

Introduction

Background

Fuelwood is the principal source of energy in the Himachal Pradesh hills of India. Electricity is widely used mostly for lighting. Considering the vast hydroelectric potential of the State, electricity is a promising alternative source of energy for cooking, lighting, and space heating. This report presents the findings of a case study on energy planning in the Kulu District of the Himachal Pradesh Province of India.

Objectives of the Study

The major objective of this study is to analyse issues in energy use and planning in the Kulu District of Himachal Pradesh. The specific objectives are as follows:

- (i) to identify energy resources and the use of various energy forms in the district,
- (ii) to analyse the energy consumption pattern in the district, and
- (iii) to estimate biomass requirements for the district to meet fuel consumption needs.

Methodology

This study uses both secondary and primary sources of data. Secondary sources were used to collect information on population, social infrastructure, land use patterns, cropping patterns, agricultural productivity, livestock holdings, physical resources, and data on the consumption of energy. These sources included the district census handbook, village index cards, survey maps, and official data from government departments.

A survey of 10 selected villages was undertaken to collect data on energy consumption and energy resources and their use patterns. The distance of the village from the road and the river formed the basis for the selection of villages. Out of these 10 villages, four were identified for intensive study. Structured questionnaires were administered to collect specific information on energy such as the level of consumption of biomass (fodder and fuel), electricity, and other sources of energy; distance travelled to procure biomass; recycling of waste to produce energy; and knowledge about alternative technology. The survey also gathered information on important economic variables including location of agricultural land, volume of agricultural produce, livestock, seasonal employment, handicraft manufacture, and household income and expenditure patterns.

In addition to completing the questionnaires, notes were taken during the survey on the following factors: distribution of population within village systems with particular emphasis on the relationship of agricultural land and dwelling units; relationship of the village to the surrounding environment, particularly forest land; orientation of the village in relation to sun and wind; slope characteristics; techniques of constructing buildings; and building typology affecting energy consumption.

On the basis of the survey, the study formulated a stress matrix to demonstrate the levels of stress in the surveyed villages with a view to identifying priority areas of action. The stress matrix was formed by adding the various stress factors relating to facilities such as location, education, health, food, fodder, and fuel. Different weights were assigned to denote various levels of stress relating to these factors. The

higher the total score, the greater is the stress of the village with respect to the factor under consideration. A comparison of total scores of surveyed villages helped in identifying areas for improvement.

Introduction to the Study Area

Kulu is one of the 12 districts of the mountainous State of Himachal Pradesh in Northern India. Physiographically, the State can be broadly divided into three regions: (i) The Outer Himalayas, (ii) the Inner Himalayas, and (iii) the Alpine Pastures. The annual average rainfall varies from 1,520 mm to 1,780 mm, in the Outer Himalayan Region, and from 780 mm to 1,020 mm in the Inner Himalayas. The Alpine Region is snow bound for 8 to 10 months of the year. Human settlements have concentrated in the river valleys and on mountain slopes up to 3,000 m a.s.l. above mean sea level (m.s.l.).

The State covers an area of 55,673 sq km. For administrative purpose, each district is divided into *tehsils* (sub-districts) and sub-*tehsils*. In 1981, it had a population of 4,280,818, with a population density of 77/km².

The road service in Himachal Pradesh is poor. The only railway system is a narrow gauge connection from Kalka to Shimla. The rest of the State is connected by two highways with limited vehicular capacity.

The State is predominantly rural. The proportion of urban to rural population in Himachal Pradesh is 7.61:92.39 compared to 23.7:76.29 for India as a whole. The majority of villages in the State are in the 200 to 500 population bracket.

Kulu District. The district of Kulu approximates the State average in terms of rural-urban population ratio and the average growth rate of population. The district is located centrally in the State and presents a wide variation of altitudes, similar to districts in the rest of the State. Thus, Kulu can be considered as a truly representative district for this study.

The district forms the transitional zone between the Lesser and Greater Himalayas. The altitude varies from 1,300 m to 6,000 m a.s.l. Broadly, the district can be divided into three distinct regions: (i) glaciated--north and north-east, (ii) rugged mountains--central part, (iii) gentle slopes--north-west and south-west parts.

The majority of settlements are located in the north-western and southern parts. The valleys of two major rivers (Beas and Sutlej) constitute the major settlement basin of the district. Kulu covers an area of 5,503 sq km. The district is divided into four *tehsils* with 169 villages and three towns. The villages are of various population sizes, ranging from less than 500 people to more than 4,000 people. In 1981 the district had a population of 238,734.

Socioeconomic Profile

The literacy rate of the district is 33.82 per cent, and that is lower than the State average. The urban literacy rate is 70 per cent compared to 31 per cent for rural areas. The economy is basically agrarian with 79 per cent of the population dependent upon agriculture. Because of the hilly topography only 7.45 per cent of the total area in the district is cultivable. Wheat, maize, paddy, and barley are the major cereal crops grown in the district. Diverse agroclimatic conditions provide the potential for growing cash crops such as pulses, potatoes, and fruits.

Livestock is the next most important source of income in the area. The livestock population has increased in Kulu at an annual rate of 1.5 per cent over the past few years. Cattle, buffalo, sheep, goats, pigs, and ponies are the important types of animals reared for food, ploughing, transportation, and wool. Kulu produces a sizeable amount of different varieties of fruits. About 14.5 per cent of the total land in the district is devoted to horticulture. The district has some small-scale industries dealing in shawl-making, carpet-weaving, and knitting.

Transportation and Communications

The road system is the most important form of transportation in the district. The road network serves about half of the villages. However, most of these villages are linked by fair weather roads and accessibility is limited during rainy and winter seasons.

Social Infrastructure

All villages in the district have one or more sources of drinking water supply. More than 80 per cent of villages have more than one source of water supply. Almost all villages have primary schools, 45 per cent have lower secondary schools, and 14 per cent have higher secondary schools. However, only 54 per cent of the villages have access to primary medical facilities. Only the district headquarters has a hospital and very few private medical practitioners, maternity homes, and child welfare centers are available in the district.

In 1981, roughly 70 per cent of the total villages with nearly 79 per cent of the total population had access to electricity supply. In most villages with power supply, electricity is used for domestic, industrial, and commercial purposes. Very few villages (about 8%) use electricity for agricultural purposes. About 60 per cent of the villages have postage and telegraphic facilities in the district.