A Bioclimatic Afforestation Guide for the Porto city

Valença, Maysa *(maysa@valenca@gmail.com)*, Faculdade de Letras, Universidade do Porto, Portugal.

*Praca Teixeira de Pascoalis 15, 4000-532, Bonfim, Porto.*

**Introduction:** This poster summarizes the research developed during the second year of the Master’s Degree in Hazard, City and Spatial Planning, at FLUP, for the master’s dissertation. The purpose of the study was to propose measures that mitigate negative impacts of the Urban Heat Island (UHI) as the presence of this climate-related problem has been reported in the latest studies on Porto’s climate. In the search for nature-based solutions, this dissertation focused on developing the basis for Porto’s Bioclimatic Afforestation Guide.

**Aim:** This research aimed to answer the question: What are the criteria for proposing street afforestation in the City of Porto, to enhance the street’s bioclimatic benefits?

The main objective to design a spatial analysis tool (The Bioclimatic Afforestation Guide) based on the selected criteria and test it in laboratory spaces.

“(...) the contribution of trees to the microclimate is often due to their shading capacity (...)”.

**Methodology:**

1. **Main Question**
2. **Criteria Selection**
3. **Application**
4. **Result Analysis**
5. **Conclusion**

- **Main Question**
  - Bibliographic Review on Urban Forest in Porto
  - Laboratory Streets
  - Guide’s Draft

- **Criteria Selection**
  - Geographic Orientation
  - Cont. analysis

- **Application**
  - On which side should the street be shaded?
  - Check the tables to define the area needed to shade.
  - Calculate the number of trees needed.

- **Result Analysis**
  - No
  - Yes
  - Cont. analysis

**Proposal for Streets to Afforest:**

**Results:**

**Laboratory Streets:** Rua de São Brás and Rua da Constituição.

**Key:**
- Proposed streets to afforest;
- Rivers and watercourse;
- Green spaces;
- Buildings;
- Douro River and Ocean;
- Neighboring Cities;

**Discussion:**

This study leaned on the concept that the contribution of trees to the microclimate is often due to their shading capacity as it decreases the amount of radiation that reaches the surface. Therefore, the criteria was chosen to demonstrate the need for shade on the sidewalks. The Bioclimatic Arborization Guide for Porto proved to be successful in proposing an area to be planted considering the local conditions of each street, as demonstrated, during the test in the laboratory spaces. This study is an example of place-based solutions in urban planning. And it shows that even when working on an urban scale, it is beneficial to consider the local analysis.

Regarding the proposed streets to afforest, it is necessary to say that a substantial part of it already present trees and gardens. Still, it is unknown if they are adequate to the bioclimatic needs of their placement.

The guide created was designed to be simple and intuitive, so that it could be part of a planner’s tool kit and assist in the decision making on the Green Urban Infrastructure to establish in Porto. However, there is more work to be done. The criteria selected, their levels of influence on thermal comfort, their interactions with each other and the values of physiological equivalent temperature (PET) need more understanding and research work. Afterwards, the bioclimatic guide might become an Artificial Intelligence tool and even expanded for application in different cities.