III

IMPLEMENTATION APPROACHES

The last ten years constituted an important period in the recognition of rural energy problems by government and non-government organisations. This has led many agencies to test and adopt various implementation approaches. Broadly, they fit into three categories:

- o external sponsorship
- o private sector initiatives, and
- o participatory village development.

Attempts will be made in this Section to present the main aspects of each approach and thereby examine their usefulness.

External Sponsorship

The approach is characterised by the predetermination and control, by external agencies, responsible for determining the stability of selected technologies to the 'targetted' population in rural areas. Executing agencies decide everything about project selection, development, and implementation. Targets are set to disseminate specific products through uniform directives using inadequately trained extension agents. Very little emphasis is placed on the process of "fine tuning" in correspondence with local circumstances or on market surveys to suit users' preferences. Examples are given below with reference to various projects implemented in the country.

Community Forestry

The Community Forestry Development and Training Project (CFDTP), as explained in Section I, was launched in 1980. In spite of the rhetoric that the project should be implemented with full participation of community members, the top-down implementation style seems to have persisted. District Forest Controllers (DFC) expected the *Panchayat* forestry committees to shoulder the responsibility of forest protection in areas designated as *Panchayat* Forest (PF) and *Panchayat* Protected Forest (PPF)[4]. Following the project period of five years, there was a general feeling that it had not proceeded as well as expected. According to Gautam and Roche (1987), *"In Bhusaphede, Nandu, Lankuri, and Magapauwa panchayats, the villagers themselves used to pay for forest watchers to protect areas of natural forest. Since the project began, some of the villagers have stopped the payment to the watchers".*

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4. *Panchayat* Forest (PF) and *Panchayat* Protected Forest (PPF) were categories of forests under the Forest Regulations introduced in 1978 to encourage local participation in afforestation and conservation of forests PFs were handed over to the village *Panchayat* for planting on barren and denuded areas. PPFs were meant for the planting and protection of nationalised forest where scattered trees still existed. The revenue generated is shared on 50-55 basis between the Government and local groups respectively. Since the cessation of the Partyless *Panchayat* System, the status of these forests has not been determined.

In all the *Panchayats* of Dolakha District, when people were questioned about who owned the forest, the answers varied depending on whether the respondent was the District Forest Controller (DFC), the Forest Ranger, the *"Pradhan Pancha"* (head of the Village *Panchayat*) or "the Swiss" (expatriate officials appointed by the donor). In one detailed survey of a *Panchayat*, covering 40 households, only one person knew anything about the community forestry legislation. No one knew that the plantation area in the village was designated *Panchayat* Forest and had been handed over to the Village *Panchayat* (Khusle and Roche 1986). Another study related to private planting revealed that people engaged in forestry extension activities were not familiar with the legal provisions under the relevant Act (Gautam 1986).

Drawing from the experiences with community forestry within the Integrated Hill Development Project, Gautam and Roche conclude (1987) *"The situation in Dolakha District has become quite serious. We need to stand back and look at the fact that our village-level afforestation programme is now in reality paying the villagers to plant, and also to protect, the area from themselves. The annual bill has already reached Rs 3.5 million and is increasing every year at the rate of Rs 200,000."* The basic concern is the question of effectiveness in community participation and the sustainability of the payment system as pursued in the projects.

A contrasting case from Darchula District is described by Chand and Wilson (1987).

> *"In Hikila Panchayat, a women's committee formed in 1985 has in effect written its own management plan at the suggestion of the District Forestry Office staff. The plan is based on a simply worded protection agreement devised by the committee in consultation with local leaders and women. Because the whole community is aware of this agreement and because most people were involved in its formation, it has unanimous support and implementation has been successful."*

The above illustration shows that, given an opportunity for flexibility and assistance from the DFC, the local committees can assume full responsibility in implementing forestry management plans successfully. This is true especially when local people are involved from the very beginning in the process of planning. Unfortunately, except for a few succesful cases, active participation of local people in forestry programmes is far from being satisfactory. This is, in part, due to insufficient support from the district forestry offices and the lack of trust, on the part of local people in forest officials. In many cases, villagers are skeptical. They believe that when the trees are ready for harvesting, the Government will take away the timber and they will have very little benefit from it. More efforts are, therefore, needed to clarify the issues and gain the confidence of local villagers. Another report (Gronow 1987) points out the two critical factors that currently limit the success of community forestry.

- The approach does not accept that it is the community and not the professional forester that has to develop the management solutions for PF and PPF.
- The Rangers and Community Forestry Assistants are not equipped to facilitate forest management development in the village.

The CFDP approach has put a great deal of emphasis on strengthening the District Forest Controller's Office. However, efforts to strengthen local forestry committees have been inadequate. Attempts to educate people about the provisions under forestry rules and regulations are insufficient. Local communities cannot be expected to participate without a clear understanding of what and how they will benefit. Forest committees are confused about their legal status and their rights and responsibilities. Villagers are uncertain whether tenure of PFs and

PPFs will ever be granted to them. Because of project funds and other inputs, indigenous forest management practices are gradually becoming obsolete. The objectives of CFDP programmes, in terms of procuring more people's participation, need to be communicated to people in simple terms. The beneficiaries must be involved in planning from the very beginning and implementation must take place with full conviction and willing support.

Mini/Small Hydroelectric Installations

The principle objective of the small hydroelectric system (capacity ranging between 100 to 500kW) has been to electrify district headquarters that cannot be reached by the central grid system. The power plants are operated and managed by the Small Hydroelectric Development Department (SHDD) of the Nepal Electricity Authority.

Establishment of the small hydroelectric projects were largely motivated by political considerations and less so by techno-economic grounds. Most of them have been implemented with foreign assistance and rely on foreign engineering, imported turbines, and other equipment. The construction was undertaken by contractors under the supervision of SHDD. The UNDP/World Bank Energy Sector Assessment Report (1983) indicated that several of these small hydroelectric projects were characterised by poor site selection, poor design, inadequately trained staff, maintenance difficulties, and poor administration. None of these projects generate sufficient revenue to keep up with operation and maintenance costs. Government subsidy to run them has reached the level of Rs 8 million annually (WECS 1986).

Improved Cooking-stove (ICS) Dissemination

The dissemination of ICS is undertaken by about eight agencies which include the Community Forestry and Afforestation Division of the Forestry Department, the Small Farmers' Development Projects of ADB/N, the Production Credit for Rural Women (PCRW) programme of the Women's Development Section, UNICEF, and other donor agencies. The usual approach is to buy ICS from the producers in large numbers and distribute them through agency representatives at no cost to the users, except for installation in their own homes. The cost of transporting stoves from the production centres to the users is also borne by these agencies. In most projects, ICS are integrated into the overall development effort. These efforts have served useful demonstration purposes.

The ICS programme in Nepal has not, however, been able to move beyond the demonstration phase. One key reason is that the current implementation approach limits the interaction between the producers and the users. The role of the intermediary agency has been more a deciding factor. By 1984/85, a decade after its initiation, the total number of ICS distributed amounted to just 30,000 units. Subsidies have mainly been used to push the users rather than "create" markets through such mechanisms as advertising, education, promotion of additional production centres, and public support services to meet user requirements. Lack of proper training in stove installation and maintenance is yet another serious problem. A sample survey conducted on the SFDP in Kavre District shows that out of 112 stoves distributed in different villages throughout six *Panchayats*, only 71 stoves were installed. Of the 41 stoves that were not installed, 24 households indicated that the absence of a technician was the primary cause for their inability to have them installed (Basnet 1983).

Experiences from Bhumisthan *Panchayat* showed that the acceptance of ICS increases when the existing design is slightly modified, allowing larger pots to be used for cooking and the chimney

pipe to be regularly scraped and cleaned. These innovations were realised because of the interaction between producers and users with the help of a development catalyst living in the village (Rijal et al. 1987). Another important factor was that the linkage between SFDP and village households was very strong.

Biogas Dissemination

The Biogas Company is the main agency responsible for the promotion and dissemination of biogas technology in Nepal. The plants are fabricated and maintained through 2 regional offices and 11 sub-branches. ADB/N has been supporting the company as a principal financier and also as a promoter. ADB/N helps the company to market its biogas plants through its loan procedure. The Biogas Company selects the site, determines the size, constructs the plants, and provides a 7 year maintenance guarantee. Whenever economic feasibility is assured, ADB/N extends a loan to individuals or groups of farmers. The Bank places the order with the company's field offices on behalf of the clients and the payment is made directly to the company by ADB/N after satisfactory construction of the plant. Emphasis is currently placed on integrated schemes that encourage productive use of the slurry for agriculture or fishery. Also, community plants are installed to run agro-processing mills using the gas in a duel fuel engine and the slurry in farming.

Currently, the Biogas Company undertakes extension, promotion, training, and research activities. Research efforts are mainly geared towards generation of biogas in colder climatic conditions, use of crop residue and biomass waste for gas generation, and cost reduction in the construction of plants. In the absence of the active involvement of other organisations in R&D activities, the company has to stretch its limited resources. There is now the realisation that it may perhaps be more productive to shift the responsibility of construction to the private sector and hence enable the company to concentrate more on R&D, promotion activities, and monitoring of construction activities for proper quality control. An important role that the company could play under the changed circumstances would be to train (a) private contractors on biogas construction techniques and (b) interested users on the operation and maintenance of biogas plants and efficient use of the gas and the slurry.

Private Sector Initiatives

The private sector approach emphasises cost-effectiveness and profitability in operation. The marketing and dissemination of technologies are oriented towards commercial purposes and they have to suit users' requirements and preferences. Successful extension and dissemination of programmes mainly rest on the following four main factors.

- The users and the producers together develop, adopt, own, and manage the technologies.
- Entrepreneurship is encouraged on a private basis.
- Innovation is based on rural needs and conditions.
- Organisational and management arrangements are made in correspondence with the requirements of the different scales of technologies.

The third point that deserves attention here is the essential role of the catalytic agents (Figure 1). Known as the Group Organiser in the Small Farmers' Development Programme or the *Lami* as in the Participatory Action Research Project for Rural Energy Planning (Bajracharya et al. 1987), they assist community members in integrating their knowledge, values, and perceptions with new information and outlooks on development opportunities. While living in the village, they engage in dialogues and encourage the villagers to organise among themselves for more productive and equitable uses of resources and technologies. Furthermore, they carry the villagers' felt needs for acquiring technical information, expert consultation, extension services, and other development opportunities from related agencies. Examples include the dissemination of micro-hydro technologies involving individual entrepreneurs, groups, and communities.

Individual Entrepreneurs

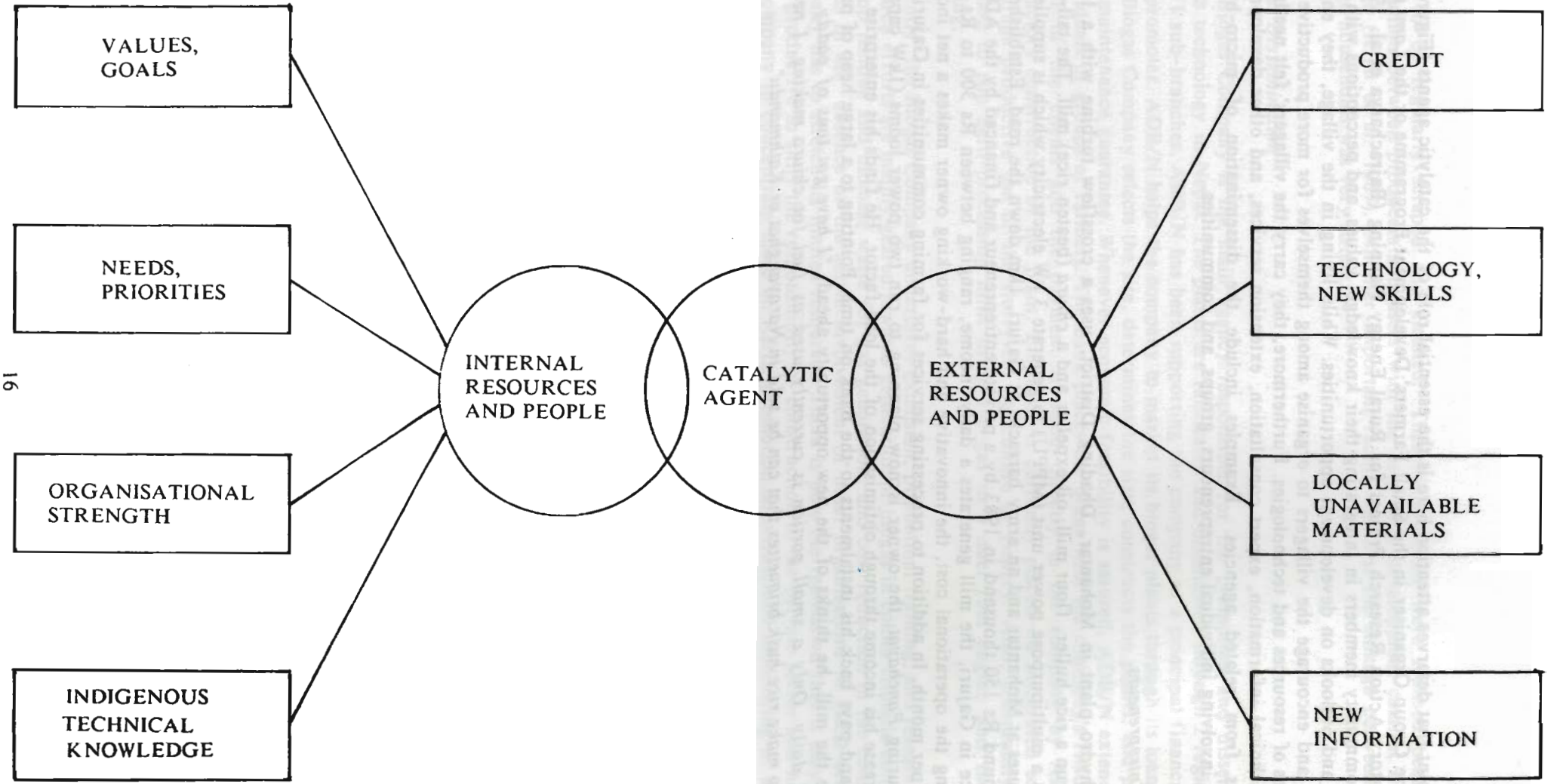
The micro-hydro plant in Mohantar, Dhading District, uses a crossflow turbine with a 13kW capacity to run a rice huller, flour mill, oil expeller and a *chiura* (beaten rice) mill. The tail-race water drives a multipurpose power unit (MPPU) to generate 3 kW electricity which is supplied to about 20 houses at Mohantar and an army barracks at Gajuri, 1km down the road. Established at a cost of around Rs 150 thousand in 1983 by a private entrepreneur and financed by the ADB/N branch office in Gajuri, the mill generates a daily income, ranging between Rs 300 to Rs 400. After meeting the operational cost, the innovative and hard-working owner makes a net income of Rs 8,000 per month. In addition to processing services for farming communities in Gajuri and the neighbouring *Panchayat*. the owner is now planning to run two power looms (1kW capacity each) to increase his income through optimisation of the load factor. He finds his enterprise very worthwhile and pays back his instalments to the Bank on time. Pointing to a large heap of paddy husk outside the mill, he thinks of the new opportunity ahead, *"I have got tons of paddy husk accumulated daily. Only a small portion is currently used as fuel for chiura making. I need a technology to make rice husk briquettes that can be sold in Narayanghat or Kathmandu"*.

Group Efforts

The rural electrification project at Taklung, Gorkha District, has been owned and managed by a group of small farmers since January 1985. It provides energy on a commercial basis. Balaju Yantrashala, a private manufacturer, had installed the water turbine of 10.2kW capacity at Reginas Village in Taklung in 1978 for Hom Bahadur Gurung under ADB/N financing. Technically, the turbine was running very well for agro-processing purposes. However, he could not run it profitably because of poor managerial capability. The condition of the mill was a matter of concern to the owner and the Bank. The owner could not pay back the loan instalments and the delinquent amount had reached Rs 113 thousand by December 1984.

At this stage, 5 members of a SFDP group proposed to run the problematic mill on a group basis and approached the SFDP Group Organiser for help. A meeting was subsequently held among the SFDP group members, the turbine owner, the Group Organiser, and the ADB/N Branch Manager. The owner expressed his readiness to transfer the ownership to the small farmers' group if they were willing to pay back his delinquent loan. Finally, all the partners came to an agreement. The loan was transferred to the SFDP group under the leadership of Ram Hari Khanal and the group started operating the mill in mid-January 1985.

A member of the group (Taman Thapa) was sent for training on operation and maintenance at a turbine workshop in Kathmandu. The group subsequently appointed Taman Thapa as their treasurer. He had to work full time in the mill and keep a proper account of all incomes and



Source : Bajracharya 1986

expenditure. They hired, in addition, an experienced operator and a helper at salaries of Rs 600 and Rs 400 per month respectively. The milling service was maintained at 9 to 10 hours per day and, gradually, the mill started operating at a profit. Once every month, the commodities accumulated from the payment in kind were equally distributed among all the members and the cash income used to repay the loan to SFDP.

As their confidence in mill operating increased, the group initiated the idea of electricity generation, particularly during the night when the mill is usually not in operation. Twenty-five households expressed their interest in buying the electricity. SFDP helped arrange the technical survey to be done by a private manufacturer from Kathmandu. He suggested the use of a 3kW electricity generator that he had developed by integrating the electric motor with the capacitor The estimated cost of installation was Rs 30,000. At SFDP's recommendation, UNICEF provided a grant of Rs 18,000 for the rural lighting scheme. In a month's time, the 3kW asynchronous generator was installed and electricity was distributed to 25 households, the SFDP Office, the local school, and several shops in the market centre. The tariff was based at a monthly rate of Rs 12 for each 40 watt bulb or 20 watt fluorescent tube. With 44 bulbs illuminated every evening, the small farmer's group received an annual revenue of Rs 4,750 in addition to Rs 44,730 from milling (Gorkhali 1988).

Electricity brought about a big change in the village. Many villagers consider electricity to be prestigious. Three women members of the small farmers' group are now operating knitting machines in the evening. The shopkeepers have been able to keep longer shopping hours.

Informal Cooperative Arrangement

The micro-hydro turbine mill at Uppallo Archale, Nawalparasi District, provides an example of the community approach. This mill is cooperatively owned by 182 persons. Because of adequate water resources in the area, in 1980 the farmers and the officials of the United Mission to Nepal (UMN) proposed to set up a rice mill. The cooperative mill was the outcome of this proposal. Each person agreed to buy a minimum share of Rs 200. A "management committee" was formed with representatives from 7 wards of the village. The mill installation took place in September 1980 and operation started in October. Mill operators were chosen from their own community and later sent for training. In December, 150 people received their share certificates at an inaugural ceremony. Another 32 persons joined later. Nine persons were elected for the Management Committee at a general meeting. Each ward selected its own members. Two more were chosen from among the largest shareholders. The Management Committee elects the chairman and the treasurer. The committee meets every month and gives a monthly statement of expenditure and income.

Another example of a community-managed watermill is the multipurpose cooperative mill with 32kW electricity supply system extended to Bhorletar and Karaputar market centres in Lamjung District. This project is financed by ADB/N and is owned by more than 50 members of the farming community from Karaputar.

In all of the above cases, i.e., the promotion of micro-turbines, biogas plants, and improved cooking-stoves, ADB/N plays a supportive role as an intermediary or link organisation. It not only provides the credit support for widespread dissemination of proven technologies but also coordinates the channelling of government subsidies and technical support services to technology developers (manufacturers) and end users (farmers, entrepreneurs). Technology display, training, demonstration, and communication of research findings are conducted through its Appropriate Technology Units (ATUs) at the regional level. At the same time, necessary credit support for the

acquisition of desired technologies is made available through its field network of more than 500 offices in the country. Training on operation and maintenance for operators is imparted through the Bank's regional training network. A number of small blacksmiths' workshops have been established in the *Terai* and the hills through the Bank's support to facilitate the repair and maintenance of energy technologies. The cost-effectiveness, a growing network of local fabrication capability, the increasing availability of maintenance services, and the support from ADB/N, all of these have strengthened the private sector approach, especially in promoting micro-hydro technologies and biogas. This is worthy of further expansion with regard to other technologies and in other countries.

Private Forestry Management

The private sector approach in the management of community forestry holds a lot of promise. Agroforestry activities, recently undertaken by small farmers' groups with ADB/N and CARE/Nepal assistance, demonstrate that community/group management has been able to effectively address problems of fuelwood, fodder, and soil erosion. The programme is integrated with income-generating activities such as fruit tree plantation, livestock development, and irrigation facilities for crop production.

An example of such community forestry management was started in March 1984 by a small farmers' group in Kakarbhitta, Jhapa District. Community forestry development was initiated in the Tiring area of Kakarbhitta with the formation of the *"Sana Kisan Van Vikas Samiti"* (Small Farmers' Forest Development Committee) which consisted of representatives from 14 male groups and 8 female groups. Under the management of the committee, a forest nursery was established, and this is currently producing 40,000 seedlings of fuel and fodder tree species annually. This *"Samiti"* also organises agroforestry activities through the mobilisation of group members. One of the major functions of this *"Samiti"* is to prepare an integrated plan for inter-cropping and fodder production and identify possible sites. The plan is implemented and managed with full cooperation from group members. Ten hectares of "wasteland" have so far been used for agroforestry plantation. The land was divided into 22 blocks and each block was assigned to a group for management and maintenance of the plantation. In the long run, the aim is to generate income for the participating small farmers by producing fodder for their own livestock and eventually by selling timber and fuelwood. In addition, several socioeconomic and environmental benefits (listed below) are also becoming apparent (Shrestha 1988).

- Small farmers have started to grow trees around their farms and in denuded areas. This has brought about environmental improvement in the area and helped control soil erosion.
- The farmers are seemingly pleased by the promising results of inter-cropping systems such as *sisoo* with groundnut and of *dhaincha* and ginger with *sisoo* and *ipil-ipil*. The production and sale of *Khar (Imperata Spp)* for roofing has yielded a net income of about Rs 5,000 annually in the last few years.

The success of Kakarbhitta had a good demonstration effect on a number of other SFDP areas. The prerequisites for the initiation of such group cooperation include technical support, training and credit assistance for inter-cropping and livestock development, and the assurance of a long-term lease for the use of forest land. It is now evident that the group involvement of community members in forestry development is a viable alternative.

Another case study from Tupche Village, Nuwakot District, reveals that several small farmer groups used fallow hillsides for establishing fruit orchards. For ensuring the protection of these areas, the local authorities enforced the rule that a trespasser would be levied a fine of Rs 50. One half of this amount is offered to the person who notifies the authorities about the violation and the other half is deposited in a fund. The smooth functioning of the programme in the village owes much to the supportive role that the local authorities played in legitimising the small farmers' efforts. The village assembly in Tupche went even further in passing a resolution to prohibit outsiders from felling trees from the village forest (Shrestha 1980). Another example of a similar nature comes from Belkot Village in the same district, where local community participation was instrumental in protecting and developing 35ha of forest without the assistance of the Forest Division (Shrestha 1980).

Given the success of private initiatives in forest management and the need to increase the forest cover in the hills of Nepal, the idea introduced by Chalise (1983) is worthy of consideration. The concept is to encourage individual farmers to grow more wood on privately-owned marginal land. Because of the low crop yield on such land, it is possibly more profitable if trees are grown with the explicit purpose of marketing wood in nearly all urban centres. With the income generated by the sale of wood, the food requirements of the household can be supplemented. The success of this proposition would, of course, depend upon the assurance that fuelwood can be marketed and also that an alternative opportunity is available during the years when the farmer has to wait for the trees to mature. These aspects will have to be investigated in much greater detail. The point, however, is that forestry activities have to be seen not only from the perspective of meeting subsistence requirements but also from that of marketing possibilities and, hence, income enhancement opportunities. Forestry can then be easily combined with other activities such as livestock development and dairy products, not to mention minor forest products. Seen in this light, the programme will have to be supported by technical input, training, credit services, and others to strengthen the capability and confidence of the farmer.

Participatory Village Development

The Participatory Village Development Approach emphasises the integration of energy supply to meet development objectives. Small farmers' groups are encouraged to develop their own organisations such as inter-group committees or user groups as a prerequisite to implementing village level integrated programmes. A case in point is the successful implementation of the lift turbine pump project by small farmer groups at Karma Singh *Phant* in Gorkha District. As shown in Figure 2, irrigation and hydropower were the crucial inputs to the initiation of many related activities that contribute to the village development process. This contrasts against the approaches discussed above where, for example, the turbine is used for milling or the forestry activity is geared towards supplying fuelwood or fodder. In Karma Singh *Phant*, the rural community was faced with the lack of water to irrigate their *Tar* land[5] despite the fact that the Daraudi River, flowing a few metres below, could supply plenty of water. Since irrigation by gravitational flow was technically unfeasible, the community was looking for alternative technology options to lift the water to irrigate the *Tar* land. In 1985, the Agricultural Development Bank proposed the "Turbine Pump Installation Project" to the community of 41 small farm families. A precondition, that they must organise among themselves to determine a practical mechanism for water use, and mobilise as much of their resources as possible for the project, was also proposed. With firm commitments assured by community members, the Bank imported a turbine pump from China under a TCDC arrangement (Technical Cooperation among Developing Countries). With active

5. The *tar* is a raised river bed that stands up to 50 metres above the water level of the flowing river.

collaboration among bank engineers, private sector entrepreneurs, and community members, the construction of the diversion canal and the pump house, and, finally, the installation of the turbine pump took nearly eight months. The project was completed at the end of 1986 and the total cost was Rs 1.2 million. The pump currently generates 16 kW of power. Approximately 45 litres of water per second are lifted up to 21 metres, from Daraudi River, and 15 hectares of agricultural land belonging to 41 small farm families are irrigated. Agro-processing units are also attached to the turbine for rice hulling, grain grinding, and oil expelling.

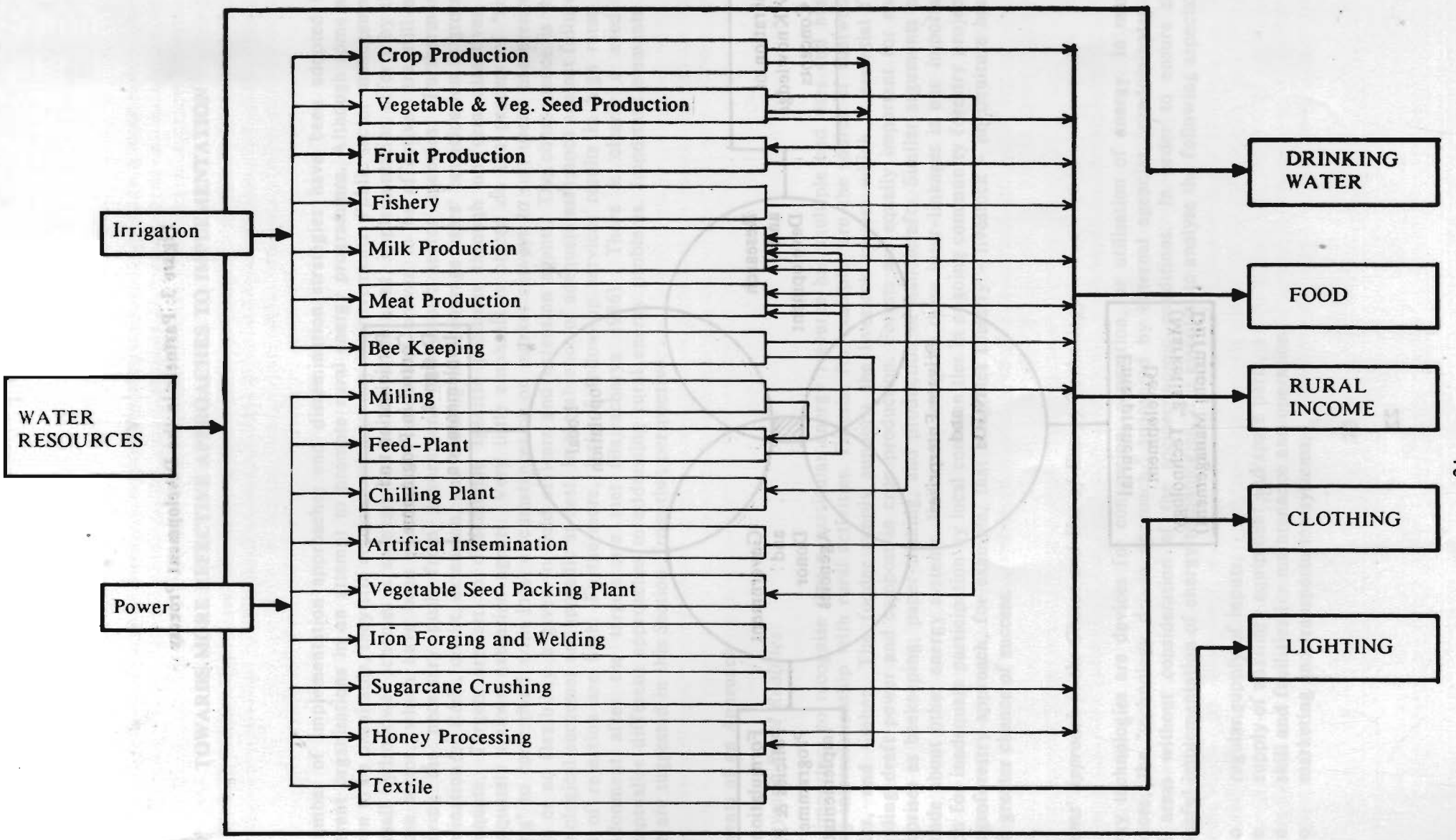
Before the installation of the pump, only one crop of rainfed paddy could be grown on the *Tar* land. Currently the farmers are cultivating multiple crops including early paddy, late paddy, wheat, potato, and seasonal vegetables. The irrigation system and the processing activities are being managed by a committee chaired by Iswar Prasad Pant. With the increased income from crop production and mill operation, other activities, as shown in Figure 2 are gradually being undertaken. The basic idea is to maximise the sustained use of local resources for meeting the basic needs of the community such as drinking water, food, clothing, lighting, and income generation. Emphasis is also placed on minimising external dependence. With the encouragement from benefits received due to the project, the community has recently established a fishery pond and integrated it with fruit and fodder plantations. By-products from the agro-processing units are fed to the fish. According to a report from Badri Sharma, SFDP Group Organiser working with the community, the farmers have now harvested their first fish crop.

The village has undergone a visible change within a year. Twenty-one new houses and a primary school have been built. A number of fodder trees were planted on areas that are not suitable for crop farming. The farmers are now planning to increase their livestock numbers so that more milk and meat can be produced for the market. Confidence in their own ability to plan and implement has also increased. The farmers' committee is now thinking of investing a part of its income in the installation of a generator to produce electricity. According to Ram Prasad Kaini, who has been very active since the programme was initiated, *"The hard days have passed and a better future is ensured."*

The key to success here is the participatory approach. It advocates experiential learning through active participation of all the concerned partners in situation analysis, decision-making, and evaluation. Partners include two or more of the following parties: (a) village residents, (b) government officials or donor agency representatives, (c) researchers, and (d) private entrepreneurs or non-government organisers (Figure 3). All those involved become engaged in change by changing, through a constant process of action and reflection. Dialogues and negotiations among the partners make them sensitive to one another's perspectives. Their mutual interests are reflected in problem identification, planning, implementation, monitoring, and evaluation. Action is perceived as the consequence of shared goals and shared responsibilities (Bajracharya et al. 1987).

Another important aspect of the approach is that energy planning and the application of energy technologies become, not the end by themselves, but the means to address critical problems faced by villagers. This lends itself to greater relevance in the eyes of community residents. Consequently, they are more willing to participate in programme activities because of the confidence that their own needs and priorities are being looked into.

Figure 2: Irrigation and Rural Energy Development Model
(Potential Project Activities Envisaged for Small Farmers' Model Village Development)



Note: -

Direct linkages
Indirect linkages

Source : Adapted from Agricultural Development Bank, Nepal

Figure 3: Partners in the Development Process