Adaptive Architectonics for Human and Non-Human Coexistence: Toward Water-Based Biodiversity Oriented Spatial Practices

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Responsive Ground Research Lab.
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Abstract

Architectural space is increasingly confronted with ecological conditions that exceed human-centered programmatic and formal logics. Climate change, hydrological uncertainty, and biodiversity loss demand spatial practices capable of accommodating human and non-human species within shared environmental systems. In this context, adaptive space is no longer defined by static form or singular use, but by its capacity to operate as a relational and ecological mediator.

The research proposes an experimental design-research framework that rethinks architectonics as a multi-species spatial practice. Architectonics is understood as the coordinated organization of material, biological, and hydrological processes across scales. The study aims to exemplify how a construct can be established through design strategies and parameters specific to the Mediterranean underwater ecosystem, thus developing transferable methodologies that address water-based relations, material agency, and spatial adaptability as drivers for biodiversity-oriented design. Transferability is addressed through a protocol-based methodology structured around (a) transcalar mapping procedures, (b) performance-based material testing, and (c) iterative prototyping cycles adaptable to different ecological contexts. Through transcalar spatial mappings, material explorations, and speculative prototyping, architectural space is framed as an evolving interface that supports habitat formation, ecological succession, and cohabitation across species.

The research foregrounds non-human agency including vegetal growth, microbial processes, sedimentation, and hydrological flows as active participants in spatial production. By integrating these agents into architectural thinking, adaptive spaces emerge as open systems that respond to ecological rhythms rather than impose fixed boundaries. Such spaces prioritize coexistence, resilience, and ecological continuity over control and optimization. Grounded in ecological systems theory and process ontology, space is conceptualized as a dynamic system of interactions.

Positioned within broader discussions on ecological transitions, the research contributes a design-oriented perspective that aligns architectural research with water-based biodiversity goals. It argues for a shift from anthropocentric architectural solutions toward multi-species architectonics, offering a conceptual and methodological framework applicable to diverse ecological contexts, including Mediterranean landscapes undergoing environmental transformation.