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RESEARCH WORKING PAPER NO 3.

SOCIO-ECONOMIC ANALYSIS OF THE EFFECTS FROM THE KULEKHANI HYDRO-ELECTRIC PROJECT, NEPAL

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PREFACE

No analysis can be better than the quality of the facts and figures on which it is based. The data-selection in the case of the socio-economic impact from the Kulekhani Hydro-electric Project, was influenced by the author's general knowledge about Nepal through the last six years and particular working hypotheses presented in Research Working Paper no 1 (Bjønness 1982).

It must be underlined that the datas are drawn out of a multitude of possible alternatives. This can be used as a criticism towards the paper as well. Moreover, it should be mentioned that the author has found the work with this topic extremely challenging.

Any comments, contributions and / or criticism to the approach and conclusions in the paper are wellcome. Opinions expressed in this document are those of the author and do not necessarily coincide with the views of the Nepal MAB Committee or His Majety's Government (HMG) Administrative Section of the Kulekhani Hydro-electric Project in Kulekhani.

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The work is challenging and I am most grateful to Dr Ratna S.J.B. Rana, who personally took the initiative to this study. As a geographer himself, he is interested in the prosperity for Nepal and her future in developing her hydro-electricity.

Dr Chranjeevi L.Shrestha has given most valuable support, for the progress of this work. Member secretary Prof. Suresh R. Chalise has generously given time to assist the project in the most helpful way.

This study would not have been complete without the many HMG bodies and contact persons who have contributed to the results with their valuable time. My serious thanks goes to: Ministry of Electricity, Topographic Survey Branch and the HMG Project Administration Section in Kulekhani. My thanks goes to Project Manager in Charge, Mr S.N. Pradhan, Deputy Project Manager in Charge, Mr K.C Thakur, Chief geologist, Mr D.B. Thapa, Chief Administration officer, Mr H.K. Singh and Section officer, Mr R.P Adhikari. They all generously contributed with their valuable time in discussions.

My thanks goes to the important contributions made by all Pradhan Panchas in the Kulekhani watershed. In particular I am most grateful for the encouraging team, lead by Mr Uttam P Uphadhyay together with Mr B.P Dhakal and Mr B.P Manandhar who participated in two surveys and Mr K.P.Ghimire, Mr G.D. Rana, Mr L.N. Neupane and Mr S.K.Shrestha who all participated in one survey each.

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SUMMARY

This study: Socio-economic Analysis of the Effects from the Kulekhani Hydro-electric Project has a survey sample of 224 households from Kulekhani watershed. These households included 1729 persons and covered all ethnic groups.

The HMG Department of Electricity, Administration Section was responsible for landrequisition, resettlement and compensation to the affected households in the watershed. According to the HMG Administration could the affected locals of approximately 500 households choose between:
a resettlement in Thori in Bara district for lost land or
b compensation in money.
Most of the households choose the latter and there was a massive out-migration to Hetauda and other places after the construction started. The compensation problems are always difficult to deal with, and an important question is how much should the compensation include:
1 only market price for land or
2 compensation for other lost resources in local society?

The chapter 2, includes also an analysis of the landrequisition and compensation experienced by the investigated households. 39 households were directly affected and most of them had lost land and houses. The compensation rate given to them ranged from some few hundred rupees to several thousands. However, there seem to be difficult for many of them to obtain the same or similar living conditions and access to resources as before. Loss of land and houses affected them directly, while there were several resources lost in local society which were indirectly felt and for which there were given no compensation. The problems connected with definitions of what the different resources are is included in the chapter.

Chapter 3 is the analyses of skilled and unskilled work at the Kulekhani Hydro-electric Project. The high-technology project required approximately 2.000 skilled and unskilled labourers at any one time during the peak periods. The ratio between skilled and unskilled labourers was 2:1.
The contractors claimed that the unskilled labourers were an unstable group, however, the analysis showed that the project managed to keep an even labourforce Fig 8, in spite of obstacles as oil-shortage, monsoon and agricultural seasons. On the other hand did the labourers claim that it was difficult to get work at the construction sites. Unskilled labourers were not employed on long terms, only on a daily basis, and this fact created naturally uncertainties among them.

Skilled labourers on the other hand, had good working opportunities they were hired for at least a month and their wages were fairly good. In order to recruit labourers, the Company established a training school for skilled labourers. This was a beneficial establishment, as it is difficult to obtain relevant education in Nepal.

Accumulated knowlege is important on all levels. It is recommended that the HMG's Administation Section in Kulekhani should report their experiences and problems and how they were solved on the
- administrative
- management
- technological levels.
As this type of knowlege is beneficial for similar projects in other parts of Nepal. Only through evaluation is it possible to improve the pracsis. However, there should be two levels of evaluation:
1 Accumulation of knowledge by employed staff.
2 Systematic evaluation made by an external evaluation team.
The Administrative Section should not participate in the second category nor should the latter participate in the first. The information should be considered through independent evaluation.

The analysis of the participation in construction work among the locals showed that previously there were far more unskilled labourers than today. While the skilled labourers participate according to the Pradhan Panchas as before.

The participation rate differs considerably among females and males. The first group participated in the beginning of the construction phase, however, some cultural problems arose and the females are today relatively few. Male participation is, on the other hand, relatively large. 9.6 per cent of the males participated in temporary or permanent work last year. In geographical terms, the participation from the areas close to the construction sites are overwhelming. It can be concluded that geographical distance explains a high participation on the construction sites.

There is a significant difference between ethnic groups concerning skilled and unskilled work. The skilled work is mainly done by the ethnic groups higher in the caste hirarchy, and the Chettries and Newars dominate relative to the number of persons in different ethnic groups. Unskilled work, on the other hand, is done by all ethnic groups and the figures found correspond closely to the distribution of persons in different ethnic groups.

An estimate of the total man-years at the project for the whole watershed is based on the figures found for the 224 households. If the preconditions are approximately right the participation rate show that 40.4 per cent of all man-years was done by labourers from Kulekhani watershed.

Chapter 4 is an analysis of participation in traditional work in the watershed. It is obvious that possibilities to work in traditional skills, compete with the work at the construction site. Traditional work is extensively combined with subsistence agriculture. That is skilled work either done as an ethnic profession or as a speciality usually exchanged by kind or a general work as hired labour in agriculture. These skills are meant to cover local needs usually paid for in kind or local commercial needs paid for in cash.

The most striking result is the degree of participation. Only 16.1 per cent did agriculture without any additional income.

The majority, 57 per cent, combined

agriculture with traditional work, while the rest combined all three professions.

The importance of traditional work in local society must be underlined. The traditional skill could also be used directly in construction work at the different sites or indirectly for the 2000 persons working at the project at any one time.

Chapter 5 highlight the different changes taking place in Kulekhani watershed during the construction phases. Some of these changes are directly caused by the precence of the project, as the higher prices on basic commodities and the creation of higher prices on land. However, other changes are caused by the developement processes itself, and are difficult to isolate from the other.

Food and problems connected with production of agriculture were the most seriously felt problems. Of the investigated households 9 reported that they were spending the compensation money for survival. In other words, there are some housholds caught in the poverty circle, and who can not manage to invest their compensation in productive means.

On the other hand, there will always be some who can produce a surplus to be sold in the local market. (This will be treated more in dept in Research Working Paper no 4).

The impact from the project is felt differently, depending on the localization of the different Panchayats. The upstream, Daman, Palung and Thachok/Tistung Panchayats are unaffected by the construction and impact from the project. The downstream Sisneri Panchayat is heavily affected, as it has permanantly lost several resources as water for household-and agricultural usage. This implies also that the river is dry and creats serious problems for the population. The Kulekhani Panchayat is also affected, however, they have partly got some of their problems solved due to compensation for lost land and houses. In this Panchayat there are after all some serious environmental problems connected with the reservoir itself which have to be solved.

1 SOCIO-ECONOMIC ANALYSIS OF THE EFFECTS FROM THE KULEKHANI HYDRO-ELECTRIC PROJECT

INTRODUCTION

Water plays a central role in daily life in Nepal. Beyond questions of improved drinking water and sanitation there are issues involving water, that are of immense consequence to future economic growth, social improvement and present environmental degradation in the Himalaya.

- Irrigation and
- development of hydro-electricity

are the two major concerns in Nepal, whereby the latter will be discussed here.

The seriousness of energy matters in general and hydro-electricity in special can be underlined with the facts that:

> "Nepal's present per capita electricity consumption is low in comparison with other developing countries and only 4 per cent of the total population is using hydroelectric power. Ratna Shumshere Rana, vice-chairman of the Planning Commission, said that out of total energy consumption in Nepal more than 85 per cent is provided by fuel-wood, 6 per cent by petrol and 1 per cent by hydro-electric power" (Far Eastern Economic Review, 1983).

In other words the consumption of commercial energy is low. Up to the fulfilment of Kulekhani Hydro-electric Project there was relatively limited commercial energy available for the industrial sector. However, by the end of 1982, "the overall situation has improved largely due to an increase in the supply of power following the completion of the 60.000 kv. US$ 124 million Kulekhani Hydro-electric Project" (Far Eastern Economic Review, 1983).

The first phase of Kulekhani Hydro-electric Project was completed by the end of November 1982. The second Kulekhani Hydro-electric Project was initiated in 1982 and is calculated to produce 30 mw.

These two projects are, however, relatively modest in size. Nepal has taken initiative to discuss with the World Bank and India about the proposed Karnali project with the capacity of 3.600 mw.

This is an extremely large project situated in remote areas in far West Nepal.

The land area to be inundated is 10 km^2, which means that 10.000 people living in the area have to be resettled (UNDP/Norconsult 1977).

As can be seen from the above development schemes of hydro-electricity, the scale of existing and proposed projects imply that there will be several effects and aspects involved in the energy matters from policy, planning, development ideology (Bjønness 1983), and not to be forgotten the everyday realities in a subsistence local society, who after all will experience the development of hydro-electricity.

1.1 Objectives and aims of the socio-economic study

This report analyses social and economic perspectives, problems and consequences involved in local society, when the development of Kulekhani Hydro-electric Project took place in Nepal (Figures 1 and 2).

It is not the intention of the report to deal with all types of impact involved in these processes, but to isolate some selected parametres which are intended to explain the main factors and reasons for change in the watershed. As the Kulekhani Hydro-electric Project brought about changes unknown to the Nepalese society, its impact was heavily felt by the 2.100 persons who had to relocate in the Terai area or in the watershed. Similarly the locals also felt the impact from the project as their day to day situation was affected either directly through new working opportunities or lack of the same or through indirect factors as higher pressures on local resources as food and other commodities.

The ultimate objective of this study is to:

Identify and analyse the socio-economic impact from the project on "old" and relocated households, their land use practise (improvement, investment) coverage of basic human needs and the migration from the watershed.

The aims of study in the phase T_{1-2} are to:

(i) Identify and analyse the different ethic groups possibilities for skilled and unskilled work at the project, and to what extent they participitate in permanent or temporary work.

(ii) Identify and analyse the different ethnic groups use of
- compensation for land requisition
- income from work on dam construction
- other income from traditional work,

in order to cover basic human needs.

(iii) Identify and analyse impact from the project during construction periods and impact from the overall development process.

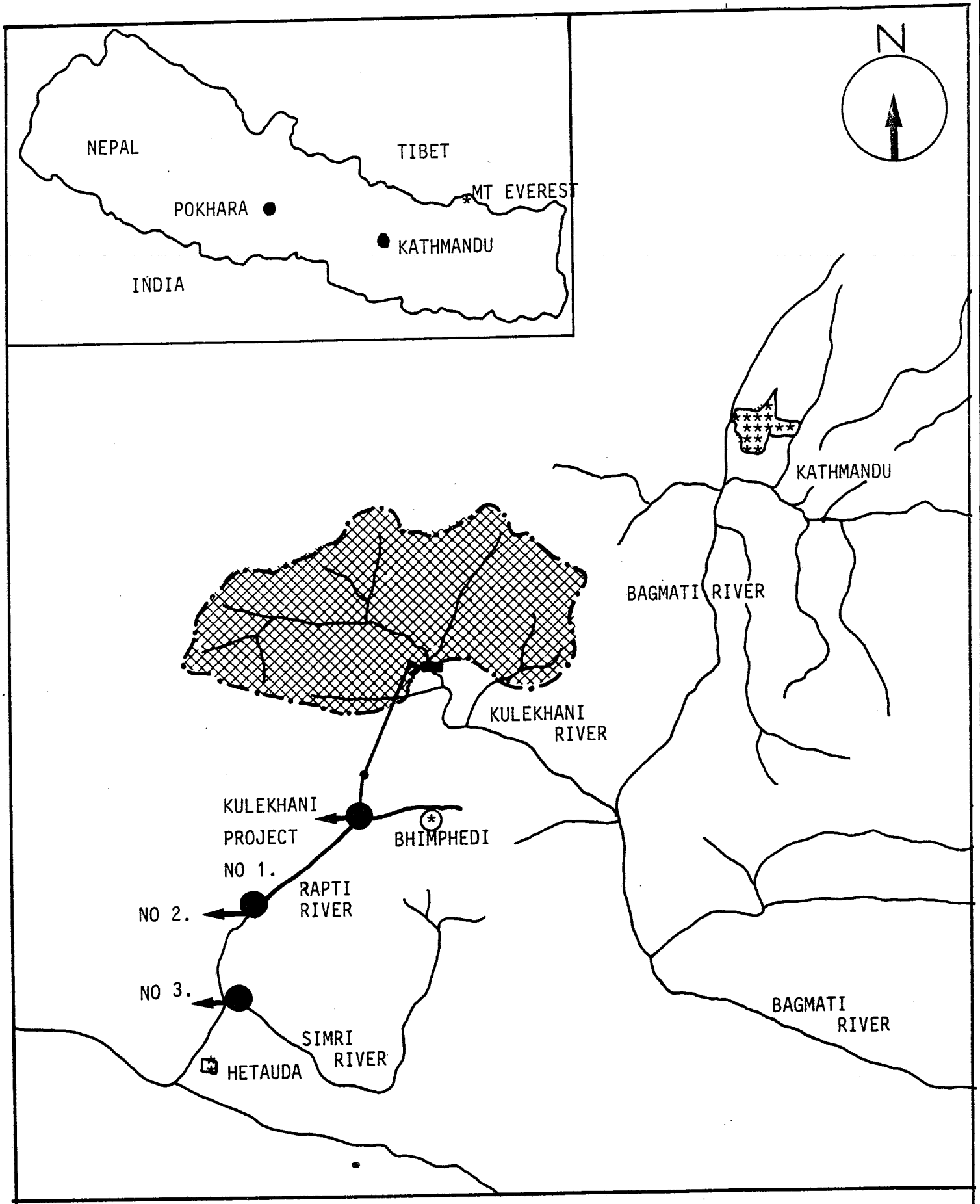

FIG 1 LOCATION MAP OF NEPAL AND THE KULEKHANI WATERSHED. THE KULEKHANI HYDRO-ELECTRIC PROJECT NO 1, 2 AND 3 ARE SHOWN. THE WATER FROM KULEKHANI RIVER IS DIVERTED TO THE RAPTI RIVER

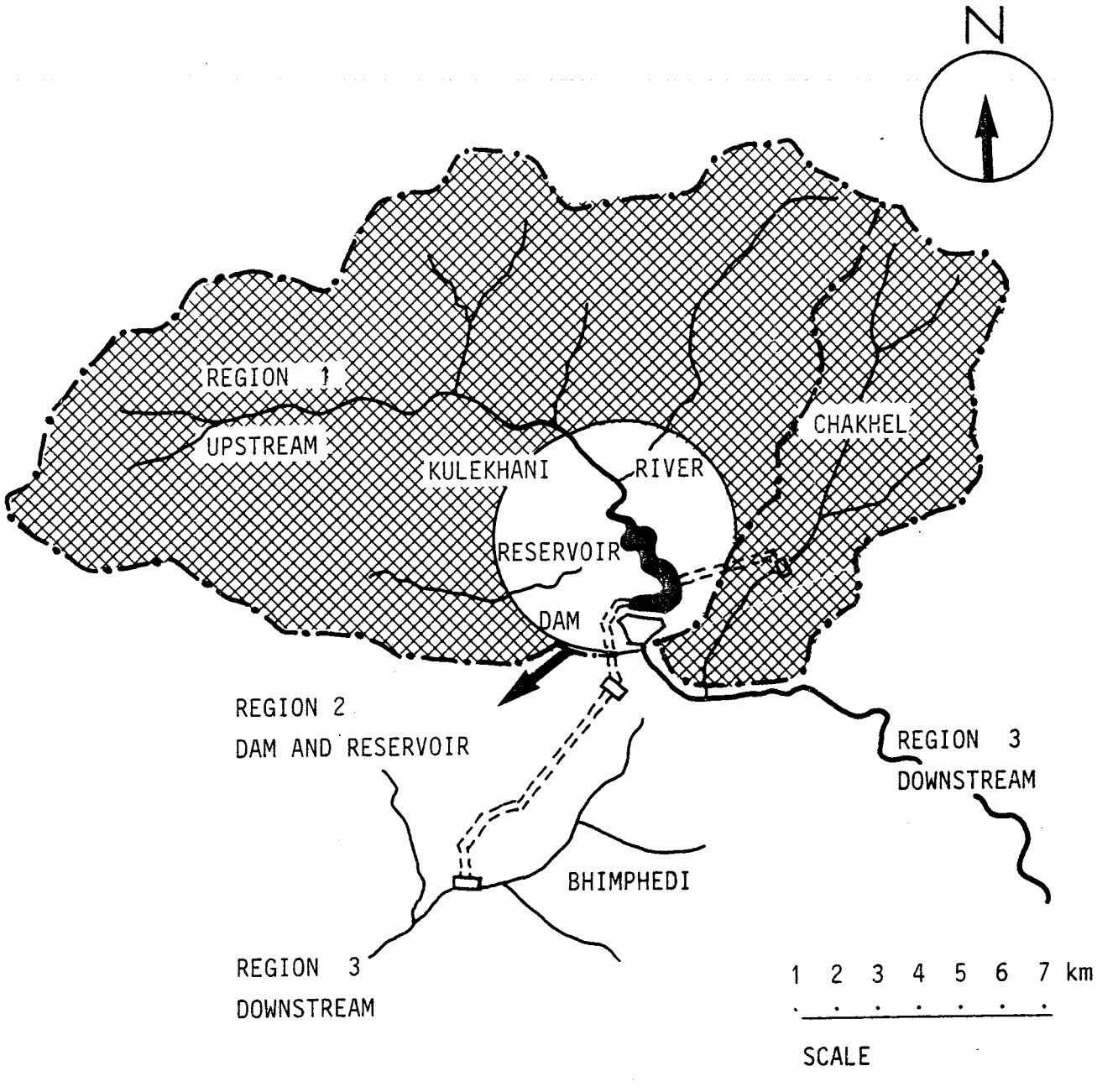

FIG 2 KULEKHANI WATERSHED AND KULEKHANI HYDRO-ELECTRIC PROJECT, DIVIDED IN SUB-REGIONS: UPSTREAM, DAM AND RESERVOIR AND DOWNSTREAM AREAS

The livelihood in Kulekhani watershed is mainly based on subsistence agriculture. Some few households are only doing agriculture, while the rest of the population combine subsistence agriculture with traditional work in local society, handed down trough generations.

Fundamental for the analysis of the socio-economic aspects are the extent of interrelationship between the local population and the project. It is important to isolate the factors involved, which creates contact and possible change.
The first factor for contact and change is the requisition for land to construct roads and the dam and reservoir itself. It implies that several households had to relocate in other places outside or in the watershed.

The second factor for contact and change is the possibilities for skilled and unskilled work at the Kulekhani Hydro-electric Project itself. In the traditional setting the availability for off-farm work is mainly through traditional work to serve local society. This opportunity to get work might give the locals possibilities to labour far more intensitively than before and is supposed to be preferred compared to the traditional work in local society.

It is therefore anticipitated that:

- geographical closeness and
- ethnic group

decide to what extent the local population participitate in work at the project.

It is also anticipated that:

- farm size
- limited work possibilities in local society
- extent of participation in traditional work

will decide *to what extent the local population will seek work at the project*

The social environment is a composite of numerous interrelated factors. Although these items may be identified from checklists, interviews, the interrelationships are generaly poorly understood and have largely been ignored in project planning (see Research Working Paper I). In part, this problem is caused by one failure, - to recognize that social processes have feedback.

It is the intention to combine the next report on land use and environmental changes to this report in order to isolate some factors leading to change in the watershed. However, as many possible social effects are project and process specific, the universal answers to such difficult questions might after all be limited.

1.2 Nepal - a brief introduction

Geography plays an important part in Nepal. The country, with a total area of 140.000 square kilometres, or about twice the size of Sri Lanka, is mountainous. It is roughly 850 km long from east to west, and 180 km wide. Its altitude varies from 150 metres above sea level in the southern part to the highest peak on earth "on the top of the World" in the Northern Himalaya. A variety of valleys and river basins dispersed from east to west with successive parallell ranges of hills can be found in between. The three major river systems of the country are transversal, cutting the east-west mountains into fragments.

Nepal is a land-locked country in the Himalaya region of the World. Due to this site it has some of the most rugged and difficult mountainous terrain in the World. There are in principal three main river basins which topographically divides the country:
The Kosi, the Gandak and the Karnali. These basins mainly run from north to south. However there are four main longitudinal belts which cross them:

1. The Terai, continuating flat-land from the Indian sub-continent, it is a flat and fertile land. It is an extension of the Gangetic Plain of North India, and covers 17 % of total area.
2. The Siwalik foothills and the Mahabharat mountain ranges are raising up to 3.000 m. a.s.l. and merges into the Indian Border through its extensions at Dang and Chitwan.
3. The Mid-Hill, lies between Mahabharat range and the High Himalaya. This part is formed by the valleys of the Himalayan rivers and its tributaries. Due to its site and situation the terrain is roughed with steep slopes. Up to 3.300 m the farmers can grow grain successfully.
4. The High-Himalaya mountain range raises to the peak of Chongmo-logma or Sagarmatha (Mt. Everest) 8.848 m.a.s.

Climate regions and agricultural location are closely related. The humid subtropical climatic zone, encomposing mainly the Terai and Inner Terai, reaches approximately 1.700 m.a.s.l. providing the rainforests, foodgrains: mainly rice, maize, wheat and millet, oilseeds, pulses, sugarcane, jute, tobacco and tea. Since rainfall decreases

from about 2.500 mm in the east to about 1.500 mm in the west, sugercane, tobacco, jute and tea are more important in east-Terai while pulses, oilseeds and newly introduced cotton are more important in West-Terai.

Each hill area is a micro environment with varying conditions for plant growth depending on the elevation, cloud cover, precipitation sun-expose and direction of slopes. The microthermal climate of the lower parts of Mid Hill supports a variety of agricultural enterprices as foodgrains, potatoes, fruits and species and livestock mainly consisting of cattle and buffalo. In the higher parts of Mid Hill, at subalpine elevations (2.700-4.000 m) where the winters are more severe and the summers cool, the cultivation of barley and potatoe dominate together with livestock as yak, nak, sheep and goat.

The timberline is approximately 4.600 m.a.s.l. and above this is the alpine tundra up to the snow-covered peaks of the High-Himalaya range.

Nepal's population of 16,1 million in 1982 is *ethnically and culturally* complex. In type and culture they range from the Indians in the south to the Tibetans in the north. The 75 ethnic groups speak fifty different languages.

Historical origin, language and cultural connection make it possible to classify most ethnic groups into the following categories: Indo-Aryans or Indo-Nepalese and Tibeto-Burman or Mongoloid. The first category entered Nepal from India more than 2.500 years ago and inhabited the Terai and lower Mid Hill belt. The latter category came to Nepal across the Himalaya from the north and inhabited the Himalaya valleys and slopes.

Nepal has been continously subject to cultural influences from the neighbours, and there are important ethnic and cultural differences within the country. The Hindu group makes up 80 per cent of the total population. The Brahmin castes, such as Brahmin, Thakuri, Chettri and others have kept a "modified" culture from the North Indian subcontinent. They are clearly related to the Indians through their language, religion, social organization and physical appearance. Their Hinduism has been influenced both by the Buddhism and by indigenious folk beliefs.

The people of the Terai are predominantly of Indo-Aryan stock. Those of the Mid-Hill are a blend of Tibeto-Burman and Indo-Aryans. The Tibetan groups of the High Himalaya, clearly related both physically and culturally to the Tibetans have developed regional distinctions among themselves. Most of the Tibeto-Burman groups as Tamang, Rai, Limbu, Sunwar and Sherpas live in the north and east while the Magar, Gurung and Thakali are found in west and central Nepal. The Newars are ethically a people of Tibeto-Burman and North Indian ancestry. They have a Tibetan influenced language and their religion is mixed Buddhist and Hindu. They are by tradition craftsmen and traders, and are famous for their Newar-culture. The Magars, another Tibeto-Burman or Mongoloid subfamily, are mainly farmers. Tamangs are the largest clan in the Tibeto-Mongoloid subfamily. The majority of them are tenant farmers, porters, domestic servants and woodcutters.

On the basis of *religion* the people can be grouped into Hindus, Buddhists, Muslims and tribal Shamanists. The religious groups have developed a distinct style of religious practice and belief. Thus the definition of a Hindu of Buddhist Society in the classical sence of the term, is not applicable to the Nepalese society in general. However, the strict rules of Hinduism define a Hindu as a person born in a Hindu family, who will remain a Hindu until death.

The *settlement pattern* reflects several factors. Almost all Nepalese live in villages or small towns. The size and types of rural settlements vary widely. That is dependent on ethnic groups as some are living in clustered areas (villages or small towns) as the Newars, while others are living scattered as i.e. the Tamangs. Naturally the size and settlement pattern are determined by the availability of space, configuration of the terrain and fertility of the soil. In Terai there are compact settlements with villages of more than 500 houses. On the slopes of the Mid-Hill and the Himalaya there are disperced settlements, sometimes clustered consisiting of only a number of houses.

Population distribution reflect physical and historical conditions. The pattern changes gradually with developments in malaria eradication in Terai, industrialization in urban areas and possibilities for irrigation of agricultural lands.

The age structure of the Nepalese population is representative of the pattern in most developing countries with high birth rates and declining death rates. Children aged 0 - 14 years and young people aged 15 - 24 years is estimated to constitute about 58 per cent of the total population (ESCAP 1980). This heavy concentration of the population in the young and dependent agegroups has economic and demographic significance and implications. The high number of young is disproportionate in relation to the productive groups. In other words, this means a heavy burden for the economically productive sector. Another major hinderance to economic progress is the fragmentation of available farmland. Land has to be divided between brothers.

With limited resources and a rapidly expanding population, the *population pressure and migration* are closely connected. The rough estimate on distribution of land resources and population is:

> 1/3 of the population lives in Terai on 2/3 of the cultivated area, while 2/3 of the population lives in Mid-Hill on 1/3 of the cultivated area.

The rapid increase in population at 2,4 per cent a year, has been exerting an adverse influence on resources, natural environment and economic stability of the country. Serious problems like migration, deforestation and soil erosion are emerging (Far Eastern Economic Review, 1983). The average size of farms is 0,4 hectare in Mid-Hill, while it is 3,0 hectare in Terai.

These imbalances in man-land ratio have forced people from the Mid-Hill to seek alternative and more durable economic opportunities in Kathmandu, the Terai and India. The migration into the Terai-region has accelerated through the 1960-1980. This is due to the eradication of malaria in the mid-fifties, and a response to the felt population pressure.

Continuing population imbalance in the Mid-Hill has increased pressure for bringing more lands into cultivation. This is done either by moving into much steeper land adjoining farms or by deforestation of nearby steep areas. The result of movement into such marginal lands has been the primary cause of yield declines in the Mid-Hill. Further livestock pressure in the Mid-Hill has also aggravated the situation, causing deterioration in the quality of hill pastures. It is anticipated by FAO that there are at least one cattle or buffalo per person in Nepal. Forests have also been denuded because of cutting for fuelwood and lopping for animal fodder. Consequently animal productivity is anticipated to be declining or at least stagnant.

The combination of:

(i) fuelwood and fodder extraction in hill forests,

(ii) intensive grazing and improper cultivation on steeper slopes,

have increased flooding and crop area destruction in the river valleys and the flood plains in Terai. These factors are threatening to reduce further Nepal's available cultivated lands as well as in India and Bangladesh.

1.3 Subsistence agriculture - some comments

To label and classify the farmer's agricultural production in developing countries has proved to be very difficult. In reality there exists all stages from the primitive cultivator, those who are producing for subsistence, to those who are integrated in the larger complex of national and international markets.

In literature the discussion is concerned about the distinction between a peasant and a subsistence farmer. Wolf (1966) use the term peasant to describe a "rural cultivator" who "control the means of production, including their own labour and its products for the culturally defined equivalent goods and services of others" (Wolf 1966 p. 3).

According to several authors (Keyder 1975, Rudengren 1981) the term subsistence has become ambiguous, mostly because of its frequent use and its application to describe the minimum level of food, consumption goods and shelter needed to support life. It includes also the source and means to produce these minimum requirements.

In the traditional subsistence agriculture, output and consumption are identical (Todaro 1977 p.220) One or two stable crops as rice, corn barley or wheat are the main sources of food intake. Output and productivity are low, due to minimal capital investment, simple tools and shortage of labour in the busy agricultural periods. According to the economist's view "the law of diminishing returns" is in operation as more labour is applied to shrinking parcels of land (Todaro 1977). Usually the labour is underemployed most of the year due to the very seasonal peak periods for planting and harvesting. The traditional neo-classical theory of production where land (and perhaps capital) is fixed and labour is the only variable input, provides according to Todaro (1977) some insight into the economics of subsistence agriculture.

This approach into the subsistence problems does not take into regard other important aspects as the farmers decision-making and knowledge about production and means of production, his use of inputfactors as seeds, fertilizer and irrigation which can vary to considerable degrees.

Low productivity in subsistence agriculture results from a combination of several factors restricting the growth of output:

1 Limited amount of land a family can cultivate. Available terraces are intensively cultivated with traditional technology. In spite of increased labour inputs, they are subject to rapidly diminishing returns.
2 Traditional tools and lack of animals.
3 Scarcity of labour available during growth season for planting, weeding and harvesting. Upland terraces need rain, and this limits the time for planting etc. to the early weeks of a rainy season.

Any Government attempting to transform this traditional agriculture must recognize that in addition to adapting the farm structure to meet the demand for agricultural production, profound changes affecting the whole economic, political and institutional structure of rural societies will often be necessary.

Other authors consider the degree of interaction as a criteria. As the subsistence agriculture is characterized by the isolation of the economic unit and by the independent valuation made by each household of the production unit (Barkay 1981). In this system each village is a subsistence market and the whole economy is characterized by limited interaction with the outside world.

Economists tend to use money value as the most common measure to find the relative and absolute standard of living and to quantify access to resources in developing countries. This might be the least suitable measure, because to quantify variables in a subsistence agricultural economy is difficult. Market prices on basic commodities fluctuates from locality to locality over time. The definitions of resources are difficult to settle, because a monetary value of the produce (market price) will differ from a measure of work invested (working hours or days). This will also be the case for nutritional value of the production (utility) . In this discussion "ambiquity then arises between two possible definitions, the actual consumption of the society as subsistence, or the biological minimum as subsistence" (Keyder 1975). It has been argued that the actual consumption definition indicates an absence of a surplus, while on the other hand the biological definition will imply the existence of a surplus.

Several theorists are strictly considering the agricultural production as the main basis for a definition of subsistence. A class-concept would consider if a potential surplus was consumed by an exploitating class of landlords. However, in this study the concept *Subsistence* is defined as to include:

(i) agricultural production based on traditional farming practise, knowledge, technology and decision-making

(ii) socio-economic and cultural dimensions, as the use of hired or exchanged labour, interpersonal relationships,

(iii) pluralistic exploitation of environment, gathering of nature's produce (grass-cutting, fodder from looping trees, firewood, herbes etc.)

(iv) exchange of traditional skill for cash or kind.

The latter point is extremely valuable, as most authors seem to neglect the exchange of traditional skill in local society, whereby the household can exchange their produce of specialities and maintain an income-source of importance. The households pluralistic activities to vindicate subsistence has to be taken into regard, as this is the most vigorous element in survival. This adds a far more dynamic aspect to the subsistence concept, as a household will create a potential surplus by using all resources and traditional skills.

In Nepal His Majesty's Government, National Planning Commission (1979) undertook a survey of employment, income distribution and consumption pattern. The results from this survey reflect the present status of the subsistence agriculture in the country. Although there are regional differences, the status in the Mid-Hill belt reflects a marginal situations for most of the farmers.

The *Poverty line* in Nepal is defined as:
"Based mainly on average daily value of calories required for survival (2256) and lowest average actual daily consumption expenditure on basic necessities, total per capita requirement of minimum subsistence level of expenditure has been estimated at Rs 2 a day" (National Planning Commission 1979).

The report contains a distinction between the *poorest of the poor*, which are households whose income level is below minimum subsistence level of income and *poor above poverty line*. The latter means households with average expenditure estimated between 2-2.68 Rs. This situation four years ago, shows regional differences as the per cent of households below poverty line in the mountains is 68.19 in per cent of all households, while the national average is 34 per cent. During the last few years, the situation has not improved.

The findings in the above mentioned report,created conciousness about the status of the poor. It led to reviced objectives of the development planning with more emphasis on the coverage of basic needs and the improvement of the peoples' living conditions in general. This resulted in the main objectives of the Sixth Plan:

1 Gradual elimination of absolute poverty through employment opportunities
2 Fulfilment of minimum basic need
3 Social restructuring
4 Conservation and development of natural resources.

These are the accepted "Basic Principles Of the Sixth Plan 1980-85" (National Planning Commission 1979).

1.4 The household survey in Kuleknani

Defintions and sampling procedure.

It is general agreement that *the household* is a convenient and appropriate *sample unit* for most surveys. However, there is no universal agreement as to its definition, neither in different countries nor within one country. It is important that a definiton is adapted to local conditions. In the survey-area Kulekhani, there are several ethnic groups living clustered in villages or scattered in the watershed. A village might have several families related to each other through close economic ties, but without living under one roof or eating together (Newars, Brahmin, Chettries) while other are living in scattered dwellings (Tamangs, Magar) providing basic needs for the family unit.

The household in this survey is defined as:

A group of persons (bound by ties of kinship from one ethnic group) who live together under one or several roofs, but who are providing themselves with food and other domestic arrangements.

There are three features that decides the household:

a) A common source of the major part of income mainly agricultural and livestock production, or exchange of skill specialities for income as blacksmith, priest tailor etc.,

b) a common source of food,

c) a common place to sleep, under one roof or in the compound of the extended family.

The sharing of a common source of food is taken to include the provision for a common income source. In Kulekhani it is mainly from agriculture and livestock production. Occupation-and employment status of a household depends also on the caste-system, as i.e. blacksmiths and tailors exchange their services for food.

All communities in the Kulekhani watershed practise to a varying degree Hindu or Buddhist religions. In the area the ideology and practise of the caste system is also evident. As ethnic group and caste in Nepal are complex, a few introductory remarks are appropriate.

One distinction goes between touchable and untouchable ethnic groups. The different ethnic groups can be seen in Table I. The untouchables in Kulekhani watershed include the Damai (tailors), the Kami (blacksmiths) and the Poude (sweepers). They are "impure" in the sence that the touchables can not accept water or prepared food from them. There are strict rules according to the Hindu values as to what are allowed for the untouchables. A Kami can for instance not enter a house of a pure caste. When collecting his kind for his traditional work, he has to stand on the doorstep.

Another distinction divides touchable ethnic groups into those whose male members wear the sacred thread and those who do not. In the first category are the Brahmins and the Chettries. These two groups are culturally very similar, however, the Brahmins are considered as ritually superior. Brahmins are the only priests for the other Hindu groups.

The second category is the touchable, but not sacred thread - wearing ethnic groups. They include Hindus as well as Buddhists. However, since some Buddhist groups have their own value systems, a Newar would not accept that he is "below" the two former groups. The Newars have their own separate, but roughly parallell caste hierarchy. The Poude is lower caste Newars.

The Newar caste hierarchy consists of artisans and caste groups ranging from the lowest to the highest, from sweeper to priest. There is a cultural entity among the Newars although it is not one single ethnic group in the sence the Magars or Tamangs are for instance (Bista 1976).

The Tamangs form one of the major Tibeto-Mongoloid speaking communities. They prefer the higher, dryer elevations for living and farming (Figure 3).

In the Kulekhani watershed they are living in scattered dwellings. Their old villages are today submerged in the reservoir.

The Magars have mongoloid physical features and their mother tongue is a Tibeto-Burman dialect. Magars have historically been in close contact with Hindus and have adapted their cultural habits (Bista 1976).

The Hindus are practising the joint family system. Everyone is obliged to preserve the family kinship which is patrilineally organized. There are two important factors linking the family group together:

1) The economic interdependency due to joint ownership and cultivation of land. It is the young people's responsibility to take care of the older generation,

2) the Hindu spiritual band where worshipping of the family God is very important.

A woman becomes part of the joint family upon marriage. She is following her husband's family. Her function in the family differs a bit according to caste and geographical region. In some families she becomes an additional member of the family labour force. While in other families her dowry will add to the family wealth. However, her most important function is to get a male heir in perpetuating the family lineage (Stone 1978). Marriage among Brahmins and Chettries is, as a rule, monogamous, yet polygony is frequently found (Bista 1976).

The Buddhists are mainly marrying monogamous. However, fraternal polyandri is also found. That is the situation when two brothers marry one joint wife.

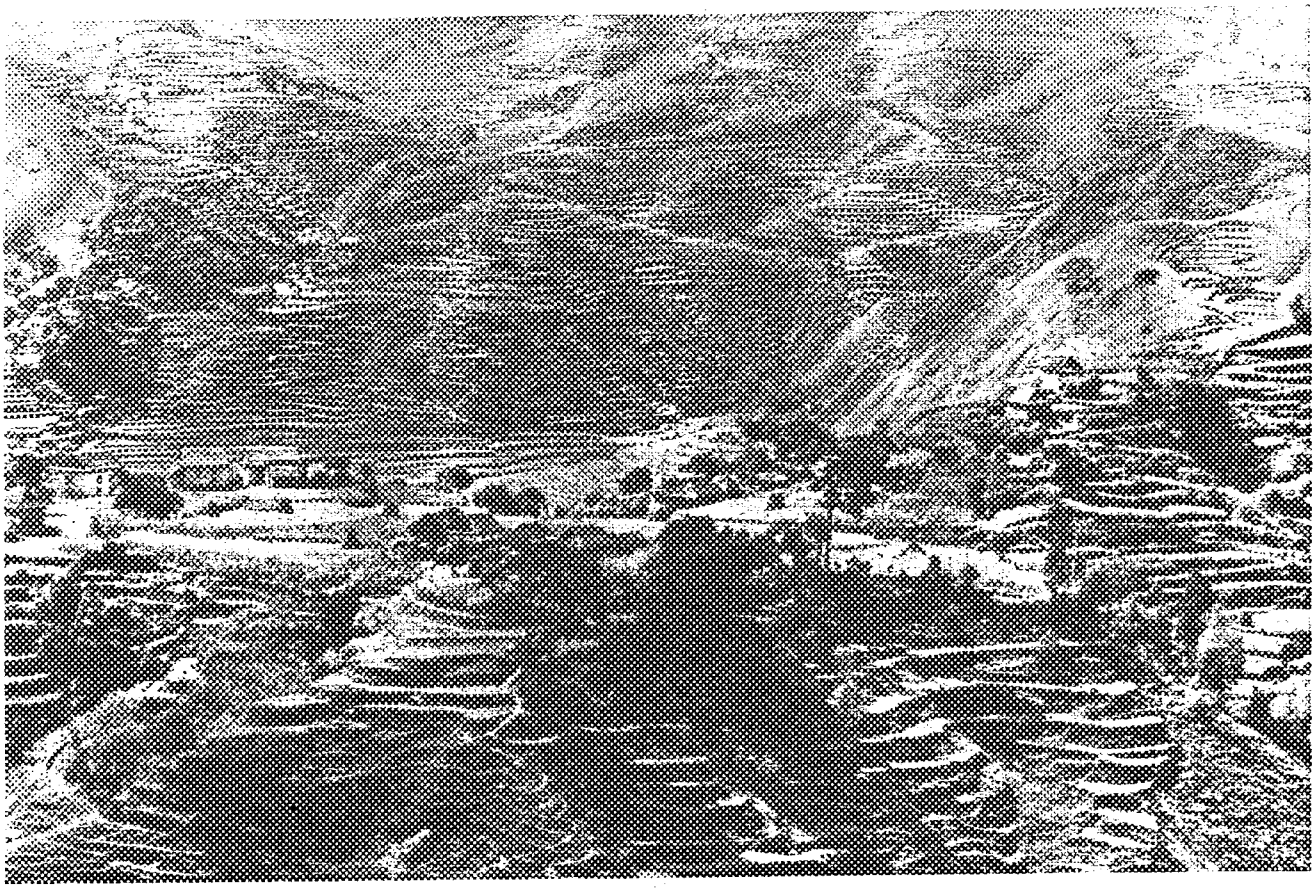

FIGURE 3 MOST OF THE VILLAGES ARE SITUATED WITHIN THE STREAMVALLEYS, ALONG SEVERAL HILLSIDES WHILE THE HILLSIDES HAVE LESS POPULATION. THE SETTLEMENT AND CULTIVATION ARE ALSO CONCENTRATED IN VALLEYS AND PHERIPHERAL HILLSLOPES WHEREAS THE HIGHER ALTITUDES ARE LESS DENSELY SETTLED AND UTILIZED.
THESE TAMANG HOUSES ARE LOCALIZED ALONG A RIDGE, SURROUNDED BY BARI FIELDS AND GRAZING LAND.

(Photo: I-M.BJØNNESS 1981)

The socio-economic survey was undertaken in Kulekhani. The *method of sampling* included several aspects:

(i) An orientation to the District Administration. Meetings were organized with District level officials in charge, and the Kulekhani Hydro-electric Project Administration.

(ii) A training of the investigation-team included also a pretest of the questionnaire

(iii) The following reconnaissance in the Panchayats of Kulekhani:
   a) Questionnaire to the Kulekhani Hydro-electric Project Administration, relocation office, Geologic section, and Project Manager in Charge.
   b) Questionnaire to the Pradhan Panchas in the different Panchayats.
   c) Questionnaires to the housholds in the Panchayats on:
      - Socio-economic effects from the Kulekhani Hydro-electric Project.
      - Land use within the watershed.
   e) Dairy-report, from the investigation of each household, with the investigators' remarks for observations.

The fieldwork covering "Phase I during construction" took place end-August to mid-October 1981.

Techniques as quota sampling, areal sampling, accidental sampling etc. are weak alternatives to random sampling.

In the case of Kulekhani *the random sample* of 224 households was selected according to ethnic and caste composition, socio-economic strata and ecological setting and resource-situation in different elevations. Kulekhani has a complex socio-cultural situation with different ethnic groups and unequal distribution of resources, material as well as immaterial. The distribution is diversified ethnically as well as according to elevation. The investigated households were in the following panchayats: Kulekhani, Chitlang, Thachok, Sisneri, Phakhel, Tistung, Palung and Daman.

The *method of sampling* was done according to *the following basic principles:*

1. The population in Kulekhani, according to ethnic group and caste composition (APROSC 1979).

	Kulekhani watershed		Survey Sample	
Ethnic group	Number of persons in Kulekhani	%	Number of households	%
Brahmin	9 047	25	21	9.4
Chhetri			33	14.7
Newar	8 684	24	56	25.0
Tamang	14 475	40	84	37.5
Damai	3 928	10	7	3.1
Kami			10	4.5
Poude			4	1.8
Magar	57	1	9	4.0
	36 187	100%	224	100%

Table I. SURVEY SAMPLE 1981
THE POPULATION IN THE KULEKHANI WATERSHED (SOURCE: APROSC 1979) AND NUMBER OF HOUSEHOLDS INVESTIGATED, ACCORDING TO ETHNIC COMPOSITION AND CASTE

2. The population in Kulekhani is divided in *high, medium and low strata*, according to the income distribution and consumption pattern found by HMG, National Planning Commission's survey (1979). 60 per cent of the population in Central Region is classified as poor, while 36 per cent of this group is below the poverty line (Figure 4).

3. The population in Kulekhani is divided according to the *ecological setting and resource situation* in different elevations. These imply to survey households in transect lines from the valley bottom to the top of the ridges.

FIGURE 4 MAIZE IS ONE OF THE MAIN STAPLE FOOD IN THE AREA. DEPENDENCY ON RESOURCES AVAILABLE, THE HOUSEHOLDS WHO DO NOT HAVE ACCESS TO KHET LAND, LIVE ON TWO MEALS OF MAIZE PORRIDGE A DAY.
MALNUTRITION CAN BE OBSERVED ON THE BOY'S BELLY IN THE BACKGROUND, THIS IS MAINLY BECAUSE OF ONE-SIDED FOOD HABITS.
(Photo: I-M.BJØNNESS 1981)

There are some uncertainties connected with data-collection among illiterate people. This is mainly because perception of time might differ between interviewer and interviewed. Due to this differences it was necessary to:

(i) limit the time-period for different questions

A question was forwarded and limited to the period between two festivals, i.e. between Dasai this year and last year. As the interviewes took place before Dasai 1981, this limitation was convienient.

This type of limitation was also important when the temporary work at the Kulekhani Hydro-electric Project was figured out. An attempt to come closer to the time spent on temporary work, was by questioning the length of work i.e. if it took place from rice-planting up to harvest etc. The absolute figures used in this analysis must sometimes be considered approximate in a statistical sence. However, they are often giving some information on trends rather than facts. On the other hand, conclusions are after all based on figures as exact as they are possible to get from a survey in a developinq country.

THE SURVEY SAMPLE

The survey sample is shown in Table 1. It shows approximately the same relative distribution of the population as the distribution according to the survey undertaken by APROSC (1979) . In other words the survey sample is statistical representative for the population in the Kulekhani watershed also according to ethnic groups. 224 households participated in the socio-economic survey, while 112 is the sample of the in-depth land-use survey. The latter will be the basis for the next Research Working Paper no 4.

The interviewed households are geographically distributed as shown in Figure 5 . The number of households are approximately equally distributed in

- the downstream panchayat Sisneri
- the dam and reservoir panchayat Kulekhani and
- the upstream panchayats Phakhel, Chitlang, and Thachok /Tistung. Palung and Daman are situated far away, and the number of interviewed households from these panchayats are not so numerous.

Ethnic group does not necessarily correspond totally with religion. Of the 224 households, 53.6 per cent were Hindus (120 households), while the remaining 46.4 per cent (104 households) were Buddhists.

The number of persons in a household can be seen in Table 2. The table shows the absolute and relative number of persons. It is especially among the Newar and the Tamang one find the large households consisting of 8 members or more. The Damai, Kami, Magar and Poude do not show the same tendency, they consist mainly of relative few members in a household. The majority of the households among the Brahmin Chettri, Newar and Tamang show a relatively similar pattern with 5 to 8 members.

The 224 households have altogether 1729 household members. The distribution of females and males according to age-groups can be seen in the Tables 3 and 4 . The majority of the population is below 30 years. The same tables show also the total number of females and males in the households. Table 3 , shows that i.e. one household has as many as nine females, while two households have seven. The similar figures are shown for male-members in the households. The sample has equal number of females and males. The distribution of the sexes according to age, shows no significant differences.

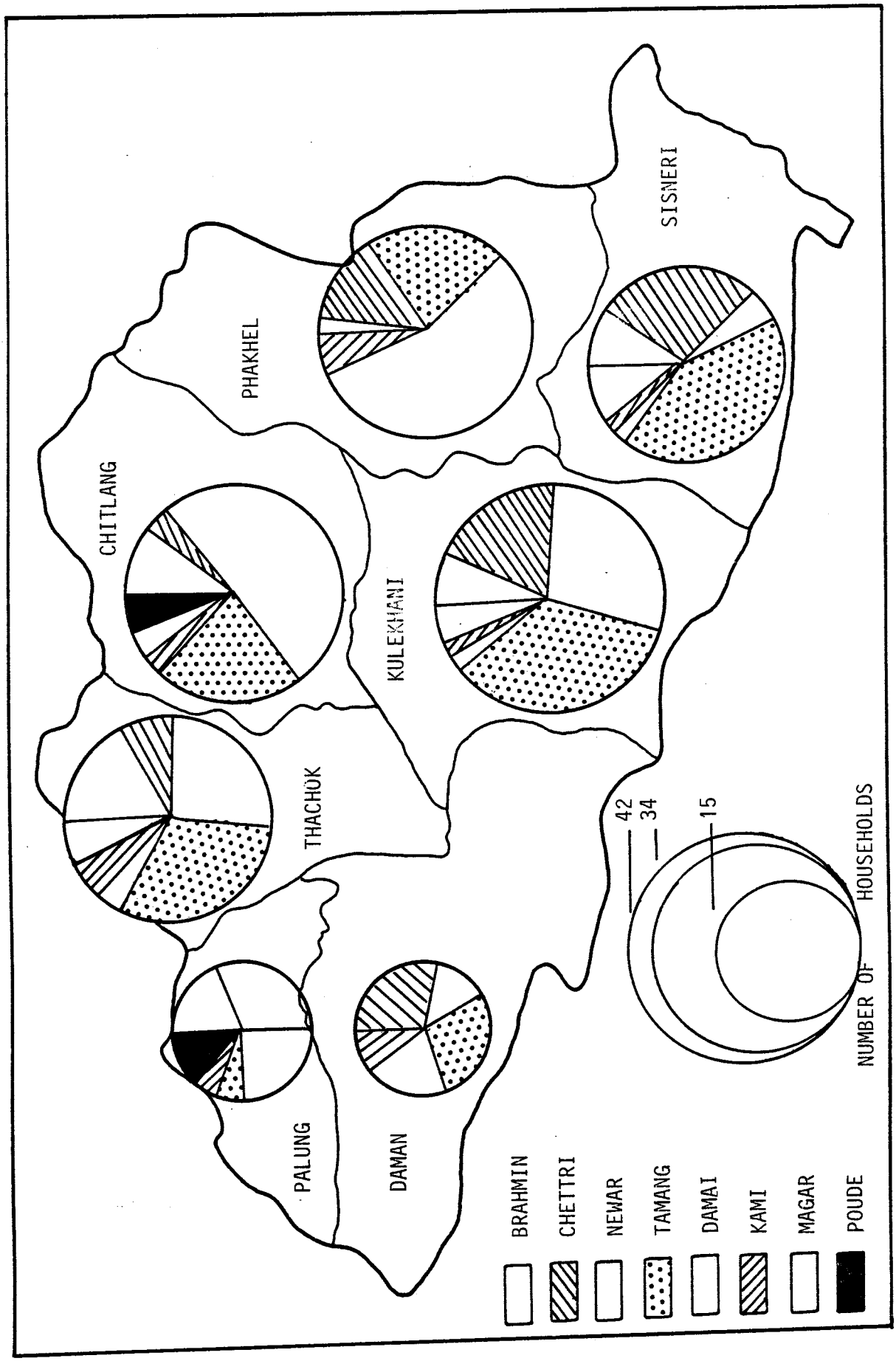

FIGURE 5. NUMBER OF INTERVIEWED HOUSEHOLDS ACCORDING TO ETHNIC GROUPS IN DIFFERENT PANCHAYATS

ETHNIC GROUP \ NUMBER OF PERSONS IN A HOUSEHOLD	1	2	3	4	5	6	7	8	9	10	11	12	13	>14	TOTAL HOUSE-HOLDS
BRAHMIN					3	3	1	2	3		5	1		3	21
CHETTRI		1	1	4	4	3	5	7	2	2		1		3	33
NEWAR	1	1	3	4	11	9	6	4	5	3	1	2	1	5	56
TAMANG		5	4	8	10	13	11	11	5	5	4	2	3	3	84
DAMAI		1	2			1	3								7
KAMI			1	1	1	2		3		1				1	10
MAGAR		1	1	1	1	1	1	2			1				9
POUDE		1	1					1	1						4
TOTAL HOUSEHOLDS	1	10	13	18	30	32	27	30	16	11	11	6	4	15	224

TABLE 2. BRAHMIN, CHETTRI, NEWAR, TAMANG, DAMAI, KAMI, MAGAR AND POUDE HOUSEHOLDS, ACCORDING TO NUMBER OF PERSONS IN THE HOUSEHOLDS.

Age \ NUMBER OF FEMALES IN A HOUSEHOLD	1	2	3	4	5	6	7	8	9	Total number of females	%
0-11	82	48	15	13	3	2	2			316	36.6
12-30	98	47	19	7	1	2			1	303	35.0
30-59	118	21	7	2	5					214	24.8
>60	25	3								31	3.6
										864	100%

Table 3. NUMBER OF FEMALES IN A HOUSEHOLD ACCORDING TO AGE-CATEGORIES. THE TABLE SHOWS ABSOLUTE AND RELATIVE NUMBER OF FEMALES IN THE SURVEY SAMPLE.

Age \ NUMBER OF MALES IN A HOUSEHOLD	1	2	3	4	5	6	7	Total number of males	%
0-11	78	48	20	8	1	1		277	32.0
12-30	92	46	18	8	5	3	2	327	37.8
30-59	145	19	3	4	1			213	24.6
>60	40	4						48	5.6
								865	100%

Table 4. NUMBER OF MALES IN A HOUSEHOLD ACCORDING TO AGE-CATEGORIES. THE TABLE SHOWS ABSOLUTE AND RELATIVE NUMBER OF MALES IN THE SURVEY SAMPLE.

Farm size is the main factor for survival in agriculture. The indept analysis of agriculture and livestock prediction will be covered in the Research Working Paper no. 4. However, the farm resources and size will briefly be dealt with here as it is regarded important as to what degree the different households participate in off-farm work.

The available resources: farm-size in Ropanies, *khet*, which are irrigated terraces for rice cultivation and *bari* which are dry terrace farming are good indicators on the household status. The owners of Khet will generally manage to feed the family with their products. Most wet-rice cultivation in Kulekhani is found on the lower reaches of the rivers. In these areas the fields are levelled, however, the eleborate terracing of steep valley slopes for Khet is not typical. The water supply is nearby. Most farms are operated by farming labour alone.

The Bari-cultivation is usually situated on levelled terraces on steep slopes. The output depends on the precipitation. Most of the subsistence farmers have Bari only.

The main crops grown in Kulekhani watershed are: maize, rice, wheat, millet and beans (dahl). These are mainly grown for local consumption or exchange for other products.

The cash-crops are potatoes, mustard oil, seeds, and winter season vegetables as cauliflower and raddish. The potatoes and raddish are sold to Kathmandu or Hetauda. The same is also the case for apples grown in the watershed.

The cash-crops can be sold outside the watershed mainly because of the road: Tribhuvan Rajpath with connects Terai with Kathmandu. This road passes through Daman and Palung, and has been the main incitament for production of cash-crops in the latter Panchayats.

ETHNIC GROUP \ FARM SIZE IN ROPANIES *)	NO FARM	1/2	1-2	3-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-59	60-79	80-99	>100	TOTAL	%
BRAHMIN				1		1	5	2	4	4		2	1		1	21	9.4
CHETTRI		1		1	3	9	6	5	2	1		2	2	1		33	14.7
NEWAR	2		1		14	7	10	5	3	5	2	6	1			56	25.-
TAMANG	1	2	4	3	8	25	18	10	4		1	6	2			84	37.5
DAMAI	1	1	3		1			1								7	3.1
KAMI		1	1	1	1	3	1	1		1						10	4.5
MAGAR		1		1	3	2			1		1					9	4.-
POUDE			1	1	1			1								4	1.8
TOTAL	4	6	10	8	31	47	40	25	14	11	4	16	6	1	1	224	
%	1.7	2.7	4.5	3.6	13.8	21.-	17.9	11.2	6.3	4.9	1.8	7.1	2.7	0.4	0.4		100 %

TABLE 5. FARM SIZE IN ROPANIES ACCORDING TO ETHNIC GROUPS.

*) One ropanie is 74 X 74 feet, and 10 sq.feet equals approximately 1 m^2.
10 ropanies equals approximately 5-6 decar.

ETHNIC GROUP \ BARI IN ROPANIES	1/2	1-2	3-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-59	60-79	>100	TOTAL	%
BRAHMIN			1	2	2	6	3		1	1	1		1	18	10.7
CHETTRI	1		2	8	6	2	1	1			1	2		24	.14.2
NEWAR		2	7	14	3	5	2	2	3	1	3			42	24.9
TAMANG	2	4	4	10	13	11	6	3		2	5	1		61	36
DAMAI		1		1			1							3	1.8
KAMI	2	2			3	1								8	4.7
MAGAR	1		2	2	2	1		1						9	5.3
POUDE		1	2	1										4	2.3
TOTAL	6	10	18	38	29	26	13	7	4	4	10	3	1	169	
%	3.7	5.9	10.7	22.5	17.1	15.3	7.7	4.1	2.4	2.4	5.9	1.7	0.6		100 %

TABLE 6. BARI UPLAND DRY TERRACES FOR GROWING MAIZE, MILLET ETC. ACCORDING TO ETHNIC GROUPS.

ETHNIC GROUP \ KHET IN ROPANEES	1/2	1-2	3-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-59	TOTAL	%
BRAHMIN		1	1	4	6	2					1	15	16.5
CHETTRI	2	3	1	9	4	1			1			21	23
NEWAR	3	2	3	12	8	3	1					32	35.2
TAMANG	1	1	5	6		1						14	15.4
DAMAI													
KAMI	2			1								3	3.3
MAGAR		1	1		1							3	3.3
POUDE	1	1			1							3	3.3
TOTAL	9	9	11	32	20	7	1		1		1	91	
%	9.9	9.9	12	35.2	21.9	7.7	1.1		1.1		1.1		100 %

TABLE 7. NUMBER OF HOUSEHOLDS WITH KHET - IRRIGATED TERRACES MAINLY FOR RICE- ACCORDING TO ETHNIC GROUPS.

2 LANDREQUISITION - RESETTLEMENT AND/OR COMPENSATION

2.1 Analysis at the Project level

The HMG Department of Electricity was responsible for the landrequisition, resettlement program and compensation for land. The World Bank adviced the Nepalese to work out a resettlement plan. "As Kulekhani reservoir will inundate about 2.2 km^2 of land of which 0.8 km^2 is cultivated land. Some 1200 people in 235 houses in the submergible land have to be resettled before the construction of the dam. This settlement problem though not large in magnitude still faces some social and physical problems. Land surrounding the Kulekhani region is scarce and possiblilities of opening new land for agriculture is negligible, and the settlement has to be carried out in lower plains of Nepal. Guidance in agriculture, husbandry and health is particularly important to the newly settled people during the first few years" (Nippon Koei 1976).

Actually the damconstruction, dam and reservoir area, road-access to the area and land for personell quaters, affected 321 houses, 500 families or approximately 2100 people (HMG. 1981). The ethnic composition was approximately 60 per cent Tamangs and 40 per cent Newars (Figure 6).

Nippon Koei (1976) further adviced His Majesty's Government that: "the removal of residents on the land to be submerged is an important problem which should be solved before the commencement of the construction. The problem should be solved by demographic plan and local developing policy, though it must be solved taking public feeling of inhabitants into consideration. The same consideration should be paid upon the inhabitants in drought area" (Nippon Koei 1976).

An organized resettlement program was launched. The locals could, according to the HMG officials choose between:

a) resettlement in Thori in Bara district for lost land or
b) compensation in money.

The advantages of a resettlement program was considered by HMG. "It is eccential with a detailed resettlement plan primarily to ensure that the resettled people can earn a living under conditions at least to those now existing" (Nippon Koei 1974).

FIGURE 6. MARKHU VILLAGE. THE KULEKHANI HYDRO-ELECTRIC PROJECT PROVIDED HOUSES FOR NEPALESE, JAPANESE AND KOREAN STAFF WORKING ON THE PROJECT.
SOME FEW HOUSES ARE STILL LEFT OF THE PREVIOUS VILLAGE IN THE FRINGE AREAS. THERE ARE SOME FEW NEW HOTELS AND SHOPS BUILT BY THE NEWARS ALONG THE ROAD IN THE LEFT BACKGROUND OF THE PICTURE.
(Photo: I-M. BJØNNESS 1981)

However, one village leader in Kulekhani convinced the locals about the advantages of cash compensation. According to the Pradhan Panch in Kulekhani Panchayat (Mr. Ram Hari) most of the people followed the advice and bought land for house construction in Hetauda and few bought land for agricultural purposes within the watershed.

Some resettlement took place without Government involvement. Approximately 50 families resettled within the watershed, in Sim lang, Markhu and Nayagaun villages. This has naturally affected the pressure on land in the watershed and around the construction place. An organized resettlement program was launched, but not accepted by the locals. This is anticipated to worsen the subsistence situation for many resettled farmers, as they could not by themselves buy good quality land with their compensation money. The prices on land in Hetauda arose parallell with the influx of farmers from Kulekhani.

Land	Compensation rate	Land quality
Awal	2500 Rupees per Ropani	first class
Doyam	2000 " " "	second class
Sim	1500 " " "	third class
Chahar	1200 " " "	fourth class

Table 8. The compensation rate given by HMG for different qualities of land (Source: HMG-administration 1981).

The compensation rate was settled according to the quality of land (Table 8). There were some difficulties concerning the land rate. The farmers had previously to the Topographic Survey Department claimed to classify awal land as doyam, in order to be taxed less. As the compensation was paid according to the classification on the cadastral map made by the Topographic Survey Branch, there were some disagreements in local society concerning the compensation rates.

Another aspect was the increase in value on land during construction time. It rose from 2 000 NRs to 10 000 NRs, per Ropani for the best irrigated land i.e. "paddy". This was mainly due to increased demand by farmers who had obtained compensation and wanted to live in Kulekhani watershed. But there were also

interests from people settled outside the watershed to get land for tourism and recreation purposes close to the new "lake". The differences between compensation and the increase in value for land created problems. The demand for land created higher prices on land available, while people could not pay the increasing prices with their compensation. Important in this connection is the relationship between compensation according to:

1) the market price and
2) the permanent loss of a resource for potential agricultural production.

Experiences from other countries show that the compensation usually cover both these aspects. In addition there will be some timelag before the affected people can establish themselves in another area and get into agricultural production. Without any other source of income it seems impossible to avoid using some compensation money just for subsistence.

The payment of compensation for land and houses started in 1975 and proceeded through the construction time. In 1977, the compensation was finalized for 60 per cent of the land and buildings were commenced by 70 per cent. Resettlement in Tori was limited, and 10 per cent of the affected households were finalized in the end of 1977 (Nippon Koei 1977-78). By 1981, the administration had completed compensation to former land owners by 95 per cent. However, the administrator in charge anticipated that the work would continue 1½ year for legal proceedings.

Out of the 500 families some lost all their land while other lost parts of their land. During the socio-economic investigation of the Kulekhani Hydro-electric Project it turned out to be difficult to get exact information about the process of land requisition, the populations motivation for seeking one solution of compensation instead of another.

Table 9 shows that required land in the dam and reservoir is 1.46 km^2. The extent of the dam and reservoir itself is 2.2 km^2. The difference between these figures is probably due to the fact that not all land is classified as agricultural land. Included is also land for multipurpose use which the locals benifited from. All Government land is traditionally used for many years. Submerged, the land is no longer of any value to the local farmers. The traditionally used land is a permanent lost resource. The progress of house compensation is shown in table 10.

	DAMSITE		POWERHOUSE		
	ha	NRs.	ha	NRs.	total ha
1977/78	129.6894	5.567.634	12.5112	486.135	142.2006
1978/79	10.3075	427.047	7.2103	307.405	17.5178
1979/80	6.0565	247.257	4.3800	212.691	12.0247
1980/81	-	-	9500	36.989	9500
1981/82	x	2.665.545	x	82.800	-
	146.0534	8.952.483	25.0515	1.126.020	172.6931

Table 9. Progress in terms of area and cash of land compensation in dam, reservoir and powerhouse sites 1977-82 (Source. HMG.-administration).

	DAMSITE		POWERHOUSE		
Year	no	NRs.	no	NRs.	total no
1977/78	204	1.955.098	6	87.360	210
1978/79	146	1.615.092	22	55.900	168
1979/80	13	120.148	12	65.306	25
1980/81	-	-	-	-	-
1981/82	28	228.374	-	-	-
	391	3.918.712	40	208.566	403

Table 10. Progress of house compensation in dam and reservoir and powerhouse sites (Source. HMG- administration).

The table shows also that the average compensation per house is approximately 10.000 NRs. in the damsite. This seems to be a relatively low compensation compared to the expences for the construction of a new house. By 1981 a new one-story house made out of traditional used local materials as stone and clay and roofed with tatch: 22 ½ feet long and 15 feet broad, costs 10.000 Rs. Roofed with corrogated sheets the price would be 16.000 Rs. This is a traditional Tamang house. However, there are several other ethnic groups who build their houses differently. A two-story traditional Newar house would cost 30.000 Rs.
The house rates were fixed and worked out by the HMG Administration Section.

The lesson to be learned from the resettlement and compensation problems in Kulekhani watershed, is the alternative given by the project and the choise for cash compensation taken by the population themselves. Most of the people who resettled in Hetauda experienced that house construction there was far more expensive than in thier local area. Their presence and demand for land created also pressure on land available, which resulted in higher prices. If they obtained land, there would afterall be a timelag between the payment for compensation and when the new production in agriculture could take place. People living at the subsistence level will thereby often be caught in the poverty circle. Lack of resources, establishment in new social surroundings and problems with cultivating new soils can easily result in a proletarization process. Most of the people did not want to move from their well-known area, mainly because of ethnical relations and attachment to the Kulekhani watershed. Among the local leaders there were after all an oppinion that a well planned resettlement program would have been the best solution to the emerging social problems (Pradhan Panch, personal communication I98I).

For the locals left in Kulekhani, the experiences with compensation is felt different for people living around the dam reservoir and the downstream. The looses of resources were heavily felt, both concerning land and other traditional resources used by the locals. This will be futher analysed in the next paragraph.

2.2 Analysis at the household level

Resettlement took also place within the watershed. Of the approximately 2100 people who were directly affected by the construction of the road, dam and reservoir, 11 households: 2 Chettries, 6 Newars, 1 Damai and 2 Magars, resettled within the watershed. They bought new land and built new houses. The main reasons for resettlement were the possibilities to buy new land and kinship-ties within the area.

Most of the households who got *compensation* from the HMG-Administration had already moved from the watershed when the survey took place in 1981. However, 39 out of the 224 surveyed households were directly affected by the project. This is shown in Table 11. Of these households the majority got compensation already in 1977. By October 1981, only one household had not received the compensation. According to the HMG-Administration they would fulfil all their legal obligations by the end of 1981.

As can be learned from Table 12, most of the households who received the compensation live within Kulekhani Panchayat, and some have also resettled in Chitlang Panchayat. Compensation for lost resources was also given to some households located in the fringe of Markhu village. As the Markhu village was required by the project and rebuilt as the main administrative centre and living quarter for the staff, these households did not necessarily loose all their land due to the location of the administrative centre. Some of these households are included in the survey.

Table 13 shows the landrequisition according to ethnic groups. The majority are Newars and Tamangs. Some Brahmin, Chettries and Magars did also loose their land.

Table 14 shows the compensation amount paid by HMG Administration according to the ethnic groups. The amounts of Rupees for lost resources are statistically arranged along a geometrical line in the table. This is done to show the whole scale of compensation from those who only got some few hundred Rupees to those who got more than 60.000 Rupees. These figures again reflect the former property or parts of it. As can be learned from Table 14, it is the Newars who lost the largest land and house properties. The other ethnic groups got smaller compensation amounts. Most Newars, Tamang and Magars lost land and houses where the dam and reservoir are located today.

	1976	1977	1978	1979	1980	1981	Total number of households
Number of households	3	18	7	5	4	1	38
In % of investigated households	1.3	8.0	3.1	2.2	1.8	0.4	17 %

TABLE 11 THE NUMBER OF HOUSEHOLDS RECEIVING COMPENSATION FOR LOST LAND AND / OR HOUSE, ACCORDING TO YEAR. THE FIGURES ARE IN IN ABSOLUTE AND RELATIVE FIGURES.

Land requisition / Panchayat	number household	%
Chitlang	7	17,9
Kulekhani	30	76,9
Tistung	1	2,6
Thachok	1	2,6
Total	39	100 %

TABLE 12 LAND REQUISITION ACCORDING TO AFFECTED HOUSEHOLDS IN CONCERNED PANCHAYATS

Land requisition / Ethnic group	number household	%
Brahmin	2	5,1
Chettri	3	7,7
Newar	16	41.-
Tamang	13	33,3
Damai		
Kami	1	2,6
Magar	4	10,3
Poude		
Total	39	100%

TABLE 13 LAND REQUISITION ACCORDING TO ETHNIC GROUPS

Rupees / Ethnic group	unspecified	100 249	250 499	500 749	750 999	1000 1999	2000 3999	4000 7999	8000 15999	16000 19999	20000 23999	24000 29999	30000 59999	>60000	TOTAL	%
Brahmin	1	1													2	5.I
Chettri									1	1				1	3	7.7
Newar	3						2		5	1		2	1	2	I6	4I.-
Tamang	I		1			1	4	1	4		1				I3	33.3
Damai																
Kami							1								1	2.6
Magar				1				1	1		1				4	I0.3
Poude																
Total households	5	1	1	1		1	7	2	11	2	2	2	1	3	39	
%	I2,8	2.6	2.6	2.6		2.6	I7.9	5.I	28.2	5.I	5.I	5.I	2.6	7.7		100%

TABLE I4. COMPENSATION AMOUNTS PAID BY THE HMG ADMINISTRATION IN KULEKHANI, ACCORDING TO ETHNIC GROUPS.

Some of the resettled Newars established trade, shops and hotels in Markhu village. This village is the main trading centre and resting place along the old and traditional mule-path from Terai to Kathmandu. During the construction period it was an important market and trading centre. Most of the resettled Newars managed to reinvest their compensation in profitable business.

Some of the Tamangs, on the other hand, were not so fortunate. In fact some of them were totally dependent on spending their compensation money for survival. This was a sad observation, as they in fact were consuming their inherited fortune and were caught in the poverty circle.

It can also be learned from Table 14, that some households did not want to specify the compensation amount because they were suspicious of the possible use of this information.

Some problems were felt by the households who were directly affected by the project through compensation. These problems are shown in Table I5. The loss of local grinding water mills and houses were the problems most seriously felt. Some claimed also that they had not received compensation for the road which was constructed earlier.

The HMG Project Administration in Markhu faced some problems concerning this latter problem. Up to I982 nearly all households who had lost land, houses and other resources got their compensation paid by the HMG Project Administration. The Department of Roads had, on the other hand, not by the end of I98I given compensation for land lost for the road. This fact created problems for the HMG Project Administation, who were blaimed for this delay. The HMG Project Administration felt that these problems should have been dealt with *before* the construction started. They also regretted the lack of coordination between the different departments involved.

So great were the locals populations' expectations for compensation for lost land to the road, that when the research team arrived in the Kulekhani watershed, the locals queued up outside the compensation office the next day, awaiting their compensation from the suitcase the team brought to the Markhu village.

After all, compensation for lost resources, raises many questions as to how to define a lost resource. One can start by asking, what is actually a lost resource?
Further, compensation for what and to whom, as some individual loose some private resources and the community can loose other resources or the possibilities for agricultural production in future.

The definition of some resources was obvious in Kulekhani were so many households lost land and houses. In addition to those mentioned they also lost other resources as: fish in the river, the possibility to graze animals on the traditionally grazed land, collect firewood, collect herbs, cross the river on the suspension-bridges, water to run the mills etc.

The invisible resources are more difficult to define.
infrastructure either directly by losing the access to the market or indirectly by the barrier for interaction and contact as i.e.
filling up of the reservoir itself. Prior to the dam and reservoir the people crossed the Kulekhani river on suspension-bridges, which today are removed and replaced by new plastic boats. (In the beginning the locals did not know how to manoeuvre a boat. Usually they were standing in an over-croaded boat, exposed to waves and wind. The boat should have been replaced by a wire-boat made out of wood and iron with a hand-driven wheel, and the locals could have winched themselves across in a more safe way. Today the reservoir is a serious barrier for interaction.

After all, the resources and compensation problems in Kulekhani Panchayat have to some extent been dealt with and most of the affected households did feel they had got sufficient compensation (Table 15).

The Kulekhani Panchayat lost 37 water-mills in the damsite and 12 in other areas. This fact is seriously affecting the local population. Two of the mills had not been compensated.

The situation in Sisneri Panchayat is different. This panchayat is located downstream and its first experience was the dry Kulekhani river, and consequently the lack of water and fishes.

Lost resources / Ethnic group	lost mill	lost house	lost house mill	no comp. road	not full comp.	no comp. mill	not sufficient	total	%
Brahmin	3							3	8,1
Chettri	2	I	1					4	10,8
Newar	1	3		3	1		1	9	24,3
Tamang	6	I		4	3	1	1	16	43,2
Damai	1							1	2,7
Kami	1							1	2,7
Magar	2	1						3	8,1
Poude									
	16	6	1	7	4	1	2	37	
%	43,2	I6.2	2,7	18,9	10,8	2,7	5,4		100 %

TABLE 15. PROBLEMS RELATED TO COMPENSATION AND LOST RESOURCES ACCORDING TO ETHNIC GROUPS.

During the construction periods they had difficulties to get proper drinking water as the Kulekhani river was sometimes polluted by oil and construction materials. The household members, usually the females, had to walk for hours to fetch water in a far away stream. This added burdens to the females' work. The locals tried also to dig holes in the riverbank to fetch fresh water there.

It was however, the obligation of the project to extend a pipe down to this "dry" panchayat, but this was not completed by the end of 1981.

Further the lack of water also affected the irrigated paddyfields and the mills. The number of directly affected households were approximately 40 and irrigated land was 122 Ropanies. In addition the population lost 25 water mills and 3 oil mills. The mills are fundamental in the processing and preparation of rice, maize and oil-seeds.

The 114 meter high dam and the crest length of 420 meters itself was a barrier for their previous easy access to the Markhu village and market-place. Today they have to walk all the way around and cross the dam crest itself, or use the boat. In addition to these negative effects of the dam and reservoir, the most felt serious impact is the fear that the dam will break one day. The population have experiences from flooding in the Kulekhani river during monsoon, and to the damage of agricultural lands. They had great fear for possible consequences if the dam could not resist floods.

The lower parts of Phakhel Panchayat is affected by the regulation of Phakhel Kola. As the river is diverted to the reservoir, many households have lost their drinking water.

On the other hand, the upstream Panchayats are economically benefiting from the project in the long run due to the construction of the road. That makes transportation of especially vegetables and fruit to the market in Kathmandu easier.

2.3 Conclusion

Analysis at the project level

The HMG Department of Electricity and its section in Kulekhani was responsible for the landrequisition, resettlement and compensation for land. Several previous reports adviced the HMG Administration Section to fulfil the compensation in advance of the construction phase T_1. In addtion an organized resettlement program was launched The local population affected from landrequisition was approximately 2100 persons. They could according to the HMG officials choose between:

a) resettlement in Thori in Bara district for lost land or
b) compensation in money.

The locals were convienced by one leader of the advantages of cash compensation. This lead to a massive outmigration to Hetauda, while some few choose to resettle within the watershed itself.

During this process there arose some problems between the locals and the HMG Administration Section in Kulekhani, mainly based in different perception about the value of the land. The HMG Administration had their compensation rate (Table 8) and the locals argued about the raise in prices due to the construction site itself and buyers of land for tourist purposes as well as the pressure created by the locals who had got compensation and wanted to buy irrigated land.

Compensation for lost land is a very difficult aspect when starting a project of such scale. It is important in this connection to consider the relationship between:

1) the market price and
b) the permanent loss of a potential resource for agricultural production.

Experiences have shown that compensation has to be looked into from both these angels, as there will always be some timelag until a farmer can establish agricultural production in another area.

Analysis at the household level

The socio-economic survey of 224 households showed that 39 households were directly affected by the project. Most of them had lost all their land and houses, while other lost part of their previous land.

The compensation amounts ranges from below 1.000 up to more than 60.000 NRs. Some of the Newars who got compensation established trade, shops and hotels around Markhu village. Other households as some Tamangs were not so fortunate, they spent their compensation on survival.

The questions about compensation raises many issues, as for instance, how to define a resource. There are visible resources as land, houses, bridges and established paths. While there are other used by tradition as, the fish in the Kulekhani river, the possibility to graze animals at Government land, collection of firewood and herbs and water to run the mill. Some of these have been paid for, though not all of them. Similar problems have taken place in other countries and the compensation to local society for their loss of resources has aspects it is very important to deal with (see Bjønness 1983 p. 40).

The invisible resources are far more difficult to realise at once. It is the loss of infrastructure either directly by losing the access to the market or indirect by the barrier for interaction and contact represented by the filling up of the reservoir.

The loss of resources are felt differently, around the dam and reservoir and downstream. While most of the resource and compensation problems have been dealt with in Kulekhani Panchayat, the Sisneri downstream Panchayat is seriously affected. This is mainly because they lost the Kulekhani river itself which is the main resource for households and agricultural practise. It was the obligation for the project to extend a pipe down to this "dry" Panchayat, however by the end of 1981 this had not been done.

There were fears among the locals downstream if the dam-construction would break due to heavy rain and flooding. It would have been wise to instal a warning system if the water arose to a critical level in the reservoir itself.

3 SKILLED AND UNSKILLED WORK AT THE KULEKHANI HYDRO-ELECTRIC PROJECT

Several questions are the basis for the futher analysis of the participation in skilled and unskilled work at the Kulekhani Hydro-electric Project. These questions have to be related to different levels.

THE PROJECT LEVEL:

(i) which variables decides the employment rates of skilled and unskilled labourers

(ii) what types of experiences were gained during the construction phases for the HMG Project Administration in Kulekhani.

THE LOCAL LEVEL:

(i) to what extent were the local population participating at the construction work compared to labourers from outside Kulekhani watershed

(ii) which variables can explain to what extent the local population participate in temporary or permanent work

(iii) to what extent is traditional work in local society in competition or combined with the work on the project

(iv) where there any changes in local society which influenced to what extent the locals participated on the project?

All these questions pose two independent variables as:
ethnic group and geographical distance to the construction sites
to be considered in depth.

3.1 The employment at the Project level

The Sambu Construction Company hired *subcontractors* locally. This was for instance for excavation work in the tunnel, plastering the mountainsides besides the dam with concrete etc. The subcontractors' work with shotcrete (plastering of mountainsides) was nicely done, while the excavation work in the tunnel was not successful. According to the Company it was difficult for the Nepalese to solve problems on the site. The Sambu Construction Company's problem was that difficulties could not be solved by the local subcontractors. While on the other hand, the local unskilled workers reported that the work was dangerous and they were afraid of working in the tunnel. The technical knowledge (skills) differs between these two groups and problems with transfer of high-technology to local society has to be dealt with in a proper way. As the Nepalese had no experience in this type of contract work, it seems reasonable to look into these problems in advance of the next large scale construction (Figure 7).

However, subcontractor work as: the road to the damsite, stonewalls for landslides and drainage work was done by locals. For more complicated subcontractor work the Company hired Indian contractors. They organized difficult work operations and hired local labour.

UNSKILLED AND SKILLED LABOUR

The salary and working conditions were of two fundamental types:

a) *Unskilled* labourer, with daily wages, hired on a daily basis without any job-security (excavator, cooly, roadworker etc.)

b) *Skilled* labourer, with monthly wages, hired for minimum a month (office workers, blacksmith, electrician, carpenter etc.)

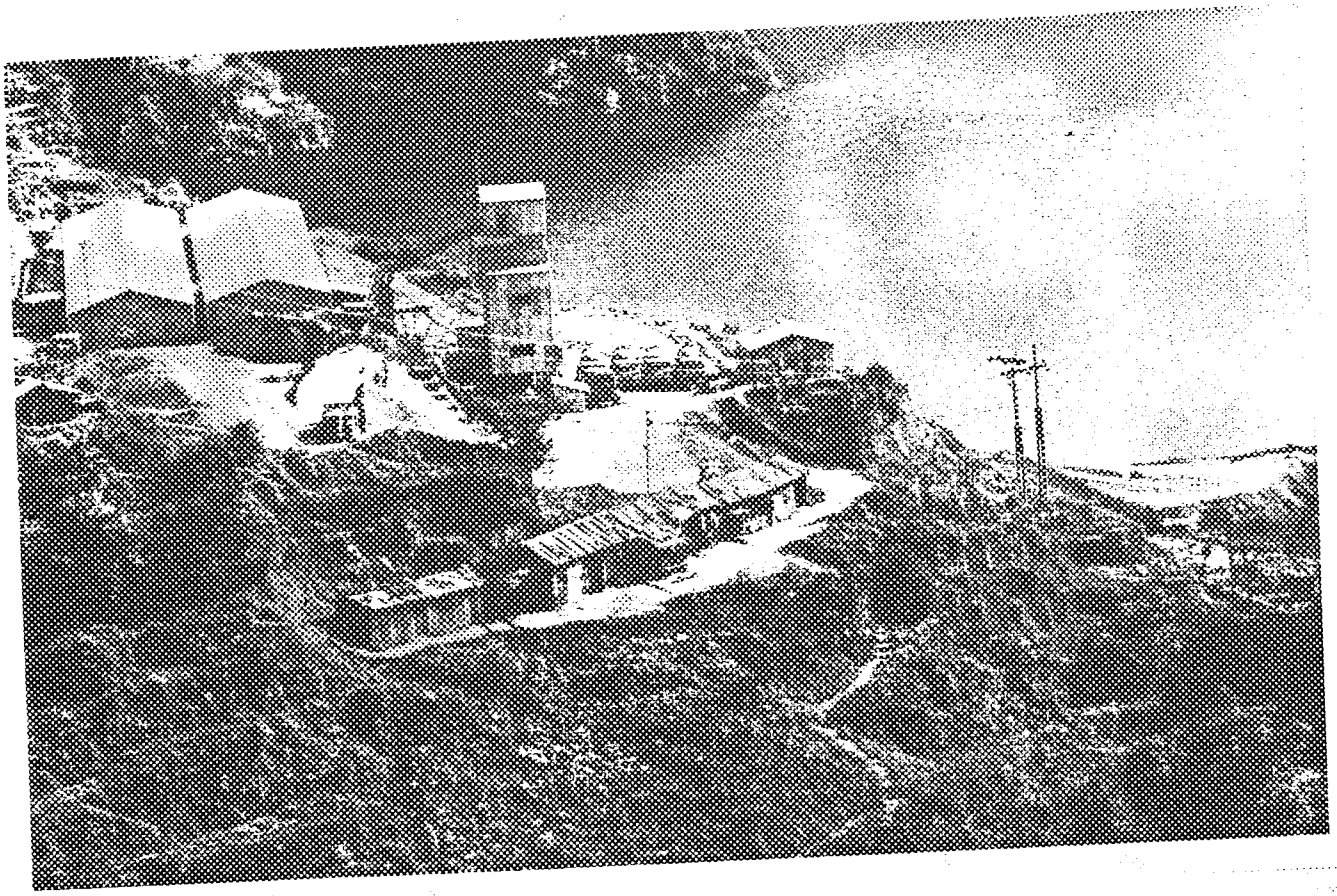

FIGURE 7. THE CONSTRUCTION SITE FOR THE CHAKHEL TUNNEL LEADING WATER FROM THE PHAKHEL PANCHAYAT TO THE RESERVOIR. AS CAN BE SEEN, THE SAMBU CONSTRUCTION COMPANY USED HEAVY MACHINERY ON THE CONSTRUCTION SITES.
IN THE FOREGROUND HAVE THE LABOURERS FROM OUTSIDE KULEKHANI WATERSHED CONSTRUCTED SQUATTER HOUSES OF AVAILABLE BUILDING-MATERIALS.
(Photo: I-M. BJØNNESS 1981)

The salary for unskilled labourer started with 8 Rs a day in 1977 and raised to 12 Rs in 1981 for an 8 hours day. In certain cases it was raised to 16 Rs, depending on the work. The Company hired female labourers for less wages than the male counterparts. Their work was classified as light and in 1981 paid with 10 Rs a day. The Company paid salaries adjusted to the Government standard for similar work. However, according to the Sambu Construction Company there were no problems to hire local people for unskilled work. The only problem seen from the Company's side was to secure enough people doing unskilled work, during rice-plantation and harvest times. At these periods the unskilled labourers took 10-15 days leave of absence. As the Company wanted to keep the time schedule for the contract work, double salaries were paid during festivals and Dasai.

Skilled labourers were well paid according to Nepalese wages. The salaries ranged from a driller who got 22-24 Rs a day, depending on the qualification of the work, to a carpenter with 30 Rs a day. The employment for at least a month, gave far better working security. There were problems to get some types of skilled labourers i.e. carpenters. This was mainly due to the high demand for carpenters for house construction activities in Kathmandu.

Training courses were organized by Sambu Construction Company in order to recruit locals from Kulekhani for work as carpenters, drillers, heavy machinery drivers, mechanics and electricians etc. The trained locals could thereafter release some of the 100-200 skilled Koreans on the project.

EMPLOYMENT OF SKILLED AND UNSKILLED LABOURERS

The Sambu Construction Company started the construction work in Nov. 1977. The Company anticipated that recruited labourers or approximately 5-600 skilled labourers came from Kathmandu and the Sun Kosi Hydro-electric Project in east Nepal. However, many of the skilled labourers were recruited from Kulekhani watershed as well and trained by the Company.

The relationship between the skilled and unskilled labourers at the Kulekhani Hydro-electric Project from July 1979 (T_1) - and July 1981 (T_2) can be seen in Figure 8 . The figure shows the total number of unskilled and skilled labourers at the dam - and powerhouse construction sites during this period. The employment ratio of skilled and unskilled labourers was approximately 2:I during T_1 and T_2.

The figure shows that the employment of skilled labourers was to some extent uneven through the construction period, this was also the case for unskilled labourers. However, the fluctuations due to oil-shortage, monsoon, and agricultural work were not as great as one should expect. It is reasonable that the oil-shortage from February to April 1980, should be reflected in the employment figures, as it seriously affected the construction work and brought nearly all work to a standstill. This was information from the UNDP-office in Kathmandu. This disturbance is, however, for instance not reflected in the employment for damconstruction which started in Nov. 1979 and was finished in May 1981.

A decline in employment during monsoon can be seen in Figure 8, for the total number of skilled-as well as the unskilled labourers.

The unskilled labourers were according to the Company supposed to leave the construction sites during monsoon for agricultural work. However, this pattern is not reflected in the agricultural preparation - and harvesting periods.

Table 16 shows the employment of unskilled and skilled labourers in July 1981, which was the termination phase of construction at the dam and powerhouse sites. In other words, the number of skilled and unskilled labourers is only shown for this month. However, the total man-days at dam - and powerhouse sites for unskilled and skilled labourers are also shown. Interesting figures are the total man-days for:

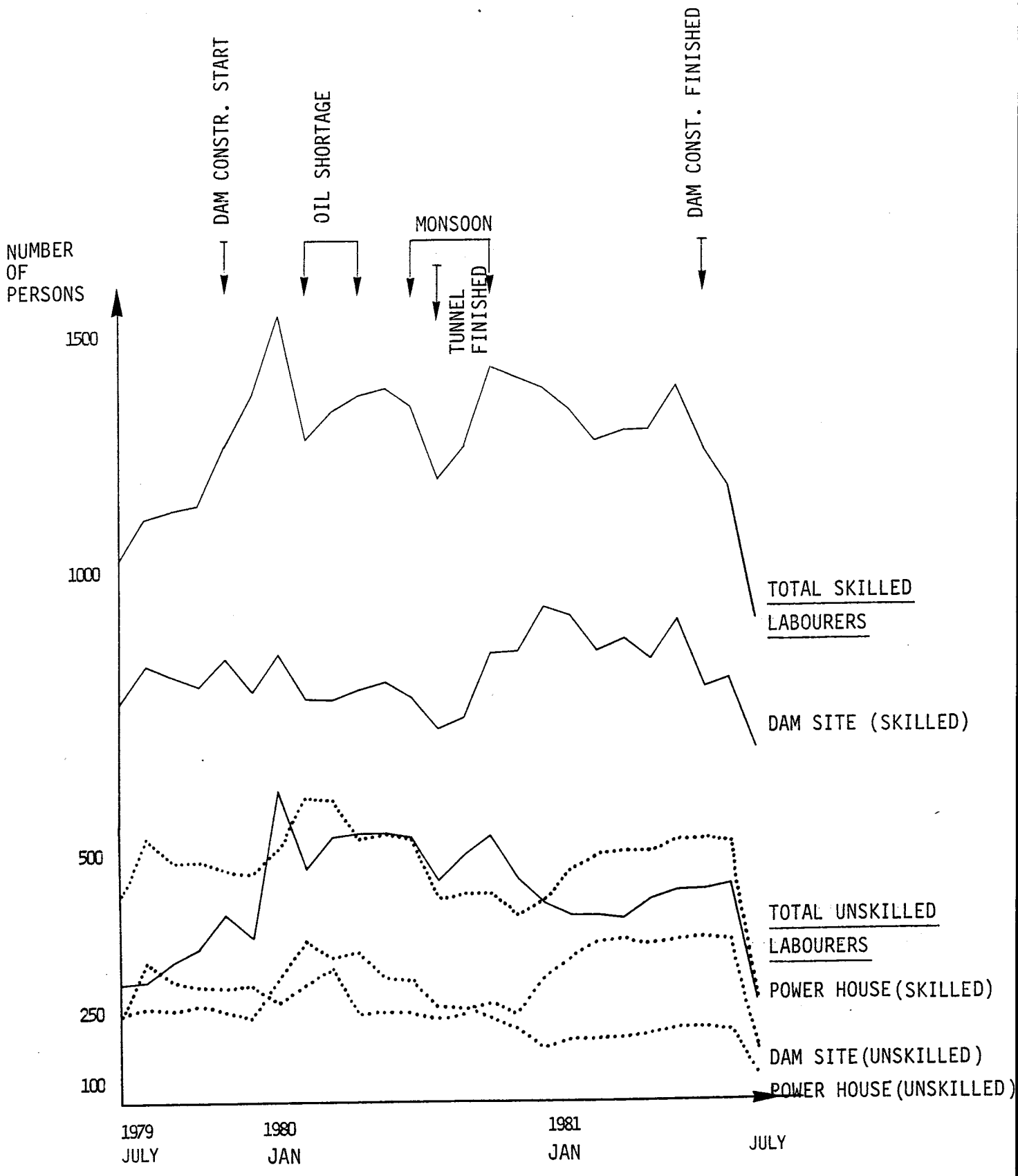

FIGURE 8. SKILLED AND UNSKILLED LABOURERS AT THE KULEKHANI HYDRO-ELECTRIC PROJECT'S DAM AND POWERHOUSE SITES DURING THE CONSTRUCTION (T_1) AND TERMINATION (T_2) PHASE - JULY 1979 JULY 1981. THE FIGURE IS BASED ON DATA FROM SAMBU CONSTRUCTION'S "MONTHLY CONSTRUCTION REPORTS".

JULY 1981	DAM		POWERHOUSE		TOTAL	
	TOTAL MAN-DAYS		TOTAL MAN-DAYS			
	NUMBER	TOTAL MAN-DAYS	NUMBER	TOTAL MAN-DAYS	NUMBER	MAN-DAYS
UNSKILLED LABOUR	150	599.128	100	462.200	200	1.061.328
SKILLED LABOUR:						
MECHANICS	20	36.568	13	7.142	33	43.710
ELECTRICIANS	15	23.831	12	15.330	27	39.161
FITTERS		5.873		149		6.022
MASON		34.230	20	6.202	20	40.432
BRICK-LAYERS		720				720
CARPENTERS	60	65.114	40	35.950	100	101.064
PLASTERS		25.941	15	12.694	15	38.635
DRILLERS	30	222.914	7	138.245	37	361.159
PIPE FITTERS		5.197	15	2.967	15	8.164
BLACKSMITHS		5.200		3.760		8.960
STEEL BENDERS	30	30.086	10	11.939	40	42.025
PLUMBERS		3.393		1.617		5.010
OILERS		2.938		182		3.120
CONCRETE WORKERS	365	168.950	75	90.772	440	259.722
OPERATORS	175	270.900	30	62.667	205	333.567
FOREMEN	30	27.515	9	10.880	39	38.395
TOTAL	875	1.528.498	346	862.696	1.221	2.391.194
KOREANS	(70)		(43)			

TABLE 16. THE TOTAL NUMBER OF SKILLED AND UNSKILLED LABOURERS AT THE DAM AND POWERHOUSE SITES IN JULY 1981. TOTAL MAN-DAYS IS SHOWN FOR THE PERIOD NOV. 1977- JULY 1981. THE TABLE IS BASED ON "MONTHLY CONSTRUCTION REPORTS".

Unskilled labourers, with 1.061.328 (equals 2.900 man-years).
Skilled labourers, with 1.329.866 (equals 3.640 man-years).

These figures do not reflect the previous ratio of skilled and unskilled of 2:1. The difference can be explained with demand for different types of labourers during the project phases T_0 - T_2.

The period Nov. 1977 to July 1979 is not shown in Figure 8. This period should however, reflect a relative high number of unskilled labourers in order to correspond with the total man-days figures shown above.

The demand for unskilled workers on road, excavating the tunnels and other heavy construction work is anticipated to be higher in the T_1-phase.

3.2 Experiences from the Project work

HMG's Project Administration was the responsible Nepalese part in the Kulekhani Hydro-electric Project. Sambu Construction Company from Korea was responsible for execution of the construction work. Nippon Koei from Japan was the engineering consultants.

The HMG staff was 347 in 1980, 392 during 1981 and 297 in 1982 which included project manager, administration accountant, engineers geologists and related staff.

The HMG's Project Administration in Kulekhani reported that the learning from the project work, which is the first of such scale in Nepal could be summerized as:

(i) Administrative knowledge
(ii) Management knowledge
(iii) Technical knowledge.

It was reported that several of the staff would seek similar work on the next hydro-electric construction site. In this way an expertise group will lead the development of hydro-electricity in Nepal.

It was difficult to get to any facts about the *HMG's administration's experiences and problems, and how they were solved* during the different project phases. For the benefit of similar work in future the HMG-staff should have worked out reports on the experiences in the different fields (administration, management and technical aspects) during the different project phases (Figures 9 and 10).

Only analysis of experiences, problems and solutions in the different aspects mentioned above can improve the administration, management and technical skills. However, this type of analysis or evaluation of the project should be dealt with at two levels.

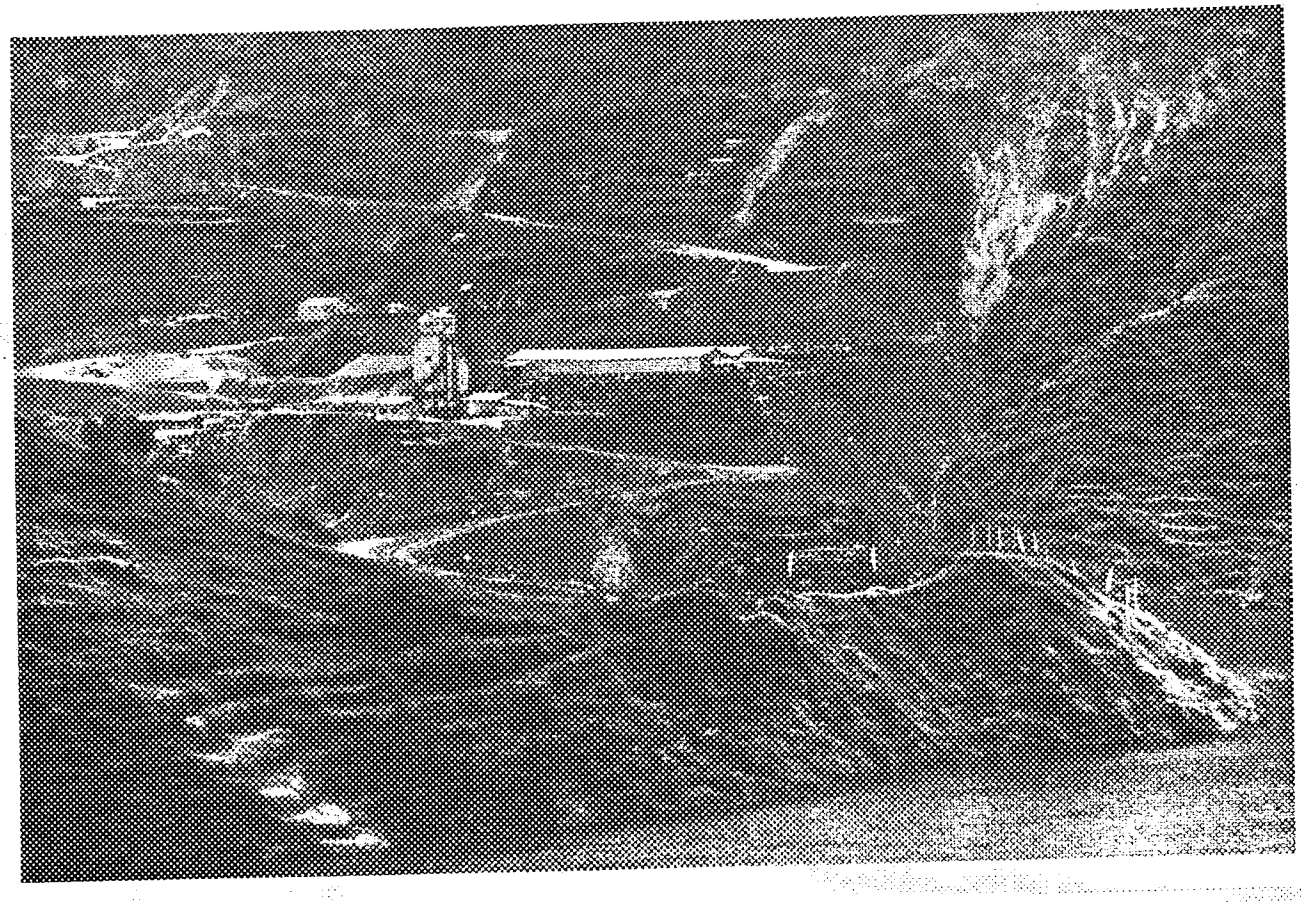

FIGURE 9. THE DEVELOPMENT OF HYDRO-ELECTRICITY IS AFFECTED BY POLITICS, PLANNING, ECONOMICS, OTHER USES OF WATER-RESOURCES, ENVIRONMENT, AND SOCIAL FACTORS AS FOR INSTANCE THE MOVEMENT OF THE POPULATION IN THE RESERVOIR AREA.
IN THE FOREGROUND HAVE THE TAMANGS PUT UP PRAYER-FLAGS FOR THE BENEFITS OF THE HYDRO-ELECTRIC PROJECT. THESE FLAGS ARE SITUATED ON A RIDGE WHICH WILL BE SUBMERGED. IN CONTRAST TO THIS TRADITIONAL SYMBOLS IS THE CONSTRUCTION SITE IN THE BACKGROUND.
(Photo: I-M. BJØNNESS 1981)

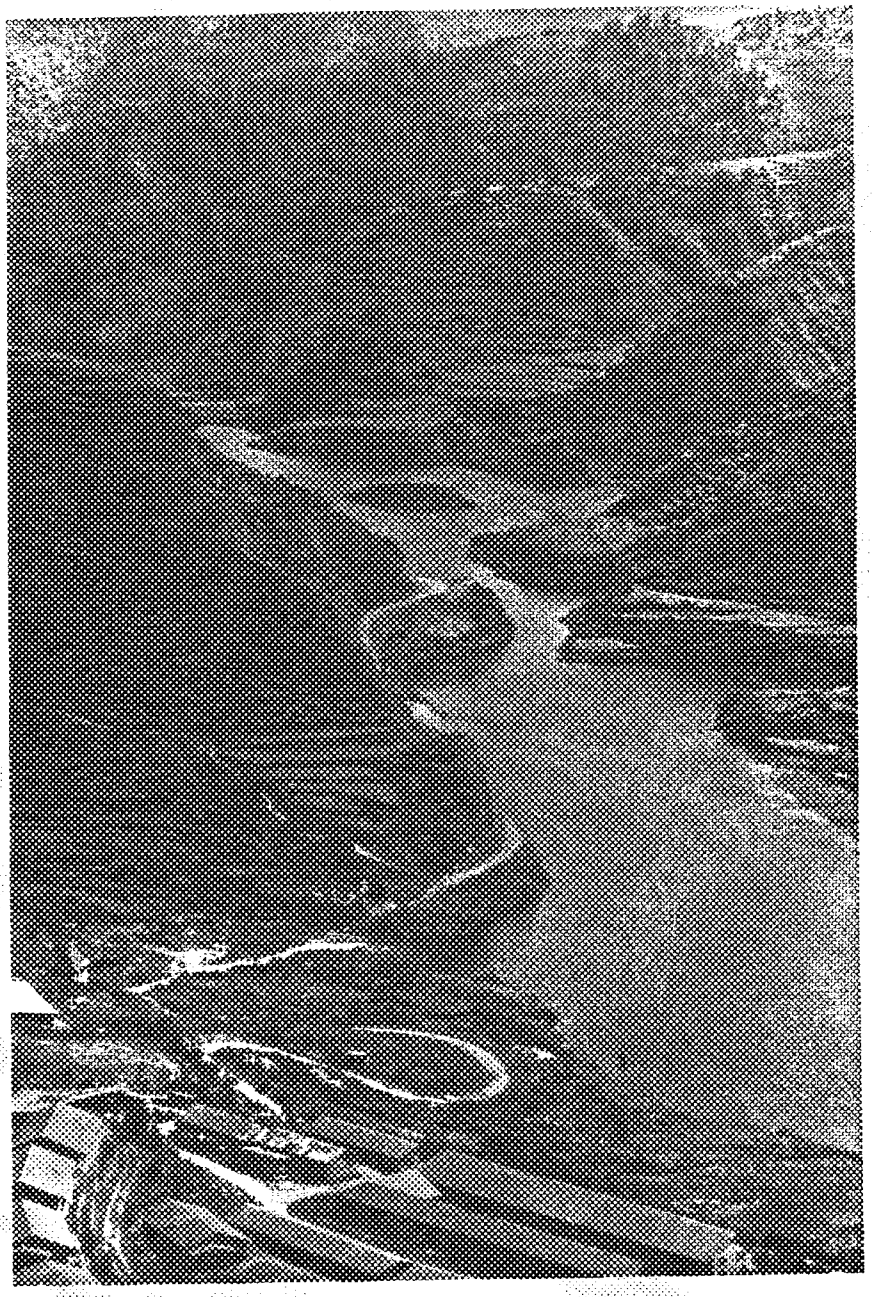

FIGURE 10. THE KULEKHANI RESERVOIR IS BEING FILLED UP. THE ROAD ON THE LEFT BANK WILL BE SUBMERGED. THE MARKHU VILLAGE ADMINISTRATIVE CENTRE IS SITUATED IN THE FOREGROUND.
THERE WERE AND STILL ARE FEARS AMONG THE HMG ADMINISTRATION'S GEOLOGISTS THAT THE BANKS OF THE RESERVOIR WILL ERODE AND LANDSLIDES OCCUR. FAO HAS A REFORESTATION PROGRAM ON THE BANKS ALONG THE RESERVOIR IN ORDER TO PREVENT LAND-SLIDES.
(Photo: I-M.BJØNNESS 1981)

The first evaluation level should undertake:

Accumulation of knowledge by employed staff.

It is no better way of advancing our knowledge than dispassionate analysis and critisism. Since the accumulation of knowledge from the Kulekhani Hydro-electric Project is extremely important in view of the further development of hydro-electricity in Nepal, the HMG Project Administration is recommended to work out systematic and final reports on the aspects mentioned above.

The second evaluation level should undertake:

Systematic evaluation with emphasis on external evaluation based on interdisiplinary nature.

Evaluation of a project is usually done in terms of an analysis of productivity (production/direction costs and efficiency, benefits/ direct and indirect costs). Moreover, the debate on what actually evaluation implies, has come to concentrate around the question of moving away from the cost-benefits and cost-effectiveness analysis (Elzinga 1981). The discussion concerns how to move away from macro-level analysis and rather link this level to the micro-level evaluation.

Project appraisal and evaluation stages have received much attention in the evaluation litterature. Today there exist many manuals, books and articles on how to develop and use methodologies for policy development and planning, for administrative and management purposes as well as for meeting accountability needs of funding agencies. One might easily ask what is all this evaluation business about? There are a number of problems and weaknesses pertaining the conventional evaluation steps. The usual failures are the treatment of datas as they possess cross-cultural generality and as if they are politically and ideologically neutral. No evaluation can be separated from the value and ideological basis.

In spite of all these weaknesses of the evaluation approaches in general, it is important that a systematic evaluation of administration, management and technical experiences and problems are dealt with also by an external evaluation team.

3.3 Analysis of the locals' participation in skilled and unskilled work

The following analysis is based on the socio-economic survey (see 1.4 The household survey in Kulekhani), which took place in the Kulekhani watershed in August / September 1981. At that time it was one year left of the construction (T_1) phase.

Of the 224 households in the survey sample, 26.8 per cent answered that one or more houshold members had participated in work at the Kulekhani Hydro-electric Project. This figure implies participation once during the whole construction period (from T_1 to T_2) which took four years. To what extent the locals participated in construction work depends on their ability to get skilled or unskilled work. It also includes to adjust to the project's demand and possibilities to get other work in local society, as traditional work connected to agriculture or crafts.

The project staff anticipated that approximately one third of all labourers were recruited among the locals. This figure implies that every twelwth household had at least one person participating in work at the construction sites. However, it is of interest to find some reasons why many locals did not participate. Some of the main reasons are shown in Table 17. Man-power shortage is the main reason, as permanent work at the project coincide with the agricultural seasons. Several households reported that members had tried to get work without sucess. This was mainly because they had no relatives working there already, who could help them (Table 17).

There were other reasons as well. The project sites were considered dangerous working places, and the locals were sceptical. Moreover, an in-depth question about the word *danger* reflected that many people did not think of physical danger as a threat (i.e. stone in the head or damage on the working place). It was rather the fear that the mountain's super-natural power would threaten their lives.

The mountain itself was disturbed by the activities of the project. It was extensively believed that the mountain's super-natural power would purnish the intruder. This belief was widely held by many Tamangs, who avoided to take work at the project.

Another belief which also kept them from the construction sites was the understanding that a human sacrifice should take place in order to strengthen the dam construction. Naturally these strongly hold believes based in mythology and religion,kept some locals from participation.

In order to avoid such misunderstandings, it can be concluded that information about the construction work and possible dangers and how to avoid them, should be given emphasis. Illiteral unskilled labourers should be given proper information in order to avoid superstition.

PARTICIPATION OF FEMALES AND MALES

The participation of *females* in 1981 is extremely low (Table 18). The causes have to be sought in the early construction phase T_1. At that time several females asked for and got employment at the project. In the beginning of the Project approximately 40 females participated. They were mostly hired for cooking and cleaning. Some children below 14 years helped them in the cantinē. However, after a relatively short time there arose cultural and social conflicts between the Nepalese females and the foreign staff. These conflicts were mainly based in different cultural, social and religious values and believes between the mainly Hindu Nepalese and the Koreans. As a Hindu society place strict rules on female behaviour, the locals wanted to protect them. It was felt that the females should not be "exposed" to the foreigners and not seek employment at the project.

REASONS / NUMBER	NO REA-SON	MANPOWER SHORTAGE	FARM WORK	DIFFIC. WORKING COND.	NO RELA-TIVES	DO NOT LIKE IT	DANGEROUS WORK	NUMBER OF HOUSEHOLDS
	1	88	9	5	6	10	17	136
IN % OF HOUSE-HOLDS	0.4	39.3	4	2.2	2.7	4.5	7.6	61.3

TABLE 17 DIFFERENT REASONS FOR *NOT* TAKING WORK AT THE KULEKHANI HYDRO-ELECTRIC PROJECT IN ABSOLUTE AND RELATIVE FIGURES.

TYPE OF WORK / SEX	PERMANENT WORK	TEMPORARY 1-6 MONTH	TEMPORARY 6-12 MONTH	TOTAL	% OF TOTAL NUMBER FEMALES AND MALES
FEMALES	1	2	2	5	(0.6)
MALES	40	18	25	83	(9.6)
TOTAL	41	20	27	88	-
IN % OF ALL HOUSEHOLDS	18.3	8.9	12	39.3	

TABLE 18 TOTAL NUMBER OF FEMALES AND MALES PARTICIPATING IN CONSTRUCTION WORK, PERMANENT, TEMPORARY 3-6 or 6-12 MONTHS AT THE KULEKHANI HYDRO-ELECTRIC PROJECT, LAST YEAR.

These initial conflicts which arose between the foreign staff and the locals are anticipated to have created much to the distrust between locals and the expatriate staff later on. The conflicts could have been avoided if the Korean staff had known more about the cultural, social and religious believes and values in Nepal. On the other hand, the Japanese staff had a good relation and reputation among the locals.

The participation of *males* (Table 18), last year was also relatively limited. Approximately half of the males were permanently employed while the other half were temporarily employed. This implies that many of the males took work at the project for limited periods: from three - to six months and up to a year.

In a predominantly subsistence agricultural society it seems as temporary work was regarded the best combination with the seasonal agricultural work. Many household members did choose this type of combination as an alternative to traditional work (discussed in the next chapter).

Skilled and unskilled work according to Panchayat

Figure 11, shows the participation of skilled and unskilled labourers according to panchayats in 1981. As can be seen it is an overwhelming participation of labourers from Kulekhani Panchayat, compared to both upstreams and downstream panchayats. This is on line with Nippon Koei's suggestion that "materials and persons shall be provided locally as much as possible" (Nippon Koei 1976). There is also a relative high degree of participation from the Phakhel Panchayat.

The absolute number of skilled and unskilled labourers are shown in Tables 19 and 20. The tables show the distribution of different types of skilled work according to panchayats. As can be learned it is Kulekhani which have had the largest number of skilled and unskilled labourers. It was reported from the Daman, Palung and

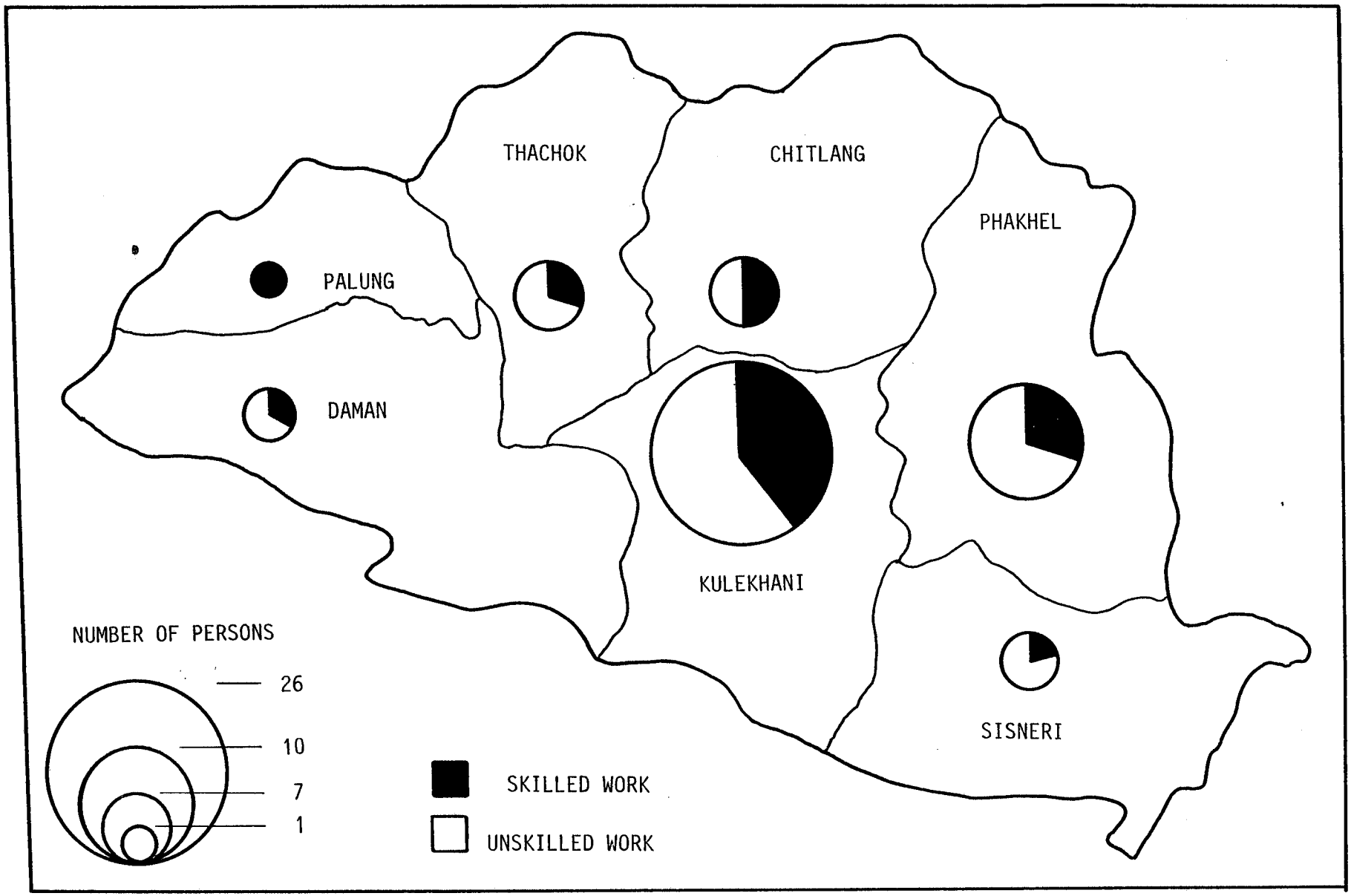

FIGURE 11. THE TOTAL NUMBER OF LABOURERS DOING SKILLED AND UNSKILLED WORK AT THE KULEKHANI HYDRO-ELECTRIC PROJECT ACCORDING TO PANCHAYAT IN 1981.

Skilled work \ Panchayat	Chitlang	Kulekhani	Phakhel	Tistung	Daman	Palung	Thackak	Sisneri	Total
Operator									
Unspecified	2		2		1		1		6
Blaster		2							2
Driller	1	3					1	1	6
Timechecker			1						1
Electrician		1							1
Subcontractor		3		1		1			5
Supervisor		1							1
Total	3	10	3	1	1	1	2	1	22

TABLE 19 SKILLED LABOURERS IN ABSOLUTE NUMBERS WORKING AT THE KULEKHANI HYDRO-ELECTRIC PROJECT, ACCORDING TO PANCHAYATS AND DIFFERENT WORK CATEGOIRES.

Unskilled work \ Panchayat	Chitlang	Kulekhani	Phakhel	Tistung	Daman	Palung	Thackak	Sisneri	Total
Cooly	1	6	3	1	1		1		13
Watchman	1	2							3
Signalman		2	2					1	5
Roadwork			1		1			1	3
Ordinary labour	1						2		3
Unspecified		6	1				2	2	11
Total	3	16	7	1	2	-	5	4	38

TABLE 20 UNSKILLED LABOURERS IN ABSOLUTE NUMBERS WORKING AT THE KULEKHANI HYDRO-ELECTRIC PROJECT, ACCORDING TO PANCHAYATS AND DIFFERENT WORK CATEGORIES.

Tistung Panchayats that two years back several locals had participated on the project while today (1981) there were less. This seems to be the trend today that there are less locally employed manpower than earlier.

Skilled and unskilled work according to ethnic groups

According to the HMG-Project Administration there were no differences between the ethnic groups with regard to seek work at the project. Their experience was that none groups denied doing the suggested work at the dam site or in the tunnel. However, several accidents took place during the construction period. According to the Police, 28 persons died, of which several were from the Kulekhani watershed. According to the Pradhan Panch in Chitlang (personel communication 1981) two persons from his panchayat died on construction work and three were seriously wounded. These accidents had an impact on the population. Many feared to work especially in the tunnel. The low participation of locals by the end of the construction period can be explained by fear of accidents. This fear might be an indirect cause for expressions as "do not like it", "difficult work" and "dangerous work" (Table 17). The locals also claimed that several labourers from other places died. Figures from these accidents were never given officially.

Tables 21 and 22 show the absolute number of skilled and unskilled labourers at the Kulekhani Hydro-electric Project in 1981 according to ethnic groups. As can be seen from the tables there seem to be a small, but notisable difference in number of skilled labourers according to ethnic groups as there are more Chettries and Newars in this category than Tamangs relative to the number of people in the different ethnic groups. There is an absence of lower caste groups as Damai, Kami, Magars and Poude. On the other hand in the unskilled category there are participation from these groups. As can be seen from Table 22 the participation of unskilled labourers correspond closely to the distribution of persons in the different ethnic groups (Table I).

Ethnic group \ Skilled work	Un-specified	Blaster	Driller	Time-checker	Elec-trician	Sub-contractor	Super-visor	Total skilled labourers	%
Brahmin			1				1	2	9
Chettri	1	2	3		1	2		9	41
Newar	2					3		5	23
Tamang	3		2	1				6	27
Damai									
Kami									
Magar									
Poude									
Total skilled labourers	6	2	6	1	1	5	1	22	
%	27	9	27	5	5	22	5		100

TABLE 21 SKILLED LABOURERS AT THE KULEKHANI HYDRO-ELECTRIC PROJECT, ACCORDING TO ETHNIC GROUP IN 1981.

Ethnic group \ Unskilled work	Coly	Service watch man	Signal man	Road work	Ordinary labour	Un-specified	Total un-skilled labourers	%
Brahmin	1					2	3	8
Chettri	2	1	1	1	1	1	7	18
Newar	4		2	1	1	1	9	23
Tamang	3	1	1	1	1	6	13	34
Damai			1				1	3
Kami	2					1	3	8
Magar	1						1	3
Poude		1					1	3
Total unskilled labourers	13	3	5	3	3	11	38	
%	34	8	13	8	8	29		100

TABLE 22 UNSKILLED LABOURERS AT THE KULEKHANI HYDRO-ELECTRIC PROJECT, ACCORDING TO ETHNIC GROUP IN 1981.

MAN YEARS AT THE KULEKHANI HYDRO-ELECTRIC PROJECT

The number of man-years at the Kulekhani Hydro-electric Project is shown in Table 23. These figures imply temporary and permanent work at the construction sites, with regard to ethnic groups. The total participation throughout the construction phases T_1 and T_2 is approximately *129 man-years* for the 224 interviewed households.

During the five years of construction this figure can be an underestimate of the actual participation, because some people were not able to estimate correctly the length of their work. If this figure is approximately correct and gives a significant rate of employment, it is possible to estimate the approximate participation for the population in the Kulekhani watershed.

The following figures gives an estimate of the participation.

2.391.194 man-days at the Kulekhani Hydro-electric Project in the end of 1981, equals 6.540 man-years.

The 224 households include approximately 1730 persons.
There are 36.000 persons in the watershed.
This leads to the following estimate:

$$\frac{1730}{129} = \frac{36.000}{X}$$

$$X = 2.684$$

2.684 MAN-YEARS

According to the estimate above, the participation of the local population in Kulekhani watershed equals 40.4 per cent of the total participation in man-years on the project. This is a relatively high rate of participation. Another fact might throw light on the extent of participation. Figure 11 indicates that geographical distance is an important variable to take into account, as closeness to the construction sites seems to indicate higher participation.

ETHNIC GROUP \ MAN YEARS	3-6 MONTHS	6 -12 MONTHS	> 2 YEARS	MAN-YEARS	%
BRAHMIN		1	17	18	14
CHETTRI	2	4	31	37	29
NEWAR	1	5	20	26	20
TAMANG	1	9	25	35	27
DAMAI			4	4	3
KAMI		1	7	8	6
MAGAR	½			½	0.5
POUDE	½			½	0.5
TOTAL	5	20	104	129	
%	3.9	15.5	80.6		100 %

TABLE 23 TOTAL MAN-YEARS IN TEMPORARY AND PERMANENT CONSTRUCTION WORK AT THE KULEKHANI HYDRO-ELECTRIC PROJECT IN THE 224 SURVEYED HOUSEHOLDS, ACCORDING TO ETHNIC GROUPS.

3.4 Conclusion

Analysis at the project level

The high- technology Kulekhani Hydro-electric Project required many skilled and unskilled labourers during the construction phases T_1-T_2. During the peak period the ratio between skilled and unskilled labourers was 2:1.

According to the official figures from Sambu Construction Com-- pany (Monthly Construction Reports) there seem to be a relative even employment of skilled and unskilled labourers throughout the period shown in Figure 8, in spite of obstacles as oil-shortage, monsoon and agricultural seasons.

The contractors claimed that the unskilled were very unstable labourers, as they went home to do their seasonal agricultural work and participated in festivals etc. On the other hand the labourer claimed that it was very difficult to get permanent work conditions at the project. Unskilled labourers were employed on a daily basis, and this creates uncertainties.

The situation was different for the skilled labourers who were hired for at least a month. In order to recruit skilled labourers, the Sambu Construction Company established a training school. This was an advantage for labourers from Kulekhani as well as from other parts of Nepal. It is anticipated that several will use their new skill to get work at similar construction sites. As it is difficult to get trained and skilled labourers due to lack of relevant education, this was an important cource for technical skills.

However, accumulated knowledge is important on all levels. The HMG's Project Administration in Kulekhani should have reported their experiences and problems which arose during the construction phases for the benefit of similar projects in future. It is only through a thorough evaluation of the; administration, management and technical knowledge, that it is possible to improve a similar situation.

In other words, there should be two levels of evaluation, where the first should undertake:

Accumulation of knowledge by employed staff.

The second should undertake:

Systematic evaluation with emphasis on external evaluation.

The one level should not cooperate with the other, because it is important to get the "inside" as well as the "outside" views on how the HMG's Project Administration as well as the Sambu Construction Company and the Nippon Koei functioned in cooperation and gained experiences and solved problems throughout the construction phases.

Analysis at the local level

The analysis of the participation in construction work among the locals showed that:

(i) Throughout the construction phase T_I , 26.8 per cent of the households answered that one or more members had worked at the construction sites.

(ii) It is, however, anticipated that the participation rate was quite high in the beginning of the construction phase (personal communication with all Pradhan Panchas in the Panchayats). It was lower by the end of the construction phase (T_I) and termination phase (T_2).

(iii) The participation rates differ among females and males. While there were several females who participated in the beginning of the construction (T_I), they soon left the project due to cultural and social problems between the females and Korean staff.
9.6 per cent of all males in the 224 households participated in permanent and temporary work last year. This is lower than the previous figures of participation during the five years of construction.

(iv) The participation in skilled and unskilled work is shown in Fig. 11 . and it is an overwhelming number of labourers from Kulekhani Panchayat, both with regard to skilled and unskilled work. Geographical distance explaines a high participation.

(v) There is a significant difference between ethnic groups concerning skilled and unskilled labourers. The skilled work is mainly done by Brahmins, Chettries and Newars, while the two latter dominate relative to the number of persons in different ethnic groups. The Tamangs are relatively few, and the Magars Damai, Kami and Poude do not participate at all.
Unskilled work is done by all ethnic groups and the participation rates correspond closely to the distribution of persons in different ethnic groups.

(vi) The total man-years at the project (include temporary and permanent work) through the whole construction phase (T_I), show that the 224 households had contributed with I29 man-years.
An estimate is made of the total participation from all Panchayats presupposed that the estimate of the man-years above is approximately right and that the sample is statistical representative of the population in the watershed. This leads to a relatively high participation of 40.4 per cent of all man-years at the project. by the population in Kulekhani watershed.

4 PARTICIPATION IN TRADITIONAL WORK IN KULEKHANI WATERSHED

4.1 Definitions and extent of combination with other work

In order to understand the economic strategies of the farmers, it is important to realize that most of them are operating from a poor economic base. When the two major agricultural assets - land resources and livestock - are taken into consideration, it was found that the majority of the households has relatively small holdings. Table 5 showes that the majority has farms less than 20 Ropanies. Most of the farms consist of bari-land which means upland dry cultivation (Tables 6 and 7).

Households resort to a variety of economic strategies to accomplish the task to maintain the farm and agriculture. These strategies vary a great deal from village to village, depending on available resources, land quality (khet and bari), agricultural products for cottage industry, ethnic groups and traditional work in addition to agricultural activities. From the aggregate data, it can be concluded that the average household does not live on agriculture alone. The majority rely on external sources to meet their yearly expences.

This chapter examines economic strategies in terms of participation in agriculture, traditional work in local society or outside the watershed as well as income from project work, in order to meet the yearly expences.

The major variations between villages and ethnic groups are noted. Traditionally there are several types of skilled work in local society, firstly done to cover:

(i) local needs
These are usually paid for in kind,

(ii) local commercial needs
These are usually paid for in cash.

Traditional work is defined as *off-farm work* to support the income in the rural sector. Off-farm means that the person is not working on his own farm, but might work on his neighbour's. The proportion of income from this type of work is hard to settle. Its importance can be illustrated by its combinations, utilization of different local resources, by the skill of different ethnic groups and finally by its duration throughout the year or years.

Traditional work can be distinguished in:

(i) skilled work mainly to serve the local society
(ii) agricultural related work, which includes
    wage work on other's farm
    improving products (preservation, seed production, oil production)
    transportation of farm products (coolies, porters).
(iii) service work in local society (shops, beer-brewing, teahouses)

Relatively few (16.1 per cent) of the investigated households worked in agriculture only (Table 24). The rest of the households had some types of combinations. The majority, more than fifty per cent, supported themselves with the combination of traditional work and agriculture. The combination of agriculture and construction work were also sought by relatively few, 10.3 per cent of the households only. To a certain extent all three alternatives were combined by relatively many households.

There are different kinds of *traditional skilled work* as shown in Table 25, to serve local society. The Brahmins are the priests. They are the only ethnic group who can perform Hindu rituals. They are extensively called for. The payment for their traditional duty is mainly in kind, but also in cash.

The occupational castes are closely bound to their duties in the local society. The Kamis or blacksmiths are artisans who do professional work. Their products are agricultural and construction tools, but also metal tools for kitchen purposes. They barter their products for grain. While the importance of their skill to some extent is loosing in importance, because of imported tools from India, their skill is still sought. Some of the blacksmiths found work at the Kulekhani Hydro-electric Project as steelbenders.

The Damai or tailors did much work during the construction period. (T_1 - T_2). The tailors and blacksmiths serve a bista, which means a certain number of households. The salary is in kind and they will get rice, maize or barley according to the size of the family they serve and the work done.

Types of work / Ethnic group	Agriculture only	Agriculture and traditional work	Agriculture and construction work	Agriculture, construction and trad. work	Total household	%
Brahmin	7	9	5	-	21	9.4
Chettri	8	11	6	8	33	14.7
Newar	8	34	8	8	56	25.0
Tamang	9	54	5	16	84	37.5
Damai [x]		6		1	7	3.I
Kami [x]		7		3	10	4.5
Magar	4	4		1	9	4.0
Poude		3	1		4	1.8
Total households	36	128	23	37	224	
%	16.1	57	10.3	16.6		100 %

[x] Damai and Kami own very little arable land

TABLE 24 HOUSEHOLDS WITH COMBINATIONS OF AGRICULTURE, TRADITIONAL WORK AND CONSTRUCTION WORK AT THE KULEKHANI HYDRO-ELECTRIC PROJECT ACCORDING TO ETHNIC GROUPS.

Ethnic group \ Traditional work	No tradi-tional work	Priest	Shop hotel	Cooly	Offi-cial work	Ordi-nary labour	Mecha-nics	Local wage work	Tailor black-smitn	Fire wood	Oil water mill	Beer tea-shop	Agri-cul-tural trade	Ordi-nary trade	Fishing	Total	%
Brahmin	12	2	1		3			1					2			21	9.4
Chettri	14		3	2	2	2		1			1	1	4	1	2	33	14.7
Newar	14		13	5		2	1	8			5	4	4			56	25.0
Tamang	14		1	21	6	5		14		11	1	7	2		2	84	37.5
Damai									7							7	3.1
Kami									10							10	4.5
Magar	4				1	1		1							2	9	4.0
Poude	1							3								4	1.8
Total	59	2	18	28	12	10	1	28	17	11	7	12	12	1	6	224	
%	26.3	0.9	8.0	12.5	5.4	4.5	0.4	12.5	7.6	4.9	3.1	5.4	5.4	0.4	2.7		100

TABLE 25 PARTICIPATION OF HOUSEHOLDS IN *TRADITIONAL WORK* IN KULEKHANI WATERSHED, ACCORDING TO TYPES OF WORK AND ETHNIC GROUPS.

The Poude is the ethnic group who sweeps the floors for the others. Some of them had permanent work at the Kulekhani Hydro-electric Project.

Carpentry is a traditional skill in the watershed. Up to now the products: wood-constructions in houses, doors, windows and roofs have been produced more for domestic than for commercial purposes. The carpenters are professionals producing for the local needs using local made tools as plane and axe. However, a saw is rarely seen. The raw materials are cut in the forests and dried. When the logs are cut into planks, these simple tools leave a huge wastage of woodspones. This practice effects the deforestation.

During the construction periods (T_1 - T_2) there was a great demand for carpenters and the salary for this skill arose to 30 NRs per day. Several local carpenters got the opportunity to work at the Kulekhani Hydro-electric Project.

Another type of skilled work in local society is the making of crafts. Previously there was production of cloth made of cotton. This activity is still practised in the watershed. For instance in Chitlang Panchayat there are still 150 traditional handlooms out of 200 previously. Today ready-made cloth, mostly imported from India, compete with the handloom. However, craft goods are still made out of local rawmaterials, as wood and straw. Baskets (doko) and mats to sit and sleep on are made in the watershed.

The *agricultural related work* includes local wage work on other's farm. There will necessarily be possibilities for this type of work as some holdnings are large compared to the average in Kulekhani. In the rice planting, seeding, weeding and harvesting periods it is important that there are man-power available for agricultural work. The salary for hired man power in 1981 was 4 NRs per day with two meals and local brandy (raksji) or 10 NRs per day without any food.

There are needs for different types of work related to agriculture. The Brahmins are for instance not allowed to plough their fields, due to religious believes. They will hire manpower and oxes. For this work the farmers' charge 20 NRs per pair of oxen per day (in 1981).

There are also some specialized traditional skills in the watershed. One is the making of mills and also the running of mills. There are several kinds of mills (ghattas). Some are for oil-pressing while others are for different types of grinding seeds: rice, maize etc. The making of mustard oil is another specialized skill.

The transportation of agricultural products within the watershed as well as to larger towns outside the watershed is done by coolies. The coolies are ordinary farmers, mainly Tamangs, who carry bags weighing from 60-80 kg of rice for several days to a market place. The salary is from 15 - 18 NRs per day. This heavy work is mostly combined with their own agricultural work.

Another type of agricultural work is the transportation of animals from Terai to the market in Kathmandu. This implies to walk with the buffaloes for days and cross the Mahabharath Lekh through the Kulekhani watershed.

The use of local resources: fish and wood for fuel, has been and is still very important. Fishes were catched in the river in Kulekhani- and Sisneri Panchayats and sold in the local market. The fish from Kulekhani river is famous in Nepal. During the Rana period the King got delivery every week throughout the year. When the dam was filled up, the fishes migrated upstreams. However, it is doubtful if they will survive in the new ecosystem. People in the local area were surprised of the size of the migrating fishes, as the reservoir forced several large fishes upstreams, where the locals caught them.

Wood for fuel is collected in forests in the watershed. Due to its closeness to the energy-demanding Kathmandu, the collection of fire-wood (faggot in the Tamang language), is illegally done in the Phakhel forest. While the cost of imported energy rises, traditional indigenious resources are becoming increasingly scarce. Fire-wood is the main source of income for the Tamangs who cannot feed themselves on their small holdings. Whole families are engaged in the collection and sale of this resource. The prices arose during the 1970s and one load of fire-wood (approx. 40 kg) was sold in Kathmandu for 32-40 Rs. Since supply and demand for fire-wood are seldom geographically matched, the forests need improved management if the present yields are to be maintained.

As can be seen in Table 26 the different ethnic groups have done traditional work for a relatively long time. In fact most of the households from 3-15 years. This is mainly because the traditional work and skill is handed down from generation to generation.

Participation of females, males and children in different types of traditional work is shown in Table 27. According to the figures found here it is three times as many males working in traditional work as there are females.

Of the categories choosen, the participation of females are more concentrated on occupations taking place close to the home or in the nearby areas. They are working especially in *service work in local society*. This implies business, shops and hotels, as well as tailoring, blacksmith, beer-brewing and teashops (Figure 12).

The difference in particiaption between females and males is also to be found in the distinction made between agricultural and traditional work. For instance processing of agricultural products made by females is usually defined as agricultural work, while processing of oil-seeds is a traditional skill. In this sense the reader should not be left with the imagination that the females in Nepal do not take their deal of the duties, in this sense it is a question about statistical figures. The females are bound to many duties in the household and agriculture which in a statistical sense are not covered by any separate distinction .

Participation in traditional work according to Panchayat can be seen in Figure 13 . The figures shows that there are some geographical differences, which can be related to available resources as well as to different ethnic groups. The most common activity is wage work, cooly and ordinary labour. The majority of the households participate in these activities. Business of agricultural products, teashops and mills etc. are the second most common activity. The blacksmiths and tailors serve the Bistas in all Panchayats. As can be seen, fishing and firewood cutting are localized where the resources are found.

FIGURE 12 THE LOCALS ESTABLISHED TEAHOUSES AND SMALL SHOPS CLOSE TO THE CONSTRUCTION SITES. SOME EARNED A LOT OF MONEY. AS CAN BE SEEN ON THE PICTURE THE NEW WEALTH IS REFLECTED ON THE WELLDRESSED AND NOURISHED CHILDREN. (Photo: I-M. BJØNNESS 1981)

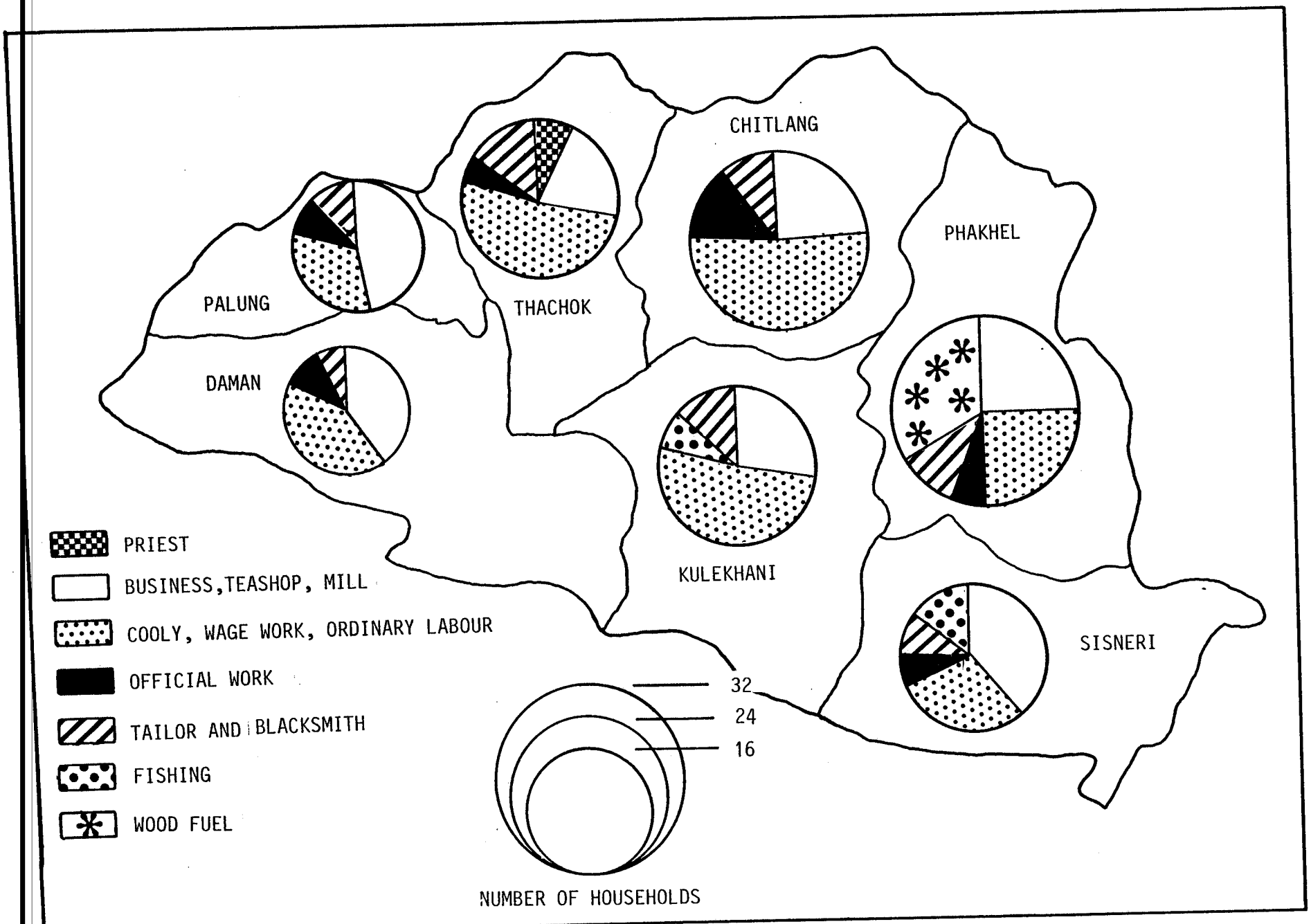

FIGURE 13. PARTICIPATION IN TRADITIONAL WORK ACCORDING TO PANCHAYAT.

Ethnic group \ Years	Tempo-rary	1 yr	2 yr	2-3 yr	4-7 yr	8-15 yr	> 16 yr	Total	%
Brahmin					2	7		9	5.5
Chettri	6		1	1	7	4		19	11.6
Newar	3	4	2	3	17	12		41	25.0
Tamang	11	4	6	10	22	15	2	70	42.7
Damai				1	5	1		7	4.3
Kami			1			9		10	6.1
Magar	1			1	1	2		5	3.0
Poude				1	1	1		3	1.8
Total	21	8	10	17	55	51	2	164	
%	12.8	4.9	6.1	10.4	33.5	31.1	1.2		100

TABLE 26 TEMPORARY AND PERMANENT PARTICIPATION IN *TRADITIONAL WORK* IN KULEKHANI WATERSHED, ACCORDING TO ETHNIC GROUPS.

Females, males children / Traditional work	Number of persons Females	Males	Children	Total	%
Priest		2		2	0,6
Business, shop hotel	8	36	4	48	14,5
Cooly	1	33		34	10,3
Official work	3	17		20	6,-
Ordinary labour	4	13		17	5,-
Mechanics		1		1	0,3
Local wage work	21	33	1	55	16,6
Tailor and blacksmith	11	29	3	43	13,-
Fire-wood	16	15	3	34	10,3
Oil, water mill	2	7		9	2,7
Beerbrewing, teashop	11	17	5	33	10,2
Agricultural trade	6	17	1	24	7,2
Ordinary trade		1		1	0,3
Fishing	2	8		10	3,-
Total	85	229	17	331	
%	26	69	5		100 %

TABLE 27 FEMALES, MALES AND CHILDREN PARTICIPATING IN DIFFERENT TYPES OF TRADITIONAL WORK IN 1981, IN TOTAL AND RELATIVE NUMBERS.

4.2 Conclusion

Traditional work in local society is combined with subsistence agriculture. It is skilled work either done as an ethnic profession (Brahmin is the priest, Damai is the tailor, Kami is the blacksmith etc), a speciality (Mill-makers, oil-pressers, traders etc) or general work as hired labour in agriculture and related activities.

In other words there are several types of skilled work in local society and they are done firstly to cover:

(i) local needs (usually paid for in kind)

(ii) local commercial needs (usually paid for in cash).

Traditional work is defined as *off-farm work* to support the income in the rural sector. Futher it can be distinguished in :

(i) skilled work mainly to support and serve the local society

(ii) agricultural related work which includes
- wage-work on other's farm
- improving products,oil-production, etc
- transportation of farm products (coolies etc)

(iii) service work in local society (shops, teahouses etc).

The different types of skilled traditional work is dealt with in Chapter 4, however, their importance for the Kulekhani Hydro-electric Project should be dealt with here.

The most striking result from the analysis is the extent of participation in all forms of combination with regard to construction work, traditional work and agriculture. Only 16.1 per cent has agriculture as their main occupation. The majority 57 per cent combines agriculture with traditional work, while the rest combines all three professions.

The importance of traditional work in local society is very high taking into regard the extent of all possible combinations. The skill can be applied directly in construction work as i.e. the blacksmiths who got work as steelbenders or indirectly as those who offered the 2.000 labourers at the construction sites all kinds of service (teahouses, hotels, shops and trade).

5 CHANGES IN KULEKHANI WATERSHED DURING THE CONSTRUCTION PERIODS T_0-T_2 .

Not all changes in economy , social and environmental conditions is caused by the Kulekhani Hydro-electric Project. For instance higher pressure on land is caused by an increase in population as well as reinvestment of compensation money. In addition there are some tendencies that Kulekhani will be a popular area for second homes for people from Kathmandu.

As could be learned from chapter 4, the extent of combinations of agriculture, traditional work and construction work was notisable. If there were no additional work possibilities in local society, one would anticipate that *migration for seasonal, temporary and permanent work* would be one solution to the households' problems.

There is a need for research on rural-urban migration in Nepal in general, and on the reasons for migration as well as the consequences of in- and out-migation areas in special. There is a deplorable lack of exact information of these problems. Exact figures could not be obtained in Kulekhani either, only an in-depth study over time can give exact figures on the extent of migration and the reasons why. However, as it is anticipated that the present land redistribution and land fragmentation are pressing problems, the following figures and discussion are ment to underline the seriousness in this topic. The viability of the present small land holdings can be explained by the following observation in 1981:

> While interviewing the Pradhan Panch in Chitlang, two brothers interrupted the discussion with their most pressing problem: the division of their inherited land. Some information on borders and size of land was written down on a cigaret-box. The office assistant confirmed the information from a hand-written book . During the discussion with the Pradhan Panch, it somehow turned out that the brothers wanted to settle their land problem while the third brother was in Calcutta. This new information brought the Pradhan Panch to the solution that no land division could take place without the third brother.

The extent of permanent migration, before the dam construction started, and last year can be seen in Figure 14.

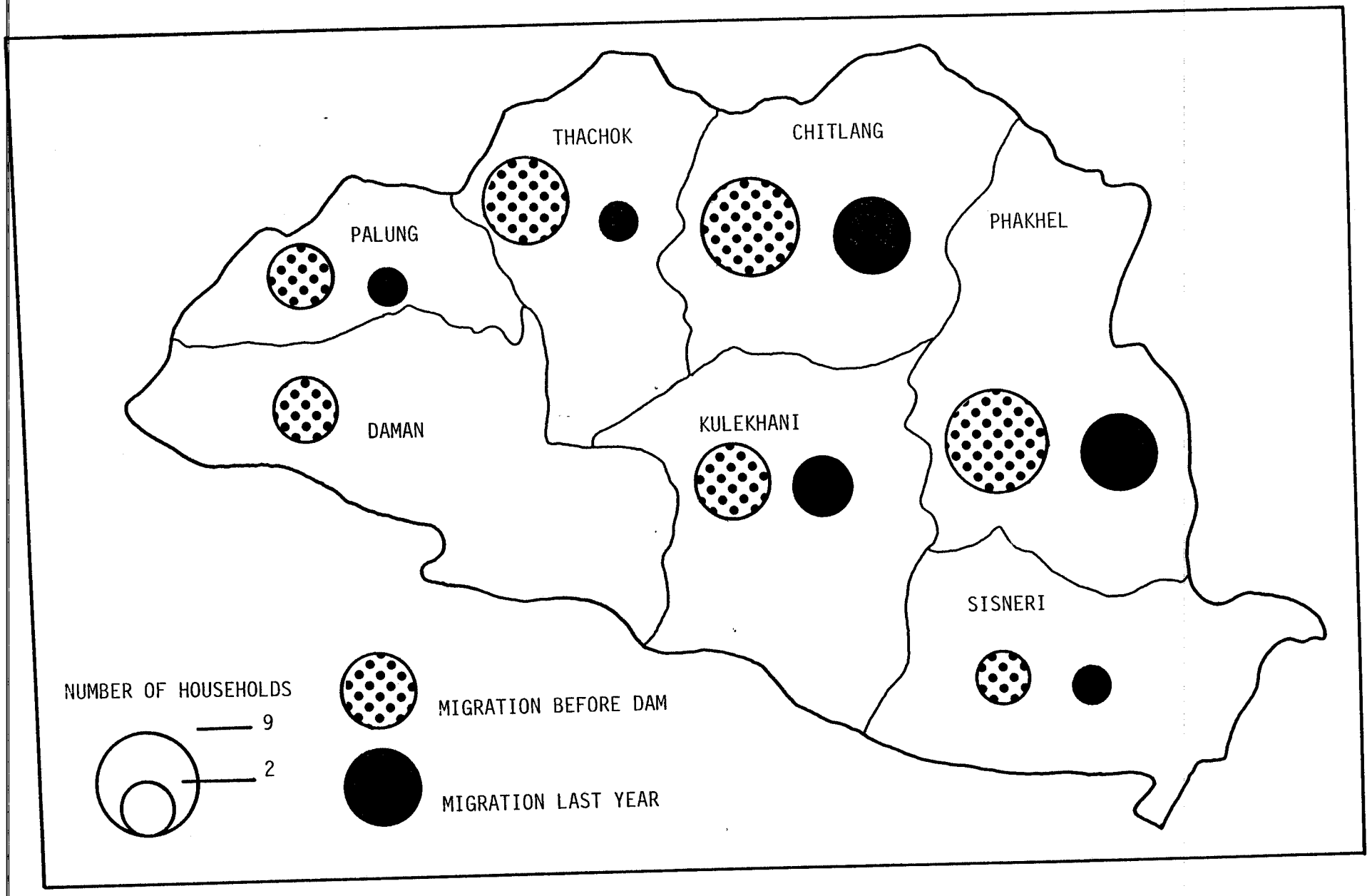

FIGURE 14 MIGRATION FROM HOUSEHOLDS BEFORE DAM CONSTRUCTION 1976 AND LAST YEAR

The figure is not meant to give exact measures on the extent of migration from the watershed, however it indicates that the migration from the investigated households are relatively high. 7.1 per cent of all households had one or more migrants last year. More exact datas would have required a more in-depth study of the temporary, occational (for festivals etc) and permanent migration. All types of migrations are important, mainly because the migrants will send back money to local society.

The temporary migration is according to the Pradhan Panchas higher today than before. The temporary migration from Chitlang and Kulekhani is relatively high, approximately 300 persons from each Panchayat are supposed to take temporary work-opportunities in especially Kathmandu. These persons take different work. This includes buffalo -transport, coolies, labourers or wage-work in agriculture, etc. The temporary work is very often seasonal, corresponding with the agricultural seasons. It is to a large extent farmers who have no possibilities to do traditional work in local society or who combine this type with work outside the watershed. It was reported that the good working oppotunities at the Kulekhani Hydro-electric Project was the main reason for the relatively low migration rate from Sisneri compared to previously.

The temporary migration is common especially from Palung, Phakhel and previously Sisneri Panchayats. The main reasons for permanent migration can be seen in Table 28. These reasons are shortage of land, work opportunities and lack of money. They are anticipated to explain the high degree of temporary migration as well.

Migration in all forms is closely connected to access to resources, and potential produce, or lack of the same. It was reported by several households that food was a main problem

Migration / Ethnic group	Number of households				Reasons for migration shortage of:		
	Before dam		Last year				
	tot.	%	tot.	%	money	work	land
Brahmin	5	2.2	1	0.4			1
Chettri	5	2.2	2	0.9		1	1
Newar	11	4.9	4	1.8	1	2	
Tamang	16	7.2	8	3.6	5	3	
Damai	2	0.9					
Kami	1	0.4					
Magar							
Poude	1	0.4	1	0.4	1		
Total	41		16		7	7	2
% of total households		18.2		7.1			

Table 28 Migration of different ethnic groups in absolute and relative number of households, before dam construction and last year. The different reasons for migration last year were shortage of money, work and land.

Food production or lack of food seem to create problems in everday life throughout the watershed. The food production itself shows regional differenciation in the watershed. The Palung, Tistung and Daman Panchayats have a diversified agriculture with potatoes, cash-crops, vegetables etc, while the lower situated panchayats produce food-grains as rice, wheat etc. For the food producers there were advantages in higher prices on different crops during the construction-periods. While on the other hand those dependent on smaller farms who could not produce enough,were seriously affected by the higher prices on basic commodities during the construction phases. The prices arose extremely during this period . There were several households who were suffering from shortage in agricultural produce and lost land to the road and reservoir area. Of the investigated households: 1 Chettri, 1 Newar,5 Tamang and 2 Magar households reported that they spent their compensation money on food. In other words, they were caught in a poverty circle, as they used their compensation money on basic commodities, and were not able to reinvest in productive means.

There were some advantages in selling poultry and eggs in local market as these prices arose during the construction phases. However, there were different types of problems as well as advantages felt for different households. Figure 15 shows the advantages and problems concerning: food, health,education,money and religion as perceived by different ethnic groups in Kulekani watershed.

Some of these changes are not caused by the Kulekhani Hydro-electric Project but rather by the overall development processes. On the other hand they indicate to what extent these topics were felt as an advantage or a problem for different ethnic groups. There are relatively more problems than ad - vantages.

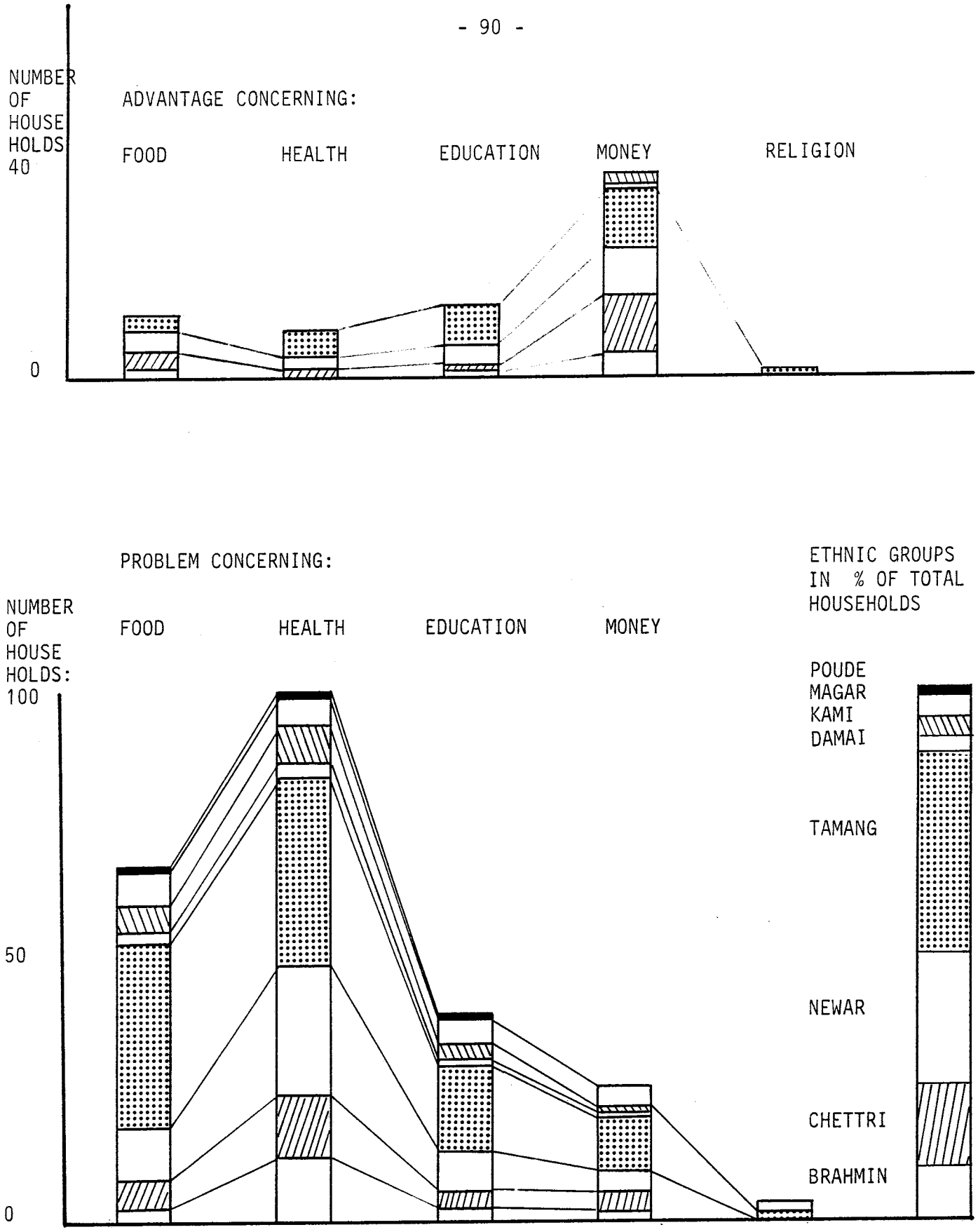

FIGURE 15 PROBLEMS AND ADVANTAGES CONCERNING: FOOD, HEALTH, EDUCATION MONEY AND RELIGION ACCORDING TO ETHNIC GROUPS IN KULEKHANI WATERSHED (SOCIO-ECONOMIC SURVEY 1981).

On the other hand, the most outstanding problems are food and health. The first is felt by relatively many households of Tamang, Magar, Dami, Kami and Poude. Concern about health is the outstanding problem for many households. Some observant households in Sisneri claimed that there were more diseases among people during the construction phases than previous. The main reason for flue, fewer and headache was claimed to be the road and the polluted river downstream.

In absence of systematic reporting and recording of the populations health conditions, it is difficult to assess the overall health conditions in Kulekhani watershed. However, it is apparent that health conditions are poor, because of improper nutrition, poor sanitation and the prevalence of parasitic infections as well as communicable diseases. According to the locals, illnesses are also attributed to fate or considered an act of an angry deity. It was widely believed that sickness and death are caused by demons, evil spirits, angry anchestors etc. To be protected against all these threats, the people usually wear a variety of precausions against the dangers. Amulets , sacred treads and charms are the most commonly used. It was futher reported that Zhakri and Dhami were the two medical practioners that were sought for. The Zhakri is an expert in botanical medicine and also in the use of the Mantras. He was considered better skilled than the Dhami who only could recite the Mantras.

During the construction phases the Sisneri population had made one important observation. During the investigation they told they felt that their boidies were warmer than before. This observation might be caused by a climatic change in the downstream Panchayat as the previous Kulekhani river had a cooling effect on the surroundings. From this observation the people belived that the climate would change and affect their agriculture with a dry and hot climate.

It is obvious that there are different types of changes in local society. Some are caused by the presence of the Kulekhani Hydro-electric Project, while others are caused by the overall development or modernization processes. The latter is diificult to isolate.

This Research Working Paper demonstrates the value of incorporating cultural, social, economic as well as physical, variables in an analysis of a watershed where development of hydro-electricity takes place. A holistic understanding of the problems is required before successful strategies for development of such a large scale plant should be implemented.

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