Urban Morphology and Sustainability

Patrícia Diogo, Maria Diogo, Joana Diogo, Manuel Diogo

***Abstract*—** The theoretical and practical nature of the research proposal, therefore, intends to associate sustainability and urban regeneration with fishing settlements and diffuse rural cores. It aims to aggregate interdisciplinary and transdisciplinary approaches anchored in a comparative analysis based on the case study in Lavra municipality of Matosinhos, assuming that protecting, conserving, improving and valuing urban soil, rustic soil, the environment and the landscape, despite their regional expression, can make valuable contributions to the promotion of the cultural legacy of smart cities and the dissemination of scientific and technological knowledge with national and international impacts.

***Keywords*—** Urbanism, Innovation, Smart Green Cities, Climate Change, Sustainable Cities.

I. INTRODUCTION

The relevance of the research project with scientific support centered on smart cities illustrated in Fig. 1, sustainability and urban regeneration, to be developed around the fishing settlements and diffuse rural core, located in the sea coast of North of Portugal territory, in the Union of the Parishes of Perafita, Lavra and Santa Cruz do Bispo, in the Municipality of Matosinhos as we can overlook in Fig. 2.

Fig. 1 – Illustration of Smart Cities. The city and the relation with Technology.

It will be understood here in the dialectical perspective of an open work related with hight impact of climate change, sea-level rise, developing solutions to emerging problems, recovering the interaction between formal logic and dialectical logic and between diachronic and synchronous readings, which seek to deepen scientific knowledge about:

1. Coastal places and cores that correspond to the old fishing and rural settlements and the analysis of their morphological and functional characteristics;
2. Meshes and axes that correspond to the growth processes of the primitive cores related to sea-level rise;
3. Connection between urban fishing subsystems, diffuse rural and periurban cores in a perspective of resilience and sustainability developing solutions to design a smart green city;
4. Urban regeneration processes within a framework of strategic convergence that values the development of inclusive citizenship processes responding with solutions to emerging urban problems.
5. Urban regeneration sustained by the development of transportation systems and internet-of-things connectivity.
6. Estimative of the impact of climate changes and the development of different policies and strategies that minimize the risks.

Fig. 2 – World Map and Portugal Map with Matosinhos Location.

From the technical-scientific point of view, the development of fieldwork that underlies heritage screening based on the diversity of the ways of establishing the settlements and the differentiation of the natural conditions of the physical environment, in the multiplicity of combinations that underline the different realities of the environment, it will be supported by the places of Angeiras, Pampelido Velho, Antela and Avilhoso belonging to Vila of Lavra.

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II. Coastal Places

In the research paper "Urban System and Pandemic Times" [1], we already mentioned that we find ourselves facing a profoundly asymmetric demographic distribution in national territory, bipolarized around the countryside/city and inland/coastal structures, and it seems pertinent to underline that although cities have gradually come to be equipped with new technological tools with the capacity of monitorization and efficiently manage their performance, natural disasters continue to be a scourge, as well as the behavior of the environment regarding to changes in sea level over the earth. In the site Climate Central [2] we can project the sea level rise in 2030, 2050 and 2100 as exemplified in Fig. 3 and the coastal flood maps are based on peer-reviewed science in leading journals. As these maps incorporate big datasets, which always include some error, these maps should be regarded as screening tools to identify places that may require deeper investigation of risk.

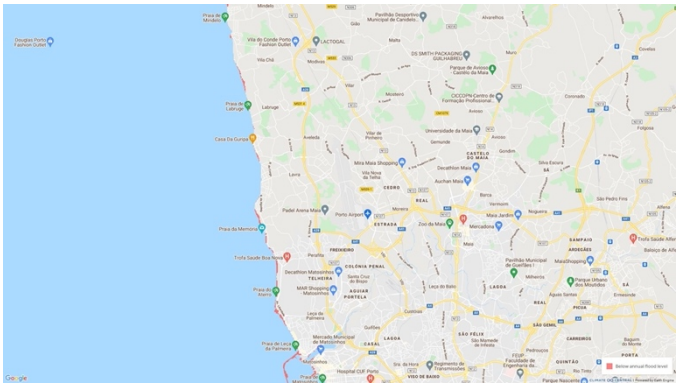

Fig. 3 – Projection of Sea Level rise in 2030 generated in Climate Central Site.

The Climate Central approach makes it easy to map any scenario quickly and reflects threats from permanent future sea-level rise well. However, the accuracy of these maps drops when assessing risks from extreme flood events. Their maps are not based on physical storm and flood simulations and do not consider factors such as erosion, future changes in the frequency or intensity of storms, inland flooding, or contributions from rainfall or rivers. So, with this floor we can affirm that this is a very effective tool to work on, but it shows us the best possible scenario. With all the natural disasters we can project that the sea level rise will be quicker than our better previsions, data that sends us to the questions: what can we do to contain the damages in our cities? Will this place be affected? If so, can we do a pilot plan to reply in other cities?

III. Old Fishing and Rural Settlements

By boosting the average water height, sea level rise is projected to make the kinds of intermittent floods that coastal communities see on average once a decade—or with a 10 percent annual risk—reach farther inland than they do today. Those floods can damage and devalue homes, degrade infrastructure, wash out beaches, rust out car underbodies, promote mold, and more.[3] As Stauss B. quoted "A portion of human-caused carbon dioxide emissions will stay in the atmosphere for hundreds of years, raising temperatures and sea levels globally. Most nations emissions-reduction policies and actions do not seem to reflect this long-term threat, as collectively they point toward widespread permanent inundation of many developed areas."

IV. United Nations Sustainable Development Goals

As we live in a global planet the information is accessible and workable to everyone. In UN SDG's it´s particular important for our research project the Goals 11th and 13th. The 11th goal entitled "Make cities and human settlements inclusive, safe, resilient and sustainable" as we observe in official layout in fig. 4, "has the priority to make cities and human settlements inclusive, safe, resilient and sustainable. It is mandatory that we can build a better world in habitation (safety, accessible price, better sanitary conditions), in transportation, in the protection of cultural and natural heritage, the reduction of people affected by catastrophes, build better and safer public space, in others. The DRR (disaster risk reduction) in a major part of our future development because we need to build cities and settlements in a solid ground."[4]

Fig. 4 – Official layout of 11th goal of UN SDG's

Fig. 5 – Official layout of 13th goal of UN SDG's

The 13th goal, with official layout pictured in fig. 5, has to take urgent action to combat climate change and their impacts. This goal is particularly important to reinforce the resilience and the capability to adopt to the risks related to clime and natural catastrophes in all countries relating politics with research and strategies e national planning. Both of them are related to our case study and to the measures we intend to implement in the future. In the Sustainable Development Goals Report 2022[5] illustrated in fig. 6, António Guterres stated that "**We must rise higher to rescue the Sustainable Development Goals – and stay true to our promise of a world of peace, dignity and prosperity on a healthy planet.**" [6]

Fig. 6 – Cover of the SDGR 2022 of UN

V. Developing Coastal Cities

The transformation of an inherently complex system like this requires research methodologies that clarify the processes of absorption of the primitive fishing cores by the existing urban network, and the one of the diffuse rural area in transition to the urban area, both with strong residential growth and diversified economic dynamics that originated functionally fragmented spaces.

The marks of this trend are visible and in need of research that refocuses the framework of strategic convergence, valuing the scale of proximity and the development of inclusive processes of citizenship, in a perspective of resilience and sustainability of the conditions of conservation of the humanized landscape and the environment, urban and peri-urban subsystems that are marked by a past that was not always favorable.

It is, therefore, within the scope of these references that the research project proposal will seek to frame Goal 11th and 13th for the "United Nations Sustainable Development (ODS)" - making cities and human settlements inclusive, safe, resilient and sustainable and take urgent action to combat climate change and its impacts - by identifying the main strengths resulting from action strategies already defined, the weaknesses to control or minimize its negative effect, the opportunities used efficiently, and the threats / risks to mitigate the inconveniences associated with it, depending on the observable reality, and based on the safeguarding and enhancement of the existing cultural and natural heritage as factors that differentiate the territories.

Fig. 7 – 15 minutes cities, in Financial Times

In this field the 15'cities presented by Carlos Moreno appear as a very valuable model to adopt in stablished cities. The paper entitled "Urban System in Pandemic Times" [7] mentions that cities are based on a system of urban reorganization, which he called "city of the quarter of an hour", a project that seeks to deconcentrate service and productive activities, bringing them from a distance acceptable place of residence. In the same research paper, it states that contemporary concepts such as smart cities and compact cities, such as those disseminated by contemporary urbanists such as Richard Rogers [8], reminding us that statistically about 68% of the world population lives and works in cities, estimating that up to 2025 this number increases to 75% of the population, increasing the risk of new direct causes of "contamination, alienation and social division" [9].

With these themes coming up, we are reaching a point that the "future" is becoming present and "Smart Cities" are a reality to old and new cities and are defined as leverages policy, innovation, and connectivity to improve the lives of its citizens combining these factors that can be utilized to achieve safe, accessible and sustainable mobility for all.

VI. Conclusion

The marks of this trend are visible and in need of research that refocuses the framework of strategic convergence, valuing the scale of proximity and the development of inclusive processes of citizenship, in a perspective of resilience and sustainability of the conditions of conservation of the humanized landscape and the environment, urban and peri-urban subsystems that are marked by a past that was not always favorable.

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[5] *The Sustainable Development Goals Report 2022* is the only UN official report that monitors global progress on the 2030 Agenda for Sustainable

Development. Using the latest available data and estimates, The SDGs Report 2022 gives the global community a reality check on the devastating impacts of multiple crises affecting people's lives and livelihoods. This annual SDG Report is prepared by UN DESA, in collaboration with the entire UN Statistical System, consisting of more than 50 international and regional agencies, based on data from over 200 countries and territories.

[6] Secretary-General, United Nations

[7] D. Manuel et all, *Urban System in Pandemic Times*, Published paper in Waset, Dubai, 2021. https://attachments.waset.org/downloads/20/papers/21ae030115.pdf

[8] Richard Rogers, Pritzker Prize in 2007, bases his vision on the influence that architecture and urban planning has on people's lives.

[9] Justifying these reasons, he alludes to the fact that sustainable urban planning will be part of the solutions to create more friendly cities that respect the citizens and the environment.

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