

Floating Building Potential for Adaptation to Rising Sea Levels: Development of a Performance Based Building Design Framework

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Abstract : Most of the largest cities in the world are located in areas that are vulnerable to coastal erosion and flooding, both linked to climate change and rising sea levels (RSL). Nevertheless, more and more people are moving to these vulnerable areas as cities keep growing. Architects, engineers and policy makers are called to rethink the way we live and to provide timely and adequate responses not only by investigating measures to improve the urban fabric, but also by developing strategies capable of planning change, exploring unusual and resilient frontiers of living, such as floating architecture. Since the beginning of the 21st century we have seen a dynamic growth of water-based architecture. At the same time, the shortage of land available for urban development also led to reclaim the seabed or to build floating structures. In light of these considerations, time is ripe to consider floating architecture not only as a full-fledged building typology but especially as a full-fledged adaptation solution for RSL. Currently, there is no global international legal framework for urban development on water and there is no structured performance based building design (PBB) approach for floating architecture in most countries, let alone national regulatory systems. Thus, the research intends to identify the technological, morphological, functional, economic, managerial requirements that must be considered in the development of the PBB framework conceived as a meta-design tool. As it is expected that floating urban development is mostly likely to take place as extension of coastal areas, the needs and design criteria are definitely more similar to those of the urban environment than of the offshore industry. Therefore, the identification and categorization of parameters takes the urban-architectural guidelines and regulations as the starting point, taking the missing aspects, such as hydrodynamics, from the offshore and shipping regulatory frameworks. This study is carried out through an evidence-based assessment of performance guidelines and regulatory systems that are effective in different countries around the world addressing on-land and on-water architecture as well as offshore and shipping industries. It involves evidence-based research and logical argumentation methods. Overall, this paper highlights how inhabiting water is not only a viable response to the problem of RSL, thus a resilient frontier for urban development, but also a response to energy insecurity, clean water and food shortages, environmental concerns and urbanization, in line with Blue Economy principles and the Agenda 2030. Moreover, the discipline of architecture is presented as a fertile field for investigating solutions to cope with climate change and its effects on life safety and quality. Future research involves the development of a decision support system as an information tool to guide the user through the decision-making process, emphasizing the logical interaction between the different potential choices, based on the PBB.

Keywords : adaptation measures, floating architecture, performance based building design, resilient architecture, rising sea levels

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