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The Role of Using Natural-Based Solutions in Residential Building Materials for Achieving Sustainable Development Goals

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The rapid population growth rate is associated with an increased number of residential buildings worldwide; thereby, the massive consumption of building materials causes negative environmental consequences such as the depletion of natural resources and rising non-renewable energy use. To address the environmental, societal, and economic challenges, using Nature-based Solutions (NbS) in residential building materials became essential and considered a catalyst tool for realizing sustainable development goals (SDGs) of the UN 2030 agenda. Consequently, using green building materials (GBM) based on NbS as a long-term strategy should be considered during the whole building life cycle for applying sustainability. This research aims to investigate the potential role of using NbS in residential building materials to achieve SDG and develop a framework for assessing and identifying the direct and indirect inner relationships that affect resource efficiency, cost-effectiveness, and building occupants' comfort level. The research attempts to answer how using NbS in residential building materials can contribute to achieving SDG. The eco-friendly approach was used based on a comprehensive literature review to identify the sustainability indicators for using the GBM. The system dynamics (SD) is also used for estimating and quantifying the selected materials through the building life span, starting from the early design stage until demolition and disposal to landfill. The causal loop diagram (CLD) was created based on the data collected from the residential building case study in New Capital Administrative in Egypt after applying the sustainability indicators, followed by critical analysis to identify the realization of the SDGs. The results showed the framework promotes the potential benefits of using NbS in residential building materials. GBM has significantly contributed to achieving several SDG goals and their targets. The study recommended that the selection of alternative materials and the occupant's comfort level deserve more attention from the early design stage and need more consideration.

Keywords, Green Building Materials, Nature-based Solutions, System Dynamic, Sustainable Development Goals, Egypt