

Vernacular Bioclimatic Principles as a Framework for Sustainable Mass Housing in Algeria Between Heritage and Contemporary Practice

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Abstract

Algeria's post-independence mass housing production, dominated by imported standardized typologies and most notably the French grands ensembles model, has consistently failed to respond to the country's climatic diversity, producing thermally inefficient buildings with high energy demand and low occupant comfort. The disconnect is acute because Algerian territory ranges from a Mediterranean north to a hyper-arid Saharan south, while the public housing programme has applied broadly uniform construction standards across that range. This paper asks whether Algeria's own vernacular tradition offers a transferable framework for climatically adequate mass housing, and what currently prevents that transfer. It proceeds as a comparative review of two bodies of material: published architectural and bioclimatic studies of Algerian vernacular settlements, and the technical regulations governing contemporary housing production. The UNESCO-listed M'zab Valley settlements, established from the tenth century onward, are examined as a documented repertoire of passive cooling strategies, comprising compact urban morphology, narrow shaded streets, courtyard typologies and earth-based thermal mass construction in an environment where summer temperatures exceed 45 degrees Celsius. The Casbah of Algiers, also inscribed as World Heritage, is examined as a Mediterranean counterpart that adapts through introverted courtyard houses, cross-ventilation systems and high-mass construction buffering diurnal temperature fluctuation. From this material the paper identifies three design principles that are physical rather than culturally specific: thermal mass optimization, courtyard-based natural ventilation, and street morphology as solar control. It then examines the Algerian regulatory framework, comprising the Programme National de Construction and the DTR thermal regulations, which address winter heat loss and summer cooling loads through separate instruments, in order to establish whether these principles can be accommodated within contemporary construction constraints. The analysis finds that the regulations classify climate and govern envelope performance but do not require block orientation, street proportion or courtyard provision, so that climatic classification does not reach built form. The findings suggest that improved housing performance in Algeria depends less on imported technological solutions than on a critical reinterpretation of locally validated architectural knowledge and its embedding in procurement criteria. These implications extend to the wider North African and MENA region, where the same tension between standardized production and climatic diversity persists.

Keywords

Vernacular Architecture, Bioclimatic Design, Passive Cooling, Mass Housing, Housing Policy, Thermal Comfort, M'zab Valley, Algeria