

INTRODUCTION

Background

The most important sources of energy in rural Bhutan are draft power for farming and fuelwood for domestic cooking and heating. Electricity is widely used in accessible areas, mostly for lighting. Non-renewable sources of energy, such as coal and petroleum products, are also used to some extent. Alternative sources of energy, such as solar power, wind power, and biogas, are also being promoted in the country. This report presents the findings of a case study on energy planning and management in the Thimpu District of Bhutan.

Objectives

The major objective of the study is to document the energy use pattern in Thimpu District and to suggest ways to improve the rural energy supply. The specific objectives of the study are stated below.

- o To analyse the energy consumption patterns in Thimpu District.
- o To assess the electricity supply situation and prospects for grid expansion.
- o To assess fuelwood supply and demand in the district.
- o To evaluate the potential for the development of alternative sources of energy.
- o To identify options for the development of renewable energy sources.

Methodology

This study uses both primary and secondary sources of data. In order to analyse the energy consumption patterns in the district, a survey of 164 households was undertaken in five blocks (sub-districts) representing two of the three agroecological zones. Ten per cent of the total households in each block were randomly selected for interview to collect information. The consumption pattern in the selected blocks in the third zone had to be assessed by a key informant survey because of the lack of accessibility and because of time constraint. Secondary data relating to the supply of various energy sources and demand assessments were collected from government departments and corporations.

Introduction to the Study Area

Thimpu District (*dzongkhag*), lying in the catchment of the Thimpu River, consists of ten blocks (*gewogs*) with a total population of 58,600. It has three agro-ecological zones: alpine, temperate, and subtropical. The temperate and subtropical zones contain 96 per cent of the total population of the district. The people of the alpine areas are nomadic herders who move into temperate and subtropical areas during the winter months and remain in the alpine areas during summer.

Agro-ecological Zones

Alpine Zone. The alpine zone consists of four blocks with a total population of 3,026, as of 1987. The major economic activity of this zone is animal husbandry, as the high altitude (4,000 m and above) and rocky terrain permit limited cultivation of potato, turnip, and barley. Animal husbandry focusses primarily on yak rearing for manure, draft power, butter, and cheese. Trading ties with areas at lower elevations and the winter migration of cattle make the people of these blocks nomadic. Trade mainly consists of exchanges of yak by-products such as butter, cheese, wool, and meat for clothes and food supplies like rice, salt, chillies, etc.

Although climatological data for this zone are not available, the climate is characterised by a very long dry period, a long period of frost (3-6 months), and perpetual snow above the snowline (4,800-5,000 m). The area is environmentally fragile with vegetation consisting of scrubs, grasslands, stunted rhododendrons, juniper, and some fir forests at lower altitudes.

Temperate Zone. The temperate zone consist of four of the ten blocks of the district with a total population of 21,604 in 1987. Agriculture is the main economic activity in this zone. Paddy and wheat are the major cereal crops and apples and potatoes are the important cash crops grown in the area. The farmers of this zone have adopted modern agricultural technology such as improved tools and equipment, fertiliser, and pesticides. Cattle are reared in this zone for manure, draft purposes, butter, and cheese. The animals migrate to the eastern region during the winter months.

The mean annual rainfall in the temperate zone varies from 1,000 to 2,000mm and the number of rainy days ranges between 100 and 120 days. The annual mean temperature is 10 degrees C and the dry season lasts for four to six months. Dense evergreen oak, blue pine, grasslands, coniferous forests, and bamboo groves are found in the area.

Subtropical Zone. This zone consists of two blocks with a total population of 8,668. Agriculture and animal husbandry are the main occupations of the people in this area. Agriculture is practised on hillside terraces with shifting cultivation. Paddy, maize, and wheat are the major foodgrain crops grown in this zone.

The mean annual rainfall in this zone is less than 2,000mm. The number of rainy days ranges between 100 and 150 and the duration of the dry season is 3 to 5 months. The mean annual temperature is between 15 and 20 degrees C. The vegetation consists of dense evergreen and semi-evergreen forests, open woodland, and degraded forests.

Institutions and Administration

District Administration System. The Fifth Five Year Plan (1982-1987) of Bhutan has laid down a firm foundation for district planning and management through the implementation of five major policies: (i) district self reliance, (ii) decentralisation of development administration, (iii) control of maintenance expenditure, (iv) people's participation, and (v) mobilisation of internal resources.

As a part of the *Dzongkhag* self-reliance policy, a certain degree of capability in district planning and implementation has been achieved. The preparation of detailed individual *Dzongkhag* plans has facilitated the incorporation of more realistic local level needs and development programmes based on the potential of the district. The devolution of the responsibilities of planning and implementation of development programmes at the *Dzongkhag* level has necessitated the strengthening of decentralised development administration. People's participation in community and public works has been a longstanding Bhutanese tradition, but has been increasingly undermined in the development programmes undertaken by the Government.

Institutions for District Energy Development

The *Dzongkhag* set-up has a Technical Services' Division for the implementation of programmes related to agriculture and irrigation, animal husbandry, health, primary education, rural water supply, etc. However, power, forests, science and technology, and urban development are not represented in this

Division. Some functions relating to these are entrusted to the *Dzongkhag* administration. For example, in the forestry sector, the district administration is given the responsibility of seedling distribution, afforestation, and forest fire control.

Socioeconomic Infrastructure and Services

Education. Thimpu District has nine primary schools, two junior high schools, and two high schools. Primary schools are run by the *Dzongkhag* administration whereas junior high and high schools are administered by the Department of Education. Education is free to all Bhutanese citizens up to the Bachelor's level. There are also a number of monastic schools in Thimpu which impart education in Buddhist studies, painting, and sculpture. These schools are run by the Special Commission for Cultural Affairs.

Health. Health services are provided free of cost by three levels of health facilities available in the district: hospitals, basic health units, and dispensaries. Hospitals provide comprehensive health services whereas basic health units provide clinical services, immunisations, emergency services, first aid, and disease investigation services. Dispensaries provide clinical and emergency services and are responsible for alerting district health authorities about epidemics.

Agriculture. Agricultural extension offices provide subsidies for soil conservation works and for the improvement of local manure resources. There are two government farms, one specialising in research and the commercial cultivation of apples and potatoes and the other specialising in mushroom research and vegetable cultivation. Four veterinary service centres located in the district provide free services such as vaccination, deworming, general treatment, and breeding.

Transportation and Communication. The motorable road network is limited to the main valleys whereas many areas of the district depend on mule paths and suspension bridges as means of access to other areas. District roads built by the Logging Corporation of Bhutan extend to some forest areas of the district. Since the capital city of Bhutan is located in this district, it has good telecommunication facilities. Six of the ten blocks of Thimpu District have limited telecommunication facilities. Branch post offices are located in some remote areas.