

# MECHANISMS FOR NATURAL VENTILATION IN THE ALLAH BUKSH SETHI HAVELI, Mohallah Sethian, Peshawar, Pakistan

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## ABSTRACT

In the 21<sup>st</sup> century, there has been a rapid degradation of the environment due to emissions of large quantities of CO<sub>2</sub> and green house gases, produced by the burning of fossil fuels in order to provide thermal comfort to buildings. This has led to the concept of 'Sustainable Architecture', which works in harmony with nature and natural forces (sun-light, wind etc.) to create buildings that aim at minimizing consumption and preventing the depletion of natural resources. Sustainability requires that human activity exploits nature's resources only at a rate at which they can be replenished naturally. In the context of Pakistan, our current practices in architecture are based on western solutions to requirements of comfort provision, leading to a growing dependence on fossil fuels, and resulting in rapid environmental degradation. Rapoport (1969) states that modern solutions to climatic problems often do not work, and homes are made bearable by mechanical means whose cost sometimes exceeds that of the building shell!

Before western ideals were imported to create architecture within the local context, indigenous architecture made a conscious effort to balance the natural environment with human habitation and lifestyles. Indigenous buildings collaborated with nature to give comfort (Rapoport, 1969).

In this paper the climate responsiveness and appropriateness of the Sethi Haveli, Peshawar, are analyzed in order to understand indigenous responses to the issues of sustainable thermal comfort. The paper focuses on the natural ventilation methods employed in the Allah Buksh Sethi Haveli and in particular the basements of the haveli, in order to understand how natural, renewable sources of energy produce comfortable yet sustainable environments. The design of these basements and their inlet and outlet ducts in particular, together with other mechanisms, promotes natural ventilation, and provides thermal comfort during the hot summer season.

**Keywords:** *sustainable architecture, Sethi Haveli, indigenous architecture, natural ventilation, thermal comfort*

## 1. INTRODUCTION

There is a growing demand for space cooling in the hot climate of Pakistan, resulting in an ever-increasing demand for energy. At the same time there has been a steady decline in the production and supply of that much needed energy. The National Energy Conservation Centre (ENERCON) predicted this shortfall as early as 1990, but the rapid pace of urbanization and the resultant energy shortfall has surpassed all estimates. In the heat of Pakistan's long summers, most buildings are dependent on air-conditioning systems which are run on electricity produced by burning fossil fuels. The burning of fossil fuels results in the production of CO<sub>2</sub> and greenhouse gases.

The concept of sustainability took shape when the usage of fossil fuels began to adversely affect the environment. In literature, the seminal book 'Silent Spring' (Carson, 1962) was the first attempt to understand man's irreversible damage to the environment. The early ecological movements of the twentieth century had a great impact on formulating today's concept of sustainability (Keeler & Burke, 2009). The 1984 Brundtland conference in Geneva consolidated the concept of 'sustainable development'. The building industry followed this lead with the development of the American Institute of Architects (A.I.A.) Committee on the Environment (COTE), with the understanding that buildings are clearly responsible for an enormous burden placed on the environment. Sustainable architecture builds on the concepts of sustainability to create buildings that work in harmony with nature and natural forces (sunlight, wind, etc.) to minimize consumption of natural resources and their subsequent depletion (World Resources Institute; Dimensions of Sustainable Development, 1992).

Sustainable architecture involves a holistic approach to the design of buildings. All the resources that go into a building (materials, fuels, or the contribution of the users) need to be part of an overall whole. The design of buildings involves resolving many conflicting issues and requirements: issues of ecology, economy and human well-being. Each design