



POLITECNICO  
DI TORINO

# Honors thesis

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DEGREE IN SUSTAINABILITY DESIGN

*Abstract*

**SCIENTIFIC BIOPHILIC DESIGN.  
Human-Nature connection in the architectural project:  
Biosphera 2.0 experience**

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February/March 2017

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The thesis focuses on the perceptual dimension of the user's physical and mental wellbeing, standing in a line of research that, starting from the approach of *Biophilic design* fits into an experimental process that puts the issue of the Human-Nature relationship in the center of the design process.

This approach finds a real application in *Biosphera 2.0* experience, the first experimental prototype of Scientific *Biophilic Design*, developed as part of a research coordinated by the Politecnico di Torino with the aim of designing a habitat module focused on the principles of *Biophilia* and built to meet the most advanced standards of quality and energy efficiency. "*Biophilia [...] is the innately emotional affiliation of human beings to other living organisms. Innate means hereditary and hence part of ultimate human nature*": this is the starting point of the thesis, which argues the need of *scientific Biophilic Design* approach, using it in the design of artificial environments as a solution for the lack of connection with nature in modern urban society, densely populated and built.

Human-Nature relationship is reflected in architecture in the urban design process through the birth of "*biophilic cities*", and at the same time in architectural scale in terms of sustainability, where environmental impacts, energy efficiency and well-being issues meet. In a period in which architecture is focused on developing sustainability evaluation tools, the issue of psychological well-being is not scientifically explored yet, and this kind of scientific approach for treating mental and physical dimension represents the innovative feature which the research is focused on. The research itself is lead through processing of data related to the user's comfort perception during *Biosphera 2.0* experience.

In the first stage of the research we developed a theoretical-bibliographic framework with the aim of a critical analysis around *Biophilia* issues, the disciplines and the existing certifications that already deal with the mental and physical dimension of comfort in architecture; furthermore, by presenting some architectural case studies, from '800 to date, we would like to show how in the past already existed buildings able to satisfy the different user's needs in an innovative way, although *Biophilic Design* approach didn't exist yet.

The innovative aspect of the research has been developed during the second stage through the application of an experimental approach to comfort in *Biosphera 2.0*, analyzing the assessment questionnaires submitted to its inhabitants and processing the perception-related data of the habitat experience. The survey aimed to using the same scientific method, used for the monitoring of building performance efficiency, even for those parameters that affect the perceptual-cognitive dimension of well-being, proposing a more widespread use in architectural design of scientific *Biophilic Design* approach.

With *Biosphera 2.0* experience, we want to show how, through the analysis of inhabitants' psychological profile, it could be possible to design an adaptive environment that can meet users' needs, not just considering the building performance as the only competitor aspect for the achievement of indoor comfort, but even starting from the specific physiological and psychological users' needs.

Our purpose has been possible by involving temporary inhabitants of *Biosphera*, which has been subjected to the "*Post-Occupancy Evaluation*" questionnaire (POE), test already included in the experimental protocol, developed by Giuseppe Barbiero and Rita Berto, made to verify the biophilic hypothesis.

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