

Impact Of Anthropogenic Pressures On The Water Quality Of Hammams In The Municipality Of Dar Bouazza, Morocco

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Abstract : Public baths or hammams play an essential role in the Moroccan urban and peri-urban fabric, constituting part of the cultural heritage. Urbanization in Morocco has led to a significant increase in the number of these traditional hammams: between 6,000 and 15,000 units (to be updated) operate with a traditional heating system. Numerous studies on energy consumption indicate that a hammam consumes between 60 and 120m³ of water and one to two tons of wood per day. On average, one ton of wood costs 650 Moroccan dirhams (approximately 60 Euros), resulting in a daily fuel cost of around 1300 Moroccan dirhams (about 120 Euros). These high consumptions result in significant environmental nuisances generated by: Wastewater: in the case of hammams located on the outskirts of Casablanca, such as our study area, the Municipality of Dar Bouazza, most of these waters are directly discharged into the receiving environment without prior treatment because they are not connected to the sanitation network. Emissions of black smoke and ashes produced by the often incomplete combustion of wood. Reducing the liquid and gas emissions generated by these hammams thus poses an environmental and sustainable development challenge that needs to be addressed. In this context, we initiated the Eco-hammam project with the objective of implementing innovative and locally adapted solutions to limit the negative impacts of hammams on the environment and reduce water and wood energy consumption. This involves treating and reusing wastewater through a compact system with heat recovery and using alternative energy sources to increase and enhance the energy efficiency of these traditional hammams. To achieve this, on-site surveys of hammams in the Dar Bouazza Municipality and the application of statistical approaches to the results of the physico-chemical and bacteriological characterization of incoming and outgoing water from these units were conducted. This allowed us to establish an environmental diagnosis of these entities. In conclusion, the analysis of well water used by Dar Bouazza's hammams revealed the presence of certain parameters that could be hazardous to public health, such as total germs, total coliforms, sulfite-reducing spores, chromium, nickel, and nitrates. Therefore, this work primarily focuses on prospecting upstream of our study area to verify if other sources of pollution influence the quality of well water.

Keywords : public baths, hammams, cultural heritage, urbanization, water consumption, wood consumption, environmental nuisances, wastewater, environmental challenge, sustainable development, Eco-hammam project, innovative solutions, local adaptation, negative impacts, water conservation, wastewater treatment, heat recovery, alternative energy sources, on-site surveys, Dar Bouazza Municipality, statistical approaches, physico-chemical characterization, bacteriological characterization, environmental diagnosis, well water analysis, public health, pollution sources, well water quality

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