

Paper number: 4946

Methods of earth building in the Huila Province, Angola

Wachilala, P.¹, Duarte, I.M.R.² and Pinho, A.B.³

¹University of Évora, School of Science and Technology, Department of Geosciences, MSc in Geological Engineering, Évora, Portugal, email: piedadewachilala@gmail.com

²University of Évora, School of Science and Technology, Department of Geosciences, GeoBioTec Research Centre, Évora, Portugal, email: iduarte@uevora.pt

³University of Évora, School of Science and Technology, Department of Geosciences, GeoBioTec Research Centre, Évora, Portugal, email: apinho@uevora.pt

In Angola, the construction made of raw earth is a cultural heritage widely used by low income households, representing over 80% of the population [1, 3]. In Huila province is evident construction in raw earth in a large scale, either in urban or in periurban and rural areas. The construction methods follow the ancestral standards, distributed throughout the region of Huila, being built by the several ethnic groups. Among the construction techniques in earth, stand out: the adobe, wattle-and-daub and more recently on CEB (Compressed Earth Block). The type of soil used to make the adobes is mainly silty-clayed sand [1].



Figure 1: Traditional housing in the province of Huila, Angola.

The most applied materials are: rods, reeds, wood, grass, straw, soil and stone, almost with the same characteristics [2]. The manufacture of adobe, consists essentially in mixing clay and grass (plant fibers), then put the mixture inside a wooden mold, having a size of 42 cm long and 18 cm high and taking three to four days to dry and be applied in housing construction.

The application of these materials makes the construction less expensive because they are collected, transformed and applied by the owner himself of housing without any project, based only on the result of the practice and experience acquired from their ancestors. They are simple constructions, presenting a typology of grouped and isolated single-family housing, ranging between 2 and 3 bedrooms [2]. The construction techniques used in such small housings have positive environmental aspects, both as regards the materials employed, such as the manner in which the constructions are raised, showing special concerns for the quality improvement of them, as regards the resistance, durability and comfort [4].

Acknowledgments: To FCT for funding the research grant with reference SFRH/BSAB/113791/2015 and the Project with reference UID/GEO/04035/2013.

References:

- [1] Duarte I, Pedro E, Varum H, Mirão J and Pinho A (2015) Bull Eng Geol Environ doi 10.1007/s10064-015-0800-3, ISSN 1435-9529
- [2] Guedes M. C. (2009). *Arquitetura sustentável em Angola. Manual de Boas Práticas*. Universidade de Aveiro: 19-25.
- [3] Pedro E, Duarte I and Varum H (2014) In: *A Engenharia como motor para a Inovação e o Desenvolvimento*: LusolImpress S.A., Ref (in CD-ROM) CLME'2014_A103565, 9 p], ISBN: 978-989-98832-1-5
- [4] Pedro E, Duarte I, Varum H and Pinho A (2015) *Preservation of Cultural Heritage* 8 (54): 311-316