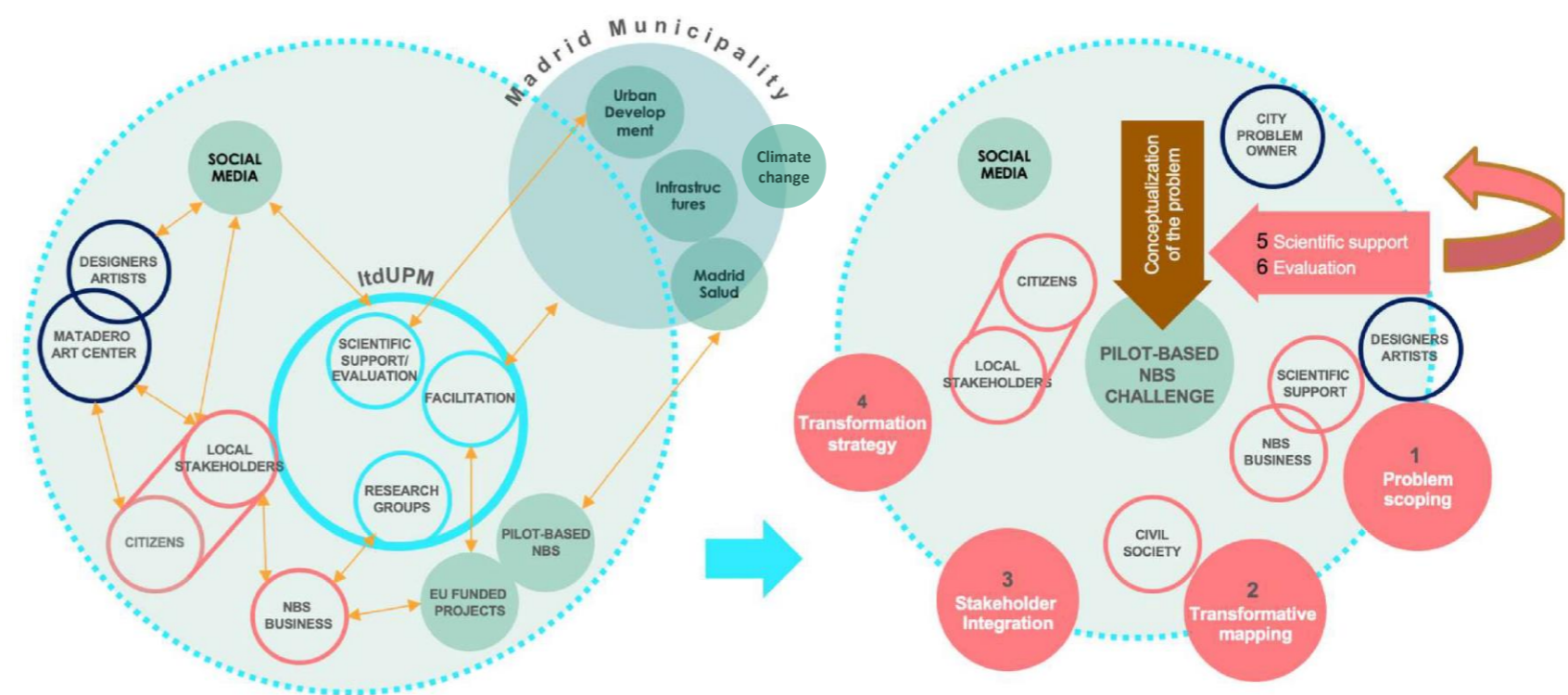
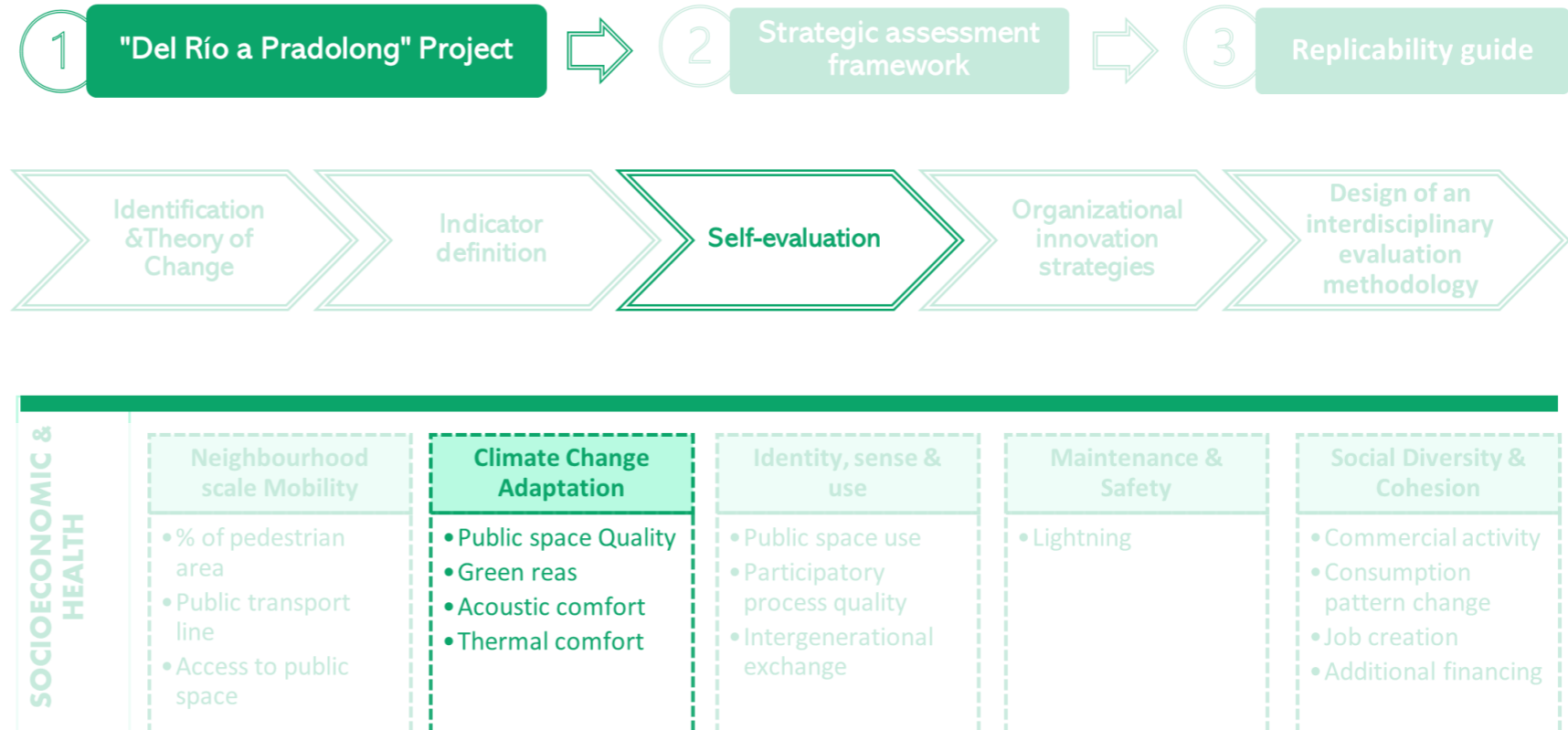




A methodology for the assessment of urban regeneration project through Nature-based Solutions

The use of Nature-based Solutions (NbS) in urban regeneration processes has been raising in the last years as a multifunctional solution to increase the resilience of the built environment in order to face the challenges derived from Climate Change. These solutions provide various benefits at the same time, such as reducing the impacts of climatic hazards, improving the environmental quality as well as increasing citizens' socio-economic well-being and health. Measuring and evaluating the impacts of NbS for urban regeneration, can still be challenging due to their multifunctional condition. In the CLEVER Cities project context, the city of Madrid has developed a comprehensive strategic framework for urban regeneration based on NbS implementation.

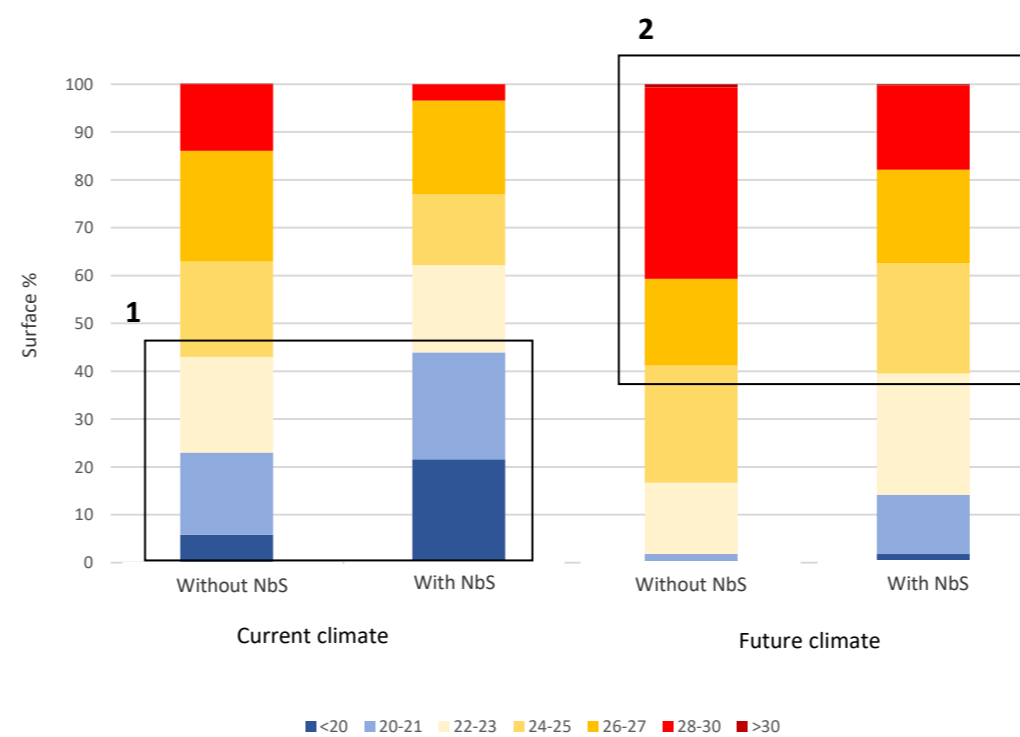
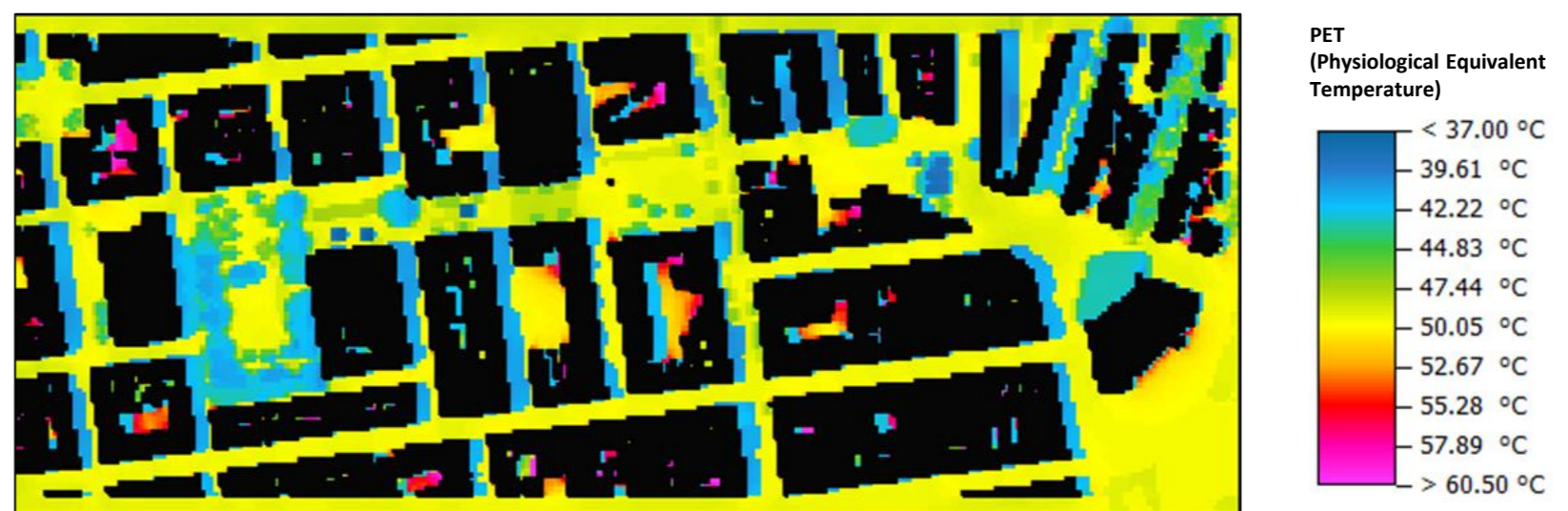
The main goal of this framework is to create a replicability guide from the methodology implemented in a specific project, "Del Río a Pradolongo", to offer a cross-sectional evaluation tool that provides a continuous learning method between parties involved. The proposal is more of an iterative process than a linear methodology, not only due to the involvement of multiple variables but also due to the impacts of the technical, economic, and social spheres of an entire community. The replicability of this assessment framework, therefore, relies also in evaluation of these multi-scalar and multilayered relationships, understanding social innovation as a transversal element to the whole process, and collaborative governance as a management model.



Pradolongo study case application in thermal comfort studies

Nature-Based Solutions thermal effectiveness simulations are tools used to predict and evaluate the impact of these solutions on temperature reduction in urban areas. These simulations are based on numerical models that take into account factors such as solar radiation, humidity, wind speed and the presence of shadows and bodies of water. The simulations allow to identify the most critical areas in terms of thermal stress and evaluate different design and configuration options of nature-based solutions by applying the effectiveness indices.

Overall, simulations are a valuable tool for designers, urban planners, and planners to make informed decisions about implementing NBS in urban areas. Four models are analyzed with a current type day (with and without NbS) and a future type day in RCP 8.5 scenario (with and without NbS). The PET would be the indicator chosen to evaluate the areas with Thermal Stress Indicator (TSI) levels.



1

Proven relevance of the solutions

In the current climate, NBS contribute to increasing from 23% to 44% the surface area of the neighborhood with a TSI of less than 21, that is, in the categories with greater thermal comfort. This means doubling the space with levels of thermal comfort compatible with the passage and the stay.

2

Resilience for the future

In the future climate, NBS have an even more relevant role in terms of lowering the TSI from levels of greater discomfort. Specifically, it would go from 41% of the space with a TSI higher than 28 to 18%. It would be demonstrated, therefore, the relevant role of the NBS especially in the face of an uncertain and unfavorable climate scenario.