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Heritage museum buildings under climate stress: Mapping deterioration across urban and coastal regions

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Abstract

Heritage museum buildings in Malaysia increasingly face environmental stressors, such as high humidity, temperature changes, and heavy rainfall. Many are found in urban centres and coastal zones. Each location brings unique environmental challenges that influence the severity and type of deterioration. These cultural assets are susceptible, underscoring the need to understand how environmental conditions, especially those tied to geographic location, contribute to building degradation. Yet current maintenance often overlooks locationspecific weaknesses, leading to poor conservation outcomes. This study compares environmental deterioration in heritage museum buildings across urban and coastal settings. Condition assessments were conducted at selected museums across multiple states and examined alongside regional temperature and humidity data. A spatial heat map generated in QGIS shows the distribution of deterioration by environmental exposure. The results show that coastal buildings face more moisture, dampness, and mould due to high humidity and salty air. Urban buildings, however, present localized problems like heat retention, pollution stains, and poor ventilation. The analysis demonstrates that environmental stressors, especially humidity and rain, work with location to shape building conditions. The study recommends climate-responsive, location-specific maintenance strategies to preserve heritage assets in the long term. These findings aim to help heritage managers and conservation stakeholders

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