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Working with farmer groups – experiences, benefits and problems

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1. INTRODUCTION

The purpose of this paper is to consolidate the author's experiences, the benefits and problems, and the challenges in working with farmer groups. Since I have worked very closely with the subsistence and poor farmers of the hills and plains of Nepal, the paper is based on that country. Initially, the paper briefly elaborates on the issues and concerns in farming systems in low-income developing countries (LDCs) in general, and in Nepal in particular, since they are relevant to the discussion of the theme, "Methodological issues and challenges". This is followed by two case studies on working with poor and subsistence farmers in Nepal.

In most LDCs, which are also generally characterized by a large population, agricultural lands are located in fragile environments. Pertinent examples are vast areas of erosion-prone land in the mountains and hills of Nepal and large flood-prone lands in Bangladesh. As a result of such fragility, together with annual floods, droughts and landslides caused by erratic and devastating weather in these countries, there is generally a perennial shortage of food for the growing population. In most LDCs, where subsistence farming is the principal characteristic of local or microlevel farming systems, farmers have acquired substantial knowledge and skills (known as "indigenous knowledge") in the development and improvement of farming systems through experimentation and learning. This is especially true in a mountainous country like Nepal, where varying combinations of systems exist and local farmers manage lands and change their farming practices according to the changing weather and local circumstances.

Farmer participation, systems approaches and multidisciplinarity have been the components of the farming systems research and extension (FSRE) methodologies since their inception in the late 1970s. Consequently, FSRE

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has sought to apply scientific methods and knowledge to solve the farmers' problems. Furthermore, FSRE has sought to integrate these components in educational as well as research organizations. However, as Caldwell & Christian (1996) point out, there are methodological and institutional tensions in pursuing solutions to these problems. Methodological tension arises from the "reductionist" approach used in scientific methods, on which basically two assumptions are made: first, a system can be explained by studying information regarding the individual parts; and, second, it is not possible to study the workings of an entire system in a scientific way because of the complexity and confounding of variables. Institutional tension stems from the fact that publicly supported agricultural education, research and extension institutions have been developed within the reductionist paradigm, with either discipline-based or commodity programme-based departments. Furthermore, there has been tension regarding the relationship between farmer participation and science, as there are concerns about the loss of scientific objectivity with farmer participation (Sebillotte, 1994, cited in Caldwell & Christian, 1996). Despite the conflicts between the practical goals of the farmers and the knowledge-generating goals of the scientists, one could minimize these and provide a scientifically valid assessment of the FSRE approaches, if the methodologies are followed with an optimum degree of farmer participation.

2. ISSUES AND CONCERNS IN FARMING SYSTEMS

Since most of the discussion that follows is based on findings in Nepal, a short description of that country would be useful. Nepal, a small country with an approximate area of 141 000 km^2 and a population of 24 million, has been divided into three broad ecological regions: the mountains and Himalayas (> 4000 m), the mid-hills (500–4000 m), and the Terai and Inner Terai (< 500 m), covering approximately 23%, 60% and 17% of the total area respectively. In the mountains and Himalayas there is virtually no or very little cropping, but there are occasional areas for monsoonal grazing. It is only in the hills and the Terai that agriculture is practised. The mid-hills are an area of rugged topography and complex geomorphology, with hill slopes being carved into innumerable terraces for practising agriculture. Soils are extremely variable, reflecting differences in bedrock, geomorphology, microclimate and past land use. Likewise, the climate is very variable, resulting from the interaction of elevation and aspect. Thus the natural vegetation, cropping, livestock and forestry vary greatly between the regions, with the average cropping intensity ranging from 150–200%. The

Terai and Inner Terai region, which consists of plains and flat land, though relatively less heterogeneous, is intensively cropped.

Hence, owing to the tremendous heterogeneity in land and soil types and the differences in slopes, aspects and topography, the generation, verification and improvement of location-specific technologies are warranted. Moreover, the wide range of socio-economic issues (ethnicity, religion, caste, gender, wealth, etc.) prevailing in those diverse environments makes the identification, analysis, development and improvement of farming systems more complex and challenging.

3. INTENSIFICATION AND DIVERSIFICATION

One of the important characteristics of agriculture in most LDCs is that the local farming systems are quite intense and diverse, and subsistent in nature, though many farmers are now engaging in marketing activities and developing diverse systems of livelihood. Such intensity and diversity result from numerous combinations of systems emanating from many land and soil types, aspects and topography. While working with rural farmers at Ratnanagar, a Terai Village in Chitwan Valley (27.4°N, 84.5°E, 350 m elev.), I noticed that the farmers practise as many as 15 different cropping patterns in the irrigated lowlands, nine in the rain-fed lowlands and ten in rain-fed uplands, with an average cropping intensity of about 200%. Although all these patterns contributed to the farmers' food security at a microlevel, rice-mustard-maize and rice-wheat-maize were the predominant patterns in the irrigated and rain-fed lowlands, while maize-mustard and maize-cowpea-mustard were important patterns in the rain-fed uplands. (See Timsina, 1986, and Timsina & Subedi, 1986, for details.)

Likewise, in another study in the villages of the Dhankuta and Terhathum districts (26.8–27.4°N, 87.5°E) in the eastern hills, the cultivated lands were located from the low-lying areas in river basins (< 1100 m elev.) with a hot, dry subtropical climate, to sloping and steep areas in the high altitudes (1100–4000 m elev.) with a warm to cool, temperate climate. Farming systems comprised crops, pastures, animals and a forest and watershed area as the most important and visible components, with farming households managing these. In Figure 1, the strong interaction represented by solid lines indicates a high degree of interdependence, while the broken line indicates a relatively low degree of interdependence between the components.

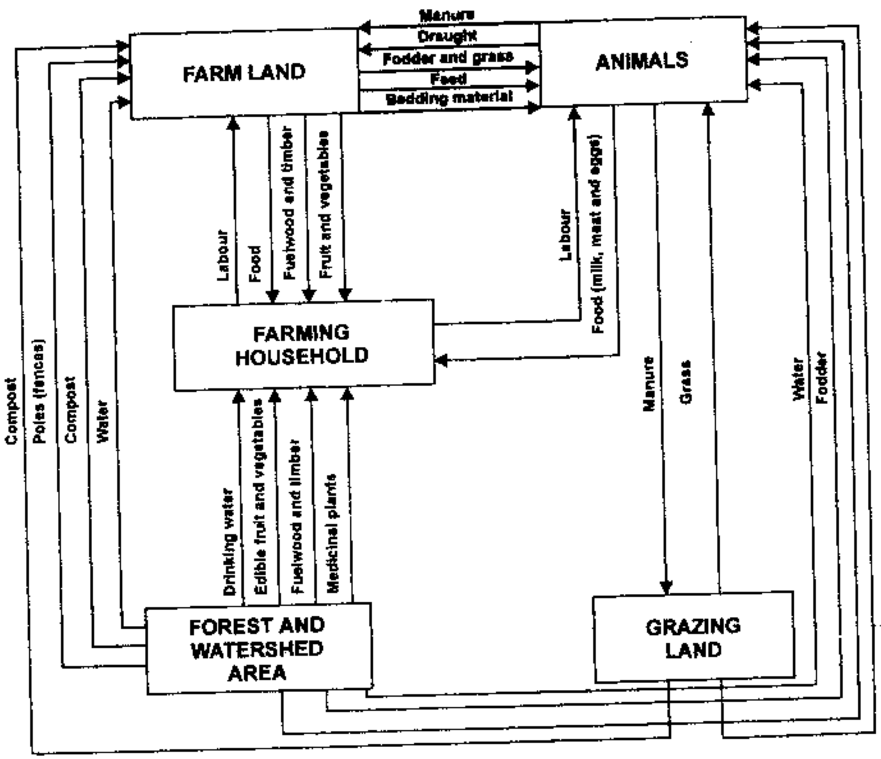

Figure 1: Farming system dynamics of successful farmers of the Eastern Hills of Nepal

Source: Adapted from Timsina et al. (1990).

A range of useful economic products can be obtained from the farmland, the animals and the forest and watershed area. By interviewing farmers from these villages, we recorded as many as 30 different cropping patterns in a transection 10 km long, with rice-wheat as the predominant pattern in the subtropical area and maize-mustard in the warm temperate areas. Table 1 shows only 20 predominant patterns from the study area. Within that small distance, farmers used at least five cultivars of rice, three of mustard and one

Table 1: Cropping patterns by land type, adopted by farmers located in subtropical and warm temperate areas in the eastern hills of Nepal (n = 10)

Cropping patterns	Subtropical	Warm temperate
Rice-mustard-maize	1	–
Rice-fallow-maize	–	1
Rice-wheat-maize	2	–
Rice-wheat-fallow	5	–
Rice-mustard-fallow	1	–
Rice-lentil-maize	–	2
Rice-maize-fallow	2	–
Rice-radish-fallow	1	1
Rice-cabbage-fallow	1	1
Rice-wheat + pea-maize	–	1
Rice-squash-fallow	1	–
Rice-fallow-fallow	1	–
Maize-mustard-fallow	–	3
Maize-finger millet-fallow	–	1
Maize-rice-potato + mustard	–	1
Maize/finger millet-wheat	–	1
Maize-potato + cauliflower-fallow	–	1
Maize-wheat-fallow	–	1
Vegetable seed production	–	1
Maize + soybean + beans	–	3

Source: Adapted from Timsina et al. (1990).

of finger millet, all of which were indigenous, whereas for maize and wheat both indigenous and exotic cultivars were used. Farmers raised a range of animal species, mostly indigenous ones, with indigenous feed being fed. Furthermore, they raised as many as 15 different indigenous species of fodder trees and shrubs on the contours of farmlands, providing excellent roughage for the animals and manure and litter for the farmlands. After close inspection and a critical analysis of the systems and the farmers' income, as well as the mechanisms of local marketing and support services prevailing in the area, Timsina et al. (1990) concluded that they were "successful farmers", who were following sustainable systems of farming.

I have also examined the farming systems in other Asian countries such as Bangladesh, China, India and the Philippines, and have noticed varying degrees of intensification and diversification in those countries too. In a small, flat country like Bangladesh, farmers practise as many as 30–40 different cropping systems in the northwestern part of the country. In a large country like China, there were also many diverse and intensive systems in the past. However, owing to the current rapid rate of industrialization, many lands have now been consolidated, cropping intensities have decreased and diversification has been reduced. As a result of the decrease in the size of farms owing to the increase in the population, and the need for diverse food requirements owing to complex socio-economic circumstances, land fragmentation is the single major reason for such intensification and diversification of land and farming systems in the LDCs.

However, although intensification and diversification of this kind may provide an opportunity for greater food production, income generation, risk adjustment and sustained living in such situations, concern regarding the sustainability of the systems may arise owing to a decrease in the quality of the soil resources. This is especially so if the extracted soil nutrients are not replenished according to the demand of the component crops in the systems (e.g. see Timsina & Connor, 2001, for rice-wheat systems of the Indo-Gangetic plains of south Asia). Despite such concerns, however, the need for increased food production and income leaves no option for the LDCs except to cultivate the land with great intensity and diversity. Input subsidies, favourable output prices, clear vision from governments, strong commitment, support to farmers, and greater investment by governments in agricultural research would definitely help lessen the concerns regarding sustainability. This subject, however, is beyond the scope of the current paper.

4. INDIGENOUS KNOWLEDGE

There are numerous case studies on the rationality of indigenous systems, knowledge and skills of the biophysical environment, traditional practices and technologies in varietal selection and irrigation, and knowledge of crop and animal pests and disease management. In Nepal, Chand et al. (1990) reported on the traditional wisdom of the farmers in the eastern hills, while Paudel (1996) reported on the innovations and indigenous management of farmers in the command areas of the Regional Agricultural Research Station, Nepalganj, in western Nepal. Likewise, Jodha (1990) reported that inaccessibility, fragility, marginality, diversity or heterogeneity, niche availability and human adaptation mechanisms are "mountain specifics" and that farmers have developed strategies in response to those specificities. In the hills of eastern Nepal, farmers use a range of local materials and techniques to control plant and animal pests and diseases (see Timsina et al., 1990, for details).

Farmers also utilize the crop by-products in a number of ways. Besides the rice grains that are consumed by the farmers and their families, the husks are either burnt in the field for manure or used as litter, while bran is fed to the animals mixed with other farm products. Broken rice obtained after milling is used as human food or animal feed, while the straw is used as animal feed, roofing material, fuel, or for making cushions or carpets. Other crop and animal by-products are also used intensively (Timsina et al., 1990). Farmers try to diversify into activities outside farming where the returns on labour may be better, while still retaining a strong attachment to the land and farming. Such diverse uses suggest that the farmers maximize their farm resources. To a subsistence farmer, diversity of this kind is important for income generation, risk adjustment and sustained living.

Such information and the strategies of the farmers must be explored, captured, documented and utilized, and innovations warrant the inclusion of farmers in the research and development processes. Nevertheless, agricultural researchers and development workers should not be satisfied just to report such case studies. Farmers must be encouraged and supported to take up the more profitable and sustainable technologies, otherwise the hill farmers will forever remain in a subsistence "prison".

5. NEED FOR GENDER ANALYSIS

Gender analysis is a methodology for identifying the roles and needs, constraints and opportunities of men and women, and such an analysis can form a basis for allocating resources for the benefit of each sector. The analysis can make a difference by improving the lives of men and women, and by improving the efficiency and positive outcomes of research and development efforts (Feldstein & Poats, 1989). In earlier works, Timsina et al. (1989, 1990) identified the roles of men and women in agriculture in the

Terai and hills of Nepal, and observed that women were as involved as, or even more than, men in decision making and in the physical participation in several aspects of farming. Later, a review of the gender issues in farming systems research and development activities in Nepal was conducted, and it concluded that women were actively involved in agriculture, livestock and forestry activities in both the Terai and the hills of Nepal (Timsina, 1992). Many other case studies in rice-based farming systems also showed that gender analysis could really make a difference in FSRE (Adalla, 1988; Ashby, 1990; Chabala & Gichiru, 1990). The second case study presented below is an example of the application of gender analysis research methodology to multipurpose tree species in farming systems for a site in Nepal. (See Timsina et al., 1996, for details.)

6. NEED FOR FARMER PARTICIPATION

Owing to the complexities of the farming systems that prevail in the LDCs, and in recognition of the farmers' indigenous knowledge and management skills, there is an increasing urgency for farmer participation in the FSRE. Such participation is important because the complex farming systems operating in the small farmers' environment demand research that is applicable, practical or problem oriented, rather than scientific or "basic". The former type of research essentially follows a bottom-up or systemic approach, which requires an in-depth understanding of the local biophysical environments in which the existing and potential farming systems develop and the socio-economic environments in which such systems operate. The latter type, however, follows a top-down or reductionist approach in which researchable problems are hypothesized or assumed, based on perceptions and priorities of scientists or researchers. Farmer participation, on the one hand, helps obtain the information on the biophysical and socio-economic environments and, on the other hand, it also helps improve the decision-making abilities of researchers and farmers. The researchers working with farmers can receive direct feedback on the need for appropriate research methodology and experimental techniques relevant to the local farmers' settings.

It has also been reported that in some parts of Nepal there are many innovative and research-minded farmers who test and adapt suitable cultivars themselves. For example, a study in the western hills reported that farmers brought germ plasms (e.g. rice varieties such as Chhomrong Dhan, Aus Masuli and Chaurasi Dhan, and also banana and onion varieties) from other

districts or even from India on their own initiative, and tested and adopted these in their environments. Researchers in the area later came to know about these varieties, included them in their research programme and subsequently released them as promising varieties. The researchers named this innovation informal "farmers' research" and suggested recognition and promotion of such research by the formal research institutions (Dhital et al., 1996). This example suggests that it was not the farmers who participated in formal research, but rather that the researchers participated in the informal "farmers' research". Gurung et al. (1996), however, give several reasons for a decline in the farmers' participation in outreach activities, and make a number of suggestions to enhance such participation among farmers in the western hills.

There are many examples from other parts of the world where farmer participation has improved scientists' understanding of efficient research methodology and the decision-making ability of farmers regarding the adoption of technology (e.g. Farrington & Martin, 1988). McArthur (1998) summarizes the concept of, and approaches to, farmer participation in and beyond the boundaries of FSRE, based on information from an international symposium on FSRE in Sri Lanka in 1998. Similarly, there are examples of farmer participation in agricultural research in Australia. The participatory approaches and techniques include involving farmers in using computer models (APSRU, 1991; Martin et al., 1996), farmer-scientist co-learning and action researching (Foale et al., 1996, 1997; Bawden & Packham, 1991), enhancing farmer participation in land-care activities (Chamala & Mortiss, 1990) and the check approach (Lacy, 1998).

7. CASE STUDIES

In a few FSRE activities in Nepal, farmers were included in most of the field research, and I strongly believe that such inclusion has improved the research methodology and enhanced the results of the research in terms of its potential application. In the two case studies presented here, both male and female farmers participated throughout the FSRE project period. These studies were carried out by two critical teams of multidisciplinary scientists from the Institute of Agriculture and Animal Sciences (IAAS) in Rampur, Chitwan. The first study, based on research supported by the Ford Foundation, aimed at training the faculty members in FSRE approaches and methodologies, while at the same time generating technologies relevant to the needs of local farmers. The second study, with a small grant from the

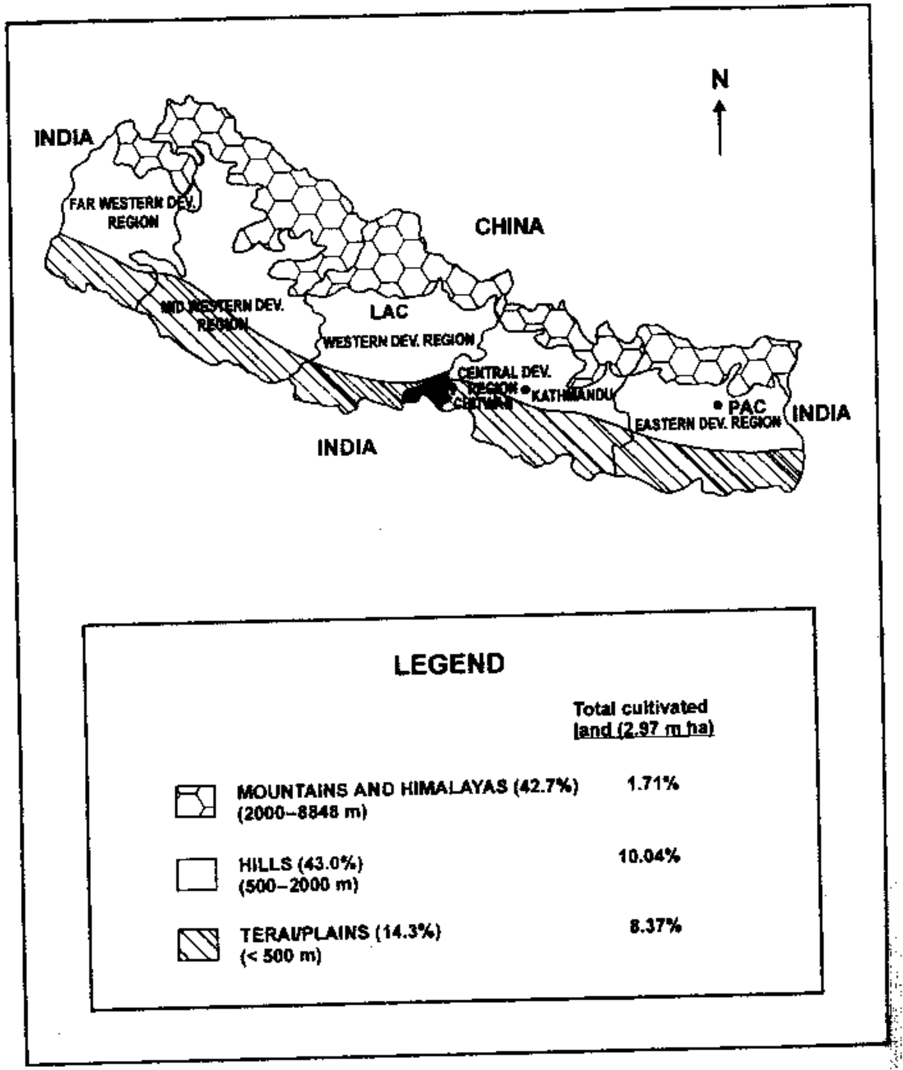

Figure 2: Map of Nepal showing agro-ecological regions

Note: The black area indicates the study areas for two case studies.

Source: Adapted from Neupane et al. (1994).

then Women in Rice Farming Systems Programme of the International Rice Research Institute, illustrates an example of the gender analysis approach to research and extension, in which researchers worked closely with both male and female farmers, focusing on their issues and problems.

7.1 Case study 1: Farming systems research and extension in Chitwan, Nepal

Formal agricultural education in Nepal started with the establishment of a school of agriculture on 17 August 1957. This was later upgraded to a college of agriculture in 1968, and finally to the IAAS of the Tribhuban University in 1974, with its headquarters at Rampur, Chitwan. The Institute has discipline-based departments with disciplinary-based courses; the academic staff have disciplinary-based degrees and are responsible for teaching, research and extension in the country. Since the academic staff were trained in disciplinary-based subjects, in the early 1980s the Institute realized the need for a systems perspective for various activities. The first step was to train the scientists in systems approaches to teaching and research by working with the farmers so that academic courses could be designed by incorporating the farmers' perspectives, as these could be relevant to the country's needs.

The research team, comprising multidisciplinary faculty members representing agronomy, horticulture, plant breeding, entomology, animal nutrition, agricultural extension, sociology, agricultural economics and agricultural botany, was established in 1990. The research sites were located in three villages, Kholaghali, Daletar and Bharlang, under the Kabilas Village Development Committee in Chitwan district about 20 km from the IAAS campus (Figures 2 and 3). The broad objectives of the project were as follows:

- To develop and enhance the teaching and research skills of IAAS faculty members and introduce students to systems perspectives by:
  - Working with men and women farmers in their actual settings to identify problems and develop research agenda
  - Working together across scientific disciplines to understand the problems better and develop a research agenda as a whole
  - Helping students to analyze the different qualitative farming systems models, and to adapt them to individual problem situations

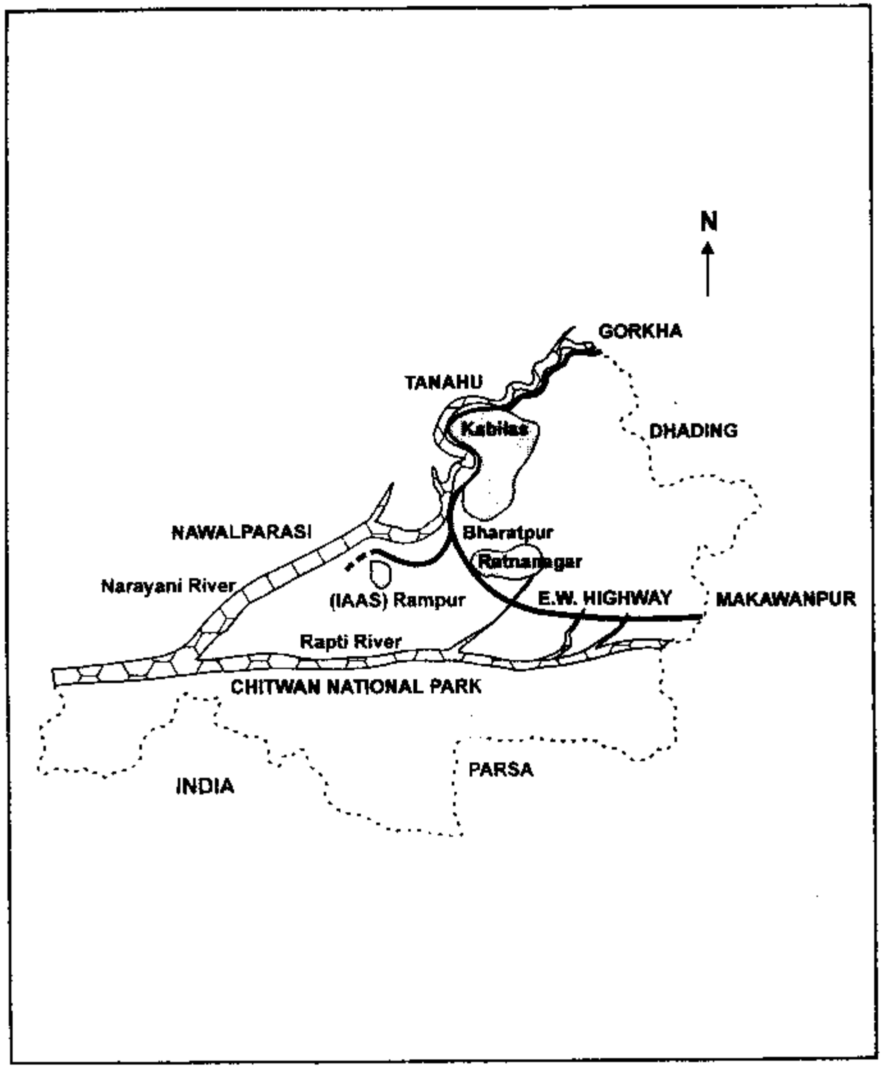

Figure 3: Map of Chitwan district

Note: The shaded area above (Kabilas) is case study site 1, while the shaded area below (Ratnanagar) is case study site 2.

Source: Modified from Neupane et al. (1994).

- Establishing research links among scientists of different agricultural institutions to share information, strengthen each institution's research, and reduce duplication of research efforts

- To share FSRE skills in teaching with other non-participating faculty members, so that the effort could be multiplied
- To demonstrate the value of addressing the whole farm ecosystem (plant, animal and human) in research with the aim of improving the living standards of farm families, as well as increasing marketable production
- To strengthen the focus on women in agricultural research and production by reflecting the gender roles in agriculture through the involvement of women farmers, women students and women's faculties

7.1.1 Methodology

A comprehensive systems analysis was conducted prior to undertaking component technology (on-station and on-farm) research to understand and describe the research site in terms of biophysical and socio-economic characteristics, identifying the issues and constraints and developing an action research agenda. For this purpose, a set of informal techniques, such as rapid rural appraisal (RRA) and participatory rural appraisal (PRA), as well as formal techniques were used. The informal techniques included conducting semi-structured interviews and informal group discussions with farmers, drawing participatory maps (social, resource, hydrology, soil, etc.) and transections by the farmers and researchers, developing wealth ranking techniques and preparing seasonal calendars and historical profiles of the site. In addition, gender issues and concerns were addressed through gender analyses techniques, as proposed by Feldstein & Poats (1989). Formal techniques, such as focused structured interviews, were also used. Results of the PRA/RRA, the formal techniques and the gender analyses are reported in various publications (Neupane et al., 1992, 1993a, 1993b, 1994).

Initially, the project developed a conceptual framework where human, animal, forestry and crop components are viewed as an integral part of the farming system. The study thus followed a holistic and systems approach, with farmer participation at all stages of research. While the holistic and systems approach was the primary strategy of the research, researchers identified component technology research as an equally important activity. The research team worked with several farmer groups with varying incomes and ethnic and social backgrounds. These farmers practised several different cropping patterns in varying intensities and diversities. Thus, some farmers were interested in establishing on-farm trials for crop species and cultivars, some for vegetables, some for multipurpose tree species, while many were also interested in trials for livestock species. Some of the livestock groups formed were of goats, buffaloes and cattle. Some farmer groups comprised exclusively men or women, while others consisted of both male and female farmers.

7.1.2 Crop-related problems

Prior to the project, the farmers grew a range of crop species and cultivars on a range of soil and land types and slopes. The PRA/RRA study, conducted at the research sites, showed the main crop-related problems to be low productivity resulting from the low yield of the crop species and cultivars, the incidences of pests and diseases, soil erosion and low soil fertility, and the lack of information on improved technology. However, it was recognized at the very outset that even if improved technologies were identified and supplied to the farmers, there was still a chance that they would not be adopted because of the farmers' low economic status and indigenous ethnic backgrounds. This fact suggested the need to generate very different technologies for different socio-economic and ethnic groups. The groups needed to decide on the adoption of the appropriate technologies after having considered the various trade-offs.

7.1.3 Planning, design and testing

Various on-farm trials were jointly planned, designed and tested by both researchers and farmers, with consideration of the potential for improving existing systems with low productivity on each land and soil type, within an agro-ecological setting and the farmers' socio-economic environment. Examples of the design and testing of cultivars based on cropping systems were cowpea and maize cultivar trials for maize-legumes/finger millet-fallow patterns (in sloping uplands), early and main season rice cultivars for the first and second rice crops for the rice-rice-wheat and rice-wheat patterns (in lowlands) and wheat cultivar trials for rice-rice-wheat and rice-wheat patterns (in lowlands). Other cultivar trials included on different land types and cropping systems in the same or different villages, but still within the research site, were for lentils, chickpeas and vegetables. Likewise, management trials (or "plus" trials, i.e. trials where each nutrient element is added and the response is examined one element at a time, in wheat and

fertilizer trials in rice and wheat) were conducted in several farmers' fields. To support the on-farm activities, on-station trials were conducted at the IAAS research farm. Farmers visited the on-station trials at various stages to help them compare the performance and evaluation of technologies through on-station and on-farm trials.

7.1.4 Monitoring and evaluation

On-farm trials were frequently monitored and evaluated at different stages of the crop growth by both researchers and farmers. Several techniques were used to evaluate the trials, of which matrix ranking was the most useful. For example, the matrix ranking of the rice cultivars by the participating farmers at the research site is presented in Table 2. For comparison, the grain yields evaluated by the researchers are also presented. Based on the agronomic performance, mainly grain yield, the researchers rated Chaite-2 and Ghaiya-2 the superior cultivars, while from the farmers' evaluation, Chaite-2 and Laxmi emerged as superior. In contrast, the farmers evaluated the cultivars not only from a yield perspective, but also according to quality characteristics such as cooking quality, low grain shattering, low seed dormancy during storage, disease and insect resistance, and straw for animals. The result was that the farmers selected Chaite-2 and Laxmi for further consideration and testing. (See Timsina et al., 1993c, for details.)

A similar methodology was used to evaluate and select cowpea and chickpea cultivars (Timsina et al., 1993a, 1993b), which ultimately increased the adoption of these species and cultivars in the farmers' environments.

7.1.5 Strategies for success

Although there were many problems in working with the farmers during the course of the research, the researchers learnt much about the participatory and systems approaches to research and extension, while at the same time helping the farmers. Three strategies were identified that were entirely different from other studies and resulted in the success of this project: the holistic perspectives and systems approaches; the testing of technologies in both research stations and the farmers' fields, and farmers' participation in all stages of FSRE. Furthermore, several visits and informal and formal surveys were conducted and gender-disaggregated data on decision making and labour participation were obtained by time-task analysis to identify gender-specific roles and gender-related issues, problems and opportunities.

Table 2: Matrix ranking (1 = poor; 9 = excellent) of early rice cultivars grown by participant farmers, Chitwan, Nepal, July 1992

	Chaite -2	Chaite -4	Ghaiya -2	Radha -2	Radha -32	Laxmi
Yield						
• Grain	7	3	5	3	4	8
• Straw	6	3	3	8	4	6
Tilling	7	4	5	3	4	7
Disease resistance	7	4	5	3	4	8
Insect resistance	7	3	5	3	4	8
Early maturity	4	6	5	7	4	4
Shattering	6	4	5	4	5	6
Threshing ease	4	6	5	7	4	4
Dormancy	7	3	5	4	4	7
Milling recovery	5	4	5	5	6	5
Grain weight	6	4	4	6	3	7
Cooking quality	6	5	5	4	4	6

Notes: Best variety: Two farmers – Laxmi; the rest of the farmers – Chaite-2. Researcher's evaluation (for comparison): Grain yield (ton/hectare): 4.8, 4.2, 5.2, 4.2, 4.1 and 3.9. Best variety: Ghaiya-2 and Chaite-2.

Source: Adapted from Timsina et al. (1993c).

On-farm and on-station links, commodity programmes and FSRE programme links, and research-extension links were the major linkages developed within the project framework, which also facilitated the development and promotion of the improved technologies. In addition, farmers' skills development activities (such as training and visits), farmers' group formation (such as a goat development group, a buffalo development group and a farmers' credit and support services group) and alternative technologies (which were identified and tested) also greatly helped identify and promote the FSRE technologies.

7.1.6 Design of courses with systems perspectives

After completion of the project in 1994, a core course on "farming systems and sustainable agriculture" was developed, and systems perspectives were added to several other courses. Many academic staff have since been developing research proposals, and have been conducting research and extension activities with farmer participation and with systems perspectives and approaches.

7.2 Case study 2: Gender analysis approach to farming systems research in Chitwan, Nepal

The study was conducted in two villages: Baghmara village, with its indigenous Tharu community, and Mohana village, with its migrant Brahmin and Chhetry communities in the Ratnanagar Village Development Committee, Chitwan, Nepal (Figures 2 and 3).

The study had the following objectives:

- To quantify the gender division of labour in crop and animal production, and in fuelwood and fodder collection
- To analyze the position of forest, fuelwood and fodder, and the roles played by men and women in meeting the fuelwood, fodder and timber requirements
- To set the criteria for the selection of farmers (both men and women) for the design and testing of on-farm trials, and to empower and enhance their skills by providing related training and visits

The researchers hypothesized that gender analysis in forestry/rice farming systems research could make a difference by improving the efficiency and positive results of research, and improving the lives of women.

7.2.1 Methodology

The methodology adopted both formal and informal approaches to understanding the farmers' problems and constraints, identifying researchable issues and testing the multipurpose tree species in the farmers' fields. Informal approaches, such as PRA/RRA, helped the researchers to obtain qualitative information about the villages and to focus on the issues to be included in the interview schedule, using formal approaches. Women farmers were selected as respondents for the formal survey, because from the diagnostic study researchers knew that the women were more involved in fuelwood and fodder collection and in household management, and thus had more knowledge on these issues. Thus, by interviewing the women, the researchers believed that they could obtain more reliable information that could be used for designing action research.

Timsina et al. (1992) give the results of the diagnostic study using informal approaches, while Timsina et al. (1996) provide results from the formal approaches.

7.2.2 Major findings

▪ Animal production

Farming households in Mohana (a migrant community) raised cattle and buffaloes for milk and draught work, and goats for meat and income purposes. In Baghmara (an indigenous community), most households kept one or two pairs of bullocks and buffaloes for draught purposes and raised local poultry, sheep and goats for home consumption. In Mohana, the men were more involved in grazing the animals, buying feed and carrying milk for sale, while the women were more involved in cleaning the animal sheds and feeding the animals. In Baghmara, the men were more involved than the women in cleaning the animal sheds, disposing of waste and grazing the animals, while women were more involved in feeding the animals.

The women in both villages were exclusively involved in collecting fodder and in caring for and managing the goats and poultry. The women of the migrant community indicated that they were interested in raising cows, buffaloes, bullocks and goats for milk, meat, draught power and manure, while those of the indigenous community were interested in goats and poultry. The first constraint was the unavailability of fodder for large animals, which was due to the long distances women had to travel to collect fodder, as well as difficulties of gathering fodder during the rainy season. The problems of animal production seemed to affect the wives more than the husbands in both villages. This is because the wives were directly concerned with, and responsible for, the care and management of the animals.

▪ Fodder and fuelwood collection

Fodder was obtained mainly from forests and private farmlands, and only the women were involved in collecting fodder from the forests. During the winter season, the women in Mohana devoted more time to this task (3.8

hours per day) than those in Baghmara (2.2 hours per day), while during the summer season they devoted a little less time in both villages (3.2 and 1.9 hours per day, respectively in Mohana and Baghmara). In fuelwood collection too, the women were relatively more involved than the men, as they had the primary responsibility of cooking for and feeding the household members, which warranted the collection of fuelwood at any time. It took about 4 and 3.1 hours per day respectively in Mohana and Baghmara to carry fuelwood from the forests during the winter season, while during the summer season it took 5 and 4 hours per day respectively. The women's input to labour was 70%, as against the men's input of 30%.

7.2.3 Implications for the design, testing and management of trials

From the diagnostic studies it was confirmed that the shortage of fuelwood and fodder was the most pressing problem to be tackled through action research in both villages. Women had a better knowledge of fodder and fuelwood, since they were more responsible for the collection and use of these items. As the farmers in the migrant village were raising cattle and buffaloes, they were interested in establishing on-farm trials for *Atrocarpus* spp., *Bahunia variegata, Dalbergia sisoo* and *Leucaena leucocephala,* which provide good quality fodder, while the women in the indigenous village chose *Melia azederaca* and *L. leucocephala*, fodder that is favoured by goats and sheep. Hence, training and demonstration trials on the nursery raising of multipurpose tree species and on-farm trials on erect, fast-growing trees that could be grown at homesteads, on farmlands, along fences and borders and among rice fields were established on various women farmers' fields. Although both men and women participated in managing and monitoring the trials, the women showed special interest, since the problem of fodder and fuelwood directly affected them.

7.2.4 Systems findings

The study identified the fodder and fuelwood species suited to each community or village and/or to the various women's groups, based on comprehensive systems analyses and active farmer participation. The research methodology integrating formal and informal approaches helped identify suitable technologies for specific groups, as well as develop a systems perspective towards research among the researchers of the institute.

7.2.5 Lessons learnt by working with farmers

I have learnt very practical and relevant lessons by interacting with Asian farmers in general, and by working with the Nepalese farmers in particular.

1. A common misconception among many researchers and scientists is that farmers in the LDCs are illiterate and have no scientific knowledge, and that there is no need for their participation in scientific research. My experience shows that although the majority of the farmers are illiterate, they have a tremendous knowledge of various aspects of farming. Many of the studies using PRA/RRA techniques (Chambers, 1994) and agro-ecosystems analysis (Conway, 1985) illustrate the farmers' vast indigenous knowledge of farming. Ranaweera et al. (1998) provide a range of papers on indigenous knowledge, farmer participation, innovations and social change, gender issues and many other aspects of FSRE that require attention. Thus, one of the obvious benefits of working with farmers is that their indigenous knowledge and innovations could be utilized in research.

2. Farmers are responsive and often communicative too. They are happy to share their knowledge and experiences of farming, unlike many scientists who do not want to disclose their results until they have been published. Although many farmers of the LDCs cannot express their knowledge and experience in the English language, which is generally used by researchers and scientists, they are quite able to express their feelings and ideas in a local language. Researchers well versed in a local language would have an advantage in working with such farmers.

3. By working with the farmers in their own environments, researchers can identify specific problems and opportunities and can intervene in the trials and application of technologies of specific farmer groups. In this way, the process of technology generation, verification and adoption can be much more efficient and cost-effective, compared with research that excludes the farmers.

4. Farmers perceive the researchers as being well educated and hence able to provide some alternative solutions to their farming problems whenever the researchers visit their fields. Researchers working or intending to work with farmers, should thus be careful not only to extract information from the farmers, but also to pass on information. They should be prepared to provide some alternative and feasible solutions to the farmers' problems.

5. Most of the subsistence and poor farmers struggle to obtain their daily food requirements. They have to work in their own fields, as well as in their neighbours' fields for their survival. Many farmers complain that the researchers often try to make themselves popular by visiting the farmers and talking for a long time without prior notification. They appear to think that the farmers are "illiterate" and are people of low socio-economic standing, so that any prior consent to or notification of their visits to the farmers' houses is unnecessary. This is true to some extent, because many poor farmers appreciate the visits of the so-called "literate" and "high-profile groups" of researchers, even though they make no substantial contribution to the farmers' plight. However, conflicts may arise from such unplanned and extended visits. Hence, caution should be exercised not to visit the farmers when they are about to leave their homes for work, nor spend time discussing irrelevant and unnecessary matters. On the one hand, the meetings should not be too long, while on the other they should not be too short, as it may be necessary to build rapport before conducting interviews or obtaining information through formal or informal methods. The best approach is to make a brief visit before an intended interview to establish a suitable time when the farmer could be interviewed. This requires advance planning, rather than visiting in an ad hoc manner or at short notice.

6. Both men and women farmers use their knowledge and labour in decision making and the performance of farm activities. Some agricultural tasks are specifically performed by men, some by women, and others by both. Some tasks are even performed by children. This is true of decision making also. Hence, care should be taken in the selection of farmers – both men and women – during interviews, PRA/RRA and action research. This will improve the equity and efficiency of the research. Evidence from the second case study suggests that gender analysis can be an appropriate tool for identifying gender issues in FSRE, where agriculture, livestock and forestry are important components, and that the analysis can make a difference by improving the efficiency and positive results of the research. Women farmers working in a group were found to be enthusiastic and developed an attitude of co-learning and cooperation.

7. Farmers are willing to participate in research provided the researchers are honest and helpful. Farmer participation in research is vital, but it should be optimal. Excessive participation may detract from the scientific content, while too little participation may undermine the practical application of the research. Depending on their interest and need for a

particular trial, farmers seek to participate and contribute to all aspects of research. However, they need some insurance against crop failure caused by a certain treatment or other internal and external factors.

8. The participatory action research of many farmers fails owing to a lack of farming supplies (seeds, fertilizers, pesticides, etc.), a lack of insurance against the failure of crops or harm done to animals used in experiments, and a lack of appropriate training of the participating farmers. Thus, free supplies (seeds, fertilizers, pesticides, etc.) should be provided to farmers participating in on-farm trials. They should also be given insurance against crop failure, as well as appropriate training to encourage their participation. In many cases, however, farmers would be interested in becoming involved in the on-farm trials for the free supplies and training only. In such cases, conflict may arise among the farmers, as it would be almost impossible to include all the farmers in the research owing to managerial and logistical constraints. Furthermore, the value and objectives of the research projects would be undermined. Under such circumstances, the farmers should be encouraged to discuss the matter among themselves and reach a general consensus. The researchers' role would be vital in helping them form a group and in explaining the objectives of the different trials and the nature and degree of farmer participation required.

9. When one works with farmers, problems may also arise in the management of the trials. While farmers are willing to participate in joint ventures of this kind, sometimes they are negligent and thus fail to manage the trials, especially under variable weather conditions, during social and cultural events, and when they have other priorities. Often quick decisions on specific management practices and control measures may be required, for which the researcher is needed. If the researcher is stationed at or near the research site, the farmers could easily make contact. However, more often the researchers are stationed at the university or research station far from the FSRE site and do not visit the trials for a significant period. In that case, on-farm trials may fail, due to negligence not only on the farmers' part but also from the researchers.

8. CONCLUSION

The two case studies presented first identified the system hierarchies, then adopted a holistic and systemic approach, and finally performed thorough

and comprehensive systems analyses to research and extension. In both studies, the system components were first identified, their relationships to one another were examined and, finally, alternative farming-systems technologies were identified, designed, tested, monitored and evaluated with active farmer participation. The identification of technologies as per the needs of men and women was necessary; thus, in both studies, women actively participated in research and extension.

In addition to the experience gained from the case studies, I briefly described my experiences, the benefits and problems of interacting and working with Asian farmers in general, and especially my working experiences in Nepal. The greatest benefits of farmer participation in agricultural research are that one can identify local and specific problems and issues for each farmer group; one can learn from the farmers and intervene in the alternative and "appropriate" technologies; and one can encourage and support them to take up the more profitable and sustainable technologies. However, the objectives of working with farmers should not just be learning per se; farmers must benefit from farmer-participatory research.

It has also been widely realized that there are complex methodological issues, problems and challenges regarding FSRE. In the context of illiterate farmers, the methodologies integrating informal approaches and techniques into research will continue to play a role. There are many reports advocating the potential applications of such approaches and techniques in the LDCs. Unlike most studies in the past, which stressed "diagnostic" research, the farmers' participatory action research should now be emphasized if farmers are to benefit from FSRE. The objectives of such techniques and approaches should not just be to demonstrate and document the farmers' indigenous knowledge, adaptive responses, research, innovation and their ability to identify problems and issues, but should also be action oriented. If the researchers limit their work to documenting their recognition of the farmers' wisdom, without providing them with appropriate technology or benefits, then the farmers will simply remain in the subsistence "prison". If we are convinced that the subsistence and poor farmers of the LDCs have been struggling for survival, we must "unlock the present gate" and think about the commercialization of agriculture while utilizing important aspects of subsistence agriculture.

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