



Mountain Population and Employment

Discussion Paper Series

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

Yu Side and Chen Guojie

MPE Series No. 15

International Centre for Integrated Mountain Development



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paper by Yu Side and Chen Guojie, entitled "Off-farm Employment in the Mountains of China", constitutes one of the six case studies on off-farm activities in mountain regions in the Hindu-Kush Himalayas, livestock, and small-scale enterprises in the townships of Lijiang, tourism and vegetable farming in Mustang and Dhaulagiri, and in Shanala Par Sub-division, Swat District (F).

It is to create conditions that would improve mountain resources and open opportunities for sustainable development.

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

Yu Side and Chen Guojie

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Foreword

The present discussion paper by Yu Side and Chen Guojie, entitled "Off-farm Employment in Mianchi 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 agriculture 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).

Readers might be interested to know that all of the six case studies (including the present one) are 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 synthesised, has also 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.

E. F. Tacke
Director General

Background of Persons Engaged in Off-farm Activities

IMPACT OF OFF-FARM ACTIVITIES ON THE ENVIRONMENT AND ON RESOURCES

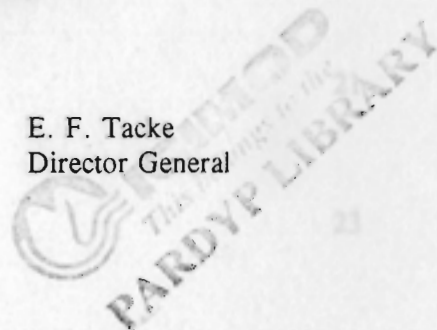


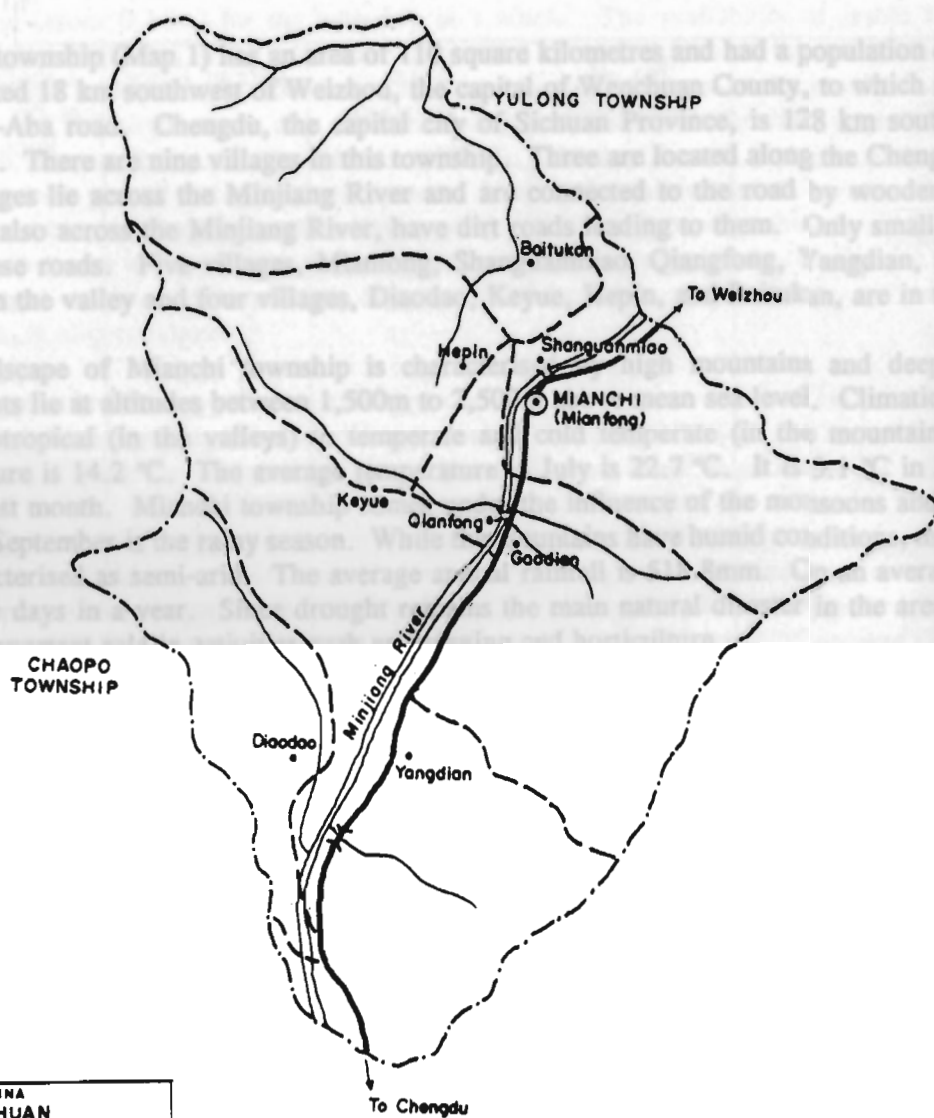
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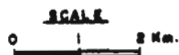
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WENCHUAN COUNTY STUDY AREA MIANCHI TOWNSHIP



LEGEND

Township Boundary	---
Village Boundary	- - -
River/Stream	~~~~~
Highway	=====
Township	⊙
Village	•



BACKGROUND TO THE STUDY AREA

Mianchi township (Map 1) has an area of 110 square kilometres and had a population of 4,619 in 1990. It is located 18 km southwest of Weizhou, the capital of Wenchuan County, to which it is linked by the Chengdu-Aba road. Chengdu, the capital city of Sichuan Province, is 128 km southeast of Mianchi township. There are nine villages in this township. Three are located along the Chengdu-Aba road and two villages lie across the Minjiang River and are connected to the road by wooden bridges. Three villages, also across the Minjiang River, have dirt roads leading to them. Only small tractors can pass along these roads. Five villages, Mianfong, Shanguanmiao, Qiangfong, Yangdian, and Gaodian, are located in the valley and four villages, Diaodao, Keyue, Hepin, and Baitukan, are in the mountains.

The landscape of Mianchi township is characterised by high mountains and deep valleys. Most settlements lie at altitudes between 1,500m to 2,500m above mean sea level. Climatic conditions range from subtropical (in the valleys) to temperate and cold temperate (in the mountains). The average temperature is 14.2 °C. The average temperature in July is 22.7 °C. It is 3.1 °C in January, which is the coldest month. Mianchi township comes under the influence of the monsoons and, as a result, July through September is the rainy season. While the mountains have humid conditions, the valley areas can be characterised as semi-arid. The average annual rainfall is 518.8mm. On an average, there are 236 frost-free days in a year. Since drought remains the main natural disaster in the area, irrigation plays a very important role in activities such as cropping and horticulture.

Agriculture is the principal occupation of the population of Mianchi township. Ninety per cent of the total labour force is engaged in agricultural activities permanently or seasonally. Maize, wheat, and potatoes are the main crops. Off-farm activities related to agriculture, such as horticulture, vegetables, livestock, and sideline activities, are undertaken concurrently with agricultural activities.

About 46 per cent of the population in Mianchi township is of the *Qiang* nationality and another 30 per cent belong to the *Zang* (Tibetan) nationality. The *Han* comprise only about 23 per cent of the total population. Although there is considerable interaction among nationalities, the unique sociocultural traits of the minority nationalities can still be detected from the buildings, clothing, and festivals in many of the villages, especially in Qiangfong village where almost all the population is of the *Qiang* nationality.

Mianchi township was selected for the study, primarily because it provides a typical example of the mix of off-farm activities, particularly those related to agriculture and traditional subsistence agricultural activities. Specialisation in any off-farm activity at the household level is not as yet evident. For detailed investigation of off-farm activities at the household level, 30 households with a population of 165 were chosen from among the villages. Households were selected from different income groups from the mountain as well as valley villages.

Socioeconomic and Resource Profiles

In 1990, according to township records, Mianchi had a population of 4,619 of which 2,313 or 50.1 per cent were part of the labour force*. Table 1 shows the distribution of population and labour force in each of the nine villages. About 57 per cent of the population live in the valley villages. The average household size in Mianchi township is 5.1. The mountain villages have a slightly higher household size (5.7) than the valley villages (4.8).

Table 1: Population and Labour Force in Mianchi Township

	No. of Households	Total Population	Labour Force	Labour Force as Per Cent of Population
<u>Valley Villages</u>	554	2,648	1,321	49.9
Mianfong	140	536	266	49.6
Shanguanmiao	115	527	235	44.6
Qiangfong	129	697	362	51.9
Yangdian	74	422	222	52.6
Gaodian	96	466	236	50.6
<u>Mountain Villages</u>	347	1,971	992	50.3
Baitukan	76	399	236	59.1
Hepin	106	610	277	45.4
Keyue	98	565	290	51.3
Diaodao	67	397	189	47.6
TOTAL	901	4,619	2,313	50.1

Source: Statistics of Rural Economy in Mianchi Township (1990).

The past record of population growth shows that the population of Mianchi township was 2,403 in 1953, 3,477 in 1964, and 4,397 in 1985. This gives an average annual growth rate of 3.41 per cent for the 1953-64 period, 1.12 per cent for the period from 1964 - 1985, and 0.99 per cent for the period from 1985-90. Local informants revealed that the population growth actually began to decline from 1978 when the two-child policy of the Government was introduced. It may be noted that for minority nationalities like the *Qiang* and the *Zang* the two-child family norm was advocated by the Government. While the growth rate of the population has declined, the growth rate of the labour force still remains high. The growth rate in the labour force between 1985 and 1990 was 3.2 per cent. This is because the children born before 1978 are now entering the labour force.

* In China economically active males between 16 and 60 and females between 16 and 55 are considered to be part of the labour force.

Females comprise almost 49 per cent of the total labour force. This indicates a female participation rate that is almost equal to that of males.

The literacy status of the population as assessed from the sample survey shows that 31 per cent of the labour force were illiterate, 34.5 per cent had up to nine years' of schooling (junior high), and 8.3 per cent had up to 12 years' of schooling (senior high). The literacy status of females was almost similar to that of males. Although 32.5 per cent of females were illiterate, a slightly higher per cent of females had received primary and junior high level of education.

The total cultivated land in Mianchi township was 7196.5 *mu* in 1990. This gives a per capita arable land of 1.56 *mu* (about 0.1 ha) for the township as a whole. The availability of arable land per capita is slightly higher (1.82 *mu*) in the mountain villages and lower (1.36 *mu*) in the valley villages. Out of the total cultivated land, 26.4 per cent is in the valley area and the rest on the mountain slopes. In 1988, 8428.1 *mu* of hill slopes were also divided among each family under the System of Contracting the Production Responsibility to Households (CPRH). Maize, wheat, potatoes and, to some extent, buckwheat form part of the agricultural system. Usually the valley areas cultivate two to three crops in a year, consisting of wheat or potatoes followed by maize and then vegetables in some cases. At higher elevations there are usually one to two crops in a year. These may consist of wheat or potatoes followed by buckwheat or maize. Interplanting of maize and vegetables, or wheat and vegetables, or apples and vegetables, is also common.

Table 2 gives a breakdown of the current land use. It shows that a very small proportion of the total area is cultivated. A large proportion of the area consists of rocky hill slopes. Out of the total area under cultivation, 2,773 *mu* (or 38.5 per cent) are irrigated. Maize, wheat, vegetables, and apples are irrigated.

Although the economy of the township is predominantly agricultural, cropping accounts for only one-third of the household income. Because of the paucity of agricultural land, the reliance on livestock, horticulture, and sideline activities combined is greater. In 1990, for example, horticulture, livestock, and sideline activities together accounted for 57.2 per cent of the household income (Table 3).

Table 2: Breakdown of Land Use in Mianchi Township

	Forests*	Wasteland	Land under Cultivation	Hill Slopes & Uses Principally Suitable for Forests	Total
<i>mu</i> **	35,395	12,885	7196	109,614	165,090
per cent	21.4	7.8	4.4	66.4	100.0

Source: Records of general conditions in Mianchi Township

* Includes fruit trees (cash crops).

** 15 *mu* = 1 ha

Table 3: Income Breakdown of Households 1985 and 1990

	Income Source in Per Cent					Income (Rmb)	
	Crops	Horticulture	Live-stock	Side-lines	Rural Enterprises*	Total	Average
1985	39.1	9.7	23.5	16.8	10.9	1,637,027	372.3
1990	32.4	15.5	30.1	11.6	10.4	2,453,628	531.2
Per Cent (+) or (-)	-6.7	+5.8	+6.6	-5.2	-0.5	183,399	+158.9

Source: Same as Table 1

* Includes only wages

It is evident that between 1985 and 1990 the share of off-farm sources of income has risen. The average income per person in 1990 was 531.2 Rmb which is slightly lower than the average for Wenchuan County as a whole.

Forests, water, and minerals are the major natural resources of Mianchi township. At present about 21 per cent of the total land area is forested. It is estimated that in the early 1950s the forests covered about 27 per cent of the total area and that most areas above 1,700m were forested. At present most of the forests lie at elevations above 2,100m.

Mianchi has abundant water resources. The Minjiang River, one of the longest rivers in Sichuan Province, runs through the five valley villages in the township. There are seven small rivers with lengths of from five km to 30 km in the region that join the Minjiang River. Previously four irrigation canals were constructed to channel water from the rivers on to the cultivated land. Two hydro-electric power stations were constructed in 1987 and 1988 respectively. However, only about 10 per cent of the total water energy is used.

According to the preliminary survey, the major minerals within this township include rock crystal, quartz, barite, mica, and marble. Most of these minerals are located in remote areas and are difficult to extract. The mineral reserves have also not been ascertained. In the past, some minerals, such as quartz, barite, and mica had been extracted by local farmers, but the extraction was informal and the scale was very small.

Infrastructure and Institutions

Everywhere in China, development infrastructure and institutions consist of extension offices/centres under the local government and organisations under the Chinese Communist Party (CCP) branches.

There is a Forestry Station, a Township Enterprise Station, and an Agricultural Technology Station which looks after the needs of all the villages. Every village has a primary school, while Mianfong has a junior and senior high school. The township also has a health centre and a network of health workers in all the villages.

The Chengdu-Aba road, the main link for Mianchi to areas outside, was constructed in 1953. However, it was only after the changes in government policy took place after 1978 that advantage of the road, in developing rural transportation and marketing products such as apples and vegetables, began to be taken by the population at large.

Mianchi township received electricity in 1974. Electricity is basically used for lighting and motive power. Cooking is usually done with firewood (80%) and crop residues (20%). Since firewood is getting scarcer and restrictions have been imposed on gathering firewood from State-owned forests, the share of electricity, particularly for heating, has been increasing.

Table 2: Breakdown of Employment and Income by Industry (1990) (Data provided by township)

Ownership	Agriculture		Non-Agriculture		Total
	No.	%	No.	%	
State-owned	100	10.0	200	20.0	300
Collective	200	20.0	400	40.0	600
Private	300	30.0	600	60.0	900
Other	400	40.0	800	80.0	1200
Total	1000	100.0	2000	100.0	3000

After the projects were completed in 1985, some of the people engaged in transportation began to experience difficulty in finding enough work. As a result, the average income began to decline. For

OFF-FARM ACTIVITIES IN MIANCHI TOWNSHIP

In Mianchi, as in other hilly and mountainous parts of Wenchuan County, livestock have always been an important source of off-farm income. The economic policy changes, particularly since 1978, have influenced the growth of horticulture, vegetables, and sideline activities at the household level. In Mianchi, the CPRH system for cultivated land was introduced in 1981. In 1983, hill lands were also contracted to households, basically for afforestation and for the development of cash crops. In 1983, Wenchuan County was selected as a trial site for the development of hydropower by the Central Government. This meant that townships in Wenchuan County were given preferential treatment and government grants for the development of hydropower stations. Also, between 1983-85, the State monopoly on the purchase and marketing of agricultural products was gradually (but not completely) relaxed. In 1988, preferential treatment in extending loans to township enterprises was also stopped. These policy changes had an impact on off-farm activities, because the number of enterprises based on local resources increased. Most of this development was at the individual or household level.

Types of Off-farm Activities

Off-farm activities in Mianchi can be divided in terms of types into employment outside agriculture and employment within or related to agriculture.

Off-farm Activities Outside Agriculture

These includes activities in rural industry, transportation, and services. Off-farm activities outside agriculture contributed 21.2 per cent of the total rural output value and employed 11.2 per cent of the total labour force. In Wenchuan County, this contribution is 33.3 and 16.5 per cent respectively, which shows that the level of development of off-farm activities in Mianchi is lower than the county average.

Rural enterprises employed 258 of the economically active labour force in Mianchi. There were 110 enterprises. Table 4 presents the breakdown of employment and income of such enterprises. It shows that rural industry provides the most employment and contributes over 56 per cent of the output value from off-farm activities outside agriculture.

Rural Industries. In 1990 Mianchi had 22 industrial enterprises with 144 employees. The major industries are extractive in nature and are owned by the township. These are sand-quarrying (employing 30 people), quartz mining (20), barite mining (10), logging (34), prefabrication (10), and mica mining (6). Among the individually-run industries are flour mills and farm tools' enterprises. Table 5 shows the employment and income breakdowns in industries by ownership levels. There is only one village level enterprise, but it contributes 54.0 per cent of the total output value of industries. This is the hydro-electric power station owned by Yangdian village.

Table 4: The Breakdown of Employment and Income in Off-farm Activities Outside Agriculture, 1990

Type of Activity	Enterprises		Workers		Total Output Value	
	No.	%	No.	%	('000 yuan)	%
Industry	22	20	144	55.8	347.2	56.7
Transportation	40	36.4	40	15.5	100.0	16.3
Tertiary	48	43.6	74	28.7	165.0	27.0
Total	110	100	258	100	612.2	100

Source: Statistics of Township Enterprises in Mianchi Township (1990)

Table 5: The Breakdown of Employment and Income of Rural Industry by Ownership Levels (1990)

Ownership	Enterprises		Workers		Total Output Value	
	No.	%	No.	%	('000 yuan)	%
Township Level	6	27.3	110	76.4	137.6	39.6
Village Level	1	4.5	16	11.1	187.6	54.0
Individual Level	15	68.2	18	12.5	22.0	6.4
Total	22	100	144	100	347.2	100

Source: Same as Table 4.

Transportation. Transportation as a rural off-farm activity in Mianchi township emerged only in 1979, although the Chengdu-Aba road was constructed in 1953. In 1985, only 25 people were engaged in transportation. During 1986 and 1987 two hydro-electric power stations were constructed in Yangdian village. This created a substantial demand for transportation. At the same time, the agency in charge of constructing the power station provided financial help in the form of loans to households who had suffered because of the location of the power station on lands that they had cultivated. As a result, the number of people engaged in transportation increased to 40.

After the projects were completed in 1988, some of the people engaged in transportation began to experience difficulty in finding enough work. As a result, the average income began to decline. For

example, the income of each person engaged in transportation services was 3,000 *yuan** per year in 1985, the figure had decreased to 2,500 *yuan* in 1990.

There are 40 vehicles, all private. There are two trucks, and 38 small tractors. The latter cost 5,000-8,000 *yuan* each, about 1/5 to 1/4 the cost of a truck. Since the tractors are not technically and economically suitable for long distance transport, most of these are used in the transportation of construction material and agricultural produce locally.

Tertiary Sector. Employment in the tertiary sector mainly consists of family businesses - retail trade, catering, and services such as hair-cutting, and video-parlours - with the lone exception of a township-run hotel. Table 6 shows the employment and income breakdowns for tertiary activities. Retail trade in daily necessities such as food and other essentials employs over half of those in tertiary employment.

Table 6: The Breakdown of Employment and Income for Different Tertiary Activities (1990)

Type of Tertiary Sector	Enterprises		Workers		Total Output Value	
	No.	%	No.	%	('000 <i>yuan</i>)	%
Commerce	30	62.4	42	56.8	90.0	54.6
Catering	9	18.8	15	20.3	39.0	23.6
Service	9	18.8	17	22.9	36.0	21.8
Total	48	100	74	100	165.0	100

Source: Same as Table 4

In 1978 there were 17 collectively-owned tertiary enterprises. After the economic reforms most of the previously collectively-owned enterprises were contracted out to individuals or closed because they were running at a loss.

Spatial Distribution of Off-farm Activities Outside Agriculture. Most of the OFEAs outside agriculture are located in the valley villages. Between 80 to 90 per cent of the employment and 93 to 97 per cent of the total output value are generated in the valley villages (Table 7).

* The conversion rate between the U.S. dollar and the RMB *yuan* was 3.72 in 1987.

Table 7: The Regional Variation of Different Off-farm Activities in Mianchi Township (1990)

Types of Activity	Region	Enterprises		Employment		Total Output Value	
		No.	%	No.	%	('000 yuan)	%
Industry	Valley Village	10	62.5	28	82.4	200.6	95.7
	Mountain Village	6	37.5	6	17.6	9.0	4.3
Transportation	Valley Village	37	92.5	37	92.5	93.0	93.0
	Mountain Village	3	7.5	3	7.5	7.0	7.0
Tertiary Sector	Valley Village	41	87.2	63	91.3	141.5	97.6
	Mountain Village	6	12.8	6	8.7	3.5	2.4

Source: Same as Table 4.

Note: Township run-enterprises are not included here.

In each of the nine villages there are 1-2 flour mills. The Xiasuoqiao Hydropower Station is located in and owned by Yangdian village along the Chengdu-Aba road in the valley. Another Hydropower Station (Chaopo Hydro-electric Power Station) is also located in Yangdian but is owned by the State. There is, therefore, a larger concentration of industrial and transportation activity in Yangdian. Similarly, tertiary activities are concentrated in Mianfong village which lies next to Mianchi town; the township capital and a centre of major services. Unlike the valley villages, the main activities in the mountains are the mining of quartz, barite, and mica.

Off-farm Activities Related to Agriculture

The off-farm activities within agriculture in Mianchi township include mainly livestock, horticulture, and sideline activities. According to township records the total output value of these activities was 1.4 million yuan in 1990 which is 63.8 per cent of the total output value from agriculture and agriculture-related, off-farm activities (Table 8). The sample survey revealed that 47.4 per cent of labour time in agriculture was spent on various off-farm activities.

Table 8: Labour Time Used in Agriculture and Agriculture-related Off-farm Activities and Output Value (1990)

Activities	Labour Days Spent		Output	
	No. (‘000 <i>gong</i>)	%	Value (‘000 <i>yuan</i>)	%
Cropping	233.1	52.6	795.0	36.1
Livestock	79.9	18.0	738.7	33.6
Horticulture	62.8	14.2	379.4	17.3
Sideline Activities	67.4	15.2	285.3	13.0
Total	443.2	100	2198.4	100

Source: 1) Sample household survey
2) Statistics of Rural Economy in Mianchi Township (1990)

Note: 1) The labour time spent on cropping is worked out based on the labour time needed for each crop and the actual area sown. The average labour time required to work one *mu* of maize, wheat, or potatoes is 32.5, 18, and 13 *gong* respectively.

2) There were 2,313 economically active labourers in Mianchi in 1990, and the available time was 693.9 thousand *gong*. Cropping used 33.6 per cent, off-farm activities within agriculture, 30.2 per cent, and off-farm activities outside agriculture 8.9 per cent of this time. Housework involved 7.3 per cent of the time of economically active persons and 20 per cent of labour days remained free.

A *gong* is a labour day of 8 hours.

Livestock. Livestock-rearing is a traditional activity in both valley and mountain villages. Livestock raised include pigs, cattle, sheep, and various farmyard birds such as chickens and ducks. Pigs are raised to meet the farmers' demand for meat and manure and the purpose of raising cattle is to provide draft power.

About 18 per cent of the labour days spent in agriculture-related activities are devoted to livestock. Compared to the labour time spent, the output value from livestock is quite high. Within the livestock sector it is the sale of pork that contributes most to household income, although only 13.6 per cent of the pork enters the market. Poultry comes second as 20.2 per cent of the income from the sale of livestock products is from poultry. In terms of labour days, however, cattle and sheep take over half of the total labour days spent on livestock (Table 9). Only 14.1 per cent of the total output value of livestock products actually enters the commodity market.

Although the total number of livestock raised in some families reaches a considerable scale, not a single household is specialised in raising animals in this township and few labourers raise animals as a main occupation. In fact, most of the livestock-raising is carried out by the theoretically inactive population (including youths under 16, women over 55, and men over 60). According to the farmers' estimates, about half of the work in raising pigs and poultry and 3/5 of the work in raising cattle and sheep are contributed by the inactive population.

Table 9: Livestock, Percentage of Livestock Products Entering the Market, Income from Sales and Labour Days Spent on Livestock in Mianchi Township, 1990

	Pig	Cattle and Sheep	Poultry	Total
No. of animals/birds	2175	4241	6130	
Meat production ('000 kg)	159.1	1.8	0.7	161.1
% of meat sold	13.6	100.0	28.6	14.7
Egg production ('000 kg)	-	-	9.4	9.4
% of eggs sold	-	-	34.0	34.0
Income from sales ('000 yuan)	81.1	2.1	21.1	104.3
% of income from sales	77.8	2.0	20.2	100.0
% of total labour days spent on livestock	37.4	53.9	8.6	100.0

Source: Same as Table 1

- Note:
- 1) The figures for labour days spent on tending animals are based on the following estimates provided by the households and key informants. 1 *gong* (8 hours) per day is required to tend 12 head of pigs, or 8 head of cattle, or 25 head of sheep, and 1 hour per day for 20 head of poultry.
 - 2) Among the total of 4,241 head of cattle and sheep, 1,529 are cattle and 2,712 are sheep.
 - 3) The figures on labour days do not include time spent by theoretical non-labourers.

Horticulture. There are mainly three kinds of horticultural activity in Mianchi township, namely vegetable cultivation, fruit cultivation, and cultivation of other cash crops such as peppers and walnuts. Horticultural activities as a whole earned an income of 379.4 thousand *yuan* and used 62.8 thousand *gong* in 1990. This accounted for 17.3 per cent and 14.2 per cent of the agricultural total respectively.

Mianchi township was the vegetable base of Wenchuan County before 1978. During that time, 10 *mu* of cultivated land from the villages of Mianfeng and Shangunanmiao were set aside for planting vegetables to supply the market in the county capital. After the cultivated land was contracted out to each household, the vegetable growing area expanded. The area sown with vegetables in the whole township was 469.5 *mu* in 1985. It went up to 824 *mu* in 1990. Income from vegetables accounted for 67 per cent of the total horticultural income (Table 10).

The vegetables cultivated here include capsicum, garlic bolt, radishes, and cabbage. The first two are the main vegetables planted for marketing purposes and these account for 60 per cent of the total vegetable cultivation.

Table 10: Output, Sales' Income, and Employment Situation in Horticulture in Mianchi Township (1990)

Activities	Vegetables	Apples	Peppers	Others	Total
Sown area (<i>mu</i>)	824	752.0	758.6	300	2634.6
Current harvesting area (<i>mu</i>)		108.9	246.0		
Output ('000 kg)	1088.4	45.4	3.2	21.9	
Percentage of output for sale	38.7	75.3	87.5	60.7	
Income from sale ('000 <i>yuan</i>)	115.3	25.8	48.3	24.3	213.9
Percentage of income from sales	53.9	12.1	22.6	11.4	100.0
Labour days spent ('000 <i>gong</i>)	45.3	11.0	3.5	3.0	62.8
Percentage of labour days spent	72.1	17.5	5.6	4.8	100.0

Source: As for Table 1

Note: 1) It needs about 55 *gong* for one *mu* of vegetables (51 *gong* for one *mu* of capsicum and 71 *gong* for one *mu* of garlic bolt per crop). The labour time needed to care for one *mu* of apples and peppers during the fruit-bearing stage is 30 *gong* and 10 *gong* respectively. Only 12 *gong* and 2 *gong* per *mu* are needed to take care of plants that are not in the fruit-bearing stage. An average of 10 *gong* is needed for one *mu* of other fruits and cash crops.

Like all off-farm activities within agriculture in this township, no household specialises in just growing vegetables. Based on the survey, the estimate of the labour time spent on vegetable growing shows that 10.2 per cent of the labour time spent on agriculture and 72.1 per cent of the labour time spent on horticulture was devoted to vegetable growing.

A large area in Mianchi township is quite suitable for growing fruits and other cash crops such as peppers, walnuts, and raw lacquer. However, little attention was devoted to the growth of these crops before 1983. In order to encourage the development of fruits and other cash crops and make better use of hilly land, over 8,000 *mu* of hilly land was contracted to each household in 1983. Since that time, some households have begun to grow various fruits and other cash trees on their contracted land, but the scale of fruit production from each household was very small. In 1986 the Forestry Administrative Bureau of Wenchuan County provided young fruit plants to the households at preferential prices. During the period since 1986, over 800 *mu* of apples, peppers, and other cash trees have been planted, both on hilly land and on some cultivated land. In 1990, the total area of fruits and other cash trees reached 1810.6 *mu*, double the amount in 1986. However, most of the fruits and other cash trees have not entered the fruit-bearing stage or are just beginning to bear fruit.

Sideline Activities. The sideline activities in Mianchi township include doing odd-jobs, embroidery, and work as craftsmen such as carpenters, bricklayers, and blacksmiths. The totals for income and employment in sideline activities were 285.3 thousand *yuan* (13.0% of the agricultural total) and part-time

employment for 624 persons respectively in 1990. The labour time spent was about 67.4 thousand *gong*. Odd-jobs contribute to more employment and income than other sideline activities (Table 11). Most of those who perform odd jobs do so in the off-farm season within the county. Most of the odd jobs are more demanding in terms of labour than skills.

Table 11: Employment and Income From Different Sideline Activities (1990)

Activities/ Items	Odd-jobs	<i>Qiang</i> Embroidery	Craftsmen	Other	Total
No. of Workers	350	180	50	44	624
Labour time spent ('000 <i>gong</i>)	31.5	24.3	9.0	2.6	67.4
Percentage of labour time spent	46.4	36.1	13.3	3.9	100.0
Income ('000 <i>yuan</i>)	161.9	40.0	72.0	11.4	285.3
Percentage of income	56.7	14.0	25.2	4.0	100.0

Source: As for Table 1

Note: 1) The time spent on embroidery by non-labourers is not included in this table. Non-labourers contribute about 25 per cent of the work in embroidery.

The *Qiang* nationality has a tradition for a type of embroidery that is famous for its unique pattern and fine workmanship. However, it was not until 1988 that the embroidery was put on sale. An exhibition of Chinese minority nationality products held in Beijing in 1988 helped to find markets for such products, both in China and abroad. Qiangfong village in this township was selected as one of the trial centres for *Qiang* embroidery. Some of the people in other villages are also engaged in this activity. In 1990, about 180 people took this activity as a subsidiary occupation and created an income of 40 thousand *yuan*.

Spatial Variations in Off-farm Activities within Agriculture. Activities such as livestock-raising and odd-jobs do not show variations between valley and mountain villages. Variations are notable with respect to vegetable growing, apple growing, pepper cultivation, and embroidery. Vegetable cultivation is mainly concentrated in the villages of Shanguanmiao and Mianfong, in the valley where vegetable production was an important activity even before 1978. The introduction of CPRH provided an impetus to this activity because of its marketing potential and the skills and experience of farmers. Baitukan and Hepin

villages in the mountains have relatively better natural conditions for the production of apples. Qiangfong is the only village in the valley where apple production is important. Also, the two mountain villages of Diaodao and Keyue have better natural conditions for growing peppers and so most of the pepper production is concentrated here. Embroidery, as indicated earlier, is mainly concentrated in Qiangfong village.

Labour Demand Profile in Agriculture and Agriculture-related Off-farm Activities

Table 12 shows the labour demand profile of the major cereal crops and vegetables. The information is based on the sample survey and is indicative of the complementarity or conflict between cropping activities and vegetable production.

Vegetable cultivation provides considerable employment during March, July, August, and January. There is some conflict in labour demand between vegetable growing and cereal crops during May-June and September-October. Villagers reported that there is some shortage of labour during these months. However, the shortage is met through labour exchange among families.

Table 12: Labour Demand Profile among Major Cereal Crops and Vegetables

Month	Soil Preparation	Seeding or Sowing	Spreading Manure	Weeding	Harvesting	Marketing
March		C1				
April	A4	A1	A3			
May	C5	C5	A4, C10	A5.5	B2	
June			A6, C10	A2, C6	B2	
July	D15			C3		
August		D15	D5	D3	C0.2	C2
September	B2		B4, D10	D4	A3, C0.4	C4
October	B1	B1	B4, D5	D3	A4, C0.4	C4
November				B1	D0.3	D3
December					D0.4	D4
January					D0.3	D3
February						

Source: Sample Household Survey.

Note: A, B, C, D stand for the crops of maize, wheat, capsicum, and garlic bolt respectively. The figures represent labour time (*gong*) spent per *mu* of land under a particular crop. For example, A4 in row 2 and column 2 means that 4 *gong* were spent on soil preparation for one *mu* of maize in April.

Among fruits and cash crops, apples are relatively more demanding of labour time. During February-March about 10-15 *gong* per *mu* are required for activities such as applying lime, irrigating, and pruning. Again, during September-November, the labour needed for harvesting and marketing is greater. About 15-20 *gong* per *mu* are required for this purpose. This is also the time when both cereal crops and vegetables need labour. However, in the Mianchi villages this conflict has not thus far been apparent, because, at present, only a limited number of orchards are at fruit-bearing stage.

Sideline activities are subsidiary occupations and are carried out concurrently with farming activities. In fact, with the exception of persons engaged in full-time, permanent jobs in rural industries or enterprises, almost everybody spends time in farming when help is urgently needed.

Factors Affecting Off-farm Employment in Mianchi Township

Mianchi township does not have a high level of off-farm employment. As indicated above, only about 11 per cent of the labour force is in rural enterprises, not all of which is full-time or permanent employment. About 30 per cent of the labour force undertake off-farm activities within agriculture. A mix of farming and related off-farm activities is the main source of income employment in Mianchi. What have been the factors responsible for the current state of off-farm employment? A number of factors can be distinguished and these have been recorded below.

Policy Attention

Not all areas in Wenchuan County received the same level of policy attention or preferential treatment with respect to policy and programme implementation. Villages near the county headquarters received relatively better policy attention in terms of government aid and technical support. Mianchi was therefore a late recipient of government attention. For example, government support for fruit-growing in Mianchi came only in 1986 whereas Weizhou, the county capital, received it in 1983.

Geographical Position

Areas having a favourable geographical position, with better access to and location of State-owned industrial projects had advantages in establishing or introducing new non-farm activities. Yangdian in Mianchi is an example. The construction of the Hydropower Station gave a boost to transportation.

Market

Off-farm activities come about in areas with easy access to markets. Locations along the Chengdu-Aba road have emerged as markets for off-farm produce such as fruits, vegetables, and tertiary services.

However, in Mianchi, a number of products also have export markets. For example, the quartz, barite, and mica mined here are exported to other areas in Wenchuan. Electricity also has a market outside Mianchi township. Sand and prefabricated components are used as construction material in Mianchi and nearby townships.

Most of the retail trade and other tertiary services are of a local nature, apart from catering (restaurants & hotels) which provides services basically to travellers.

Market opportunities for vegetables and fruits still remain to be exploited. Currently, outside merchants transport about 3/5ths of the vegetables sold in Mianchi to Chengdu. About 1/5th of the vegetables is

transported to outside provinces such as Qinhai and Gansu. About 50 per cent of the apples that enter the market are sold outside the township, mainly to Chengdu and Guanxian. Livestock products are the only products that are more or less consumed within the township, but the demand for pork remains considerable in the northern and southern counties of Aba Prefecture. At present, *Qiang* embroidery is marketed through the County Tourist Bureau. Eighty per cent of it is sold to the Provincial Foreign Trade Bureau for export and 20 per cent of it is sold locally. The potential for expanding the market for *Qiang* embroidery remains significant.

Food Sufficiency

Since 1983 every township in Wenchuan County is reported to have been able to provide enough food for the local farming population. The main outlet for marketing foodgrains is the Township Grain Purchasing Station. Mianchi township basically produces maize, wheat, and potatoes. Therefore, farmers normally exchange maize for rice from the Township Grain Purchasing Station at fixed exchange rates. Informal exchanges also take place in other forms; vegetables for rice, for example. Food security was not perceived as a reason for not going into off-farm activities in the surveyed households. But the local leaders were of the opinion that vegetable cultivation should only be cautiously expanded as it might result in shortages in the supply of grains.

Capital and Technology

Sources of funds for off-farm activities vary by type of activity and the scale of activity itself. For off-farm activities outside agriculture there are three sources of funds: bank loans, government grants, and self-generated funds. For enterprises at township level, self-generated funds and bank loans are an important source of investment, because government grants depend upon policy priority. The hydropower station is the only enterprise that receives government grants in Mianchi. Individuals, however, have to depend on loans from family and friends. To establish off-farm activities within agriculture, only small investments are required. Saplings of fruit trees are distributed by the Government at nominal cost.

Formal training, learning from family members, and learning from practice are the three ways of adapting to technology or acquiring skills. Technicians in township/village enterprises, such as the hydropower Station, are formally trained by the enterprise. Workers mostly learn the skills on the job. In the case of horticulture, livestock, and related activities the learning is through neighbours and family members with guidance from technicians from the relevant extension departments.

Contribution of Off-farm Activities to Household Income

The income survey of 30 households in Mianchi reveals that income from sources other than cropping accounted for 74.9 per cent of the total household income and 92 per cent of the total income in cash (Table 13). Off-farm activities within agriculture contributed 52.1 per cent of the cash income and 33.9 per cent of the income from off-farm activities outside agriculture. Sideline activities, horticulture, and tertiary activities ranked first, second, and third in terms of contributions to household income.

According to the level of annual income per person, the 30 sample households were divided into three categories: those with incomes of over 500 *yuan*, those with 200-500 *yuan*, and those with less than 200 *yuan*. The breakdown of cash income among these groups shows that off-farm activities within agriculture are an important source of cash income to all three categories. However, income from

horticulture, transportation, and tertiary services contributed more to the highest income group than to other groups. In contrast, the incomes from sale of crops and sideline activities were the highest for the low income group (Table 14). This is indicative of the high output value of horticulture, transportation, and tertiary services. It should also be noted that transportation and tertiary services require relatively higher initial investments.

Table 13: Household Income Breakdown for the 30 Selected Households in Mianchi Township (1990)

Sectors	Total Output Value		Income in Cash	
	('000 yuan)	Share (%)	Value ('000 yuan)	Share (%)
Cropping	29.2	25.1	4.4	8.0
Horticulture	17.0	14.6	11.7	21.6
Livestock	27.8	23.9	5.0	9.1
Sideline Sector	15.8	13.6	15.1	27.6
Industry	5.5	4.7	4.6	8.4
Transportation	7.8	6.7	5.1	9.3
Tertiary Sector	13.2	11.3	8.9	16.2
Total	116.3	100	54.8	100

Source: Sample Household Survey

Table 14: The Cash Breakdown of Different Household Groups (1990)

Class	High income group (> 500 Rmb)	Middle income group (200-499 Rmb)	Low income group (< 200 Rmb)
Sectors	Income Share (%)	Income Share (%)	Income Share (%)
Cropping	1.2	7.1	26.0
Horticulture	30.2	18.1	15.6
Livestock	3.7	11.7	10.4
Sideline	9.9	33.3	41.6
Industry	11.1	9.1	0
Transportation	25.3	3.2	0
Tertiary	18.5	17.5	6.5
Total	100	100	100

Source: Sample Household Survey

LINKAGES OF OFF-FARM ACTIVITIES

In the context of Mianchi, the linkages of off-farm activities with the farming system are more relevant and important.

Vegetable cultivation has enhanced land use, but it has also brought about some negative effects. Apart from capsicum, all the other vegetables, such as garlic bolt and radishes, are interplanted with crops such as maize, wheat, or beans. This has increased the multiple crop index of cultivated land. For example, irrigated lands in the villages of both Shanguanmiao and Mianfong, have a multiple crop index of over 300 per cent, double the township average. At the same time, negative effects are also becoming apparent. For example, the soil fertility of some lands in both Shanguanmiao and Mianfong villages are beginning to show a decline in productivity, thus needing more fertilizer to make up for the loss.

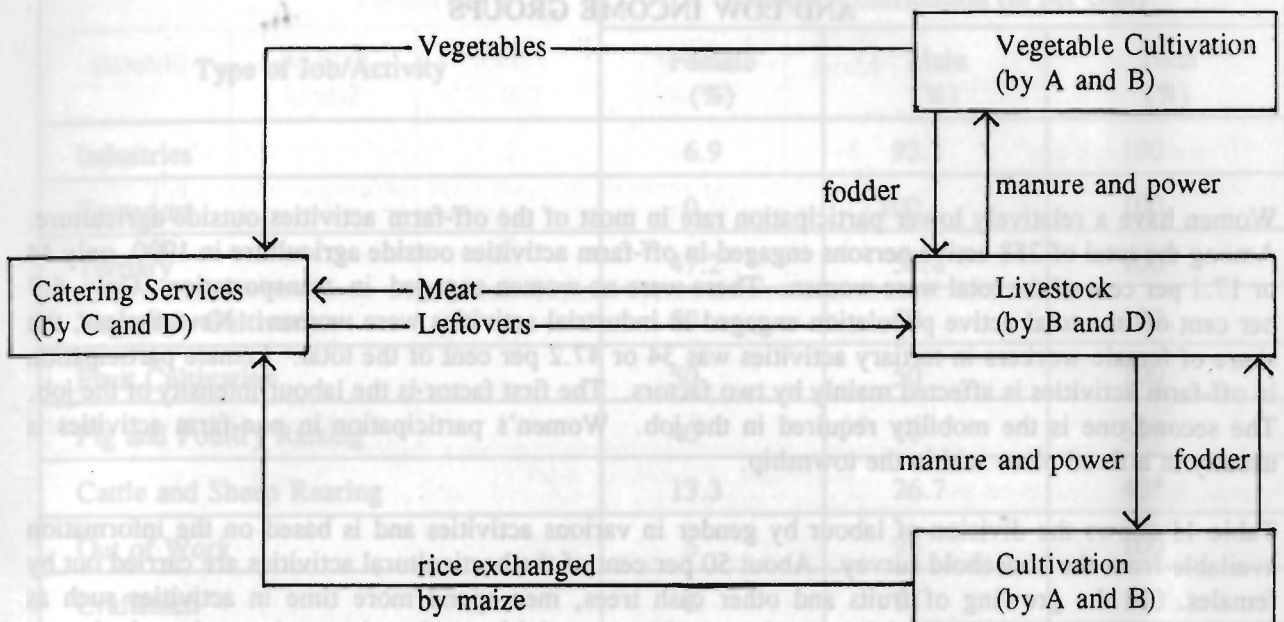
The most obvious linkage is the one between livestock and cropping. On the one hand, livestock provide manure and draft power for cropping and, on the other, crops provide fodder for livestock. In all nine villages, livestock are an important source of manure. Draft power is of singular relevance to a lot of farming activities and can hardly be replaced by other forms of power in the near future.

Because of the higher output-input rate of off-farm activities, most of the younger generation are reluctant to carry out farm activities. According to the household survey, middle-aged men and women are the major force in farming in a large number of households. The skills of most of the young people are believed to be poorer. Local leaders are afraid that the cropping system will be seriously affected when the present middle-aged generation retires from farming.

Successful linkages among agriculture and off-farm activities are exemplified in some households. In the Xong family there are four economically active persons: Xong Shouchang-head of the family (A), his wife-Liu Guiying (B), his son-Xong Touming (C), and his son's wife-Chai Xiuning (D). The main activities in this household include catering services, pig-raising, vegetable cultivation, and crop farming. The linkages established among these activities are shown in Figure 1.

Vegetable and fruit production also introduce activities related to transportation, storage, and processing. However, in the case of Mianchi, these linkages have not become apparent as yet. With the growth in horticultural production in the future (as more orchards begin to bear fruit) these linkages will become obvious.

Figure 1



EMPLOYMENT IMPLICATIONS OF OFF-FARM ACTIVITIES FOR WOMEN AND LOW INCOME GROUPS

Women have a relatively lower participation rate in most of the off-farm activities outside agriculture. Among the total of 258 active persons engaged in off-farm activities outside agriculture in 1990, only 44 or 17.1 per cent of the total were women. There were no women engaged in transportation. Only 6.9 per cent of the total active population engaged in industrial activities were women. Nevertheless, the share of female workers in tertiary activities was 34 or 47.2 per cent of the total. Female participation in off-farm activities is affected mainly by two factors. The first factor is the labour intensity of the job. The second one is the mobility required in the job. Women's participation in non-farm activities is usually in a fixed place within the township.

Table 15 shows the division of labour by gender in various activities and is based on the information available from the household survey. About 50 per cent of the horticultural activities are carried out by females. In the growing of fruits and other cash trees, men spend more time in activities such as transplanting and pruning. Females spend more time on activities such as harvesting and marketing.

Females do much of the work related to pig and poultry-raising. According to estimates made by the households, about 40 per cent of the total time spent on pig and poultry raising is contributed by females and 10 per cent is contributed by males. The remaining 50 per cent is contributed by theoretical non-labourers. In tertiary activities and crop cultivation, labour by gender is almost even. Housework and embroidery are undertaken mostly by females. Odd jobs and craft-work are mostly undertaken by men.

In addition to their contribution to agriculture and related work, women also do most of the housework. According to the estimate from the surveyed households, about 80 per cent of the housework is performed by the female population. During our survey we often observed many men sitting chatting and drinking around a table, while women did the housework or tended animals. In most villages where the level of off-farm employment is not high, the group which has the most free time is that consisting of young males. Middle-aged females are the busiest group.

In general, the development of OFEAs has not only opened new areas in which women can display their ability, but has also enhanced their role in traditional agriculture. As more and more men undertake off-farm activities, the burden of traditional agriculture is falling on women. Almost all of the women surveyed believed that they played a greater role in agricultural activities.

The participation of low-income groups in off-farm activities is lower than that of female groups. The household survey indicated that, among the 30 households surveyed, all the households engaged in transportation and over 90 per cent of the households engaged in tertiary activities had at least middle-level incomes (between 200-500 Rmb). Four factors affected the poorer groups' participation in off-farm activities. The first factor was the investment capacity or funds to start a certain activity. Secondly, they undertook activities where the risks of failure were low. Thirdly, they engaged in activities that were popular in the locality. Low income households normally did not start an activity which had not been tried out by their neighbours. Fourthly, they engaged in activities for which they had the necessary skills or the determination to learn the skills.

Table 15: Division of Labour By Gender

Type of Job/Activity	Labour Contribution (in per cent)		
	Female (%)	Male (%)	Total (%)
Industries	6.9	93.1	100
Transport	0	100	100
Tertiary	47.2	52.8	100
Vegetable Cultivation	50	50	100
Fruit Cultivation	50	50	100
Pig and Poultry Raising	40	10	50*
Cattle and Sheep Rearing	13.3	26.7	40*
Out of Work	5	95	100
Craftsmen	5	95	100
<i>Qiang</i> Embroidery	75	0	75*
Crop Cultivation	50	50	100
Housework	40	10	50*

Source: Sample Household Survey

Note: In figures marked with an asterik, the remaining percentage is contributed by theoretical non-workers (i.e., females below 16 and above 55 and males below 16 and above 60).

Horticulture and livestock-raising were, therefore, two areas in which low income households were involved for obvious reasons. Firstly, these activities did not require a lot of funds to start with. Secondly, most of the households had some experience in these activities. Thirdly, these activities were also popular in the area.

A number of persons from the low income groups are engaged in sideline activities, basically in doing odd jobs. Odd-jobs need little investment. Also, most of the activities need little skill but strong physical strength.

Background of Persons Engaged in Off-farm Activities

Information from the sample survey reveals that individually-run enterprises are owned and operated by persons with relatively higher levels of education. Off-farm activities within agriculture were mostly taken up by persons with an educational attainment of less than junior high school level (Table 16).

Past employment experience and the ability for social interaction were also important factors in establishing individually-run enterprises.

Table 16: Educational Background of Off-farm Workers

Type of Jobs	No. of Persons	Education			
		Senior School	Junior School	Primary School	Illiterate
Township-run and Village-run enterprises	3	0	2	1	0
Individually-run enterprises	13	4	6	2	1
Off-farm Activities within Agriculture	68	3	14	26	25
Total	84	7	22	29	26

Source: Sample Household Survey

Note: At least three persons were engaged in two off-farm activities.

IMPACT OF OFF-FARM ACTIVITIES ON THE ENVIRONMENT AND ON RESOURCES

Based on the above discussions, the indicators of "success" or "failure", i.e., the positive and negative impacts of the main off-farm activities in Mianchi are presented in summary form below. These are indicative of the complementarity or otherwise of off-farm activities in the mountain context.

Vegetable Cultivation

- Positive Impacts:
- takes advantage of seasonality
 - has little conflict with labour demands for crop cultivation
 - generates considerable employment and cash income
 - enhances income distribution
 - contributes to market growth
- Negative Impact:
- may lead to a decrease in soil fertility

Fruit and Cash Crops

- Positive Impacts:
- takes advantage of diversity
 - enhances the natural resource base; prevents soil erosion
 - enhances skill levels
 - generates sizeable employment and income
- Negative Impact:
- may lead to decline in food-self sufficiency

Transportation

- Positive Impacts:
- enhances forward and backward linkages of farming system
 - improves access to markets
 - no conflict with labour demand
- Negative Impact:
- limited access for females and low income groups

Qiang Embroidery

- Positive Impacts:
- takes advantage of traditional skills
 - does not impinge on the environment
 - creates considerable employment and income for women
 - complementary with other rural activities
- Negative Impacts:
- none

Livestock

- | | | |
|-------------------|---|--|
| Positive Impacts: | - | complements agriculture; enhances soil fertility; provides manure, draft power |
| Negative Impacts: | - | can impinge on natural resources through the increased demand for fodder and grazing |

Mining

- | | | |
|-------------------|---|---|
| Positive Impacts: | - | exploits resources with comparative advantages, |
| | - | provides income and employment |
| Negative Impacts: | - | destabilises the landscape; induces soil and rock slips |

In terms of the impacts on resources and environment, horticultural crops, vegetables, and *Qiang* embroidery are favourable in relation to other activities such as mining and livestock. These again are activities that are accessible to women and low income groups.

ANALYSIS OF A MAJOR OFF-FARM ENTERPRISE : XIAOSUOQIAO HYDRO-ELECTRIC POWER STATION

There was a total of 110 off-farm enterprises in Mianchi township in 1990. Most of these are on a very small scale. Only five enterprises employ more than ten people and have an income of above 10 thousand *yuan*. Of the five enterprises, the Ziasuoqiao Hydro-electric Power Station is the largest and the most stable enterprise in Mianchi. All the employees of the Power Station are from Mianchi township.

Type and Scale

Xiasuoqiao Hydro-electric Power Station is owned by Yangdian village. It is one of the biggest enterprises, both in terms of employees and income, in Mianchi township. This station is located in the lower reaches of the Chaopo River which runs through Yangdian village. Construction began in April, 1987, and the Power Station went into operation in June, 1988. At present, there are a total of 16 permanent workers in the enterprise, of which four are female. In addition, there are three temporary workers who are responsible for the supervision of the flow of water near the power station in the flood season and dry season. The net fixed assets of the Power Station are 514.7 thousand *yuan* which includes two generators with a total capacity of 420 kilowatt. A total of 2.85 million kWh of energy were generated in 1990. A revenue of 187.6 thousand *yuan* was realised in the same year.

Organisation and Management

There are only two people in charge of the management of the enterprise. One is the Director who is responsible for all the activities concerning production, distribution, and marketing. The director is also the major technician. The other management person is the accountant who is mainly responsible for financial affairs. The director was elected by the village people when the station was constructed in 1987. He makes most of the decisions regarding the management of the power plant. However, the opinions and ideas of relevant village leaders are also sought.

For the management of the Power Station, a series of regulations were jointly adopted in 1989 by the director and the village leaders. These regulations concern the issues of employment, training, dismissal, rewards, and penalties. For example, the regulations stipulate that all the workers in the Plant should be from Yangdian village, and that all the workers receive training in relevant aspects before they join the enterprise.

After the station commenced operating in 1988, the director and other workers performed their own jobs well. As a result, the station has been operating very smoothly. However, currently the principal part of the profit goes to repay the loan. Therefore the average salary for each worker is only about 140 *yuan* per month, less than five *yuan* per day. The difference in salaries among different jobs in the enterprise is very small. This has caused some discontent among the workers. They expect the situation to improve when the loan repayment is complete.

Technology and Skill levels

The workers in the Power Station are well qualified. All 16 workers are literate, nearly 70 per cent have six or more years of schooling. Five of the 16 workers are either technicians or skilled workers.

All the workers obtained basic training in related fields for one or two months before joining the enterprise. The training is supported by the village or the enterprise and is certified by the County Electricity Bureau. Also, some technicians from similar enterprises within the county were invited to provide on-the-job training to the workers. The training has helped to improve the technical competence of the workers. As a result most of the technical problems can be solved by the workers themselves.

The technology employed in the Power Station is not very sophisticated and would be considered of a medium level in the Chinese context.

Market

All the electricity is directly transmitted to the electricity grid that belongs to Chaopo Hydro-electricity Station, a State-owned enterprise located only 300 metres away from Xiaosuoqiao Hydro-electricity station. All the electricity produced by this enterprise is sold to Chaopo Hydro-electricity Station at a price of 0.06 *yuan* per kWh. Through the Chaopo Hydro-electricity Station, the generated energy is transmitted to users both within and outside the county.

Extension and Support

Ever since the construction of the power station, various types of support in the form of loans and technical training have been provided by many departments and enterprises. For example, a total of 675.5 thousand *yuan* was invested in the construction of Xiaosuoqiao Hydro-electricity Station. Out of this total, 337.5 thousand *yuan* or 50 per cent was in the form of a loan from the Agricultural Bank of Wenchuan County. Also, 58 thousand *yuan* or 8.6 per cent, was provided in the form of aid by the Hydro-electricity Administrative Bureau of Wenchuan County. The remaining 280 thousand *yuan* was paid by the State as compensation to 22 families who lost 30 *mu* of cultivated land contracted to them because of the construction of the Chaopo Power Project. This money was also used in the construction of the Power Station and arrangements were made to compensate those families through provision of employment and a share in profits.

The Xiaosuoqiao Power Station receives technical back-up and support from Shanjiang Hydro-electricity station, which is one of the major power stations in Wenchuan County, as well as the nearby Chaopo Hydro-electricity Station. This enterprise is less than a kilometre away from the Chengdu-Aba road. A dirt road connects it to this main road. However, no communication facilities are available in this enterprise.

The Xiaosuoqiao Power Station is an example of the use of a natural resource to enhance the income and employment conditions in a mountainous area. It has created 16 permanent and three temporary jobs. About 29,000 *yuan* are paid each year to the 22 families that provided the funds for this enterprise. In addition, a total of 25,000 *yuan* is paid to workers in salaries each year. The power station has helped improve the skill levels of workers and has contributed indirectly to opening up avenues for off-farm employment opportunities, particularly for those households that lost their land due to the construction of the Chaopo Hydro-electricity Station. The only problem with the power plant is that it does not provide enough employment for women. Currently, four of the workers are women. Young unmarried girls are not usually given priority for employment here because of the fact that the enterprise is under village ownership and young girls usually leave the village after they get married.

CONCLUSIONS AND GUIDELINES FOR THE FUTURE

A number of conclusions regarding off-farm employment in Mianchi township emerges from this case study. These are outlined in this chapter.

In spite of the current low level of development of off-farm employment in Mianchi township, a number of favourable conditions exists. These include regional and seasonal advantages for growing fruits and vegetables, unique traditional skills, rich water resources, and relatively good access to outside markets. At the same time, constraints to the development of off-farm activities include lack of knowledge and experience, lack of skilled personnel, shortage of funds, and lack of successful "models". Activities such as fruit and vegetable cultivation, *Qiang* embroidery, and the Hydropower station have helped to increase the use of local advantages. However, most of the advantages are still not fully developed.

There is no activity that can be termed particularly prominent in terms of employment and income in this township. Several activities, including horticulture, livestock-raising, sideline activities, industries, transportation, and tertiary activities have contributed to the generation of whatever off-farm employment there is at present.

The regional variation of off-farm employment in this township is considerable. Generally speaking, the valley villages have better opportunities for off-farm activities outside agriculture, while mountain villages have advantages for the development of off-farm activities related to agriculture.

The off-farm activities related to agriculture, such as horticulture and sideline activities, have become the major source of income and employment for the poorer groups. However, the participation of low-income groups in off-farm activities outside agriculture is very low. No special policies exist at present to help the low income groups. Nevertheless, non-farm activities have created both permanent as well as seasonal employment for the local people, while off-farm activities within agriculture have only generated seasonal employment. Generally speaking, the labour demand of most off-farm activities does not greatly hamper farm activity.

Guidelines for the Future

1. Off-farm activities within agriculture have greater potentials and provide easier access to most of the households and to females than jobs outside agriculture. The focus should be on off-farm activities within agriculture in the near future. The development of non-farm activities should be based on locally available resources and outside technology and funds.
2. Horticultural activities, such as growing apples, peppers, and vegetables, not only have a higher output-input rate and productivity than traditional crops, but also have promising markets in both local areas and outside. In addition, the land area for growing cash crops is extensive. The growing of vegetables can greatly enhance the use of cultivated land. According to the estimates by local key informants, the area of land suitable for growing cash trees is at least three times as much as the current area devoted to fruits. The area for growing vegetable can also be doubled, *Qiang*

embroidery is a unique product of the *Qiang* people and has great market potential, but it is now just beginning to move towards market-oriented production.

3. Most of the non-farm activities, such as mining, logging, and processing, are limited by many factors such as lack of resource bases, technology, funds, and markets. Relatively speaking, the exploitation of water resources has better prospects. According to a tentative survey by the relevant departments, there are another four places along the rivers in this township that are suitable for the construction of small-scale water conservation projects for energy as well as irrigation.
4. From a long-term point of view, more emphasis should be placed on human resource development and the construction of infrastructural facilities. It will be difficult for non-farm employment in this township to take off without human resource development programmes and without the improvement of infrastructural facilities. The relevant government departments should therefore make efforts to improve the knowledge and skills of the local people, to create conditions to absorb qualified scientists and technicians, and to attract investments from outside.
5. Mining in Mianchi township is still on an informal level and there are no environmental safeguards. Further, survey of mineral resources (quartzite, barite, and mica) should be conducted with a view to formalising operations and extracting minerals without damaging the environment.
6. Efforts also need to be made to improve the traffic, road, and communications' infrastructure. The condition of the roads connecting the Chengdu-Aba road with villages such as Qiangfong and Keyue needs to be improved to facilitate the transportation of vegetables and fruits to the market.
7. A number of guidelines relating to policies can also be proposed as a result of the Mianchi case study.
 - i) **Need for a Stable Policy:** A stable policy is crucial to encourage farmers to grow fruit trees on their contracted hilly lands. Any change in the CRRP policy will have a serious impact on such activities.
 - ii) **Preferential Treatment:** Farmers willing to involve themselves in horticultural development and other activities based on natural comparative advantages should receive preferential treatment with respect to loans and extension support.
 - iii) **Training:** Occasional training and guidance in the techniques of fruit and vegetable cultivation are not enough to enter a competitive market in the future. The need for well-trained extension agents, specialising not only in production but also in quality control, grading, and packaging is, therefore, great. More emphasis needs to be placed on relating basic and professional education to the needs of horticultural and similar developments. Also, information regarding markets and appropriate opportunities needs to be disseminated through the formal channels of the village and township governments.
 - iv) **Attracting Outside Expertise:** A favourable policy needs to be pursued by local governments to attract outside expertise and entrepreneurs in the development of off-farm activities both within and outside agriculture.

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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