FINAL REPORT

For
Conducting a study to assess the effectiveness of investment
In
Hills Leasehold Forestry and forage Development Project (HLFFDP)

June, 2002

Submitted By:

BDA nepal P. Ltd.

JV with

GOEC Nepal

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ACKNOWLEDGEMENT

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This report has been prepared by the consultant after the extensive documentary consultation/study.

The consultant would like to express their gratitude to I would recall with gratitude for the comments provided by Shri Shiv Chandra Shrestha (Joint Secretary on the CMED), Dr. Hari Aryal (Joint Secretary—NPC) and Mr. Sekhar Karki (CMED) was instrumental in bringing this study to this stage. He deserves more than a simple appreciation. Similarly, other senior members of the CMED were equally helpful at every stage of the project work, to whom I express my deep appreciation. Last but not least I express my gratitude to Shree Bhoj Raj Ghimire member-secretary, NPC and through him to the NPC for providing this opportunity to undertake the study and other technical staffs for their valuable suggestions and co-operation in proceeding with the study.

At last, we are grateful to all the local people and leaders who have rendered their valuable accompany to our field team during field survey.
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<tr>
<td>MOISC</td>
<td>Ministry of Forest and Soil Conservation</td>
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<td>District Forest Office</td>
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<td>International Fund of Agriculture Development</td>
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<td>Hills Leasehold Forestry and Forage Development Project</td>
</tr>
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<td>Master Plan for Forestry Section</td>
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<td>Forest Users' Group</td>
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<td>Nepal Agriculture Research Council</td>
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<td>Leasehold Forest Group</td>
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<tr>
<td>IGA</td>
<td>Income Generation Activities</td>
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<td>VDC</td>
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<tr>
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<td>Semi structured Interview</td>
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<td>Non-timber Forest Products</td>
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<td>CFUG</td>
<td>Community Forestry Users Group</td>
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Executive Summary

In community forestry, a small village-based community organizations called forest users' groups (FUGs) have played an important role in asserting their rights to forest resources as well as their local environment. People-centered resource management strategies have come to occupy a central position in different development sectors of Nepal. Nowadays, leasehold forestry is growing well as one of the user group forestry program for the upliftment of the living standard of poor people and amelioration of land that has been already degraded due to excessive grazing, removal of vegetal coverage, frequent forest fire, flooding and shallow and deep seated mass wasting.

Poor people-centered Leasehold Forestry Project is an effort to address the problems and needs of rural people. It is also the best strategy of rehabilitation of harassed land due to the pressure exerted by the growing number of people and livestock in the rural areas. This project seeks to alleviate poverty prevailing in the rural households thorough the restoration of ecological balance in degraded forest land.

The main objectives of the current study is to provide insight understanding of investment efficiency of HLFFDP on restoration of ecological balance of forestland and economic condition of participating communities. The experience gained by the study is expected to be helpful in planning and management of people-centered natural resource management activities including HLFFDP in Nepal. The study area includes 8 leasehold forests in Kavre district and 2 leasehold forests in Chitwan district.

The study method includes questionnaire survey, semi structured interview, informal discussion, direct field observation, cross-section survey and field measurement for vegetation analysis. The forest area under study was divided into two class i.e. control block (open access forest where community based forest management is absent) and treatment block (leasehold forest). The floral compositions of both control block and treatment block were measured in the direct field observation. Both descriptive and quantitative methods were applied for data analysis. The main statistical tools applied for the analysis were chi-square test and t-test.
By the findings of this study we lead to the conclusion that LFFDP has greatly contributed to poor families (<0.5 ha land owners) for fuel wood and forage production. Most of the beneficiaries were from the economically disadvantage groups like Magars, Tamangs and other occupational caste. Still, the program has to bring continue effort for adequate supply of fodder and forage among the lease farmers to support their livestock production and cash generation by cultivation of cash crops and non-timber forest products.

By analyzing the floristic composition of tree species of treatment block (leasehold forest) and control block (open access land where community based forest management is absent), we lead to the interpretation that the leasehold forestry has good impact on rehabilitation of degraded land. The site quality of leasehold forest is gradually changing from the degraded land to fertile land where tree species are succeeding the unpalatable thorny species of non woody plants. The project has invested small amount for the seedlings production, community infrastructure development and income generation activities like goat raising and bee keeping. By the analysis of bio-physical and socio-economic parameters of the study, we can conclude that the investment for LFFDP is efficient to restore the ecological balance and environmental amelioration of rural areas of Nepal but it has to make continue effort to bring more socio-economic change among the lease groups.

The study has also made some recommendations like focus on low volume and high value production as income generating activities where the lease groups lies very far from the road head i.e. cultivation of valuable medicinal plants instead of forage production in the areas which can be reached after one day walk from the road head. Constant source of income will be effective to bring lease groups from passive forest management to active forest management. Formation of inter group organizations like co-operatives will facilitate for implementation of the program in their lease land and promote the bargaining power and market for local people to get reasonable price for their products.
Being agriculture based economy, poverty in the rural areas is mostly related to the land productivity degradation and degradation of natural environment due to over grazing, soil erosion, land slides, excessive removal of vegetal coverage, frequent forest fire, flooding, drought and other natural extremes. Due to growing population and poor resource base, viscous cycle of poverty is operating in the rural areas of Nepal. To break the viscous cycle, Leasehold Forestry Program may be the best alternative in the resource poor areas where degraded forest land is given on long-term lease to poor communities to help them increase their incomes and thus raise their living standards and at the same time rehabilitate the degraded lands. The main objective of the programme is to address the needs of poorest of the poor and help the poor to help themselves.

1.1. Leasehold Forestry in the Country Context

The first recognition of Users based forestry in National policy and program planning was the Masters Plan for Forestry Sector (MPFS), 1988 that advocates for the concept of Forest Users Groups (FUG). The FUG concept has brought the sense of belongings among the local people on natural resource and their rights over the resources i.e. one who can protect and manage the forest shall also utilize its products. After the amendment in 1989, the Forest Regulation of Nepal had provided a special provision for leasehold forestry to address the poverty issue of rural people by leasing to poor households. It had also made provision of giving priority of lease forest land to poor communities over corporate bodies, industries or firms if the same land were claimed as the leasehold forest.

The hills Leasehold Forestry and Forage Development Project (HLFFDP) stared in 1993, and currently in operation in 26 districts including Kavrepalanchowk and chitwan districts. The program was financed by the International Fund of Agriculture Development (IFAD) and coordinated by the Hills Leasehold Forestry and Forage Development Project Kathmandu. The Netherlands government provided technical assistance through Food and Agriculture Organization (FAO). The project is implemented jointly by the Department of Forest, Department of Livestock Services,
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the Agriculture Development Bank and the Nepal Agriculture Research Council. The leasing of the public land is made through the respective District Forest Offices. The district offices of livestock Department provide livestock improvement and animal treatment services, and the Agriculture Development Bank (ADB/N) provides loans to these households to purchase livestock and develop the leased forestland. Similarly, the Nepal Agriculture Research Council (NARC) is entrusted with conducting action oriented applied research on forage crops and grassland improvement.

The project is designed to focus small or marginal farmers having little or no cultivated land and livestock as their major source of independent sustenance. This portion of population are forced to encroach upon and exploit public forestlands for their essential fodder, fuelwood wood and leaf-litter requirements. These forests, for lack of user responsibility or any other effective system for regeneration, have undergone increasing degradation with serious implications both for the environment and for the future well being of the poor masses. Due to highly mosaic to private agriculture and patchy land, they are less potential to be handed over to the large number of forest users as community forests. However, local people continue the encroachment of land thinking, "If I do not cut this small tree, other people will cut this. Therefore, why not should I cut this tree now". In this way, the LFFDP aims to complement community forestry program, which is the priority program for the development of forestry sector in Nepal. The project has learned from the experiences gained from community forestry in the formation and functioning of village based self-organized user groups in the development of forest resources.

The project focuses on the integration of forestry and livestock development, calling for the leasing of blocks or degraded forest land to groups of poor families in order to provide them with a more assured supply of fodder, fuelwood and other forest products. The target groups are the families who are the poorest in relation to household income and the resource base.

Two eligibility criteria for members of leasehold groups are

1. land area less than 0.5 ha
2. per capita income of Rs 3035 based on the 1996/97 prices
These households are organized into small groups and patches of degraded forest area are leased to the groups for the duration of 40 years, as per the provisions of the Forest Rules of 1995. Both land holding size and per capita income criteria have been used in the formation leasehold groups. However, households with up to 1.0 ha of arable land are also included as exceptions, provided they fall below the poverty line. This flexibility is considered to enable the forest land to be leased as much as possible to the actual users of the particular blocks and to enable the farmers groups to be located always within a reasonable distance of the land to leased (IFAD, 1989).

However, the scope, beneficiaries and target groups of leasehold forestry are different than those of community forestry. Funds generated from community forest can be used only for community development purposes, whereas leaseholders get all the benefits of the leased land. In community forestry, all the members are potential beneficiaries, but HLFFDP aims to lease forestland to landless people living below the poverty line. 25% of the funds generated from Community Forest should be used in forest development and rest could be used by users as per decision of FUG assembly e.g. in Community Development (CD), Income Generation Activities (IGA) and others need based activities but leasehold forestry covers a much wider spectrum including fodder, pasture and livestock development, rural credit services and income generation activities.

1.2. Difference between Leasehold Forestry and Community Forestry

The Leasehold Forest Groups (LFGs) are much smaller than the community forestry user groups (usually less than 10 members). All the households can be involved in all kinds of decision making process. The forest products can be harvested when actually needed by the individual households, without having to wait for the agreement of the whole forest users groups as in community forestry. In community forestry no limitations are fixed either on the area of the forest to be handed over or on the number of people to be involved in the group. On the other hand, the focus of leasehold forest for poor is limited to specific people within community who are below poverty line, although there are no legal limitations either on the size of group or on the forest area to be leased to the group. No time limit has been set for managing community forestry and the number of members in the users groups can increase due to population increase, but leasehold forest is given for 40 years at the maximum at a time and the members are
also fixed without any further addition in the group. Whatever be the nature of ownership the users are only given the usufruct right in both the systems. The DFO is responsible and authorized to hand over community forest to the forest users group, whereas there is a long and cumbersome process for the approval of leasehold forests. It has to go through the Regional Forest Directorate, Director General of the Department of Forests, Secretary of the MOFSC and finally to the Minister of MOFSC for approval. Only the Regional Forest Director is authorized to issue the lease certificate upon approval of the lease application by the MOFSC. This has significantly constrained the process of the programme.

As large forestland is handed over to the whole community it is ineffective and becomes difficult to manage community forestry according to the needs of all beneficiaries. Leasehold forestry for poor can work better in these conditions as the land is given to small and specific groups having the same needs and interests.

1.3. Leasehold Forestry, an Entry Point for Reaching to the Poorest of the Poor People

Most community forest user groups are controlled by elite groups, who do not adequately consider the needs of the members of the socio-economically deprived sections of the community (Sinha, et al. 1996 in Yadav & Dhakal, 2000). Leasehold forestry for poor, may help overcome this type of problem. Leasehold Forestry programme provides a unique opportunity for increasing the resource base of the poorest households in the community who are most dependent on forest and grassland resources for fodder and fuelwood. The fodder base, which is so vital for the survival of their animals and hence their own survival, can be increased by rehabilitating the degraded forestland, enabling them to sustain more productive livestock whilst contributing to environmental protection and conservation at the same time. Under the leasehold Forestry Project, target household has seen a 15% increase in buffalo ownership relative to control households, while at the same time reducing fodder scarcity by 21% (HLFFDP, 1999 in Yadav & Dhakal, 2000) The leaseholders have the opportunity to improve the land through planting and protection vegetation of economic value.
1.5. Objectives

The objectives of the study are as follows:

- To examine issues concerning the efficiency, effectiveness and impact of hills Leasehold Forestry and Forage Development Project (HLFFDP) to improve further performance
- To assess the impact of the project in relation to ecological/environmental progress, poverty alleviation and gender participation and identify the potentialities created for developing the new projects
- To assess the actual number of households benefited participation and involvement of women poor families and under privileged castes, community participation and the level of participation of beneficiaries in the project activities including their attitude towards such projects and future perspective, and
- To assess the appropriateness and the relevance of the design, inputs and implementation arrangements as well as the sustainability of benefits generated by the project
- To assess the strengths and weaknesses of the project by studying the targeted and actual facilities developed
- To recommend the future course of action to be adopted by the National Planning Commission keeping in view the factors such as sustainability, operation and maintenance cost, long-term and short-term national needs etc.
1.6. Scope of the Study

Major activities proposed under the study comprise the followings;

- Field observation to assess the recorded area and actual area under the project
- Study of effectiveness of the project considering factors such as sustainability, operation and maintenance, ecological/environmental benefits, poverty alleviation, beneficiaries as well as gender participation and relative strengths and weaknesses of the project
- Study of overall socio-economic benefits from the projects and lesson learnt for the future
- Recommend policy to be adopted by the National Planning commission for planning and financing the projects of similar nature
- Identify potentialities created by the project for various development activities.

1.7. Study Area Description

The study area lies in Kavrepalanchowk and Chitwan Districts. The lease group were selected based on the following criteria

1. Geographical accessibility (near the road head with in 2 hours walk and far from the road head)
2. Ethnic groups (to cover the ethnic groups from underprivileged, occupational and ethnic minority)
3. Date of handing over (to examine the effectiveness of the program in different stage of its implementation)
4. Natural vegetation type
5. Extent of land degradation while handing over

Kavre District lies in Narayani Zone of Middle Development Region of Nepal. The district headquarter Dhulikhel lies 31 KM far from Kathmandu. Landuse classification of the district are as follows
Table-1: Land use of Kavre District

If the forest and brush land are only considered under forest land, the percentage land use under forest will be fifty three. The altitudinal range of the district lies between 275 m to 3018 m. The average annual rainfall of the district varies from 985 mm at Panchabar ghat and 2687 mm at Khokhajor khola. Due to these variabilities, the district is rich in vegetation type.

District Forest office Kavre has been implementing different activities like formation of lease groups, handing over of lease land and post formation supports like training and support for implementation of operation plan of the lease hold forest groups.
Chitwan district lies in Narayani zone of Middle Development Region of Nepal. The district covers Inner Terai region to Mahabharat range. The altitudinal range of the district covers from 141 m to 1100 m reaching to subtropical climate zone. The agriculture land and urban areas of the district covers 41% and Forest land with protected area and buffer zone covers 59% of the total land (DFO, 2001)

<table>
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<th>S.N.</th>
<th>Activities</th>
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<tr>
<td>1</td>
<td>Coordination</td>
<td></td>
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<tr>
<td>• Coordination workshop</td>
<td>No</td>
<td>320</td>
<td></td>
</tr>
<tr>
<td>• Planning workshop</td>
<td>No</td>
<td>150</td>
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<tr>
<td>• Intensers planning and coordination workshop</td>
<td>No</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Nursery management training</td>
<td>No</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>• Local leaders awareness training</td>
<td>No</td>
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<td></td>
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<tr>
<td>• Land improvement training</td>
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<td>160</td>
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</tbody>
</table>

Table-2: List of Activities Carried out by DFO in Lease Groups under Study up to Fiscal Year 055/056

Singari Pakha Lease Group
- Nursery management training
- Improved cooking stove installation training
- Seedlings production
- Bamboo plantation
- Broom grass plantation

Darbardanda Pakha Lease Group
- Nursery management training
- Improved cooking stove installation training
- Seedlings production
- Bamboo plantation
- Broom grass plantation

Nigra Pakha lease group
- Nursery management training
- Improved cooking stove installation training
- Seedlings production
- Bamboo plantation
- Broom grass plantation

Bamboo plantation
- Nursery management training
- Improved cooking stove installation training
- Seedlings production
- Bamboo plantation
- Broom grass plantation
Land Improvement Program is also a priority program of Leasehold Forest and Forage Development Project. Up to fiscal year 2057/58, District Forest Office has implemented the program giving training for 2326 persons including one women and one man of each lease group. This training was effective to rehabilitate 125 ha of leasehold forest. After reclamation of degraded land, local users got benefits like fodder, thatching materials etc. This has saved the expenditure of lease members for purchasing thatching materials and increased the income from milk and meat production.

Up to that fiscal year, 105 lease members participated in nursery management training and produced 425497 number of seedlings. The project had allocated Rs 15000.00 for each lease group for basic infrastructure development program. Under this program, 21.5 KM village trail was constructed by the project cost Rs 346,600. After construction of village trail, 2500 Households are estimated to be benefited.

District Forest Office
Kavre

160 Lease groups were formed and 726.99 ha of land was handed over to the lease groups in Chitwan district up to fiscal year 057/58. Total household of beneficiaries were 1036 and population 6621. Improved cooking stove, bee keeping, Nursery management and degraded land improvement, broom grass cultivation, bamboo cultivation, nigalo cultivation were the major activities of the program. Up to fiscal year 057/058, 96 KM trail was improved, 39 school was supported for developing their infrastructure, 30 drinking water supply scheme and 6 bridge were constructed by the project cost Rs 32,07,973.80 and people participation.

District Forest Office
Chitwan
### List of selected Lease groups under study

<table>
<thead>
<tr>
<th>S. No</th>
<th>Name of the lease group</th>
<th>Location</th>
<th>Major ethnic group</th>
<th>Approx. distance from the road head</th>
<th>Area in Ha</th>
<th>Date of Lease group formation</th>
<th>Remarks</th>
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<tbody>
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<td>1</td>
<td>Sisneghari Lease Group</td>
<td>Gokule 1 Kavre</td>
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<td>2</td>
<td>Salepakha/Gole Pakha Lease Group</td>
<td>Gokule 9, Kavre</td>
<td>Tamang</td>
<td>65 KM</td>
<td>4.0</td>
<td>2052</td>
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<td>3</td>
<td>Thutisimal Pakha Lease Group</td>
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<td>Darbardanda Pakha Lease Group</td>
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<td>Lamadol Lease Group</td>
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<td>Tamang</td>
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<td>Kavreplanchok</td>
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<td>9</td>
<td>Chautari Pahadi Lease Group</td>
<td>Saktikhor 8,</td>
<td>Damai, Magar, Chitwan</td>
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<td>4.08</td>
<td>2055</td>
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<td>10</td>
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<td>Saktikhor 1,</td>
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Table-4
CHAPTER - II  
STUDY METHOD

2.1. Literature Review and Other Sources of Secondary Data Collection

Secondary data were collected from the District Forest Office, District Office of Livestock Service, District Branch of Agriculture Development Bank and Hills Leasehold Forestry and Forage Development Project, central office. The relevant literature were reviewed including published and unpublished books, reports and other documents available in the Central Forestry Library, Babarmahal Kathmandu.

2.2. Field Study and Primary Data Collection

Following consultation with the staff of HLFFDP and concerned DFO staff, eight leasehold groups in Kavre district and two leasehold groups in Chitwan district were selected for the study. Out of them, three leasehold groups of Kavre district were selected for in-depth study and five leasehold groups were selected only for cross-section survey. In case of Chitwan, one leasehold group was selected for cross section survey and one leasehold group was selected for in-depth study. Following methods were adopted for field data collection:

2.2.1. Questionnaire Survey and Semi-Structured Interview

A formal questionnaire with closed and open-ended questions was used to find out qualitative as well as quantitative data from LFG members. The survey questionnaire for LFG members included both socio-economic and bio-physical aspects for which different parameters of these two aspects were included in the questionnaires like private land holding of respondent, family size, plant species, seeds/seedlings sources, major crops produced from the lease land and their price, income from livestock, livestock fed source, fodder production in private land, social, environmental and economical constraints in the well functioning of leasehold groups.
The design of the questionnaire was carefully planned to create division between each category. The rationale behind the sequence was to obtain factual information plant species, major benefits obtained from the leasehold forests, fund mobilization, attitudes of lease members towards the project and institutional development of leasehold groups including the different types of constraints. On completion, the questionnaire was tested among the users of first leasehold group under study. The purpose of pre-test was to identify either ambiguity in question construction, or errors in interpretation on instruction. After the testing, changes were made with addition as per the suggestions.

Semi-structured interviewing in this study involved asking open-ended questions, listening to and recording the answers, and then following up with additional relevant questions. The data obtained from interviews consisted of direct quotations from people about their experiences, opinions, feelings and knowledge. A semi-structured interview (SSI) was guided and focused to the central issues of the research questions, which allowed flexibility in questioning and discussion. It provided more focused, systematic and comprehensive responses from different respondents by delimiting in advance issues to be explored. The guides provided a framework for an interviewer to develop questions, sequence of those questions, and provide feed back to the worker with information to pursue in greater depth.

2.2.2. Informal Discussions:

To find out facts about official support and institutional arrangements, informal discussions were made with Forest officials, Staff of Agriculture Development Bank, Staff of Department of Livestock, HLFFDP staff and direct beneficiaries of the leasehold forestry programme.

2.2.3. Direct Field Observation:

Field observation was carried out to gather general information and apprise the existing resource condition. The activities and conditions at present and before the hand over of leasehold forest were listed during the field observation to assess the impact of leasehold forestry. In field observation, the focus was given to the resource condition of
each LHG. Researcher conducted walk in each leasehold forest. Major vegetation species and their associates, Species composition and their maturity classes. Management activities and grazing control were also observed. Some photographs of the relevant forests were taken for further reference during field survey.

2.2.4. Cross-section Survey and Field Measurement for Vegetation Assessment

Cross-section survey was conducted with members of leasehold groups to get the information of floristic composition of tree species found in the area. It was conducted in all Leasehold Forests.

a) Control and Treatment Blocks
Since there was no baseline information about the floristic composition of Leasehold forest before it being handed over, to facilitate the impact assessment of the HLFFDP, adjoining forest patches that was not handed over as leasehold forest and prevailed grazing and frequent forest fire was taken as control blocks. Floristic composition of these blocks with Leasehold forest was compared to infer the bio-physical impact of leasehold forest.

b) Species Area Curve
Species area curves (Danbenmire 1968, Janwali 1995, adopted by B. Regmi 2000) were to check the minimum number of quadrants required to describe the floristic composition of tree species of each block. Format used for species area curve is presented in the annex 2.

c) Vegetation Analysis
Systematic sampling with nested plots was the technique applied for the sampling and measurement. Since the leasehold forest was small block relatively with homogeneous blocks there was no need of stratification and assumed as the homogenous block of the population. 5*5 m sampling plots were established at 50 m intervals in each strata for the enumeration of all tree species present in the plot. Required no of sampling plots was found by the species area curve as above.
2.3. Data Analysis

Data were analyzed using both descriptive (qualitative) and quantitative methods. Quantitative analysis included simple statistical methods like mean, standard deviation, combined standard deviation, chi-square test and t-tests. Different Weightage, values and symbols were given to different levels and types of information. These Weightage, values and symbols were applied to analyze the investment efficiency of LFFDP in terms of change in biophysical characteristics of forest i.e. degraded to vegetation rich forestland and socio-economic characteristics i.e. increase the household income and living standard of poor people. The change in biophysical characteristics was measured using the Shannon-Weaver Function ($H'$) of diversity of tree species in control and treatment plots. The collected data were entered into Excel'97 computer programme for analysis.

2.4. Study Limitations

1. Although the study has raised the burning issue regarding the impacts on socio-economic condition of poor people and on bio-diversity, at the moment it is intended to dig out only a part of the whole issue and it concentrated only on the specified objectives.

2. Questionnaire survey method was not found so much effective in this study because respondents hesitated to respond to survey questionnaires. Some people felt uneasy and refused to participate in the survey when they saw multi-paged survey questionnaire. Similarly, there are some limitations in qualitative methods such as diversion from topics, and difficulty in getting consistent information from each interviewee.

3. This study did not cover all the facts about biophysical aspect. Only floristic composition of tree species of control and treatment block was assessed to estimate the significance of environmental/ecological impacts of LFFDP.

4. The assessment of control and treatment block assumed that there was same disturbance in treatment blocks and control blocks before formation of lease groups.
and that if the treatment blocks were not handed over as leasehold forest, the floristic composition would be same to control block. This study neglects the extraneous factors as if people's attitudes towards stall-feeding may affect the floristic composition of control blocks. This is the main limitation of this study.

5. It was assumed that the users still know the exact situation existing before five years, they may not remember it exactly anymore. Therefore the approximate data may not give the better output.

6. There has been limited research in the field of leasehold forestry and specifically on this topic. Therefore I could not get adequate information from secondary sources.

7. LFFDP has been implemented in 10 districts. Chitwan district and Kavre district were selected for the study to represent low land and middle hills of the country. Due to limitation of cost for the study, 10 lease groups were selected for the study. This may not equally represent the situation of whole district.
CHAPTER - III
FINDINGS AND DISCUSSIONS

By analyzing the questionnaire following hypothesis were tested at 95% confidence interval.

3.1. **Leasehold Forest Groups Involve the People of Poor Families who have Landholdings Less than 0.5 ha.**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of the Lease Group</th>
<th>Landholdings less than 0.5 ha</th>
<th>Observed Frequency</th>
<th>Expected Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sisheghari Lease Group (Kavre)</td>
<td></td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>Salepaka/Gole pakha .. ..</td>
<td></td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>Thutisimal .. ..</td>
<td></td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>Bel Bot pakha .. ..</td>
<td></td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>Singari Pakha .. ..</td>
<td></td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>Darbandanda Pakha .. ..</td>
<td></td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Nigra Pakha .. ..</td>
<td></td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>LamodolPakha .. ..</td>
<td></td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>9</td>
<td>Chautari Pahadi Lease Group (Chitwan)</td>
<td></td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>Beldanda Lease Group .. ..</td>
<td></td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

Table - 5: Observed and Expected Frequencies of Land Holding Size of the Respondents

Using Chi-square test $\chi^2$

$$\chi^2 = \sum (o_j - e_j)^2$$

$$10 \quad = 2.605$$

The critical value of $\chi^2_{0.05}$ for $v = k - 1 = 10 - 1 = 9$ degree of freedom is 16.9. Since 2.605 < 16.9, we can accept the hypothesis that leasehold forestry has involved the poor families who have land holdings less than 0.5 ha is accepted.
3.2. Change of Livestock Number due to the Starting of HFFDP in the Area

<table>
<thead>
<tr>
<th>S. No</th>
<th>Name of the leasehold group</th>
<th>Observed Frequency (Response Yes)</th>
<th>Expected Frequency (Total number of respondent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sisneghari Lease Group (Kavre)</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>Salepaka/Gole pakha</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>Thitisimal</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>Bel Bot pakha</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>Singari Pakha</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>Darbardanda Pakha</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Nigra Pakha</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>LamodolPakha</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>9</td>
<td>Chautari Pahadi</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>Beldanda Lease Group</td>
<td>3</td>
<td>8</td>
</tr>
</tbody>
</table>

Table - 6

Using Chi-square test $\chi^2$

$$\chi^2 = \sum \frac{(o_j-e_j)^2}{e_j}$$

$$\chi^2 = \frac{(1-7)^2}{7} + \frac{(0-9)^2}{9} + \frac{(2-8)^2}{8} + \frac{(1-9)^2}{9} + \frac{(0-9)^2}{9} + \frac{(2-6)^2}{6} + \frac{(3-5)^2}{5} + \frac{(3-8)^2}{8} = 49.025$$

The critical value of $\chi^2_{0.95}$ for $v=k-1=10-1=9$ degree of freedom is 16.9. Since $49.025 > 16.9$, we can reject the hypothesis that leasehold forestry has change the livestock rearing among the lease groups.

3.3. Decrease in Fuel Wood and Fodder Collection Distance and Save the Time of Household Women

<table>
<thead>
<tr>
<th>S. No</th>
<th>Name of the leasehold group</th>
<th>Observed Frequency (Response Yes)</th>
<th>Expected Frequency (Total number of respondent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sisneghari Lease Group (Kavre)</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>Salepaka/Gole pakha</td>
<td>6</td>
<td>9</td>
</tr>
</tbody>
</table>

BDA nepal & GOEC Nepal (20)
Using Chi-square test $\chi^2$

\[ j=1 \]

\[ \chi^2 = \sum \frac{(o_j - e_j)^2}{e_j} = 5.75 \]

The critical value of $\chi^2_{0.95}$ for $v=k-1=10-1=9$ degree of freedom is 16.9. Since $5.75<16.9$, we can accept the hypothesis that leasehold forestry significantly reduce the collection distance of fuel wood and fodder and save the time of household women.

### 3.4. After Implementation of LFFDP, The Fund of Lease Groups has been Increased by Selling the Cash Crops

<table>
<thead>
<tr>
<th>S. No</th>
<th>Name of the leasehold group</th>
<th>Observed Frequency (Response Yes)</th>
<th>Expected Frequency (Total number of respondent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sisneghari Lease Group (Kavre)</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>Salepakhak/Gole pakha ..</td>
<td>2</td>
<td>9</td>
</tr>
</tbody>
</table>
Using Chi-square test $\chi^2$

$$\chi^2 = \sum (o_j-e_j)^2$$

$$10\, \sum_{j=1}^{10} (o_j-e_j)^2 = 42.67$$

The critical value of $\chi^2_{0.95}$ for $\nu=k-1=10-1=9$ degree of freedom is 16.9. Since $42.67>16.9$, we can reject the hypothesis that leasehold forestry has contributed for raising the fund of leasehold groups.

3.5. It was impossible to identify and count every individual in the community. The random sample techniques was carried out and for such case, the Shannon-Weaver Information Theory Function (Shannon Weaver 1949 after modification of Lloyd et.al.1968 presented by B. Regmi 2000) was used to measure the tree species diversity in treatment (leasehold forest) and control (nearest govt. forest that is assumed to bear same disturbance gradient to lease hold forest before starting LFFDP). It is one of the simplest and most extensively used diversity indices and measures the average degree of uncertainty of predicting the species
of a given individuals picked at random from community. The formula for Shannon-Weaver Function is:

\[ H' = C / N \times (N \log_{10} N - \sum n_i \log_{10} n_i) \]

Where,

- \( H' \) = Shannon-Weaver Function
- \( C \) = constant for conversion of logarithms from the base 10 to the chosen base
- Here \( C = 2.302585 \)
- \( N \) = Number of individuals of all species
- \( n_i \) = number of individuals of a species

Table showing the calculation of Shannon-Weaver Function (\( H' \)) of Treatment and Control block

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of the lease group</th>
<th>( H'a )</th>
<th>( H'b )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sisneghari Lease Group (Kavre)</td>
<td>2.4</td>
<td>1.72</td>
</tr>
<tr>
<td>2</td>
<td>Salepakha/Gole Pakha .. ..</td>
<td>1.8</td>
<td>NA</td>
</tr>
<tr>
<td>3</td>
<td>Thutisimal .. ..</td>
<td>2.2</td>
<td>1.37</td>
</tr>
<tr>
<td>4</td>
<td>Bel Bot pakha .. ..</td>
<td>2.08</td>
<td>1.92</td>
</tr>
<tr>
<td>5</td>
<td>Singari Pakha .. ..</td>
<td>2.03</td>
<td>1.29</td>
</tr>
<tr>
<td>6</td>
<td>Darbardanda Pakha .. ..</td>
<td>1.9</td>
<td>NA</td>
</tr>
<tr>
<td>7</td>
<td>Nigra Pakha .. ..</td>
<td>2.4</td>
<td>NA</td>
</tr>
<tr>
<td>8</td>
<td>Lamodol Pakha .. ..</td>
<td>2.03</td>
<td>1.67</td>
</tr>
<tr>
<td>9</td>
<td>Chautari Pahadi Lease Group .. .. (Chitwan)</td>
<td>2.01</td>
<td>1.9</td>
</tr>
<tr>
<td>10</td>
<td>Beldanda Lease Group .. ..</td>
<td>2.6</td>
<td>1.8</td>
</tr>
</tbody>
</table>

\( H'a \) = Shannon's \( H' \) of treatment block

\( H'b \) = Shannon's \( H' \) of control block

Hence, for the t-test

\[ t = \frac{\bar{H}a - \bar{H}b}{S_{ab}} \times \sqrt{\frac{n_1 n_2}{n_1 + n_2}} \]

Where, \( \bar{H}a \) = mean of Shannon's Weaver Function of treatment block

\( \bar{H}b \) = mean of Shannon's Weaver Function of control block

\( S_{ab} \) = combined standard deviation

\( n_1 \) = number of observation in treatment block
\( n_2 = \text{number of observation in control block} \)

By this test statistics, \( v = n_1 + n_2 - 2 = 10 + 7 - 2 = 15 \) degree of freedom and the value of \( t = 3.89 \) which is greater than tabulated value 2.131 at the level of significance (\( t = 0.05 \)). By this test we lead to interpretation that after the implementation of LFFDP, the floristic composition of lease hold forest has been increased significantly.

3.6. **Caste Wise Distribution of Beneficiaries of Hill Leasehold Forestry and Forage**

![Castwise Distribution Beneficiaries of HLFFDP](image)

Here, Under privileged groups represent Tamang, Magar and Chepang (Parja) and occupational cast represents black smith and tailors.

3.7. **Peoples attitudes towards the HLFFDP**

By the questionnaire survey, the attitudes of people towards the Hill Leasehold Forestry and Forage Development Project was tested by a set of questionnaire. The response of the people was as follows:

![What is the best way to generate income by the HLFFDP?](image)
What is the main benefit you got from HLFFDP?

- 3% Fuelwood
- 14% Fodder
- 41% Income from Cash
- 42% No response

Chart-3

What do you think about the Leasehold Forestry can improve your living conditions after implementing cash generating program?

- 18% Yes
- 40% Mixed
- 26% Myth
- 16% No response

Chart-4
Before implementation of Leasehold forestry program, this **pakho** (marginal land) was covered with thorny species like Aisalu (*Rubus spp.*) and Mayal (*Pyrus spp.*). Grazing was not protected and we did not have even single branch of tree to make stick. After leasing the land, we restricted the grazing. We divided the lease land into 8 plots for collection of fodder. But we planted trees in communal basis. Last year we planted 2000 seedlings of *Alnus nepalensis*.

Before leasing the land, there was no chiraito in this forest. This may be due to free access to grazing. We protected the forest and nowadays the stock of chiraito is very good. Last year, we collected 250 Kg of chiraito and sold it. I never believed that such a desert-like patch of land would be changed into dense tiger living forest.

Kanchha Tamang  
Lamadol Lease Group  
Riyale VDC, Ward no 4  
Kavre

Before implementation of leasehold program, this land was devoid of vegetation. The landslip was triggering our VDC building and houses of some members of our group. Now, we are managing this land as leasehold forest. Last years, District Forest Office supported us for planting Amliso and nigalo. Grazing has been totally controlled. After leasing the land, this land slip has not increased. We have divided the land into 6 plots and harvested grasses. We have planned to plant broom grass, nigalo and lapsi tree in our leaseland.

Shayam Thapa  
Chairman  
Bel bot Pakha Lease Group  
Ghartichhap, Kavre
3.8. Strengths and Weaknesses of LFGs

Following table shows the strength and weakness of Leasehold forest groups

<table>
<thead>
<tr>
<th>Strengths of LFGs</th>
<th>Weakness of LFGs</th>
</tr>
</thead>
<tbody>
<tr>
<td>➔ Socio-culturally and economically homogenous groups</td>
<td>➔ Poor participation in some cases</td>
</tr>
<tr>
<td>➔ Increasing awareness</td>
<td>➔ Non equal responsibility bearing</td>
</tr>
<tr>
<td>➔ The knowledge and team spirit being developed</td>
<td>➔ Poor documentation</td>
</tr>
<tr>
<td>➔ Majority of the people have low economic status as per the targeted beneficiaries of LFFDP</td>
<td>➔ Non-transparent fund management in some cases</td>
</tr>
<tr>
<td>➔ Good protection of forest</td>
<td>➔ No complete implementation of LHF OP</td>
</tr>
<tr>
<td>➔ Attitudes towards private land /communal land plantation of fodder and tree species being developed</td>
<td></td>
</tr>
<tr>
<td>➔ Good protection of forest</td>
<td></td>
</tr>
<tr>
<td>➔ Unity and commitments for protection</td>
<td></td>
</tr>
<tr>
<td>➔ Consensus in group co-ordination</td>
<td></td>
</tr>
<tr>
<td>➔ Good initiation</td>
<td></td>
</tr>
</tbody>
</table>

Table-10
Summary of Findings 3.1 to 3.5

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Confidence level</th>
<th>Accepted/ Rejected</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leasehold forest groups involve the people of poor families who have land holding less than 0.5 ha</td>
<td>0.95</td>
<td>Accepted</td>
<td></td>
</tr>
<tr>
<td>Change of livestock number due to the starting of LFFDP</td>
<td>0.95</td>
<td>Rejected</td>
<td></td>
</tr>
<tr>
<td>Decrease in fuel wood and fodder collection distance and save the time of household women</td>
<td>0.95</td>
<td>Accepted</td>
<td></td>
</tr>
<tr>
<td>After implementation of LFDDP, fund of lease group has been increased by selling the cash corps</td>
<td>0.95</td>
<td>Rejected</td>
<td></td>
</tr>
<tr>
<td>there is significant increase in floral composition of leasehold forest after implementation of LFFDP</td>
<td>0.95</td>
<td>Accepted</td>
<td></td>
</tr>
</tbody>
</table>

By the above table, we can find that leasehold forestry program had significant impact on increase in floral diversity and decrease the distance and save the time for fuel wood and fodder collection distance.

In case of fund raising by selling the cash crops, the response was mixed. In case of Chitwan district, leasehold members responded that they have raised fund after selling the cash crops and also the program has good impact on livestock rearing. In case of Kavre district, the response was distinctly variable among the lease groups of different agricological zone and accessibility to road head. For example, the leasehold groups lying far from the market, i.e. Salepakha lease group Gokule and Bel bote pakha lease group Ghartichhap of Kavre responded that the livestock rearing has not been increased after the program implementation. This is may be due to lack of access to market for diary products. During the attitude test of leasehold group members, most of the respondents in the remote areas of Kavre district responded that the NTFPs cultivation in their lease land would be the best way to generate income. While the response of lease groups near to the road head was mixed. They emphasize both NTFPs cultivation and forage production.
Interestingly, most of the lease groups of remote areas like Gokule, Ghartichhap and Darbardanda lease groups of Kavre district responded that lease group forests can improve their living condition after implementing cash crop cultivation program. But the response was mixed in Chitwan district. This may be due to other cash earning opportunities in the accessible area.
CHAPTER - IV
CONCLUSIONS AND RECOMMENDATIONS

4.1. Conclusions

By the findings as presented above, we lead to the conclusion that LFFDP has greatly contributed to poor families (<0.5 ha land owners) for fuel wood and forage production. Still, the program is not adequate to supply the all needs of fodder and forage. Leasehold forestry has no significant impact on improvement of socio-economic condition of lease groups by cash generation through cultivation of cash crops, NTFPs and other products and services at this stage. Although Leasehold forestry has good socio-economic impact in the lease groups of Chitwan District under study, impact is not significant in all leasehold forestry groups under study. By analyzing the floristic composition of tree species of treatment block and control block, we lead to the interpretation that the leasehold forestry has good impact on rehabilitation of degraded land. The site quality of leasehold forest is gradually changing from the degraded land to fertile land where tree species are succeeding the unpalatable throny species of non woody plants. By the analysis of bio-physical and socio-economic parameters of the study, we can conclude that the investment for LFFDP is efficient to restore the ecological balance and environmental amelioration of rural areas of Nepal but it has to make continue effort to bring socio-economic change among the lease groups.

4.2. Recommendations

1. The LFFDP has greatly emphasized on forage and fodder production in case of Kavre district. Still there is great potentiality of income generation activities like cultivation of valuable non-timber forest products, which will help to generate income for the lease groups, and organizational and economical sustainability of lease group can be expected.

2. While designing the income generation activities for the leasehold forest groups, existing socio-economic condition should be analyzed to reach at the facts on which socio-economy of local people depends. After reaching to the fact, the program should promote the existing system to improve their economic status. For example,
if local people have only one option of selling diary products as income generation activity, the Leasehold forestry program should emphasis for forage and fodder production at first. If the lease group lies far from the road head, milk production may not feasible with out proper preservation and processing techniques. In this situation low volume and high value production should be focused as income generation activities i.e. cultivation of high value medicinal plants instead of fodder tree and vegetable seed production instead of fresh vegetable. Constant source of income will be effective to bring lease groups from passive forest management to active forest management.

3. Regular technical support and monitoring should be provided by the project and DFO in the field of cultivation of NTFPs, pasture land management, horticulture, fodder tree species, livestock farming, agroforestry, tree plantation and silvicultural operations. Strong monitoring and extension support are needed to expand the benefits. The outcome of such monitoring would help the users in providing them with some technical knowledge about cultivation, protection and harvesting of the products.

4. Existing manpower of District Forest Office in not sufficient to carry out all the activities related to leasehold forestry. In this condition, Non governmental organization can play important role for empowering institutional and social capacity of leasehold groups.

5. By informal discussion of lease groups, it was found that there was many small groups related to fresh vegetable production, water management and community infrastructure development where the members of lease group also give time to attain group meeting and discussion. But, these groups are not functioning as LFG or CFUG. Therefore, it is advisable that LFG or CFUG should be the entry point for all the activities that have linkage to forest.

6. Since the inter-users group has emerged as the effective entity in terms of institutional arrangements as well as management of forests, formation of such
groups should be continued in leasehold forestry projects. This kind of body should be encouraged to take the responsibility of coordinating with line agencies including non-governmental organizations, donor agencies, government organizations and other community based organizations. Formation of NTFPs and diary co-operatives of lease group will help to facilitate for implementation of the program in their lease land and promote the market and bargaining powers of local people for reasonable price of their products.

7. Potential leasehold lands should be identified and demarcated in the hills to extend the programme

8. Total responsibilities for approval, handing over, supporting and monitoring of the leasehold forest should be given to the DFO as is the case with CF. This makes the process short and easy.
9. The focus programs under different areas should be identified according to geographical accessibility, socio-economic condition of local people and bio-physical characteristics of the forest. Demonstration effect is good method of technology transfer. Therefore, LFG from each agricological zone should be selected as Model Leasehold Forest Groups in each district. This should represent at least one single theme why this LFG is model leasehold forest groups and why they are different from common practices. The thematic model may be reclamation of degraded land in different types of problem soil, women LFG, Agri-silviculture, Agri-pasture, horto-silviculture etc.

10. The operational plan of leasehold forest groups should be divided into two phase i.e. land reclamation and group mobilization; and intervention of cash crops. Over grazing is the main cause of land degradation in the area. However, physical barrier like construction of barbed wire fence and stone wall are impossible in all leasehold forests. Social fencing or social commitment not to allow grazing their livestock in the protected forest blocks is only the effective method of fencing. Therefore, impact of grazing on vegetation and soil character should be well disseminated among the lease members to promote social fencing.

11. By this study and the study conducted by LFFDP in the past, it was found that the magnitude of impact of LFFDP is considerably variable according to agricological zone and accessibility to market. Therefore program planning should focus on the agricological zone and accessibility criteria. Establishing base line data for different agricological zone, accessibility and market niche will help to generate better information for monitoring and evaluation of the project.
References


IFAD (1989). *Report and recommendation of the President to the Executive Board on a Proposed Loan to Nepal for the Hills Leasehold Forestry and Forage Development Project,* Executive Board, IFAD, 5-8 December 1989, Rome, Italy.


ANNEXES

Annex 1
Questionnaire used for household survey

A. general information
1. Name of the respondent
2. Name of the lease group
3. Name of the hamlet/settlement
4. Ward no:
5. VDC:

Gender of lessee---------------­
Cast /ethnic group of lessee------------------­
Farm size Private land------------------­(in ropani)------------------­(in ha.)

6. Position in lessee group

B. Demographic information:
1. family size
2. Age group
   Children (below 12)
   Teenagers (below 25)
   Adult (above 25)
   Old (above 60)

c. Private land holding by the respondent

<table>
<thead>
<tr>
<th>Land type</th>
<th>Irrigated farm land</th>
<th>Rainfed farmland (in ropani)</th>
<th>Marginal land (Khoriya) in ropani</th>
<th>Total (ropani)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cropping pattern</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production per unit land</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
d. **Leased land**

1. **General**

   Area (ha) individually managed by household--------------------------

   Area (ha) managed together with lease group

   Year started-----------------month-------

   Total area of the group (ha-----------------Date lease contract:-----------------

3. **Plant species**

   No of planted species:

   Seedling sources;

   Types of planted species (area/no of plants, species and variety)

   1. edible food bearing trees/shrubs-------------------------

   2. medicinal plants----------------------------

   3. fodder----------------------------------

   4. forage-----------------------------------

   5. timber-------------------

   6. fiber------------------------

   7. other please specify-----------------

4. **seed/seedlings Managed**

   Individual (------)

   Group (--------)

5. **What is the main benefit you got from HLFFDP**

   ---------------------------------------------------------------------

6. **Major crop sold and the prices**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Crops</th>
<th>Per unit price</th>
<th>Road head</th>
<th>Market</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
### E. Livestock

1. **Number of animals owned (before starting the LFFDP)**

<table>
<thead>
<tr>
<th>Types</th>
<th>Buffalo</th>
<th>Bull</th>
<th>Cow</th>
<th>Goat</th>
<th>Pig</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breeds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(improved or local)</td>
<td></td>
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</tr>
<tr>
<td>Number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please convert the data into animal unit.

2. **Number of animals owned (after starting the LFFDP)**

<table>
<thead>
<tr>
<th>Types</th>
<th>Buffalo</th>
<th>Bull</th>
<th>Cow</th>
<th>Goat</th>
<th>Pig</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breeds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(improved or local)</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please convert the data into animal unit.

3. **Livestock feeding source calendar:**

<table>
<thead>
<tr>
<th>Month</th>
<th>Ja</th>
<th>Feb</th>
<th>Mar</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Private land</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lease land</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other communal land</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. **During which period (month) do you have acute scarcity of animal feeds?**

(Nepali month)

From ------------------------to ------------------------ Number of months--------

4. **Do you keep forage stored?**

Yes/no-----------------------------------

5. **Do you harvest forage from the lease land?**

Yes/no-----------------------------------

If yes, for which animal do you use this fodder mainly?------------------------------------

6. **Does the lease land produce adequate forage for the livestock raising?**

1. Less-----------------2. Equal-----------------3. More ----------------- (tick one)
8. Do you grow fodder on your private land? if yes specify below

9. cropping pattern
   Pure stand,
   Inter crop,
   Terrace raiser,
   Kharbari,
   Other specify

10. Where do you get the seedlings? Tick mark in possible options below:
   1. Forest Nursery
   2. Leasehold-group nursery
   3. Village/community nursery
   4. Private nursery
   5. Other (specify)
   6. Do you pay for seedlings?
   7. If yes, which species?

11. Which species do you prefer to plant in lease and your private land?

12. Is there any source of seedlings nearby?

13. Is there considerably decrease the fuel wood and fodder collections distance that save the time of household wife?
F. Income generation

1. Income from livestock:

<table>
<thead>
<tr>
<th>Milk and other by products:</th>
<th>unit price</th>
<th>Annual income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat</td>
<td>unit price</td>
<td>annual income</td>
</tr>
</tbody>
</table>

2. Income from non-timber forest products

<table>
<thead>
<tr>
<th>Types of NTFPs</th>
<th>KG sold</th>
<th>Per unit price</th>
<th>Total price</th>
</tr>
</thead>
</table>

3. Income form off-farm employment (if any please specify the type and amount of income)

4. Which is the best way to generate much income by this leasehold forest?

G. Constraints

1. social constraints

is there any intra-institutional or inter-institutional constraints:

a. yes b. no

b. if yes what is the issue

c. if yes, what is the effort made to solve the constraints

d. is there equal participation of lease groups in decision making i.e. disadvantage group
e. If no what is the main cause?

f. Is there equal participation in benefits sharing process?

2. Gender Constraints
   a. How many women are involved in the executive committee?
   b. If no why?
   c. If yes, in which matter?
   d. What is the frequency of visit of technical staff?

5. Financial constraints
   a. What is the amount of fund raised by the lease group?
   b. What is the striking needs that the fund should be allocated
c. Is the existing fund is adequate to solve the needs of lease crops?

6. Environmental Constraints
Is the lease land bears the quality to implement the proposed income generation scheme?

If not what is the effort carried out to rehabilitate the degraded land?

what are the limiting factors to rehabilitate the degraded land?

**Other constraints**
Constraints experienced while developing lease land:
1. Fencing
   explain------------------------

2. Lack of irrigation
   ---------------------------

3. Polishing-------------------------

4. Lack of man power------------------

5. Unavailability of seedlings-------------------

6. Others--------------------------------------

(thank you very much for your kind information)
Annex 2

Format used for species area curve to determine the quadrant number while assessing the floristic composition of control and treatment block (with example data)

Name of the leasehold forest:
Aspect:
Dominant species:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Number of new species</th>
<th>Cumulative number of new species</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>3</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>0</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>0</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>0</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>0</td>
<td>26</td>
<td></td>
</tr>
</tbody>
</table>

Cumulative no of new species became constant for four quadrants subsequent to quadrant 11, show the required no of quadrants for that block is 15
Annex 3

Formula used for calculation

1. Chi-square test $\chi^2$

$$\chi^2 = \sum_{j=1}^{n} \frac{(o_j - e_j)^2}{e_j}$$

Where,
- $\chi^2$ = a measure of the discrepancy existing between the observed and expected frequencies
- $o_j$ = observed value
- $e_j$ = expected value

2. Shannon-Weaver Function

$$H' = C/N \left( N \log_{10} N - \sum_{i} n_i \log_{10} n_i \right)$$

Where,
- $H'$ = Shannon-Weaver Function
- $C$ = constant for conversion of logarithms from the base 10 to the chosen base
  Here $2.302585$
- $N$ = Number of individuals of all species
- $n_i$ = number of individuals of a species

3. t-test

$$t = \frac{\bar{H}_a - \bar{H}_b}{S_{ab} \sqrt{n_1 + n_2}}$$

Where,
- $\bar{H}_a$ = mean of Shannon's Weaver Function of treatment block
- $\bar{H}_b$ = mean of Shannon's Weaver Function of control block
- $S_{ab}$ = combined standard deviation
- $n_1$ = number of observation in treatment block
- $n_2$ = number of observation in control block
5. Makare Bishwokarma, Shaktikhor VDC
6. Santa Bahadur Ranamagar, Kaule, Chitwan
7. Sher Bahadur Praja, Kaule-7, Chitwan
8. Chandra Man Praja, Siddi-6 Kotran, Chitwan
9. Kalimaya Tamang, Siddi, Padheripakha, Chitwan

Kavre District

1. Mr. Prakash Pakural, District Forest Officer, Kavre
2. Mrs. Binda Humagai, Ranger, Planning Section, District Soil Conservation Office, Kavre
3. Mr Shiva Ram Thapa, Ranger, District Forest Office, Kavre
4. Mr. Kausalendra Sha, Ranger, District Forest Office, Kavre
5. Mr. Shiva Prasad Arayal, Junior Technician, District Livestock Development Office, Kavre
6. Mr. Tek Bahadur Lamichani, Golule-1, Kavre
7. Mr. Tilak Shrestha, Gokule-1, Kavre
8. Santalal Tamang, Rayale, Kavre
9. Buddi Bahadur Tamang Rayale-4
10. Ramsaran Shivhabhakti, Rayale-3

Note: Other comment will be incorporated in Final Report.
4. Combined Standard Deviation

\[
S_{ab} = \sqrt{\frac{\sum (H_a - \overline{H_a})^2 + \sum (H'_b - \overline{H_b})^2}{(n_1 + n_2 - 2)}}
\]

Where,

- \(S_{ab}\) = Combined standard deviation of \(H'_a\) and \(H'_b\)
- \(H'_a\) = \(H'\) of treatment block
- \(H'_b\) = \(H'\) of control block
- \(\overline{H_a}\) = mean of \(H'\) of treatment block
- \(\overline{H_b}\) = mean of \(H'\) of control block
- \(n_1\) = number of cases observed in treatment block
- \(n_2\) = number of cases observed in control block

Annex 4

Team Member for Survey Work (Field Visit)

1. Sanjaya Chaudhari, Chitwan District
2. Nabin Shrestha, Chitwan District
3. Nabin Shrestha, Kavre District
4. Dilip Panjiyar, Kavre District

Annex 5

List of Persons visited during the study

Chitwan District:
1. District Forest Officer, DFO, Chitwan
2. Ranger, Saktikhor Rangepost, DFO, Chitwan
3. Sun Krishna Shrestha, Bhandara VDC Chitwan
4. Chingare Bishwokarma, Shaktikhor VDC