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Farm-Forestry : A Farming Systems Approach

(A Case Study of Chitwan District in Nepal)

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Abstract

[A case study of a 3-year farm-forestry project was conducted in Chitwan during the winter of 1983. Farm Forestry was conceived as one of the structural variable in the Nepalese Farming System. Data collected by administering personal interviews to a group of randomly sampled heads of the households of 4 villages of Khairini Panchayat. Findings revealed that there was a great pressure of both human & livestock population on cultivated land for food & feed. Tho role of livestock in supplimenting farm income was great. Fuel and fodder needs ranked as the most important felt needs of the farmers which clearly indicated a great potentiality for the extension of farm forestry program on a much wider scale].

Introduction

In an agrarian country like Nepal where population is skyroketting (2.66 percent), the pressure on renewable and non renewable natural resources is spectacular. The tree is used in various ways. It gives us timber. Dry branches are used for firewood and green leaves and tender branches of tree are used for animal fodder. They are also extensively used for making thatched houses. Forest, as a renewable resource, has rapidly depleted (*Gurung : 1974; Eckholm : 1976*). Recently the situation has been aggravated by an ever-increasing consumption of fuelwood and fodder compared to the limited supply (*Bhadra : 1982*). Some have argued (*Bajracharya : 1983*) that the primary cause of deforestation in Nepal is the clearing of forests to increase farm land and fodder, and not, as generally assumed, the need for fuelwood. However, energy such as electricity and gas are either meagre or non existant in most of rural Nepal. It is estimated that more than 60 percent of the total domestic energy consumption is met by fuelwood in India (*Ghosh : 1979*) and it is almost 90 percent in Nepal.

This situation has deteriorated further due to high man-land ratio. In Nepal 7 persons are dependent on one hectare of cultivated land. A piece of land (0.7 ha/family)

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supports 6 human beings and an equal number of animals (*Pyakuryal, K.; Axinn, G.; Axinn, N. and Shrestha, C. M. : 1978*) by growing food crops, vegetables and fruits. The productivity of farm land has steadily declined during the past decade mainly due to declining fertility of soil (*Yadav : 1979; Bhadra : 1982*). A new pattern of movement of farm population from their previous areas of residence to newer forest areas has been observed.

Eckholm (1976) documents a distribution of 77000 hectares of forest for settlement during 1964 to 1974 and an equal amount is estimated to be taken over by illegal enchroachment during the same period. Poverty, lack of adequate off-farm jobs, increasing pressure on cultivated land, declining fertility of soil and numerous other factors have contributed to this farm to forest migration stream. Consequently, these helpless farmers have mercilessly deforested the new area, tapped water resources at the origin, endangered wild life species and ultimately contributed to ecological imbalance. Campbell (1978) maintains that Nepalese traditional system of resource regulation was more concerned with the right to exploitation and distribution rather than conservation but Nepal's case is not unique in this regard because "mastery over nature" is a historical reality to mankind and a concept such as 'ecodynamics' has been just put forth recently (*Boulding : 1978*).

National viewpoints and country needs have quite often conflicted with localviewpoints and personal needs. In Nepal where the majority (69 percent) of the total population is poor (*Jain : 1981*), people mostly struggle with basic needs such as food, clothes, and shelter. Resource conservation in such cases is just a mockery to those who have to survive somehow. In some farming communities public pastures have been gradually converted to farm land and naturally growing fodder and fuel trees have been over lopped and almost defoliated. This continuous deforestation for fuel and fodder by the individual farmer is a burning need to satisfy his personal houshold needs against a broader national need for forest conservation.

Conceptual Framework

Hence, as a conceptual framework what is visualized is since there will not be in the near future a major shift of the farm population to a non-farm sector the pressure on cultivated land will still increase. As a result, more people will proceed toward forest enchroachment. Similarly deforestation will increase as fuel and fodder requirments keep increasing. This has been diagrametically expressed in figure 1 and 2

To intervene in this situation, farm forestry component should be included in the conventional farming systems approach which usually contains only crop and livestock mix. When farm forestry is incorporated with farming farmers would be encouraged to grow fuel and fodder trees either along the bunds or on marginal land or on any communal land to meet their fuel and fodder needs. Livestock production will increase due to the increased availability of green fodder. Green leaf manure, leaf mould manure and compost would improve soil fertility. Farm income will increase which will then reduce the farm-forest migratory

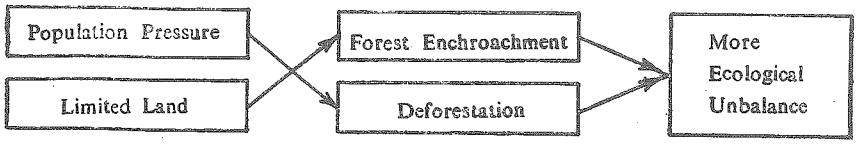

Figure 1

SCHEMATIC DIAGRAM OF FARM-FORESTRY APPROACH

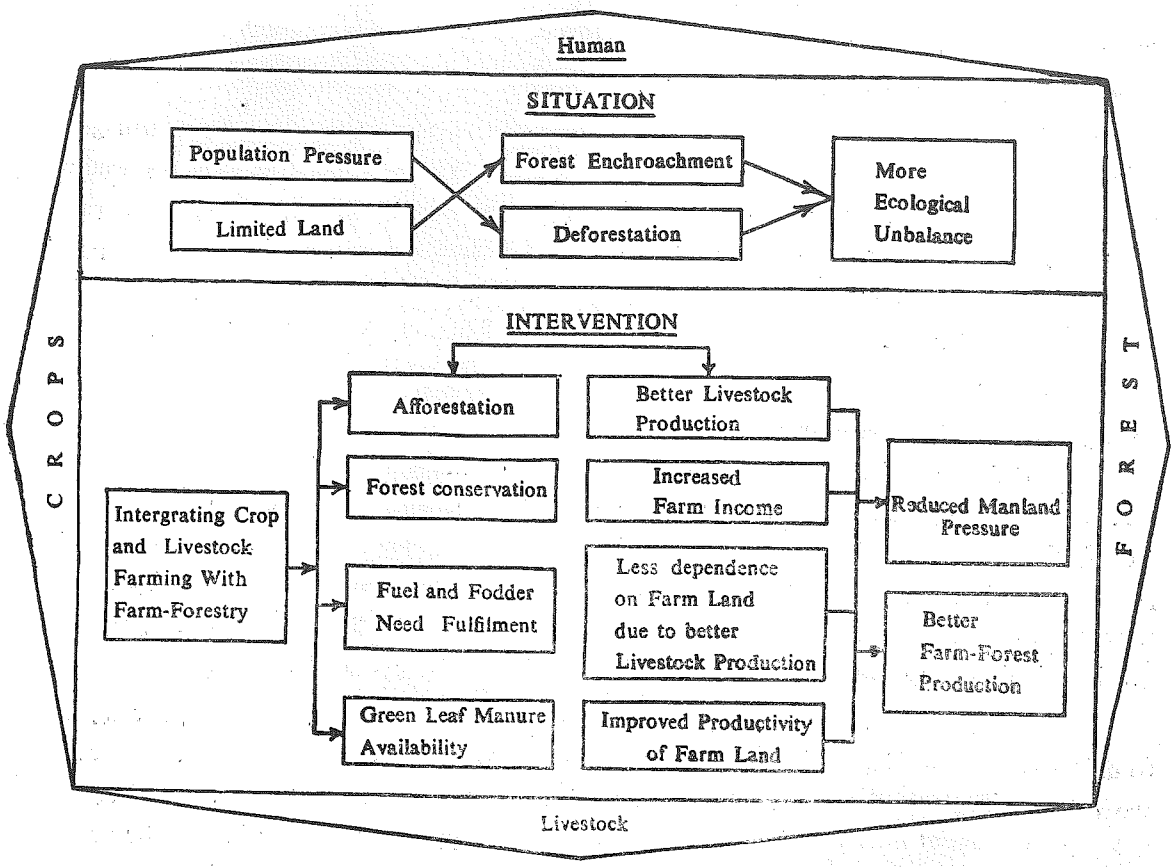

Figure 2

stream and help protect forest resources. The pressure on cultivated land would reduce due to the greater role of livestock production. All of this would lead to better farm/forest production which would ultimately help to improve the quality of life. A schematic diagram is given (figure 2) to express this conceptual framework.

Case Study

A 3-year farm-forestry project (Title 3-P-82.01) funded by IDRC was introduced during the year 1983. Its command area covered three districts : Makwanpur and Chitwan in the first year and Gorkha was added in the second year. The general objective was to develop among small farmers the practice of planting trees on their own land to satisfy their needs for fuelwood fodder, green manure and small timber. The present case study which was conducted during the winter of 1983 attempts to describe the "context" of the project setting. It is too early to assess the impact of the project (as it has just completed the first year). Information regarding personal demographic characteristics, socio-economic data, farming systems including crops, livestock, fruits and vegetables, farm-forestry, and the farmers' attitude and perception towards resource conservation was sought.

Study Locale and Methodology

Project activity was limited to Khairini Village Panchayat in Chitwan. Four villages namely Parsa, Mangani, Jamauli and Khairini of Khairini Village Panchayat were the study locale. There villages are nearly 10 to 15 kilometers south-east of Bharatpur which is the district headquarter. A random sample of 25 household heads was drawn from these purposively selected 4 villages. An interview schedule containing both closed and open ended questions was prepared and pretested. Then the heads of households were personally interviewed. Data were mechanically analyzed.

Description of Sample Population

Out of the 25 household heads (HH) 13 were from Mangani, 6 from Parsa, 3 from Jamauli and 3 from Khairini. There were altogether 317 persons in those 25 households out of which 148 were male and 169 were female members. The family size was 12.68 persons. There were altogether 4 ethnic groups i. e. Tharus, Brahmins and Chhetries, Newars and Magars. Their percentages were respectively, 48, 40, 8 and 4 Demographically, half of the population were within 15 years of age (Table 1 and Table 2).

The average size of land holding was 3.30 Ha per family. The size of holding ranged from 0.3 Ha to 15.6 Ha. All land was self cultivated. Most of the cultivated land (a little above four fifths) was low land; similarly three-fourths of the total land was under irrigation. A substantial number of household heads (56%) supplemented their income by producing some domestic products. Ghee, alcoholic beverages, bamboo canes and mats, and course cloth were some of the domestic products. Tharus usually produced alcoholic beverages and Chhetries ghee. All except one Tharu household had always lived in the same village. All the non-Tharus had migrated to these villages from elsewhere. On an average, there were 10.24 animals and 13.3 fowls (chickens, ducks and pigeons) per household.

Results and Discussion

Work Patterns

Sex differentiation was noticed in terms of work pattern. The main jobs of the male

TABLE 1

Household Heads Classified According to Ethnic Groups

Ethnic Groups	Household Heads	
	Number	Percentage
Tharu	12	48
Brahmin and Chhetri	10	40
Newar	2	8
Magar	1	4
TOTAL	25	100

TABLE 2

Demographic Structure of Sampled Population

Age Group / Sex	Below 5 years	5-10 years	10-15 years	15-60 years	Above 60 years	Total
Male	28	36	19	59	6	148
Female	27	34	23	80	5	169
TOTAL	55 (17%)	70 (22%)	42 (13%)	139 (44%)	11 (4%)	317 (100%)

members of the household in the morning were plowing, and going to the jungle for fire-wood cutting. In the afternoon, either they plowed the farm or went to the jungle for wood cutting or grazed livestock or took rest. In the evening either they did farm chores or took rest.

Women's jobs in the morning were sweeping the house and courtyards, carrying wood, milling, cooking, and cleaning the cattle-shed. In the afternoon women cut grass or performed other farm operations such as transplanting or weeding. In the evening they did household work such as cooking.

FARMING SYSTEM

(a) Cropping Patterns

Crops, fruits, vegetables and livestock farming were integral parts of the farming system. The usual cropping patterns of the area were: paddy-wheat; maize-mustard; and/or paddy-mustard-maize. Inter cropping was also reported. Maize and soyabean; rice and

masoor (dal), and wheat and peas were the common intercropping practices. Almost all the heads of the household sold of the produce (mustard, maize and wheat). In spite of very few farmers having any surplus, most farmers had to sell some grain in order to fulfill their cash needs. All reported that they consumed all the rice.

(b) Fruits

All except two households grew fruits plants. Mango, guava, papaya and banana were found to be relatively widely grown fruits. Some of the other fruits grown were jackfruit, lime, pineapple, lemon, lichi, peach, pear rnd pomegranate. Seventy-two percent of the total number of fruit plants were reported as improved varieties (Table 3). However, all fruits were grown for home consumption.

TABLE 3

Types and Quantity of Fruits Grown by Farmers

Fruits	Variety		Total
	Local (number)	Improved (number)	(number)
Mango	19	61	80
Guava	40	29	69
Papaya	38	16	54
Banana	115	107	222
Jackfruit	21	11	32
Lemon	05	05	10
Lime	10	06	16
Lichi	03	18	21
Citrus	03	02	05
Pineapple	—	405	405
Pomegranate	01	02	03
TOTAL	255	662	917

(c) Vegetables

Altogether 11 different vegetables (ginger and garlic included) were grown by farmers. Of ths vegetables, chilli was grown by everyone. More than four-fifths (84%) grew ginger and cauliflower and/or cabbage. Nearly three-fourths grew radish (Table 4). It is interesting to note that the majority (84%) of the farmers grew 6 to 10 vegetables; all grew four or more vegetables and all vegetables were grown for home consumption.

(d) Livestock

Cattle and buffalo were the main large animals and goats and sheep were the small

TABLE 4

Household Heads Classified According to Various Vegetables they were Growing

Vegetables	Household Head	
	Number	Percentage
Onion	11	44
Tomato	14	56
Chilli	25	100
Cabbage and/or cauliflower	21	84
Ginger	21	84
Garlic	17	68
Radish	18	72
Pumpkin	15	60
Squash	14	56
Potato	12	48

animals kept on these farms. Chicken, ducks and pigeon were the prevalant birds kept for table purpose. As mentioned previously the average number of livestock per family was 10.24. There were altogether 192 cattle and buffalo; 64 sheep and goats and 333 birds in these 25 households.

Animals were either stall fed or both stall fed and grazed with supervision or fed by supervised grazing only. However, most of the large animals were either grazed with supervision or stall fed. Small animals were mostly grazed with supervison. When they were stall fed, animals were fed straw and grass. Sometimes fodder was supplemented with concentrated mixture. For a few months milking cows and buffalo were fed '*Kundo*' (concentrated mixture). Grass or fodder were collected either from the jungle or from farm lands.

On an average, it took 4 hours to collect one basket (*Doko*) of grass. It took a whole day to collect firewood from the jungle.

Most of the farmers used their cowdung as manure but a few (one fourth) reported that they used some cowdung for fuel too. Tharus generally burnt cowdung.

(e) Fodder and Fuel *

Ipil-ipil, Khasreto, Kutmiro, Velor, Mulberry and Tanki were the usually mentioned fodder trees that the farmers were growing. Similarly Sisau, Khair, Simal and some other unspecified species were reported as fuelwood trees which were being grown in the vicinity. However, the majority of the households were not growing either fodder or fuel trees and very few had grown some fodder or fuel wood trees (Table 5).

* see appendix A for scientific names.

TABLE 5

Houshold Heads Classified According to Fuel and Fodder Trees they were Growing

Description	Household Heads	
	Number	Percentage
Household heads who only grew fodder trees	07	28
Household heads who only grew fuel wood trees	04	16
Household heads who grew neither fodder nor fuel wood trees	14	56

Most of the trees were very young (age ranged from 1 to 7 years). Compared to the farmers' increasing need for fodder and fuel, there were only 67 fodder trees and 95 fuel wood trees being grown which was not enough to meet the farmers requirement.

All except 5 household heads expressed a desire to grow fodder fuel and fruit trees. One of the most desired fodder trees was ipil-ipil.

The usual way of propagation was from seedlings. Leaves and branches were lopped at certain intervals for fooder and fuel needs.

Household heads were questioned about the depletion of forest resources and resultant effect of landslides and floods on the availability of firewood and fodder. Household heads reported that they spent more time collecting firewood at present than they did 5 years ago. Fodder (leaves and grass) was collected either from their own farm land and/or bunds or forest. Nearly one third of the household heads did not collect any fodder at all. Almost half of the household heads mentioned that it took longer time to collect fodder at present compared to 5 years ago. Most of the household heads (80%) reported that no landslides occured in this area within the past 5 years. Sixty percent of the household heads reported that they were not affected by flood within the past 5 years. 20 percent of the households heads were affected by landslides and 36 percent of the household heads were affected by flood at present. Some farmers mentioned that silt deposite on the farmland along the river bank was a problem as well as farm lands were cut and washed away due to the flood during rainy seasons.

The unavailability of tree seedlings was experessed as the biggest constraint for tree plantation (Table 6).

Household heads expressed interest in planting trees and sisau was the most liked species Most of them (80%) said they would like to plant trees either along the border of their farm land or along the river bed, on their land or on some other marginal land. Their overall view of the farm-forestry project was good (64%). The rest did not express any views.

TABLE 6

Constraints of Tree Planting as mentioned by Household Heads

Constraints	Household Heads	
	Number	Percentage
Unavailability of seedlings	13	52
Protection of planted trees	10	40
Shortage of land	01	04
No response	01	04
TOTAL	25	100

MISCELLANEOUS

(a) People's Participation

People's participation in community development was assessed in terms of the contribution they made to the community. They usually contributed to developmental process in three forms: by offering voluntary labor, by donating money, and/or by both (Table 7).

TABLE 7

Household Heads Classified According to the Kinds of Contribution they made to Community Development

Kinds of contribution	Household Heads	
	Number	Percentage
Cash	04	16
Labor	16	64
Cash and Labor	05	20
TOTAL	25	100

The majority of the household heads (64%) contributed voluntary labor. Out of various areas of contribution identified, most of the people contributed in constructing and/or repairing schools and roads. People contributed more in digging or maintaining irrigation cannels and repairing and maintaining wooden bridges (Table 8).

(b) Priority-wise Felt Needs

Household heads were asked to tell the four most important problems/needs according

TABLE 8

Household Heads Classified According to the Areas of Contribution

Areas	Household Heads	
	Number	Percentage
School	23	92
Road	22	88
Wooden Bridge	13	52
Irrigation	13	52
Health Post	06	24
Soil Conservation/afforestation	04	16

to priority which needed solution. The problem perceived most important was ranked 1 and least important was ranked 4. Scores were given to each of those problems according to their priorities. Needs mentioned in first priority received highest score of 4 and least priority problems got 1. Thus a 4 point scale was developed to measure the degree of importance of all mentioned problems.

There were altogether 13 areas where problems/needs were expressed. Irrigation and firewood plants were the most mentioned problems. Irrigation scored highest and was perceived as the most important problem of the vicinity. Firewood was the second most important need followed by fodder trees and fruit trees. (Table 9).

Conclusions

The case study shows that, in the study locale, the rural family social system supports nearly 23 human and livestock heads on a 3.3 hectares of land. On the average a household grows 2 food crops, 4 kinds of fruits trees and 6 to 10 vegetables. Additionally a few had grown fuel and fodder trees.

Farming was at the subsistence level as whatever was produced was for home consumption. Livestock suppliments farm income as livestock products such as ghee and milk are sold locally which fulfills cash needs. This demonstrates the increasing role of livestock and hence a need for improvement of livestock.

Farmers have recently faced difficulty in finding pasture and green fodder as the majority (56 percent) of them did not grow any fuel or fodder trees. However, for those who grew fodder trees (28 percent) there was still insufficient supply compared to the feed requirement.

Similarly the need for domestic energy had increased compared to the availability of

TABLE 9

Ranking of Needs as perceived by Household Heads

Needs	Number of Times Mentioned	Total Scores	Ranking
Irrigation	17	67	I
Firewood	17	43	II
Fodder	13	29	III
Fruit trees	05	15	IV
Seed grains	06	12	V
Cottage industry	04	10	VI
Electricity	03	08	VII
Drinking water	03	07	VIII
Roads and wooden bridge	02	07	IX
Improved breed of animals	02	05	X
Pasture land	02	05	XI
Erosion control	01	02	XII
Flood control	01	01	XIII

fuel wood (firewood is still the most important source of rural domestic energy in Nepal). Data showed that only 16 percent of the household heads grew some fuelwood trees. Since fuel and fodder needs ranked as the most important felt needs of the farmers, there existed a great potential for extension of the farm-forestry program on a wider scale.

The inclusion of the forestry component in the conventional farming system would directly meet farmers' fuel and fodder needs, conserve forests and indirectly augment the rate of agricultural development by improving soil fertility. It would also maintain an ecological balance and thus help to keep the rural social system healthier.

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Appendix A

Local and Scientific Names of Fodder and Fuel Trees Found in the Study Locale.

Local Name	Scientific Name	Remarks
FODDER TREES		
Ipil-ipil	*Leucaena leucocephala*	
Khasreto	*Ficus hispida*	
Kutmiro	*Litsea polyantha*	
Velor		To be identified yet.
Mulberry	*Morus alba*	
Tanki	*Bauhinia purpurea*	
FUEL TREES		
Sisau	*Walvergia sissoo.*	
Khair	*Acacia catechu*	
Simal	*Salmalia malbaricum*	
Koiralo	*Bauhinia variegata*	