



Sustainable Environment and the built Space: Integrating Ecology, Planning and Human Well-being

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**THEORETICAL MODELLING OF NEUROREGULATORY EFFECTS OF BIOPHILIC
INTERIOR DESIGN FOR EMOTIONAL WELLBEING**

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Abstract

The relationship between the built interior environment and human neurological functioning represents one of the most consequential yet undertheorized intersections in contemporary design scholarship. This paper develops a theoretical model of the neuroregulatory mechanisms through which biophilic interior design elements, including natural light, organic materials, vegetation, water features, natural patterns, and sensory complexity, modulate emotional wellbeing. Drawing exclusively on existing literature in environmental neuroscience, affective psychology, stress physiology, and biophilic design theory, the study synthesizes and reconceptualizes established frameworks, including the Biophilia Hypothesis, Stress Recovery Theory, Attention Restoration Theory, and neuroarchitectural models of cortical-limbic integration, into a cohesive theoretical schema. The proposed model delineates specific regulatory pathways through which biophilic interior stimuli act upon the hypothalamic-pituitary-adrenal axis, the autonomic nervous system, and limbic structures, particularly the amygdala, hippocampus, and prefrontal cortex, to attenuate stress responses, modulate affect, and foster emotional equilibrium. The paper argues that the interior environment functions as an active neuroregulatory agent rather than a passive spatial backdrop, and that biophilic design variables correspond to identifiable neurochemical and psychophysiological outcomes including cortisol downregulation, parasympathetic activation, and enhanced positive affect. The theoretical model advances a framework for translating neuroscientific principles into actionable interior design guidelines, with implications for residential, healthcare, and workplace environments. This work contributes to bridging the epistemic gap between design practice and neuroscientific theory, establishing a foundation for evidence-informed, emotionally restorative interior environments.

Keywords: Biophilic Interior Design; Neuroregulation; Emotional Wellbeing; Stress Recovery Theory; Attention Restoration Theory; Neuroarchitecture; Affective Neuroscience