. The population settled in the coastal strip of Huanchaco registers a spatio-temporal dynamic that has resulted in a notable change in the area of the wetland or "total", which has led to a greater occupation of the territory in that area.

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