



POLITECNICO  
DI TORINO

# Honors thesis

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DEGREE IN SUSTAINABILITY DESIGN

*Abstract*

**Biophilic design for a sustainable architecture.**

**Framing of the different project strategies and application  
of a scientific protocol to an experimental case study**

*Tutor*

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*by*

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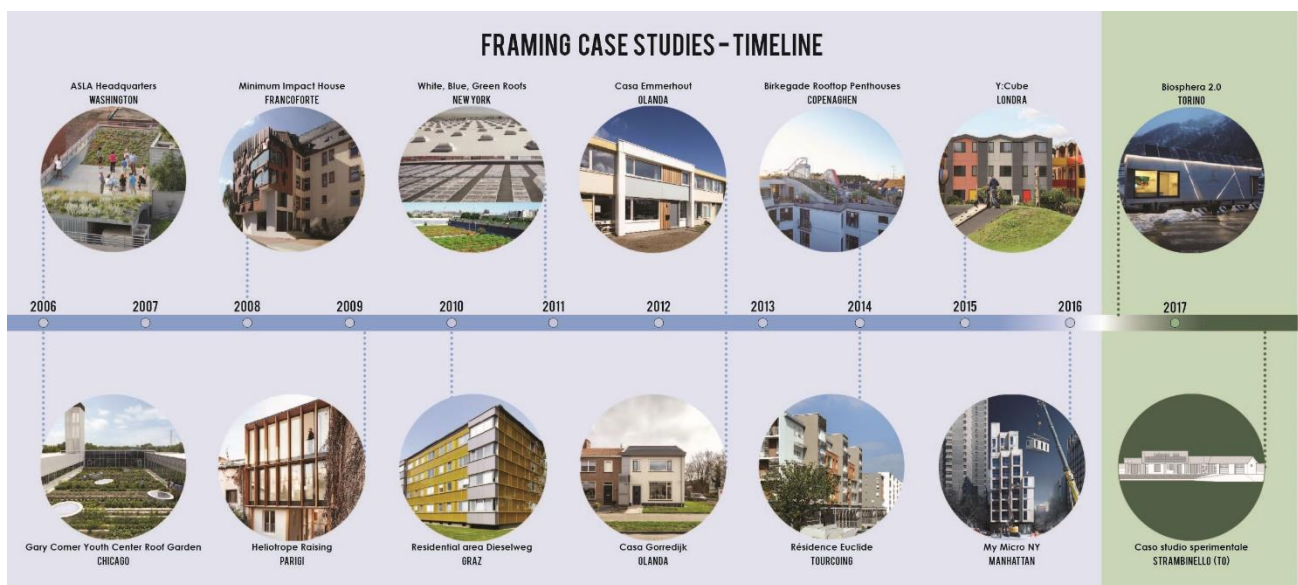
*Correlator*

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The reason why there is a need to talk about biophilic design is the exigency for architecture, in front of epochal changes such as population growth, the role of the city and the prevalence of anthropic environments on those natural, to identify new tools for sustainability in architecture.

This work starts from the framing of some case studies that emerges as the current tools in the European context tend to overlap the theme of energy efficiency to welfare well and how in the United States, where there is more focus on the theme of environmental sustainability, were developed two protocols that deals with biophilic design. However, these protocols (The Well Building Standard and Terrapin Bright Green) have an empirical approach, only in Europe is the beginning of scientific biophilic design, thanks to the experimental approach adopted by the ecologist Giuseppe Barbiero and the environmental psychologist Rita Berto in their research activities.



Elaborated by ROXANA GEORGIANA MARIAN & GIULIA NOTA

From here a "Protocol of a scientific biophilic design" was born, the first objective of the thesis, starting from the reorganization of the 14 patterns identified by Terrapin Bright Green (divided into 3 macro-categories: nature in space, natural analogies and nature of space). If in these patterns the focus is on the perception that the architect or the designer has outwardly, by completely shifting the subjectivity of the individuals to whom the projects are addressed, the Protocol of a scientific biophilic design arises instead, the focus is on man and his connection with nature through the definition of 14 connection factors (divided into sensory connection factors, emotional connection factors, cognitive connection factors) that provide the guidelines for proper biophilic design.

The second objective is to carry out experimental work on the design of a single-family house in Strambinello, which puts the clients and their needs for the first time in the center. This work is part of the design and development process of the start-up *be-eco* from the *Politecnico di Torino*, which aims to develop systems for low-impact construction, and also starts from the encounter of disciplines such as architecture, ecology and environmental psychology



*"The 14 connection factors of the Protocol of a scientific biophilic design",  
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that have had a first chance to collaborate in the design of Biosphera 2.0<sup>1</sup>. Biosphera is a scientific project where researchers have monitored and collected data relating to the energy system and the human physiology of the 32 occupants who succeeded within the 25m<sup>2</sup> housing module during the 8 stages of the planned itinerary. The thesis work, with the case study of Strambinello, goes beyond this project because:

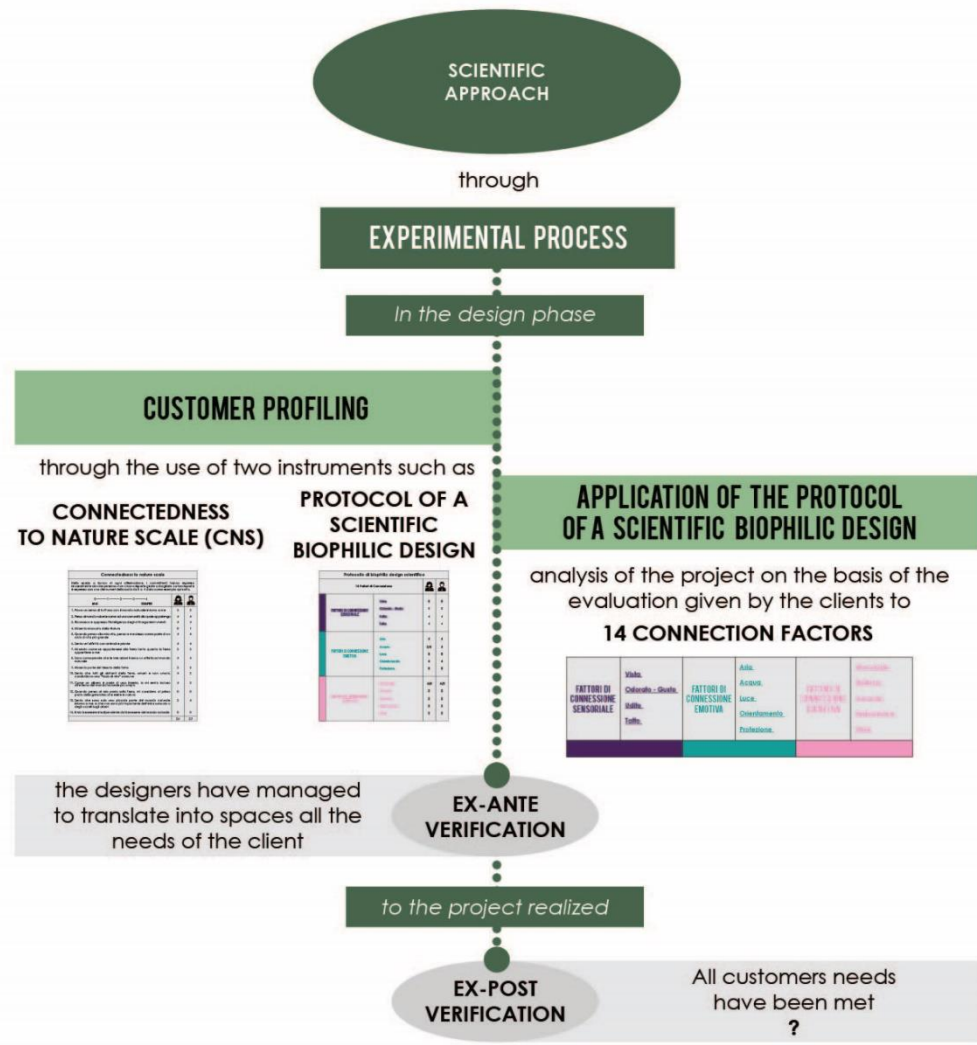
- comes to the merit of a permanent and non-itinerant architecture
- it is based on the profiling of two occupants, thus knowing their personality and their level of biophilia in order to translate their needs into living spaces
- it deals with a typology of housing (single-family residential building) and adopts a scientific approach, aspects that are now absent at international level within the existing american legislature dealing with biophilic design.

The experimental work followed in the thesis provides a first level of ex-ante verification in the design phase, based on **Customer Profiling** (through CNS and Protocol of a scientific biophilic design) and **Application of the Protocol of a scientific biophilic design** to the building, that allows to say how much the project meets the needs of future occupants.

<sup>1</sup> project co-operated by the Aktivhaus team, Politecnico di Torino DAD and the University of Valle d'Aosta

This work has a concrete purpose since there is a second phase of post-occupancy analysis and monitoring of users, so it will be possible to perform the ex-post verification of the experimental path elaborated in the thesis.

**EXPERIMENTAL CASE STUDY: STRAMBINELLO**



**14 CONNECTION FACTORS**

<b>FATTORI DI CONNESSIONE SENSORIALE</b>	Vista	<b>FATTORI DI CONNESSIONE EMOTIVA</b>	Acqua	<b>FATTORI DI CONNESSIONE SOCIALE</b>
	Colori e suoni		Luce	
	Odori		Cherchiamenti	
	Tatto		Profumazioni	

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