

## INVESTIGATION AND EVALUATION OF FIREWOOD CONSUMPTION IN TRADITIONAL HOUSES IN NEPAL

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### ABSTRACT

Firewood consumption and air temperature were investigated in winter and summer in traditional houses in the Banke, Bhaktapur, Dhading, Kaski and Solukhumbu districts of Nepal. The firewood consumption rate was 235-1130kg/capita/year. The results showed that the temperate climate used less firewood than the sub-tropical climate. The indoor and outdoor temperature difference (7.8°C), the vertical temperature difference (7.1°C) and maximum indoor air temperature (42°C) were most significant in the kitchen. The results demonstrated a waste of energy in winter and an uncomfortable thermal environment in summer. If thermal storage on the wall were introduced as well as airtight openings and improvements in fireplaces, we could reduce the usage of firewood, and the thermal and air environment would be improved.

### INDEX TERMS

Firewood, Energy, Thermal environment, Regional difference, Nepal

### INTRODUCTION

In rural areas of Nepal firewood is a main source of energy for cooking, heating and lighting. In the past, firewood was abundant and it could be easily collected in the vicinity of the villages. However, collecting firewood is becoming more difficult due to overuse and the shrinking of forest areas. Therefore, a reduction of firewood consumption is presently one of the most important issues in Nepal. Another important issue is the improvement of the thermal environment and of air quality. In Nepal, firewood is burned in an open fireplace, is very energy inefficient and creates high indoor air temperatures and low indoor air quality. In Nepal, there have been a few studies conducted on firewood consumption and indoor air quality (Fox, 1984, Davidson *et al.*, 1986, Pandey *et al.*, 1990), but, no such research has been found on the thermal environment in relation to firewood consumption. In this research we focus on energy consumption and the thermal environment in terms of firewood usage. We try to quantify these elements by considering the regional and seasonal differences of Nepal. In the future, we also plan to measure the indoor air quality.

In order to evaluate and improve the energy consumption and thermal environment in the traditional houses of the 5 districts of Nepal, the firewood consumption rates and air temperatures were measured and investigated in winter and summer. The objectives of this research are: 1) to estimate the energy consumption, such as firewood consumption for cooking and heating and 2) to measure the relationship between firewood consumption and the thermal environment, such as indoor and outdoor temperature differences, and the vertical temperature differences in the kitchen.

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