



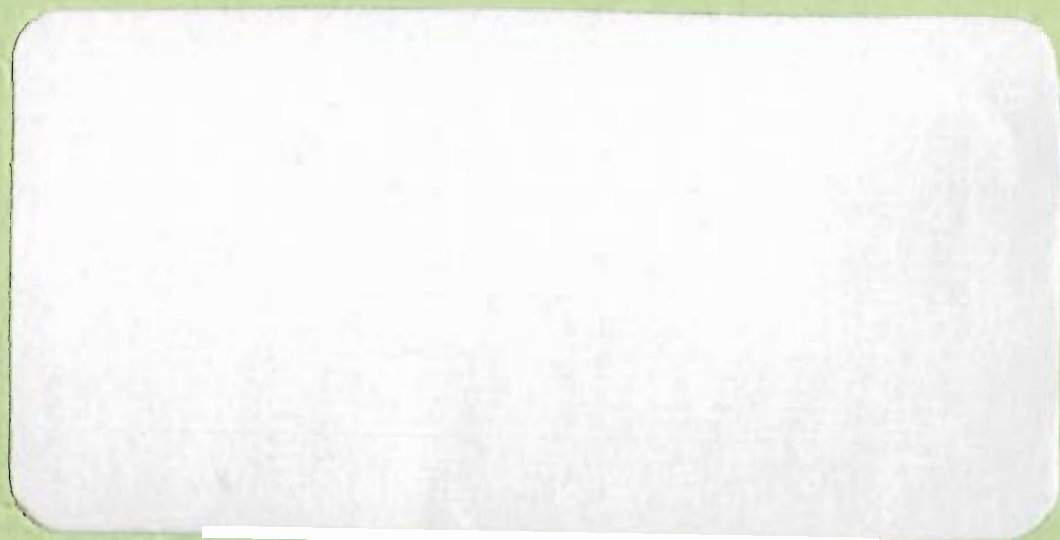
Mountain Population and Employment

Discussion Paper Series

OFF-FARM EMPLOYMENT IN WEIZHOU TOWNSHIP IN THE HENGDUAN MOUNTAINS OF CHINA

Xi Yi Huang and Chen Guojie

MPE Series No. 19



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MPE 19

Foreword

The present discussion paper by Xiyi Huang and Chen Guojie, entitled "Off-farm Employment in Weizhou Township, A the Hengduan Mountains of China", constitutes one of the six location-specific case studies of promising potential off-farm activities in mountain regions in the Hindu-Kash Himalayas. These case studies include handicrafts, livestock, and small-scale enterprises in the lowlands of Weichuan County, Sichuan Province (China), tourism and vegetable farming in Mustang and Lhasa districts (Nepal), and forest resource based activities in Shangri-La Sub-division, West District (Pakistan).

A major issue in mountain development is to create conditions that would help achieve the carrying capacity of the mountain resources and open opportunities for sustainable improvements in the living standards of mountain communities without degrading or exploiting the mountain base. This is where the promotion of off-farm employment is a key strategy.

**OFF-FARM EMPLOYMENT IN WEIZHOU TOWNSHIP
IN THE HENGDUAN MOUNTAINS OF CHINA**

Xiyi Huang and Chen Guojie

Important to ICIMOD's programme of Mountain Development and Sustainable Livelihoods, ICIMOD is concerned with mountain development and promotion in Asia, Nepal, to undertake the highest mountain studies on the current state of off-farm employment, followed by area-specific case studies. An overview studies are regularly published by the Mountain Development and Employment Division (MDE Series 12-14).

The case studies analyse and assess the current state of off-farm employment in respective socioeconomic and resource contexts. *MPE Series No. 19* studies off-farm employment and income opportunities, trace the changes of off-farm activities in agricultural and other sectors, and provide guidelines for the future development of potential off-farm activities.

These studies were made possible by a grant from the International Development Research Centre (IDRC), Canada, and the International Centre for Integrated Mountain Development (ICIMOD) working on these studies.

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Readers might be interested to know that all of the six case studies (including the present one) published under the Discussion Paper Series of the Mountain Population and Employment Division. Also, the Report of the International Workshop on Mountain Off-farm Employment, held in Kathmandu in February 1992, in which these case studies were presented, discussed, and synthesized, has been published by ICIMOD. ICIMOD is hopeful that these studies will contribute to a better understanding of the problems and prospects of off-farm employment in the mountains.

April 1992

**International Centre for Integrated Mountain Development (ICIMOD)
Kathmandu, Nepal**

Foreword

The present discussion paper by Xiyi Huang and Chen Guojie, entitled "Off-farm Employment in Weizhou Township in the Hengduan Mountains of China", constitutes one of the six location-specific case studies of prominent/potential off-farm activities in mountain regions in the Hindu-Kush Himalayas. These case studies include horticulture, livestock, and small-scale enterprises in the townships of Wenchuan County, Sichuan Province (China), tourism and vegetable farming in Mustang and Dhading districts (Nepal), and natural resource based activities in Shangla Par Sub-division, Swat District (Pakistan).

A major issue in mountain development is to create conditions that would help enhance the carrying capacity of the mountain resources and open opportunities for sustainable improvements in the living standards of mountain communities without degrading or depleting the resource base. This is where the promotion of off-farm employment based on comparative advantages assumes such crucial significance in strategies for the development of the mountains. The critical issues, interlinkages and options in off-farm employment in the Hindu Kush-Himalayan (HKH) Region have, therefore, been given primary importance in ICIMOD's programme on Mountain Population and Employment. As part of the programme ICIMOD collaborated with institutions and professionals from China, Nepal, and Pakistan to undertake the regional overview studies on the current state of off-farm employment. This was followed by area-specific case studies on prominent and potential off-farm activities. The regional overview studies are available as part of the Discussion Paper Series of the Mountain Population and Employment Division (MPE Series 12-14).

The case studies analyse and assess the current state of off-farm employment in the respective socioeconomic and resource contexts; identify factors that have inhibited or enhanced off-farm employment and income opportunities, trace the linkages of off-farm activities with the agricultural and other sectors, and present guidelines for the future development of potential off-farm opportunities.

These studies were made possible by a grant from the International Development Research Centre (IDRC), Canada, for which I am extremely grateful. ICIMOD was also fortunate to have working on these studies professionals from national institutions in China, Nepal, and Pakistan. The methodological framework and the structure of the studies were mutually agreed upon by participating researchers. From ICIMOD's side the programme was coordinated and executed by Dr. Pitamber Sharma and Dr. Deepak Bajracharya (now with UNICEF).

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E. F. Tacke
Director General

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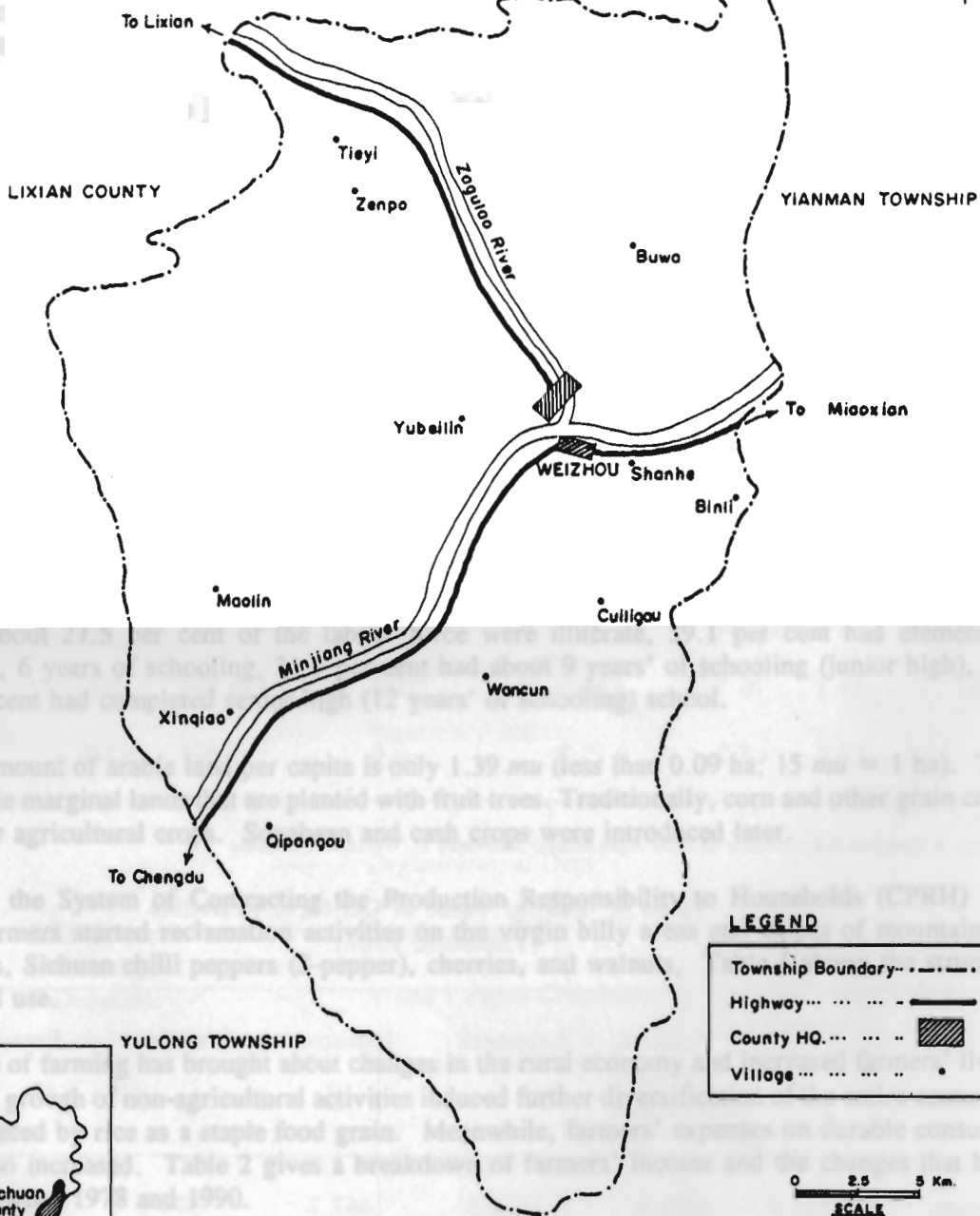
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WENCHUAN COUNTY WEIZHOU TOWNSHIP



CHINA
SICHUAN

Wenchuan
County

YULONG TOWNSHIP

BACKGROUND TO THE STUDY AREA

Weizhou township, the capital of Wenchuan County, is located in a mountainous area, 1,200 - 2,200 metres above sea level, at the intersection of the Ming River and Zagunao River. It is a temperate zone characterised by a semi-dry monsoon climate. There are two major roads crossing the region, Chengdu-Aba and Chengdu-Nanpin. The principal natural resources are water, forests, wild animals, and medicinal plants which are a source of traditional medicine.

There are 12 villages under the jurisdiction of the Weizhou township government; three in the basin at an elevation of 1,300 to 1,400 metres, another five on the mountain slopes (1,400-2,000 metres), and four at elevations of 2,000 metres above sea level (see map). In 1990, the total population was 8,223. Ninety-three per cent were of *Qiang* nationality. The culture, customs, and religion of the *Qiang* nationality are similar to those of the *Han* nationality in Sichuan Province, possibly due to a long history of exchange and involvement in the same type of agricultural activity.

Agriculture remains a major occupation, although the share of crop production in the total income has been declining for more than a decade.

Socioeconomic and Resource Profile

The total population of Weizhou township is 8,223, of which 3,872 or 47.1 per cent of the total population are part of the active labour force. Females account for 47.3 per cent of the total labour force. The average family size is around five. A sample survey of 20 households in Binli settlement showed that about 27.5 per cent of the labour force were illiterate, 39.1 per cent had elementary education, i.e., 6 years of schooling, 31.9 per cent had about 9 years' of schooling (junior high), and about 1.4 per cent had completed senior high (12 years' of schooling) school.

The average amount of arable land per capita is only 1.39 *mu* (less than 0.09 ha; 15 *mu* = 1 ha). This does not include marginal lands that are planted with fruit trees. Traditionally, corn and other grain crops were the major agricultural crops. Soyabean and cash crops were introduced later.

In 1981 when the System of Contracting the Production Responsibility to Households (CPRH) was established, farmers started reclamation activities on the virgin hilly areas and slopes of mountains to produce apples, Sichuan chilli peppers (S-pepper), cherries, and walnuts, Table 1 shows the structure of present land use.

Diversification of farming has brought about changes in the rural economy and increased farmers' living standards. The growth of non-agricultural activities induced further diversification of the entire economy. Corn was replaced by rice as a staple food grain. Meanwhile, farmers' expenses on durable consumer goods have also increased. Table 2 gives a breakdown of farmers' income and the changes that have taken place between 1978 and 1990.

In Weizhou township, the major off-farm activities include those related to livestock, horticulture and forest products, transportation, industry, and retail business. This is reflected in Table 3 which shows the output of off-farm activities.

Table 1: Land Use in Weizhou Township

| | Forest | Farmland | Fruits ¹ | S-Pepper | Total |
|-----------|---------|----------|---------------------|----------|----------|
| <i>Mu</i> | 3,421.1 | 11,430.5 | 1,415.9 | 4,249.8 | 20,517.3 |
| % | 16.7 | 55.7 | 6.9 | 20.7 | 100 |

1. Only fruit trees starting to produce fruits are included.

Table 2: Income Breakdown of Households between 1978 and 1990

| Year | Income Source in Percentage | | | | Income Per capita (Rmb) | | % Family |
|------|-----------------------------|-------|-----------|-----------------------------|-------------------------|---------|-----------|
| | Crop | Fruit | Livestock | Sideline (Other non-ag.) | Total | Average | Owning TV |
| 1978 | 50.5 | 8.5 | 3.1 | 37.9 | 1,217,618 | 113 | 0 |
| 1990 | 33.1 | 16.7 | 18.9 | 31.3 | 6,136,124 | 606 | 67.8 |
| % | -17.4 | +8.2 | +15.8 | -6.6 | +504 | +536 | +67.8 |

Source: A General Introduction to Non-Agricultural Activities in Weizhou - no date

**Table 3: Output Value of Off-farm Activities
(Thousand Rmb)***

| | Total | Fruits & Forest Products | Livestock | Industry | Transport | Retail | Other |
|--------|--------|--------------------------------|-----------|----------|-----------|--------|-------|
| Amount | 4110.9 | 1026.4 | 1160.5 | 467.7 | 574.5 | 128.6 | 753.2 |
| % | 100 | 25 | 28 | 11 | 14 | 3 | 18 |

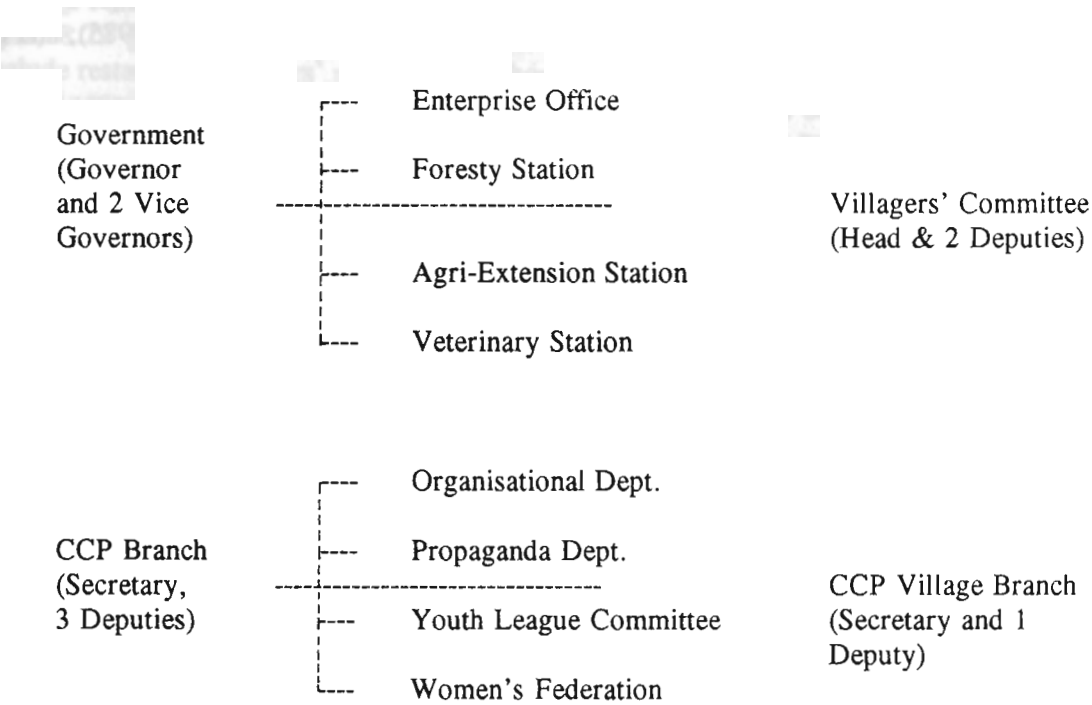
*In 1988, the conversion rate between the *yuan* and the U.S. dollar was 3.75

Water is among the major resources of Weizhou township. Since Weizhou is in a mountainous area with semi-dry climatic conditions, there is a growing demand for water for irrigation purposes as well as industrial use. The waters of the river Mingjiang remain as yet unutilised. Water conservation is one of the major needs of the area.

Infrastructure and Institutions

Development infrastructure and institutions at the township level include extension offices/centres under the local government and organisations under the Chinese Communist Party (CCP) branch (Chart 1). In Weizhou, as with everywhere else in China, political and administrative powers are shared by the local government and the CCP. The local government is usually responsible for administrative decisions, whereas the CCP branch takes care of the business of personnel, propaganda, ideological, and cultural affairs. However, whenever there is a major policy implementation exercise or a temporary job assigned by higher levels of government, both establishments generally work together under the leadership of the CCP branch since, after all, the leading posts in both institutions are concurrently held by the same people.

Chart 1: The Structure of the Local Government and CCP Branch in Weizhou Township



OFF-FARM ACTIVITIES IN WEIZHOU TOWNSHIP

The breakdown of household income as shown in Table 2 indicates that fruit cultivation, livestock raising, and other non-agricultural activities have emerged as important sources of household income. The dependence on traditional agriculture has, therefore, declined significantly.

Impact of Government Policies on the Development of Off-farm Activities

Off-farm activities in Weizhou began in the period of collectivisation, especially during the period of the "Great Leap Forward" in the late 1950s. The trees were cut down as fuel for backyard steel plants. In the early 1960s, and, in the course of the "Cultural Revolution", mining and forestry activities developed. These activities, however, were not very significant. Steady and fast growing off-farm activities emerged only after the full CPRH system was put into practice. The Central Government tried to bring about a change in the rural economic structure through a series of policies. Major policy innovations were permits to open individually and collectively-run businesses (1982); preferential credit for agricultural products' processing, storage, transportation, and marketing (1983); permits for migration and for changing employment inter-regionally and between rural and urban areas (1984); credit priorities and tax deductions for rural mining and other resource exploitation industries (1985); and the promotion of farming diversification business (1986).

Under the impetus of the above policy instruments, farmers tried to search for off-farm opportunities and business based on the comparative advantage of local resources within the constraints of capital and technology.

Types of Off-farm Activity in Weizhou Township

The off-farm activities in Weizhou township can be classified into three types: rural enterprises; family businesses and services; and off-farm activities based on forestry, animal husbandry, horticulture, and poultry.

Rural Enterprises. Rural enterprises (referred to as Type 1 activities) in Weizhou are collectively owned and run by townships or villages. Individually-run enterprises have not emerged as yet. Table 4 shows the situation of such enterprises. These enterprises employ 504 persons or 13 per cent of the total labour force. The sales from these enterprises were around 2.8 million RMB, 85 per cent of which accrued to township-run enterprises.

The enterprises consist of a cement plant; a farm machine factory; an oxygen plant; marble and jade mines, and plaster and lime factories; a hotel; cargo trucks; and a marketing outlet. Six out of the total 11 enterprises are related to construction materials. These enterprises have 435 employees, accounting for 86.3 per cent of the total employment, 83.7 per cent of the total gross production value, and 91.8 per cent of the total sales' income. The production of construction materials is the leading industry amongst all the rural enterprises.

Table 4: Basic Situation of Rural Entreprises in Weizhou

| | Total | Township run | Village-run |
|-------------------|-------|--------------|-------------|
| No. of Businesses | 11 | 7 | 4 |
| Including: | | | |
| Industries | 8 | 5 | 3 |
| Retail | 1 | 1 | - |
| Transport | 1 | 1 | - |
| Services | 1 | - | 1 |

Family Businesses. Family businesses (referred to as Type II activities) are run by farm families. There are 321 people, 8.29 per cent of the total labour force, engaged in this type of businesses. Such businesses include restaurants, barbers' shops, repair shops, blacksmiths, carpenters, stone-masons, and transportation and agro-based processing. However, the total business turnover cannot be specified. This type of business is characterised by small-scale operations, self financing, and flexible operations. The growth of such businesses depends on personal skills.

Off-farm Activities related to Agriculture. These activities (referred to as Type III) are based on products from the land. In Weizhou these consist mainly of apples, Sichuan chilli pepper (S-pepper), poultry, and livestock. Apples and S-pepper are the major activities taking advantage of favourable local natural conditions. Out of the total gross production value of fruits and forestry, the share of apples is 60.5 per cent, S-pepper 33 per cent, other fruits 3.7 per cent, and forestry products 2.8 per cent. Presently, this type of business is a part-time business for cropping farmers. Almost every family farm has apple trees, S-pepper, some pigs, and chickens. Around 75-80 per cent of the total labour force are to some extent involved in these types of activity.

In general, these off-farm activities have become the major income source of farmers and account for 67 per cent of the total income (even 90% in some villages with larger scale off-farm activities) and 50 per cent of the labour force. This is indicative of the structural transformation from a subsistence to a commodity economy, which is a crucial step in the rural modernisation process.

Spatial Distribution of Off-farm Activities

The nature and extent of off-farm activities in Weizhou are dependent, to a large extent, on the geographic location of the village or settlement. Out of the total number of collectively-owned enterprises, 70 per cent are located in the three villages of the basin, 25 per cent on the mountain slopes, and only five per cent in the high mountains. Mining on a small scale is the only activity in the high mountains. Poor transportation and geographic conditions inhibit the development of off-farm activities in the high mountains.

In terms of industrial structure, construction materials, chemical industries, services, and transportation are mainly located in basin areas. Mining takes place in mountainous areas and forestry and horticulture in the semi-mountainous areas. Agro-processing and retail trade activities are generally found in all the villages in Weizhou.

Factors Contributing to the Growth of Off-farm Activities

In order to investigate the various aspects of off-farm activities in Weizhou, Binli, a typical village, was selected for detailed study. Twenty farm households in Binli, 26.7 per cent of the total households, with a labour force of 69, one third of the total, were visited and interviewed.

Binli is located at an elevation of 1,642 metres above sea level and is 25 km by road from the central town. There are 410 inhabitants, all of *Qiang* nationality, including 215 labourers. Most families in the village belong to the *Zhou* or the *Ma* clans and have strong kinship ties. Income per capita in 1990 was 732.75 RMB, the second highest in Weizhou. The total land is 1,440 *mu* including 574 *mu* of farmland, 200 *mu* of forests, 200 *mu* of virgin hill area, 200 *mu* of orchards, and 300 *mu* of sparse grassland. The main crops are corn, wheat, and buckwheat. The areas under apples and S-pepper have expanded rapidly in recent years, due mainly to suitable natural conditions. These have become the major income source for most families, contributing, in some cases, up to 90 per cent of their total income. Animal husbandry, poultry, blacksmithing, agro-processing, transportation, and retail shops are all run by individual farmers, apart from a collectively-owned lime mine and factory.

Organisation and Management of Off-farm Activities

After the introduction of CPRH in most rural areas, off-farm activities were usually established by individual farmers. Generally speaking, county or township governments could only communicate the related central policy to promote the off-farm sector. The village (community) collective economy in most areas was too weak to introduce new activities. Individual farmers, therefore, took the initiative for off-farm development. Such activities have no defined management pattern and operational schedule and incur negligible overhead costs and capital investment. Off-farm business operations in Binli village depict this process.

Exemplary Role and Effect. In the beginning, how to select an appropriate business and how to find market opportunities are the crucial questions for farmers. They usually watch their enterprising neighbours starting an off-farm activity and follow the same approach if the pioneers are successful. Within one or two years the same business spreads out all over the region. The growth of apple and S-pepper in Binli is a typical example. In 1983, Binxu Zhou, an accountant in the village, started land reclamation along hill slopes to expand his orchard of apples and S-peppers. In the course of 1985-1987, his orchard began production. In 1991, his income from S-pepper sales reached 3,500 Rmb and 3,100 Rmb from apple sales. The income from S-peppers and apples was 3.2 times the income from grain production, the highest in the whole village. In the same period, most farmers in Binli began to expand their orchards and started to benefit from this business. When asked what off-farm activities they would undertake next, all the farmers in Binli indicated that they would further expand their orchards of apples and S-peppers. This implied that there was a lack of information and lack of opportunities to start other off-farm activities.

Off-farm activities expand rapidly in a short period through this process of copying one's neighbour. In such a situation, a single activity dominates the village economy. The danger here is that any sudden change of policy or natural calamity would lead to farmers incurring huge losses or even becoming bankrupt.

Sources of Capital and Technology. Type I businesses (collective rural enterprises) basically have three types of funding source: (i) funds accumulated in the old collective organisations at township or at village level (these account for 20 - 60 per cent of the total capital involved); (ii) private investments (about 10%); and (iii) bank preferential loans (30-70%), of which the principal can be repaid within 3 - 5 years. Depending upon the scale of enterprises, the proportion of the above funding sources differs. The first two are the major investment sources for the smaller enterprises and the third one is the source for larger enterprises.

Type II activities (family businesses and services) usually involve fixed assets to the value of between 2,000 - 6,000 Rmb from private borrowings or bank loans. Whether their borrowing can be repaid depends upon their operations as well. In our sample survey, only two farmers with transportation businesses remained in debt and all others had cleared their debts.

Type III activities (agriculture-related, off-farm activities at the farm household level) do not need very much capital investment and 100 Rmb would be sufficient to start a business. Usually S-pepper seeds and apple saplings are provided by neighbours for free, and it is seldom necessary to purchase these from the market.

The technology and skills required for off-farm activities are acquired by farmers in different ways. The technicians in Type I activities, i.e., enterprises, are formally trained by the collectives or enterprises in appropriate disciplines where the workers learn the skills on the job. On an average, 15 per cent of the employees in Type I businesses acquire their skills through the family. In Type III activities, horticultural skills were learned or acquired by farmers from pioneer neighbours.

Market and Marketing Channels. Type I activities are rural enterprises and their products can be sold in local markets without inter-regional trade. The exception is an emery factory which delivers its products to Leshan County. Type II businesses, in most cases, serve customers in the home village or township.

Type III businesses are mainly S-peppers and apples with two basic marketing channels: (1) farmers sell their products directly in the local market place; or (2) farmers make a contract with intermediate merchants who usually come to the village and purchase produce during the harvesting season. There is a wide price differential between the two types of marketing channels. For instance, at harvest time, the market price of apples is 0.80 Rmb per *Ji* (500 g), 1.20 - 1.50 in the following two months, and 1.80 - 2.00 in fall and winter. In contrast, the procurement price set by marketing contractors was 0.66 per *Ji* on an average. According to the results of the survey in Binli, 90 per cent of the farmers sold 70 per cent of their total apple produce themselves in the local market. Despite the price differential between direct marketing and indirect marketing through merchants, the total sales' income from both transactions are similar as the loss of weight, perishability, and individual labour costs offset any additional gains from direct marketing.

Comparison of Earnings in Agriculture and Off-farm Activities

In Binli village, the earnings and profit from off-farm activities are much higher than from agricultural activities. In the 20 sample households, the average annual wage per capita from agriculture was 114 Rmb in 1990. The highest wage was 300 Rmb and the lowest was 40 Rmb. In contrast, the comparable earnings from off-farm activities were about 1,148 Rmb; the highest being 3,200 Rmb and the lowest being about 73 Rmb. Sample households where at least one labourer was engaged in off-farm activities had an annual agricultural income of less than 100 Rmb. This was the case with about half of the sample families in Binli. Households with an average per capita agricultural income of over 200 Rmb invested proportionally more time and labour into agricultural work.

It is reported that all the townships within Wenchuan County, including Weizhou, produce enough grains for the local population. However, corn is exchanged for rice at the Township Grain Purchasing Station.

In contrast to earnings from agricultural crops, the average annual income of households from off-farm work was much higher. In Binli, 14 households, out of the 20 sampled, had annual off-farm incomes of between 500-2,000 Rmb. The households with incomes of between 1,000-2,000 Rmb per year were engaged mostly in Type III businesses and often had special skills which they applied in taking care of their orchards. The households with annual incomes above 2,000 Rmb were usually engaged in Type II businesses such as retail shops, blacksmithing, and employment in government establishments. Households with annual off-farm incomes of less than 1,000 Rmb usually had large family responsibilities or their orchards had not started producing fruit.

The output-input ratio (i.e., the ratio of outputs at market prices to inputs such as seeds, fertilizers, draft power, and labour at fixed prices) in the 20 sample households was 3.21 for all activities. The ratio was only 0.87 for agriculture and 5.17 for off-farm activities.

Comparison of Earnings within Off-farm Activities

Table 5 presents the output/input ratio (O/I) of major off-farm activities in Binli village. S-peppers and apples have very high O/I ratios among off-farm activities in Binli.

S-peppers do not need much management and labour input as they are planted at the edge of the fields, orchards, and gardens. The only labour required is during harvesting. Only 10 labour days are required per *mu* (for 70 plants). Apples, on the other hand, need more labour input but relatively less capital input. It is the second highest profitable business for farmers as there is no labour supply problem. Type II businesses, in spite of the high incomes accruing to some families, cannot be ranked as highly profitable activities because of the high costs and capital investments needed.

In Weizhou township, the efficiency of individual farmer-run, off-farm businesses is greater than the efficiency of village or township-run enterprises. Three of the 11 collective enterprises are running at a loss. These enterprises are those of cement, marble mining, and marketing (Table 6). The cement factory, the largest business in Weizhou, ran at a loss of 446.5 thousand Rmb. Only one village-run plastic factory had a respectable O/I ratio of 2.27.

Table 5: Output/Input Ratios of Major Off-farm Activities

| Activity | O/I Ratio |
|-----------------|-----------|
| S - Peppers | 10.44 |
| Apples | 7.84 |
| Livestock | 3.0 |
| Agro-processing | 1.61 |
| Blacksmithing | 1.59 |
| Transportation | 1.3 |

Table 6: Profit and O/I Ratio of Collective Enterprises, 1990
(‘000 Rmb)

| | Profit | O/I |
|------------------|--------|------|
| Total | -193.2 | 0.93 |
| * Cement | -446.5 | 0.76 |
| * Farm Machinery | 8.5 | 1.43 |
| * Cargo Trucks | 88.7 | |
| * Oxygen | 28.1 | 1.33 |
| * Marble Mining | -48.9 | |
| * Jade Mining | 36.7 | 1.08 |
| * Marketing | -8.0 | 0.53 |
| ** Plaster | 72.5 | 2.27 |
| ** Lime Factory | 13.7 | 1.49 |
| ** Hotel | 44.1 | 1.65 |

(Note: * indicates a township-run business and ** indicates a village-run business).

LINKAGES OF OFF-FARM ACTIVITIES

Linkages with Agriculture

In the 1980s, horticulture expanded rapidly in Weizhou. A relevant question is: has this negatively affected cropping? In Weizhou S-peppers, as noted above, are not cultivated on prime arable land. Reclamation of hill slopes has resulted in the expansion of acreage under apples. Arable land has not decreased as a result of the growth of horticulture. Further, in most cases, there is no conflict between agricultural and non-agricultural development regarding land use, because construction materials and mining are always located on the hills far away from village and farmland. Additionally, the families with individual non-agricultural businesses usually possess sufficient a labour force for off-farm jobs. Household expenditure on agricultural activities, as derived from the Binli survey, shows that on an average the cropping sector received 42.6 per cent of the total expenditure (highest 59%, lowest 2%). The expenditure in the off-farm sector was 57.4 per cent on an average (highest 98 per cent, lowest 24 per cent), which in fact is commensurate with the contribution of the off-farm sector to total household income.

Linkages with Off-farm Activities

These linkages can be seen in the area of horticultural development vis-a-vis the growth of processing industries, marketing, transportation, and water conservation.

Horticultural Production and Processing Industry

The local market is large enough for fruit production but will be too small once all the apple trees start producing, and then there will be a huge demand for post-production services such as processing, storage, and preservation. Such post-production facilities and services do not exist at present.

Horticulture and Marketing

The farmers will have to make a choice concerning different marketing channels, by participating in wholesale markets or forming a marketing cooperative in the near future when peak production is reached.

Horticulture and Transportation

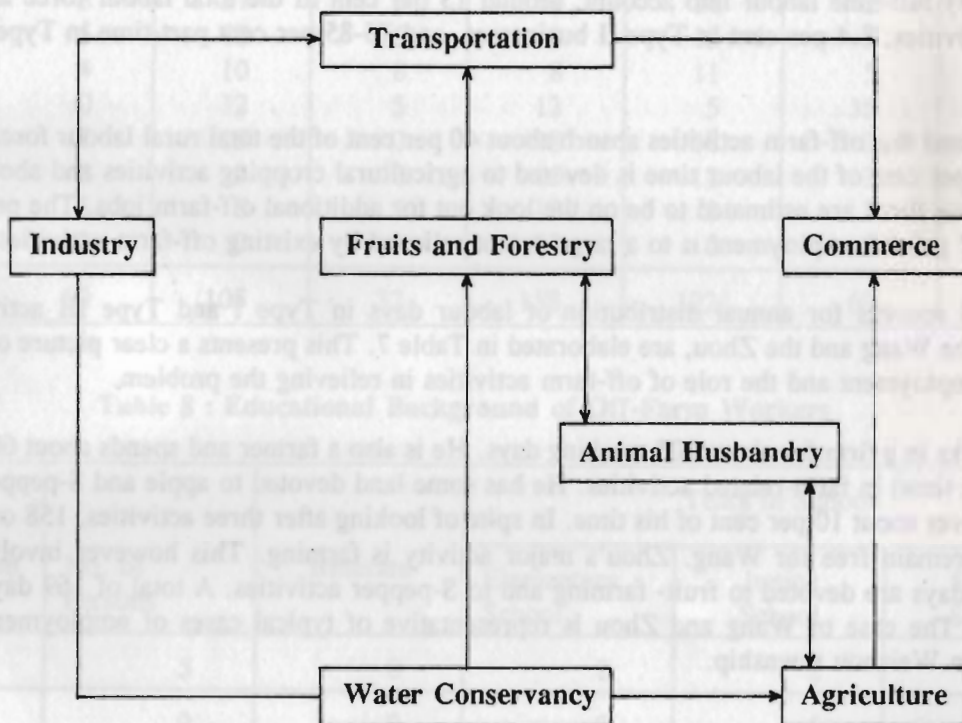
In the current stage, the farmers in Weizhou mainly deliver their fruits in two ways: (i) by carrying them in baskets down to the central town for sale, or (ii) by transporting them by tractor. Apple quality deteriorates because of transportation delays caused by poor road conditions or vehicle break-downs. It is, therefore, necessary to improve the road system. This would benefit the industrial and mining sector also.

Horticulture and Water Conservation

Because of the semi-dry climate, there is a growing demand for irrigation for agricultural, horticultural, and industrial uses. Water conservation is therefore urgently needed to strengthen the linkages between off-farm activities.

Figure 1 illustrates the chain of different industries in Weizhou, although the linkages between different industries at the current stage remain loose.

Figure 1: The Chain of Industries in Weizhou



EMPLOYMENT IMPLICATIONS OF OFF-FARM ACTIVITIES IN WEIZHOU

As with everywhere else in China, Weizhou farmers also have a problem of underemployment. The average arable land per capita is low. In a family of five persons, with three persons in the economically-active age group, only half of the labour time is reported to be sufficient for cultivating farmland. In other words, in such families, about half of the total labour force is available for off-farm activities.

Presently, a large proportion of the farmers in Weizhou are already engaged in various off-farm activities. Taking only full-time labour into account, around 13 per cent of the total labour force are engaged in Type I activities, 8.4 per cent in Type II businesses, and 75-85 per cent part-time in Type III activities.

It is estimated that off-farm activities absorb about 40 per cent of the total rural labour force in Weizhou. About 35 per cent of the labour time is devoted to agricultural cropping activities and about 25 per cent of the labour force are estimated to be on the look out for additional off-farm jobs. The pressure for the creation of gainful employment is to a large extent relieved by existing off-farm activities.

The actual records for annual distribution of labour days in Type I and Type III activities for two families, the Wang and the Zhou, are elaborated in Table 7. This presents a clear picture of the situation of underemployment and the role of off-farm activities in relieving the problem.

Wang works in a firm for about 105 working days. He is also a farmer and spends about 60 days (17 per cent of his time) in farm-related activities. He has some land devoted to apple and S-pepper production. This involves about 10 per cent of his time. In spite of looking after three activities, 158 out of 360 days in a year remain free for Wang. Zhou's major activity is farming. This however involves 122 days. About 70 days are devoted to fruit-farming and to S-pepper activities. A total of 169 days remain free for Zhou. The case of Wang and Zhou is representative of typical cases of employment in different activities in Weizhou township.

Backgrounds of Persons Engaged in Off-farm Activities

What is the background of persons engaged in off-farm activities? An attempt was made to find an answer to this question in the Binli sample survey which covered 20 households with 69 economically-active persons.

Table 8 presents the educational background of persons engaged in off-farm work. Out of the 69 persons, 55 were engaged in Type III activities and nine and five persons respectively had Type II and I jobs. The one with the highest education ran a family business while, out of the 55 persons engaged in Type III (agriculture-related, off-farm work) activities, 40 persons had six or less years of schooling. Almost 50 per cent of these were illiterate. In contrast all those in Type II businesses had six or more years of schooling. A better educational background contributes to the ability for creating off-farm work.

In terms of training, five of the nine persons in Type II activities had one or the other types of training, while only six of the 55 persons engaged in Type III activities had such training. Training enhances one's prospects of establishing an off-farm activity.

Table 7. Distribution of Annual Labour Days for Two Farmers in Binli Village

| Month | Wang [Days] | | | | Zhou [Days] | | |
|-------|-------------|--------|----------|------|-------------|----------|------|
| | Farm | Type I | Type III | Free | Farm | Type III | Free |
| 1 | 11 | 5 | 4 | 10 | 10 | 10 | 10 |
| 2 | 3 | 0 | 0 | 27 | 5 | 6 | 19 |
| 3 | 5 | 5 | 10 | 10 | 14 | 2 | 14 |
| 4 | 4 | 15 | 0 | 11 | 10 | 10 | 10 |
| 5 | 3 | 17 | 0 | 10 | 14 | 2 | 14 |
| 6 | 5 | 12 | 5 | 8 | 15 | 5 | 10 |
| 7 | 4 | 10 | 8 | 8 | 11 | 5 | 14 |
| 8 | 0 | 12 | 5 | 13 | 5 | 15 | 10 |
| 9 | 7 | 15 | 0 | 8 | 18 | 2 | 10 |
| 10 | 6 | 9 | 0 | 15 | 12 | 3 | 15 |
| 11 | 5 | 5 | 5 | 15 | 8 | 7 | 15 |
| 12 | 7 | 0 | 0 | 23 | 0 | 2 | 28 |
| Total | 60 | 105 | 37 | 158 | 122 | 69 | 169 |

Table 8 : Educational Background of Off-Farm Workers

| Types of Job | No. of Persons | Illiterate | Years in School | | |
|--------------|----------------|------------|-------------------|---------------|---------------|
| | | | Elementary School | Junior School | Senior School |
| I | 5 | 0 | 3 | 2 | 0 |
| II | 9 | 0 | 3 | 5 | 1 |
| III | 55 | 19 | 21 | 15 | 0 |
| Total | 69 | 19 | 27 | 22 | 1 |

Prior employment experience is also an important variable. Four of the five persons in Type I and all nine in Type II activities had previous employment experience in development-related or party-related activities. Only nine of the 55 persons in Type III activities had such experiences. Employment experiences made people more sensitive to market opportunities. Such people could also take advantage of their social contacts.

The case of Ma Yunzhong is typical. The current village head of Binli, Ma Yunzhong, used to be an electricity and agronomy technician in the village-run lime-mining activity. In 1987, while starting to produce apples and S-peppers, he purchased a milling machine and began to provide services to villagers for corn and wheat milling, charging 0.80 Rmb per *ji*. In 1990 he bought another flour milling machine to expand his milling business. The income from milling accounted for 34 per cent of his total income. Meanwhile, he still continued his job as village head and as an electricity technician. The income from these jobs accounted for 12 per cent of his total income.

There are also cases where former experience or training had not encouraged people to take up Type I or II activities. A farmer in Binli, with only one son, gave up his driving job in middle age. In order to avoid any risks, he even forbade his son to drive.

Women and Off-farm Activities

Rural economic reforms have provided rural women with a broad basis for playing a more important role in the economy. Although the employment rate and the incomes of women are relatively high in the coastal and developed areas, in most rural areas women remain mainly involved in farming activities. In Binli village almost all the women took part in farming work. Their participation in off-farm activities was in Type III activities, i.e., fruit and S-pepper production.

Women's Share in Off-farm Activities

Because heavy physical labour is required in the construction materials' industry, the proportion of female labour in Type I industries is only 15 per cent of the total. Most of the women in Type I activities worked in Shuanhe Hotel, the only Hotel in Weizhou township, where 70 per cent of the employees are female. There are no female employees in the mining business. In the basin areas, many women work part-time as vendors selling fruit and vegetables or running make-shift snack bars in the central town by taking advantage of location and traffic. Women seldom conduct similar businesses in the hilly areas. In Type III businesses, the female labour input is more than 50 per cent.

Division of Labour by Gender

Table 9 shows the division of labour by gender in Type III activities, in this case apples and S-peppers. As indicated above, a large proportion of the women is engaged in these activities. Four hundred labour days are required to take care of a 10 *mu* apple orchard and 10 *mu* of S-peppers. In the case of apples, 30 labour days are required per *mu*. Ten labour days per *mu* are needed for S-peppers.

Women were mainly involved in time-consuming activities, such as harvesting, transport, and marketing, that required few skills. While men also helped in transportation and marketing, they specialised in technical activities like pruning. Land management was also mainly carried out by men. In some families where men took full-time or part-time jobs in Type I and II activities, women had to take care of the orchards and even the marketing of apples and S-peppers. During the simultaneous harvesting of apples, S-peppers, and grain, men undertake farm activities.

Women's Income from Off-Farm Activities

If calculated on the basis of standard labour prices, the income earned by females would be higher than that earned by males, because Type III activities are the leading activities in Weizhou. Also, about two-thirds of the time devoted to animal husbandry is devoted by women. In families with only Type III activities, the contribution of female labour is much higher than the contribution of males. It may be noted that income from farming accounts for 10-30 per cent of the total income in households without Type I and Type II activities. Li's family in Binli, a couple with two children, elucidates this. They earned 2,750 Rmb in 1990, including 550 Rmb from grain sales, 20 per cent; 400 Rmb from S-pepper sales, 14.5 per cent; 1,000 Rmb from apple sales, 36.3 per cent; and 800 Rmb from livestock, 29.1 per cent. Estimated in accordance with the above-mentioned ratio, more than 51 per cent of the total income should be attributed to women's work.

Table 9. Division of Labour by Gender

(Unit: Days)

| <u>Activity</u> | <u>Male</u> | <u>Female</u> | <u>Total</u> |
|-------------------|-------------|---------------|--------------|
| Ploughing | 16 | 8 | 24 |
| Irrigation | 8 | 7 | 15 |
| Ditching | 20 | 11 | 31 |
| Fertilizing | 8 | 2 | 10 |
| Pruning | 30 | 0 | 30 |
| Picking S-peppers | 10 | 70 | 80 |
| Picking Apples | 30 | 40 | 70 |
| Carrying Apples | 45 | 55 | 100 |
| Marketing | 20 | 20 | 40 |
| Total | 187 | 213 | 400 |
| Per Cent | 46.8 | 53.2 | 100 |

THE IMPACT OF OFF-FARM ACTIVITIES ON ENVIRONMENT AND RESOURCES

The existing off-farm activities in Weizhou township are evidently based on the comparative advantages of a mountainous area. This has been an appropriate strategy for local economic growth.

Reclamation of virgin hill slopes for the development of horticulture has expanded the carrying capacity of the land and has also brought more income. There are many mining resources under exploitation. The growth of the construction materials' industry based on local raw materials has generated employment and reduced the supply cost of raw materials. Livestock-raising has, to a large extent, fulfilled the demand for fresh meat in the township.

However, these activities have also influenced the regional ecology. Reclamation on steep hill slopes has caused soil erosion, especially during the rainy season. Mining activities located at water sources, or located adjacent to roads and residences without regard to zoning requirements, induce mudrock flows. This endangers the road and water sources as well as the stability of the hillsides. Overgrazing damages hill vegetation. The construction materials' industry, particularly the cement industry, produces dust and pollutes the air. These negative effects need to be considered in designing future development strategies.

Indicators of "Success" and "Failure"

The positive and negative effects of two major off-farm activities in Weizhou are presented below. These are apple and S-pepper production and the construction materials' industry.

Apples and S-peppers

Positive Impacts. Resource and Environment : Utilisation of hill slopes; has expanded land availability.

Employment and Income : Has absorbed surplus rural labour and helped enhance the income level of farmers.

Agriculture : No competition with farming for capital, labour, and land; has contributed to the growth of agriculture through increased household incomes.

Society & Economy : As activities involving every family, apples and S-peppers are creating more market opportunities for local products.

Gender Issues : Women contribute more than half of the labour input; has helped in improving horticultural skills among females.

Negative Impacts. Resource & Environment: Soil erosion on slopes.

Construction Materials

Positive Impacts. Resource & Environment: Uses the natural resources in the mountains

Employment and Income: Has absorbed excessive rural labour and increased farmers' income; has also improved the qualifications and skills of labourers.

Gender Issue: No positive impact

Negative Impacts. Resource and Environment : Damaging water and causing soil conservation problems; has induced more natural calamities; problems of environmental pollution

Agriculture: Has no significant effect on agriculture.

Society and Economy : Because of low efficiency and poor management has marketing problems.

Gender issues : Very low participation on the part of women.

In terms of the impact on resources and the environment, apples and S-peppers are more favourable activities than the construction materials' industries. In terms of employment and income, both types of activity make a positive contribution. Apples and S-peppers bring about more social and economic benefits than construction materials. As for women, more female workers are involved in apple and S-pepper production than in construction materials' production.

ANALYSIS OF A MAJOR OFF-FARM ACTIVITY : WEIZHOU CEMENT FACTORY

Weizhou Cement Factory (WCF) has been chosen for the case study of a local enterprise, since it is the largest firm among the Type I businesses and is a leading local industry.

Background

The WCF was founded in 1977 and started production in 1978 with an annual production capacity of 10,000 tons. WCF at present has a fixed capital of 190 thousand Rmb (50% from township government investments and another 50% from bank loans) and 100 workers recruited from villages in Weizhou. Between 1978 and 1985, it has produced 67 thousand tons of cement. The fixed assets and cashflow increased to 1 million Rmb and all debts had been repaid. It had 700 thousand Rmb as savings in addition to the subsidies provided to the cadres in the township and to village civil establishments. Until 1985 things were going well with WCF.

However, in 1986 the township administration decided to expand its production capability to 50,000 tons by updating its production line. This was done under pressure from a central policy which stated that all cement factories with production capacities under 20,000 tons per year were to be shut down. For the proposed expansion, the Weizhou administration put in an investment of 4.2 million Rmb. The WCF's own savings of 700 thousand Rmb, a bank loan of 3 million Rmb, and 0.5 million from other funding sources were also used.

Although the equipment was upgraded to medium level by Chinese standards, the efficiency of WCF began to decline. In 1990 they incurred a loss of 50,000 Rmb. In addition, a debt of 2.12 million Rmb remains unpaid. Further, there has been a backlog of unsold inventory and the WCF is currently trying desperately to find buyers.

A closer look at the organisation and management and other related issues highlights the reasons why WCF turned from a profitable enterprise to an enterprise running at loss.

Organisation and Management

After the founding of the WCF in 1978, it was under the control of the "People's Commune" and its management was appointed by the leaders of the commune. Workers were recruited based on recommendations from all the brigades (villages) in the township. The remuneration of employees was paid according to "work points", as in the case of commune members. The management of the WCF was not changed after the introduction of the system of the CPRH system in Weizhou in 1981. Its director was appointed by the government of the township. The management has lagged behind and the organisational structure has not been able to cope with the needs of the contracting system.

WCF has been mechanised, automated, and standardised considerably. WCF, after its upgrading, required specifically qualified technicians and a professional management system. This required a completely different management approach than had been the case previously.

Before the upgrading of the plant, cement was produced according to indigenous methods and a proportion of the contents of different raw materials were monitored only roughly, based on experience. A couple of machines were used in the process of smashing, blending, and drying. Workers were able to handle these without specific professional qualifications. After the new production line was put into place, all the production processes, from raw material feeding to packing, were automated in an assembly line and hydraulic pressure, voltage, and chemical contents were all monitored by meters. In this case, every post on the production line required high technical qualifications. Nevertheless, the management sent only a couple of technicians to be trained. The quality of the product could not be guaranteed since the operational competence of the plant was lacking.

Market

The produce of the WCF was mainly marketed in the home township and county. It rarely received orders from neighbouring counties. Between 1978 and 1985, farmers' cash income rose rapidly and most farmers desired to improve their housing first. The total 10,000 tons' annual output of the cement plant was almost all sold to farmers in the county for house construction. It then seemed as if there was no marketing problem for cement. After the production capacity was raised in 1986, the management neither set up a new marketing strategy nor sent any professional salesmen to open new markets for its cement, but rather waited for orders at home. It was far too late when they sent a couple of untrained workers to train in marketing development, as several competing cement factories were established in neighbouring counties. Hence, the loss was induced by under capacity production, which, in turn, was caused by inventory pile-up and finally by marketing problems. These reasons for loss are quite different from those commonly found in other rural enterprises, which usually face problems of power supply and so on.

Evidently, there are big problems in terms of management, technology, and marketing. In this case, the WCF is not able to raise its labour qualifications, and, therefore, the quality of its product, which in turn undermines its competitive ability even to maintain its existing market share.

The turning point of the WCF from profit to loss was due to the expansion of its production capacity under pressure from a higher policy-making level. There was no consideration for market potential, technical training, quality control, and management improvement. The WCF's case shows the result of inappropriate policy intervention on business operations. Economic policies should, therefore, be formulated from a regional perspective to suit the imperatives of different regions. Enough attention needs to be paid to pertinent regional issues prior to the implementation of policy instruments so that the effect of policies follows original intentions.

As a leading firm in Weizhou, the WCF used to be a "successful" pilot, rural enterprise providing incentives for the development of non-agricultural sectors in the region. It was the example of a village-based and run raw materials' business which absorbed quite a proportion of the local labour force. The present situation is problematical, and there is no other way but to improve factory management, raise labour qualification through training, and open new markets for its product.

GUIDELINES FOR THE FUTURE

In view of the experiences in Weizhou, a more cautious attitude towards future development plans or strategies for off-farm employment should be considered, especially regarding the future promotion of different types of activity.

As for the current leading activities, apples and S-peppers should be allowed to grow but only up to a certain scale, so that the effect on the ecology and environment is minimised. Construction materials' firms should be improved and emphasis should be placed on producing quality and on marketing development, at the same time maintaining the current production capacity. Appropriate and economical environmental safeguards also need to be built-up in construction materials' industries, e.g., cement. It is proper to keep livestock at the current level without further expansion.

A number of other potential activities could be promoted in future.

1. Production of Chinese cabbages for supply to Chengdu City in autumn, a period of shortage for vegetable supplies.
2. Improvment of the road system and development of individual and integrated transportation. businesses to replace the manpower currently engaged in agricultural products' delivery.
3. Development of local arts and crafts. The *Qiang* women traditionally produced various kinds of crafts with strong cultural features. Tourist souvenirs based on traditional crafts can be developed and marketed in local markets or in Guan County. Tourist groups visiting Jiuzhaigou and Huangludong, the famous landmarks in Sichuan Province, usually stay overnight at the central town of Weizhou.
4. Efforts towards afforestation need to be vigorously pursued in order to maintain the ecological balance. Fuelwood requirements are currently met from local forests.
5. Markets are needed for apples and S-peppers, as future production is going to be much higher. Rural enterprises for the processing of fruits has considerable scope in Weizhou.

In addition, the following policies need to be considered.

1. The Central Government should pursue a policy to provide sufficient incentive to farmers to undertake off-farm activities. The local governments and townships or village organisations can play a more active role in infrastructural construction to spur on the development of off-farm activities. Existing extension and training programmes need to be improved.
2. Farmers' organisations should be promoted as a base for non-agricultural activities. Such organisations can be farmers' technological associations, credit cooperatives, marketing cooperatives, and information service centres.
3. As shown by the WCF case, the management of enterprises and the marketing system need to be improved. Employees' qualifications and competence should be raised through training programmes.

4. Bringing new business ideas to farmers enables them to develop new types of activity that are based on mountainous conditions so that they have the capacity to solve operational difficulties independently.

ICIMOD is the first international centre in the field of mountain development. Founded out of widespread recognition of environmental degradation of mountain habitats and the increasing poverty of mountain communities, ICIMOD is concerned with the search for more effective development responses to promote the sustained well being of mountain people.

The Centre was established in 1983 and commenced professional activities in 1984. Though international in its concerns, ICIMOD focusses on the specific, complex, and practical problems of the Hindu Kush-Himalayan Region which covers all or part of eight Sovereign States.

ICIMOD serves as a multidisciplinary documentation centre on integrated mountain development; a focal point for the mobilisation, conduct, and coordination of applied and problem-solving research activities; a focal point for training on integrated mountain development, with special emphasis on the assessment of training needs and the development of relevant training materials based directly on field case studies; and a consultative centre providing expert services on mountain development and resource management.

Mountain Population and Employment constitutes one of the four thematic research and development programmes at ICIMOD. The main goal of the programme is to identify viable off-farm alternatives and practical approaches to employment generation, income enhancement, and sustainability of mountain environments. Currently, the major focus of the programme is on three interrelated topics: (1) assessment of critical issues and options in mountain off-farm employment; (2) environmental regeneration and employment promotion through rural women's organisations; and (3) promotion of small towns and market centres for decentralised mountain development.

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