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THE DEVELOPMENT OF MOUNTAIN AREAS -
MATERIAL FOR SOUTHERN CHINA

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1. Introduction

Li Zhuchen estimates that mountains and hills make up approximately two-thirds of China's total area, with some 2330 counties - 69% of the total number - considered to be mountain or semi-mountainous counties*. The mountain areas contain one-third of China's population, produce one-third of total grain output and possess 40% of China's cultivable land (Li Zhuchen).

However, as the Geographical Society of China points out, for many years the state has concentrated much of its agricultural capital investment funds in developing production on the plains, ignoring the mountains. Indeed, the Society considers the state's consistent neglect of mountain areas and their development to be a major policy fault.

In recent years, there seems to be some evidence to suggest that the state is prepared to do more to encourage the development of mountain areas. This paper proposes first to outline in general terms the problems which mountain areas face, and to comment upon the possible solutions to these problems which have been put forward using materials drawn from the mountains of Southern China; and secondly, to look at developments in the rural economies of two specific areas within Southern China.

From the outset it should be noted that materials presented in this paper are concerned with "intermediate" mountain areas rather than what might be called "pure" mountain areas. These intermediate mountain areas are comparatively low-lying (predominantly under 6000 feet) and often contain some amount of flat land (mountain valleys, plains and so forth). While numerous difficulties limit the potential economic development of intermediate mountain areas, this potential remains, however, much greater than that of pure mountain areas.

* It is unclear from the materials as to any universal definition of "hills" and "mountains". In this paper, it is proposed to adopt the definition used by Cheng Weimin (1982), whereby "hills" are defined as being between 200 and 500 metres above sea level and "mountains" as being over 500 metres above sea level. It is recognised that such definitions do not adequately convey details of relief, and where possible the text will seek to clarify the nature of the terrain.

A further distinction should be made about the materials presented in this paper. The environmental conditions of the mountains in Southern China are favourable in comparison to the mountain ranges of Northern China and it would appear inevitable that the relatively advantageous natural conditions of the Southern China mountains will offer greater opportunities for development. Thus, while the problems outlined below may be found in any mountain area of China, it is doubtful if the proposed solutions can be so universally applied.

2. The mountains of Southern China: the setting

The mountain area of Southern China refers to mountain areas in the nine provinces of Fujian, Guangxi, Jiangxi, Hunan, Guangdong, Guizhou, Hubei, Zhejiang and Anhui. The area is considered, by Wang Youchen, to possess a sub-tropical or temperate climate with long daylight hours although inevitably there is considerable variation in temperatures and rainfall in the area as a whole, not least being variation by elevation, as illustrated by Cheng Weimin (1982) with reference to data for Southern Hunan:

TABLE 1. Southern Hunan. Variations in temperature and rainfall with elevation.

Height above sea-level (m)	Average temperatures			Accumulated temperatures (°C) (values > 10°C)	Frost-free days/year	Rainfall (mm)
	Jan.	Aug.	Annual			
200	6.6	28.5	18.3	5757	298	1400
400	6.0	26.4	16.7	4980	273	1600
600	4.8	25.4	15.7	4675	255	1800
800	4.0	23.0	14.9	4290	225	2000
1000	3.6	21.3	13.5	3791	201	1900
1200	0.1	20.3	11.3	2477	175	1850

Materials Source: Cheng Weimin (1982) p. 27.

The rural economy of the Southern China mountain areas in comparison with northern mountain areas is relatively prosperous - reflecting the advantageous natural conditions - with well-developed agricultural and industrial undertakings. It is claimed by Wang Youchen that transport links are comparatively convenient. Although he offers no figures, Wang Youchen notes that the density of road networks in the Southern China mountain areas is high, twice that for the mountain areas of North East China for example.

While there is no denying - as shall be discussed below - that numerous problems do exist in the Southern China mountain areas, there seems to be little doubt that the resource base of the area offers a potential for development less found in northern mountain environments.

3. Problems, solutions and progress in the mountain regions of Southern China

"At present, our nation's agriculture is in a vicious circle from which it cannot immediately free itself. On the one hand, everyone admits that in agriculture the five sectors (that is crops, livestock, aquatic production, forestry and sidelines) must be developed in an overall manner, and that measures should be suited to local circumstances. On the other hand, because of the shortage of foodgrains, many ways must be found to engage in food grain production. Thus, economic crops are being pushed out, and improper reclamation of wasteland, expansion of planting and irrational increases in multiple cropping have occurred everywhere. Mountains, forests, grasslands, lakes and ponds are destroyed and soil fertility is massively depleted. As farmland fertility drops and water and soil are lost from the slopes, grasslands become deserts, the environment is destroyed, ... increases in food grains slow, then stagnate. We are forced to expand plantings further ... This situation has affected us all." Shi Shan.

In this lengthy and revealing quote, Shi Shan appears highly aware of the grave problems which all China's mountain areas face. However, to attribute blame for current ecological problems to a shortage of food grains is in itself an insufficient explanation. Aside from the deforestation which resulted from the extension of grain fields, numerous other factors have significantly contributed to the long-standing reduction in the forestry resources.

Li Zhuchen makes the point that population increase since liberation - from 524 to 1015 millions (*Zhongguo Tongji Nianjian* 1983, p. 103) - has inevitably meant deforestation due to increased pressure upon limited cultivable land resources. Equally important is the growing demand for firewood. To be

sure this is less of a problem in Southern China than it is in some areas of North East China for example where, according to Li Zhuchen, firewood is usually lacking for 4-6 months and occasionally for periods of 8-10 months. Nevertheless, some deforestation has been caused by the felling of timber for use as firewood, as well as for other uses such as building materials and so forth. As the state council points out in the *People's Daily* 6 December 1980 (p. 1):

"in many localities today, trees are being logged arbitrarily and timber is being resold for profit. Our forest resources are being seriously sabotaged."

While China has historically suffered ecological problems, it is now being argued that recent forest cutting has greatly hastened erosion. Cheng Weimin (1984) for example, notes that between the mid-1950s and mid-1970s Hunan province saw a reduction in its forestry area of 22.83 million mu, with the percentage of plant cover falling from 41% to 31.9% and the extent of barren slope-land increasing to some 75 million mu - said to be 32% of Hunan's total mountain area. Consequently, the amount of land in Hunan which suffered from soil erosion rose from 12% to 27% of the total land area and river flows increased by 39.7%.

Cheng Weimin (1984) continues his argument claiming that these increases in soil erosion rates and river flows and the loss of vegetation cover, provided the explanation for the increasing frequency of natural disasters in Hunan in recent years. Between 1501 and 1950 there were 41 recorded instances of drought, on average one every ten years, whereas between 1951 and 1977 there were nine instances of drought, one every three years. Similarly the incidence of flooding in recent years has increased from one in ten years on average to one in five years.

In the current phase, numerous efforts have been made to improve the forestry resource base. First, there have been regulations to curb the arbitrary logging of forestry resources. The *People's Daily* 6 December 1980 outlines the following measures which were laid down by the state council in order to prevent such logging: first, forestry production plans must be strictly implemented at all levels; secondly, the state monopoly in the purchase and marketing of timber and bamboo must be strictly practiced, with all timber and bamboo free markets in forest areas being closed; thirdly, it is necessary to improve the management of timber logging and timber transport;

and finally, any peasant guilty of illegally felling trees, profiteering on timber, bamboo and so forth, should be severely dealt with.

It is difficult to know how effective these regulations have been but it must be doubted if the state can completely prevent the arbitrary logging of trees unless it can be seen to effectively remove the continuing shortages of wood for fuel, building materials and so forth, especially in the light of its insistence upon a continued monopoly on the purchasing and marketing of timber and bamboo.

To complement measures preventing the unauthorised felling of trees, the state, it is claimed, has also promoted afforestation in resolutions such as the state council "resolution on a Nationwide Voluntary tree-planting campaign" as reported in a *Xinhua* 12 March 1981 release, this nationwide voluntary tree-planting campaign being "a major measure" in the general promotion of afforestation throughout China. As Wang Youchen notes, such afforestation can be very successful where appropriate planting - such as on those hills which became barren as a result of the drive to expand grain fields - takes place.

Nevertheless, while in itself this voluntary tree-planting campaign is laudable, the fact that it seems to occupy such a major part in the overall afforestation drive, indicates that the state finds itself unable to finance afforestation to any significant extent. Indeed, while Wang Youchen calls for increased state investment to promote afforestation and the general development of the mountain economy, the Geographical Society of China makes the telling comment that mountain areas should not expect to rely on state investment funds in their development. Given the many calls on the state's financial resources, it is this latter argument which appears to be more realistic, with local areas encouraged to accumulate their own investment funds and utilise available bank loans to develop forest resources.

Aside from the preservation and extension of the forest resource base, many authors put forward the view that the existing forest resources could be better managed. Li Zhuchen for example, comments on the need for effective management of forests in terms of enclosure of forest areas and a balancing of planting and felling. Similarly, Wang Youchen notes the need for a sufficient number of nurseries to develop a stock of young-trees as well as the need for an increased scientific basis in the clearing of trees and so forth.

However, while the need for the improved management of forest resources has been recognised for several years, problems still remain. Wang Youchen notes that the number of young trees planted remains insufficient, with survival rates low, and all too often they are cut down before maturity. Concern for immediate gains and quick profits it would seem outweighing long-term considerations, although this phenomenon is only natural given the instability exhibited in rural policy in China since liberation.

Cheng Weimin (1984) notes that in Hunan, for example, while afforestation has taken place, the structure of the forests that are constructed is irrational. He comments that in the 1950s the amount of "pure" forest (that is forest consisting of one type of tree) in relation to the total forest area was small. At present, however, in afforested areas, China fir makes up 74% of total tree stock. Such a large proportion of China fir "pure" forest, argues Cheng Weimin (1984), not only reduces the natural productive capacity of the forests, but also increases the instability of ecological conditions.

However, it must also be said that state prices for timber are low in comparison to those of other goods. As Wang Youchen comments, the peasants complain that "selling timber is not as profitable as selling firewood". In other words state prices for timber are low but "private" prices for firewood are high. Given such a price discrepancy, it is not surprising that few peasants wish to develop timber forests and that their effective management remains a difficult proposition.

While effective management of forestry resources remains difficult, it is unclear how much progress can be made to prevent the serious ecological problems faced by the mountain areas. In addition, while other possible solutions to these problems - controlling water flow through the construction of reservoirs and check dams, terracing mountain slopes and so forth - are mentioned in the materials, there is little sign that such measures have thus far been implemented to any significant extent, no doubt partly because of heavy investment costs.

There is no doubt, however, that the Maoist over-emphasis upon grain production is a major cause of many of the economic and ecological difficulties currently found in the mountain regions. As Shi Shan notes above, the extension of grain fields - often through wholesale destruction

of forest resources - and multiple-cropping into areas unsuitable for grain production not only had a detrimental effect upon yields throughout China, but seriously undermined the ecological balance of the mountain areas.

The clearance of forest areas together with the extension of grain production to land with slopes greater than 25° inevitably led to increases in soil erosion. In China as a whole, the Geographical Society of China estimated that an area of 1.8 million km² - one-fifth of the total land area - suffered from soil erosion in 1980, an increase of 0.64 million km² since 1949*. Indeed, Cheng Weimin (1984) notes that some counties in Hunan have up to 50% of their total land area suffering from soil erosion. Clearly this is a significant problem.

Li Zhuchen gives numerous examples of mountain areas which were forced to give up diversified undertakings and blindly expand the sown area of grain crops - often utilising considerable amounts of capital investment funds - with similar results of low yield, ecological imbalance and irrational economic structure.

Detail from Yongshun county, western Hunan, suggests a similar conclusion (Chen Qilei *et al*). Yongshun county's resource base was given as follows:

TABLE 2. Yongshun county: agricultural resource base.

	Mu	As a %age of the county total
Total cultivable land of which:	851 487	14.8
1. Paddy fields	467 107	
2. Dry fields	385 380	
Forest area of which:	3 340 000	58.8
1. Timber forest	1 640 000	
2. Economic forest	1 110 000	
Animal husbandry area	1 142 402	19.6
Water area	77 545	1.8
Other	304 503	5.1

Compiled from materials in Chen Qilei *et al*, p. 93.

* Li Zhuchen puts the figure at 1.5 million km² suffering from soil erosion. Nevertheless, it still represents a significant fraction of the total land area.

It would be expected that the rural economy of Yongshun county would reflect the importance of its forest and animal husbandry areas. However, Chen Qilei *et al* claim that in the past too much attention was paid to grain production with the result that the rural economy became unbalanced as Table 3 illustrates:

TABLE 3. Yongshun country. Contributions to gross agricultural income, 1982 (%)

Grain foodstuffs	69
Diversified undertakings	5.6
Animal husbandry	2.2
Forestry	17.8
Sideline undertakings	9.6

Compiled from materials in Chen Qilei *et al*, p. 95.

Chen Qilei *et al* argue from the figures given in Table 3 that there is still an over-emphasis upon grain production in Yongshun, to the detriment of animal husbandry and the diversified economy in particular. This over-emphasis was also reflected, they claim, in the recent capital investment of 29.81 million yuan (22.451 million yuan of which was state investment) in the county's agricultural fields at the same time as ignoring much-needed work to control river flows and so forth. Such over-emphasis upon grain production is attributed by Chen Qilei *et al* to be a major contributory factor to the ecological problems Yongshun is now faced with. As Chen Qilei *et al* note, soil erosion affects 1090 km² of Yongshun's land, 28.6% of the total land area, with soil loss exceeding 1.41 million tons per annum. Furthermore, the decline in soil fertility is also quite startling, the lack of trace elements such as phosphorous and potassium being of particular concern. Similarly, 131 219 mu (34.3%) of Yongshun's paddy fields have extremely shallow plough layers.

In the same way that over-emphasis upon grain production was a destabilising influence on the ecological balance of mountain areas, it also served to depress peasant enthusiasm for agricultural production. As already noted, Shi Shan comments upon resulting reductions in the areas sown with economic crops, with the result that income opportunities and peasant enthusiasm for agricultural production fell especially with the maintenance of low state purchase prices for grain crops.

There has, however, been much discussion concerned with the removal of the previous over-emphasis upon grain production through the restructuring of the rural economies of mountain regions. Grain production, for example, should be rationalized so that inappropriate planting of grain does not occur. The diversified economy should be developed. Hou Xueyu argues for example, that economic forests - orchards, tea-plants and so forth - should be planted, such production having ecological and economic benefits. Similarly, Smil notes the benefits to be gained from developing aquatic produce.

However, the mountain areas still face numerous problems in restructuring the rural economy. Grain production remains a key issue. There is much dispute as to the place of grain production in mountain regions. The Geographical Society of China for example, maintains that grain production is an important prerequisite in the rural economy of mountain areas. All too often mountain areas remain dependent on the state for grain, a situation which Wang Shaoju, a peasant of Fuding county, Fujian province, argues does nothing to facilitate economic development. Further more, as Li Zhuchen comments, the inconvenience of communications make reliance upon the state for both edible and fodder grain supplies foolhardy. Wang Shaoju goes further by suggesting that a suitable solution to the problem in his village of Xiashanxi is to exempt it from state grain quotas. While a *People's Daily*, 24 June 1984 commentary upon Wang Shaoju's comments is sympathetic to his plight and that of his village, it does not go as far as advocating exemption from grain quotas.

Nevertheless, it appears that most commentators feel that it is enough for mountain areas to be self-sufficient in grain production. The state's position remains unclear. Perhaps the major problem faced by the state is that any relaxation of production quotas in mountain areas may lead to similar changes in other more favoured environments which the state view as important commodity grain areas. Despite current bumper grain harvests, the state is unlikely to tolerate a widespread reduction in grain production.

There is also some argument about the development of animal husbandry in the Southern China mountain areas. While most authors see the development of animal husbandry as an important contributory factor in developing the diversified economy of mountain areas, Hou Xueyu, a noted ecologist, feels the slogan "obtaining meat from grass mountains" - not least to increase

supplies of meat to offset shortfalls in grain foodstuffs - is not a suitable one in Southern China. He argues that the nutritious value of much of the grass in Southern China is low and unable to sustain a large animal population. To improve the grass quality would involve ploughing-up mountains which would only encourage further soil loss. Furthermore, the animal products themselves often have to be transported over long distances at high cost. As Hou Xueyu concludes (p. 40):

"The slogan of "obtaining meat from grass mountains" and building bases for animal husbandry on a large scale will inevitably create contradictions between forestry and animal husbandry and even cause large-scale soil erosion."

In addition, there is absolutely no reason to think that the Department of Commerce could handle the outputs of such bases. While not denying the potential for localised development of animal husbandry, Hou Xueyu believes that development must be carefully managed. Clearly there is still much progress to be made in the restructuring of rural economies in the mountain areas.

Smil comments that alongside the restructuring of the rural economy, changed agricultural techniques can also improve ecological conditions. He claims, for example, that (p. 184):

"The universal use of diversified cropping with proper rotations is perhaps the most beneficial step towards a sustainable agroecosystem, especially in the southern half of China with its extensive multi-cropping." Suitable rotations can improve soil structure and increase the soil's organic content as well as raising unit yields.

Furthermore, Wang Youchen claims that if, in the restructuring of the rural economies, the local production units utilise the production management forms which are available in the current phase, the economic results will be good.

According to Wang Youchen, the increasing use of production responsibility systems in grain production, the diversified economy and so forth within the mountain regions has had a favourable impact on production and peasant livelihoods. It is claimed that such systems are an attempt to redress the lack of material incentives and enthusiasm for agricultural production which previously prevailed throughout the rural economy due to the egalitarian nature of policies (for a further discussion of such production responsibility systems, see Wu Xiang; also Diu Qingqi *et al*).

Indeed a *Hunan radio* 25 February 1984 broadcast noted that in implementing responsibility systems in forestry production, contract periods of up to 50 years were being made with contracted forestry areas being both transferable and able to be inherited. Clearly some efforts are being made to encourage production stability - although contract periods of fifty years seem likely to generate their own problems.

The growing use of specialized households and more comprehensive units of production - such as agricultural/industrial/commercial complexes or forestry/industrial/commercial complexes - is also seen as an important trend in the economic development of the mountain areas. As a *Hunan radio* 22 February 1984 broadcast comments (p. 4):

"In developing the mountain areas, we can consider following the line of specialization and comprehensive operations, and integrate production, processing and marketing. We should further expand the area of private mountains in places where there are many barren mountains. We should promote contract work by specialized households and joint operations in large and remote areas of barren mountains."

Wang Youchen and others note that specialized households have been used in a variety of production undertakings within mountain areas. Such specialized households are considered to consolidate the collective economy (Wang Jifu); utilise surplus labour, increase incentives and raise the motivation of the peasants (Lin Zili); to use small investments and gain quick returns with low levels of efficiency (Li Yong); and finally, to increase the commodity circulation rate (*People's Daily* 23 December 1982).

The Geographical Society of China argue that mountain areas should experiment with agricultural/industrial/commercial complexes or forestry/industrial/commercial complexes, especially to develop local specialities to satisfy domestic market requirements. It is argued that utilising every form of such an integrated production framework can provide an outlet for surplus rural labour; can reduce transport costs between towns and countryside as a result of the *in situ* processing of agricultural produce; by-products can be more easily utilised for manure or fodder and so forth (for a further discussion of the role of these integrated production forms see Wang Songpei). However, there is little evidence to suggest that such integrated complexes have as yet become functioning production forms.

Finally, there is much discussion in the materials of developing forestry bases in order to properly manage forestry resources. Wang Youchen for example, argues that in the mountain areas of Southern China bases for such important forest commodity crops as bamboo, tung oil, tallow, lacquer, wood, oranges and so forth could be readily established.

The state believes, with some justification, that such bases together with other production management forms outlined above can enliven the rural economy in mountain areas, promoting better peasant livelihoods, higher incomes, and most importantly as far as the state is concerned, allowing the accumulation of local capital investment funds. Indeed, it is not only the development of agricultural and industrial undertakings in mountain economies which are seen as important in the current phase, the mountain areas are also being encouraged to develop mining, hydro-electric power and tourism (Geographical Society of China).

The introduction of the new production management forms has, however, not been smooth. There have, for example, been problems with the implementation of production responsibility systems (*People's Daily* 19 October 1984). As the *People's Daily* 1 September 1984 notes, the introduction of forestry production responsibility systems have done much to improve the extent and quality of afforestation, however (p. 15):

"Cadres in some localities take a one-sided view of relaxation of the policy on forestry ... Some of them have distributed collective forests among individual commune members in such a way that individual commune members can fell trees at will. As a result forestry resources in some areas have been seriously ruined."

An example of such destruction of forestry resources following distribution of private hills and responsibility hills to individual peasant households is given by Li Guifang using materials from Rongfu township, Wuhan county, Guangdong province. According to Li Guifang (k. 14) following a meeting on 23 May 1984 when distribution occurred, "On 24 May 1984 massive destruction of forest trees by the township's 500 peasant households, consisting of some 2400 peasants, began to take place. Up to the 6 June 1984 they destroyed 1283 mu of forest and felled 38 490 trees."

While these actions were met with measures from the Wuhan county C.P.C.C. - in the form of fines and compulsory afforestation - it is interesting that the

peasants of Rongfu in their defence claimed that (k. 14) "they would rather fell the trees for themselves than see people from outside the township fell and take away the trees". Clearly, there are numerous problems involved here aside from those associated with the implementation of the production responsibility system.

Again, although Wang Youchen advocated the development of forestry bases in mountain areas, he also points out the problems which have arisen, not least that the unitary management of such bases is weak, with forestry products monotonous and dull.

Furthermore, it is claimed that significant commercial difficulties remain in the mountain areas. Such difficulties can only serve to reduce any potential benefits that might be gained from the introduction of new production management forms into the rural economy.

Although it has already been stated that communication networks within the Southern China mountain areas are relatively complete, the quality and flexibility of these networks should not be overestimated. Inevitably access to major markets remains difficult and problematic with commodity and information flows restricted. Additionally, the frequency of natural disasters in the mountain regions - ranging from localised land-slips to widespread flooding, facilitated by growing ecological problems - does much to disrupt the transport networks in these regions. My own experience of travelling in a mountain area of Anhui province, for example, was that a blocked road 20-25 km away was sufficient to disrupt local transport services for several days. This kind of experience would do much to impede economic development in the mountain areas.

Again it is claimed by the Geographical Society of China that commodity circulation in mountain areas remains backward in the current phase after virtually collapsing under the negative influences of "leftist" thinking, with such thinking, it is said, still persisting. As Mao Zhiyong, Hunan C.P.C.C. first secretary, notes (p. 6):

"In order to make the peasants rich as quickly as possible, we must vigorously develop rural commodity production. At present, the main obstacle to this is, as before, that certain comrades cannot shake off leftist influences and the bindings of old traditional concepts; they manage things in an excessively rigid way, so that circulation channels are clogged and the economy fails to liven up."

However, little is said about improvements in commerce, and the previously acknowledged rigidity and backwardness of the commercial system in mountain regions is still apparent. Such rigidity and backwardness inevitably hinders rural economic development, especially because the success of production management forms such as the production responsibility system, specialized households, agricultural/industrial/commercial complexes and so forth dependent very much upon an effective commercial system.

Although a *Henan radio* 25 February 1984 (p. 4) broadcast advocates that:
"transport and sales of third category agricultural and sideline products and those of the first and second categories remaining after fulfillment of the state quotas will not be restricted to the departments handling these products or to administrative boundaries"
therby encouraging individual commercial undertakings, it is difficult to see how this can really alter the fundamental commercial difficulties experienced in mountain regions. Furthermore, the state is unlikely to allow any further significant erosion of its control of the marketing and purchasing of first and second category agricultural and sideline products.

From a general review of materials concerned in the main with the relatively favourable mountain environments of Southern China, some tentative conclusions about the state of the rural economies in such mountains can be reached. While some progress has been made to alleviate the severe economic and environmental difficulties of these areas, it would appear that any development which has taken place is very uneven, with backwardness and poverty still very much apparent. In addition, problems have also arisen out of the recent development strategies which have come into play.

From a general review, such conclusions must remain tentative. However, a more definite view of the development potential of mountain regions might be gained from observation of mountain economies at a more local level.

4. The all-round development of a mountain economy: the example of Northern Guangdong

According to Wu Yuwen, the mountain region of Northern Guangdong is made up of 14 counties - Yuechang, Renhua, Nanxiong, Shixing, Ruyuan, Lian, Lianshan, Liannan, Yangshan, Yingde, Fogang, Qingyuan, Wengyuan and Qujiang - and Shaoguan city (see Figure 1). The mountains - forming the southern section

of the Nanling mountains - are, by Chinese standards, relatively low-lying between 600-1000 metres above sea level, with a maximum elevation being 2000 metres above sea level (see Figure 2).

Wu Yuwen outlines the resource base of the Northern Guangdong mountain region as follows:

TABLE 4. Northern Guangdong mountain region : resource base

	Northern Guangdong mountain region	Resources as a %age of Guangdong's total resources
Total area (km ²)	35645	16.81
Total population (millions)	5.229	8.93
Total cultivable land (million mu)	4.886	c 10
Cultivable land (mu/person)	1.15	
Gross agricultural and industrial output value (billion yuan)	3.124	7.5

Compiled from materials in : Wu Yuwen, p.102.

Chinese statistical yearbook 1981, p.186.
Zhongguo Tongji Nianjian 1983, p. 21,148.

Wu Yuwen describes the area as being very greatly in need of development. Certainly in comparison to much of Guangdong, this Northern mountain region is backward, nevertheless, it does possess numerous advantages for potential development which make it a distinctly favourable mountain environment.

As already noted, this is a relatively low-lying mountain region (see Figure 2), with numerous large and small river valleys and basins suitable for cultivation distributed throughout the area. Furthermore, the mountains themselves act as a "protective screen" from typhoons and excessively cold weather although the region is still affected by monsoons, principally in the lowland regions. Compared to other mountain regions, Northern Guangdong has a favourable ecological system with dense forest cover protecting both upland and low-lying areas from excessive soil erosion and so forth.

Climatic conditions are also favourable:

TABLE 5. Northern Guangdong mountain region : climatic conditions

Average annual temperatures ($^{\circ}\text{C}$)	18.8 - 21.6
Average annual accumulated temperature values ($^{\circ}\text{C}$)	6860 - 7937
Annual daylight hours	1473 - 1925
Solar radiation levels (Shaoguan station) (cal/cm 2 /minute)	0.213
Average annual precipitation (mm)	1480 - 2200

Compiled from materials in : Wu Yuwen, p.102.

According to Wu Yuwen, biomass levels exceed 450-600 tons per hectare, with high levels of micro-organic activity. It would appear that, for the most part, agricultural production conditions are good.

Furthermore, mineral resources are abundant with reserves of lead, zinc, silver, Tungsten and so forth. Marble, limestone, quartz and China clay are locally quarried, and coal and iron ore are locally mined. It is not surprising therefore, to discover that the industrial base of the mountain region is comparatively advanced, especially with respect to the metallurgical industries, in refining, for example, zinc, silver, aluminum and tin and in the production of coke, pig iron, steel and rolled steel products (Wu Yuwen).

The mountain region also contains a rich variety of water resources, with almost every county capable of developing hydro-electric power stations. Again, Wu Yuwen notes that it should also be possible to develop a tourist industry, the area possessing interesting sandstone landforms, limestone caves and associated features and numerous hot springs.

Finally, and perhaps most significantly, it is claimed that the Northern Guangdong region has relatively developed transport networks. Indeed, it appears to be the hub of the communications network between Guangdong and Hunan and Jiangxi provinces. Almost every county has a major river flowing through it (although this still limits access to river margins) and most county towns are located on or near rivers (Figure 1). Road transport is relatively developed, with a network of about 7000 km of roads - although no comment is made upon their quality or distribution. While accepting that the communications network is still backward in comparison to other areas

within Guangdong for example, Wu Yuwen concludes that transport networks and communication links in Northern Guangdong are relatively convenient. Undoubtedly significant commercial difficulties will still be experienced in Northern Guangdong, however, the availability of transport networks may at least reduce the severity of such difficulties in comparison to those experienced in other less fortunate mountain regions.

Having established the significant development potential that exists in the Northern Guangdong mountain region, Wu Yuwen notes that three major problems are to be found : first, the population of the area continues to expand upon a finite resource base. Although no comment is made in the materials, it would not be surprising to discover that the current "one-child" policy is difficult to implement in such mountain regions as Northern Guangdong.

Secondly, there are still numerous ecological problems to be faced, with natural disasters still common-place. In May and June of 1983 for instance, much flooding occurred in numerous counties of Northern Guangdong following torrential rainfall throughout the mountain area. Qingyuan, one of the region's more low-lying counties (see Figure 2), suffered much damage as a result. In May 1983, communes throughout Qingyuan experienced flooding and tornadoes which left 1 person dead, 12 injured, 832 houses either destroyed or damaged and over 60000 mu of agricultural land inundated (He Shibing *et al.*, 14.5.1983). A month later, in June 1983, He Shibing (19.6.1983 and 20.6.1983) reports further flooding damage in Qingyuan after yet more torrential rain (460 mm in 48 hours). On this occasion, 7300 homes were destroyed or damaged with 11000 people reported homeless. Over 200000 mu of agricultural crops were inundated with at least 11000 mu of crops completely destroyed. Communications and transport networks, electricity supplies and so forth were severely disrupted. Similar problems were reported in the *Nanfang Ribao* 17.6.1983 for Yangshan county.

Thirdly, the utilization of the land resources which are available in Northern Guangdong is poor. Production levels remain low and the potential for development remains as yet unrealised. In the current phase, perhaps not surprisingly given the beneficial affects which can accrue to the peasants, it is the stimulation of the local economy, through a more efficient utilization of the available resources, which has been to the fore with little written about population or ecological controls within the area. This is perhaps a significant indication that long-term problems of

population increase and ecological difficulties will remain and even intensify.

Grain production remains a significant problem. Wu Yuwen, using 1982 statistics, notes that the gross grain output of the Northern Guangdong mountain area was 3.96 billion jin, an amount considered to be insufficient to fully meet local needs. The state had to supply over 600 million jin of grain foodstuffs (16.6% of total needs). To improve this situation, the introduction of production responsibility systems is seen as important. In Qujiang county for example, Qiu Fusheng reports that the introduction of the all-round contract system of production responsibility fostered a bumper grain harvest with 73 households selling over 10000 jin of grain to the state. Qiu Fusheng notes that Qujiang county has now become a key grain-producing area, regardless of whether households are located in the mountains or on the plains. In Hongwan commune, a mountain production unit of Qujiang county for example, 114 agricultural households - out of a total of 800 - produced over 10000 jin of grain. It is clearly hoped that the widespread introduction of production responsibility systems into grain production can change the area from a grain-deficit region into one of at least self-sufficiency in grain foodstuffs.

There has also been some improvement in the development of the diversified economy. Wu Yuwen comments that, until recently, the diversified economy in the Northern Guangdong mountain region was weak despite the fact that some production undertakings as noted by Liang Rencai, were long-established. In the current phase it would seem that, with diversified undertakings no longer considered to be "tails of capitalism", local specialities have reasserted themselves. Wu Yuwen, for example, notes that local fruit products have developed - pear production in Yangshan; plums in Wengyuan; sand pears in Shixing; mandarins in Lian and so forth. Similarly, silkworm production has gathered pace in Qingyuan, Yingde, Wengyuan and Yangshan with many previously barren hills effectively utilized. Such utilization, is claimed, requiring relatively small amounts of investment and low labour requirements yet yielding quick and large benefits, although no detail is given to justify these claims.

Production responsibility systems have also been used to facilitate the development of diversified undertakings and it would appear that specialized households are also emerging. Xie Yifang et al report that in Qingyuan,

specialized households have been emerging in both the mountains and the plains - though it is not specified in what proportion. In total, some 26 diversified undertakings are currently developed by over 8500 specialized households within Qingyuan, including tea, fruit and so forth. The economic benefits of developing diversified undertakings in this way are, it appears, large with some specialized household per capita incomes reported to be in excess of 10000 yuan. Indeed, Xie Yifang *et al* claim that in Qingyuan, amongst the 8500 specialized households, the average net income per capita in these households is 1100 yuan.

Similarly, all-round contract systems of responsibility have been implemented in forestry work, such work being important to repair the environmental damage caused by the excessive clearance of forest in this century, with average annual net depletion rates reaching 400000 m³. Li Qingyu *et al* (9.4.1983) give the example of Zhao Mujiao of Yaozu production team, Yao'an brigade, Yao'an commune, Lian county. Together with her household - a labouring ability of 6 - she signed contracts with the brigade forestry centre to establish nurseries (for which it was claimed she would receive subsidies) and develop forestry paths as well as being responsible for 1000 mu of forestry land. The brigade was responsible for supplying a sufficient quantity of grain for subsistence and all income derived from the contracted land went to the household, 10685 yuan in 1982. A further example of the beneficial impact of responsibility systems in forestry is offered by Guan Jian *et al* for Nanxiong county and it is hoped that such development will occur on a wide scale.

Again, the all-round contract systems of responsibility have been used to develop aquatic produce. Some 390000 mu of water area exists in Northern Guangdong of which 270000 mu could be used in the development of aquatic production (Wu Yuwen). Breeding fish requires little investment, involves few costs but can yield quick and high returns as Liu Xueyuan of Maoping production team, Chengjiao brigade, Chengjiao commune, Shixing county discovered (Zhu Zuzhou). In 1982, from 24 mu of contracted fish-breeding pools, his household was able to achieve a net income of 15515 yuan:

TABLE 6. Liu Xueyuan's household, Shixing county ; production output, costs and net income, 1982 (yuan unless stated)

Total output of fish (jin)	13350
Gross income from fish production	17355
Gross income from 5 pigs and numerous head of poultry	3020
Gross household income	20375
Production costs	4860
of which	
1. fish-breeding taxes	4360
2. cost of fish fry; piglets	500
Net household income	15515

Compiled from materials in Zhu Zuzhou, p.2.

However, it must be said that the production costs outlined in Table 6 seem incomplete. No mention is made, for example, of fodder costs, cost of fish nets and so forth which will lower net income. Nevertheless, there is little doubt that net income will remain high.

Aside from agricultural production, Wu Yuwen also noted the need to fully develop local industrial undertakings, hydro-electric power supply, mining and tourism. Local industry, for example, seems to have developed using investment funds from two sources : household funds; and provincial/county funds. He Shibing *et al* 17.9.1984 note the example of Ye Jinyang's household in Qingyuan, who set up a copper-refining factory which in 1983 had a gross output value of over 970000 yuan, 58000 yuan being contributed to the state in taxes with the household net income being 90000 yuan. On a larger scale, Bai Shanhua notes the development in Yangshan county of large cement and phosphate fertilizer plants funded by provincial investment funds. Such plants have not only yielded good economic returns, but have also provided employment for surplus rural labour.

However, it must be said that the industrial development outlined above remains, in a case like that of Ye Jinyang, somewhat exceptional, and in the case of the Yongshan cement and phosphate fertilizer plants, an example of external investment which not every county can expect. There appears to be still much room for further developing rural industry in Northern Guangdong though industrial concerns are certainly to be found in the area.

However, significant developments have been made in terms of hydro-electric power generation. In Liannan county, for example, the Liannan county authorities note how their county has developed 78000 kw of a potential production capacity of 149000 kw. Currently, the county network of small-scale hydro-electric power stations annually supply 200 million kWh of electricity, 45 million kWh of which goes outside the county, for example to neighbouring Yangshan (Li Qingyu et al, 3.4.1983).

The benefits that have derived from this development of hydro-electric power have been four-fold. First, it has facilitated the development of rural industry at county and lower levels. Of particular importance has been the growth of commune- and brigade-run agricultural produce processing industries. In 1982, the commune- and brigade-run industrial undertakings had a gross industrial output value of 9.51 million yuan, in comparison to a gross industrial and agricultural output value of 8.77 million yuan in 1970 (Liannan county authorities).

Secondly, this industrial development has in turn facilitated an increase both in collective funds and per capita distributed incomes within the county:

TABLE 7. Liannan county. Collective funds and per capital distributed incomes 1970, 1982 (yuan)

	1970	1982
Collective funds	195000	697000
Per capita distributed income	70	182

Compiled from materials in : Liannan county authorities, p.44-5.

Thirdly, this increase in collective funds in turn promotes agricultural development. Of the 54000 mu of cultivable land in Liannan county, some 33000 mu was constructed (in Liannan this probably refers to the terracing of hillslopes) from collective funds obtained from hydro-electric generation.

Finally, peasant livelihoods have improved as a result of the increased availability of electricity. In Liannan county 80% of all households have electricity - although it must be asked why 20% remain without even though Liannan produces electricity surplus to domestic needs. However, much has been gained through the development of the hydro-electric power industry.

It has already been noted that rural economic development can only fully develop if the commercial system - both in terms of physical accessibility to markets (availability of transport, adequacy of transport networks and so forth) and the availability of administrative channels to markets - is capable of carrying the burdens which an enlivened rural economy can place upon it.

In the Northern Guangdong mountain area, there are signs that attempts are being made to improve physical accessibility within the area - accessibility which has already been described as relatively convenient for a mountain area. Both He Shibing (29.5.1983) and Hu Cheng (1.6.1983) note the emergence of individual peasants specializing in the transport of goods. In Qingyuan for instance, He Shibing (29.5.1983) notes that over 3400 peasants are employed in the private transportation of produce. Undoubtedly such individuals have made an important contribution to the reported flourishing urban and rural markets within Qingyuan - and this despite the natural disasters noted above which it faced. This flourishing commercial activity being both the cause and effect of the large proportion of households - 20% of the county's total number - which are recognised in Qingyuan as specialized households.

Hu Cheng (1.6.1983) notes that peasant Xie Mingji of Xiajie production team, Qingshan brigade, Fucheng commune, Wengyuan county, after effectively utilising barren slopes to develop ginger and other cash crops in 1982, had a net income of 23500 yuan. With this income he purchased a 5 ton lorry and became involved in the transporting of local agricultural produce and other goods. In only one month in 1983, his income was 2800 yuan, reflecting the high need for transport in the area, perhaps as great a need as the availability of roads themselves. (Though no details are given as to how Xie Mingji purchases diesel, spare parts and so forth).

Hu Cheng (16.9.1984) notes that the Wengyuan county authorities recognize that they should maintain roads for peasants such as Xie Mingji, and to this end they have established 19 maintenance squads to ensure that the county's 138 roads - totalling 755 km - are capable of carrying traffic all-year round, although it appears almost certain that periodically natural disasters will disrupt transport networks and commodity flows as already noted in Qingyuan and Yangshan.

This awareness of the importance of physical accessibility to markets is matched by an awareness that supply and marketing organisations must also overcome the difficulties they have experienced in recent years - although there is of course no guarantee that such an awareness will be translated into physical actions. The *Nanfang Ribao* (27.3.1983) notes the improvement which has occurred in Lian county's supply and marketing co-operative. Previously, co-operative workers were concerned that they did not make losses and as a result they did not concern themselves with the more remote outlying mountain areas. However, after adopting a system of responsibility for tasks within the co-operative, it is claimed that commercial work has been transformed in all respects, though no details are given.

Nevertheless, the material on commercial improvement is by no means comprehensive. The best that can be said is that commercial improvement is being claimed, but this improvement is obviously patchy with commodity circulation difficulties continuing to prevent a fuller development of the mountain economy of Northern Guangdong. Although detail is scant, it seems most likely that certain counties - as well as certain production units within the counties as a whole - will enjoy greater development than others because of the high proportion of low-lying plain land contained within them, as well as factors such as proximity to the major urban market of Guangzhou, or lesser urban centres such as Shaoguan.

It is noticeable that much material appertaining to the rural development of Qingyuan for example is to be found. Qingyuan has a high proportion of plain land (see Figure 2), and is only 60 km from Guangzhou with - at least - good river and rail links to the provincial capital (see Figure 3). No doubt these favourable conditions combine with recent policy changes to allow significant development in the rural economy of Qingyuan, encouraging a comparatively high degree of specialisation in

commodity circulation and enabling it to counter the natural disasters it does have to face. It would not be unexpected to find such development in Qujiang or Yingde for example (see Figures 1 and 2) but in the more peripheral counties to the North, North East and North West of this mountain region, counties which contain much less low-lying land, it is expected that they are faced with commercial and production difficulties which prevent the high degree of specialisation in commodity circulation found in Qingyuan as well as general development in their local economy.

Furthermore, it is difficult to believe that widespread specialisation in production can occur in the Northern Guangdong mountain area bearing in mind the difficulties to be found in grain production - the Northern Guangdong mountain region still striving to be self-sufficient in grain. Both Qingyu et al and Li Qingyu et al (9.4.1983) note that grain supplies (both edible and fodder grain) have been guaranteed by production units for those who develop specialized undertakings. Given the current grain situation in the region, production units can ill afford to subsidise many households in this way. In addition, whereas in more favoured environments local subsidies have been used to encourage households to specialize in grain production, effectively guaranteeing fulfilment of state grain quotas and supplies to those households who do not engage in grain production but concentrate on their speciality (for example, the local cash subsidies operating in Yixing county on the western shore of Lake Tai, Jiangsu province as noted by Lin Zili), the local mountain economies of much of Northern Guangdong is ill-equipped to do this. Consequently, specialization of production across the whole region remains low, and so do potential benefits.

There are also still numerous problems to overcome in developing mineral resources. Wu Yuwen, at the same time as advocating effective mining of such resources, admits that there is still excessive competition; weak management; incomes from mining remain low while extraction costs are high; there is much unco-ordinated exploration and prospecting; and all too often mining operations give rise to the destruction of the ecological balance and environmental pollution.

Finally, there still appears to be a reluctance on the part of some peasants to sign contracts for responsibility land. Li Qingyi et al give

the example of 60 mu of fish ponds in Yingde remaining idle even though contract terms offered to cultivate these fish ponds were favourable, only 100 jin of fish each year being required by the authorities. (The example of Liu Xueyuan's household, Shixing county given by Zhu Zuzhou has already been seen to produce some 13350 jin of fish from only 24 mu of fish-ponds. Although pond quality may be different, a quota of 100 jin annually seems very reasonable indeed).

Two explanations were offered for the reticence displayed in Yingde; first, the fact that peasants have found that contracts have been arbitrarily amended by local cadres. In Yingcheng town, Yingde county, four households jointly contracted 800 mu of water area to develop fish-farming. The contract was valid for two years. They were required to hand over 2000 yuan to the local authorities in each year of the contract. Having made 1500 yuan profit after fulfilling the contracted profit quota, certain cadres - jealous of these high household profits - tried to raise the profit quota higher. As a result, the four households did not renew the contract.

Secondly, there is much theft of the produce of contracting households. Li Qingyi *et al* offer examples from Yuechang, Yingde, Qujiang and Yangshan counties, where land is left idle because peasants are afraid that any produce they develop will be stolen. Indeed, Deng Hanping, a peasant of the Number 5 production team, Madu brigade, Longyin commune, Qujiang county, after making a net income in 1982 of 11000 yuan through contracting a 14.5 mu fish-pond and a 13 mu orchard found that "being jealous of his profit, some people called for the abolition of (his) contract and urged equally sharing the fish-ponds among all households" (Li Qingyi *et al*, p.43). Furthermore, when Deng Hanping re-invested his income and excavated further fish-ponds on deserted land, cadres from a neighbouring production team blew the ponds up (Li Qingyi *et al*). With contracts being signed for increasingly long periods of time, this phenomenon could become a major problem.

To sum up, the Northern Guangdong mountain region is a favourable mountain environment although production possibilities and income are limited in comparison to much of Guangdong. In comparison to other mountain environments, however, its development potential appears considerable,

although as of yet, such potential has only been partially realised, predictably being concentrated on the more low-lying lands within the region where production possibilities are large and commercial difficulties less apparent. Significantly, the question of ecological difficulties and possible solutions are little mentioned, and in the long-term, such difficulties may prove to be particularly damaging to the mountain economy.

5. A "mountain grassland resource base" : Jiangyong county, Hunan province

From the outset it should be noted that the material on Jiangyong is such that this section represents more an outline of the resource base which is available in Jiangyong for development rather than an investigation of its past or present development characteristics. No local media material on Jiangyong from provincial newspapers or any other source is currently available, but the material that is available - principally an article by Chen Yunlong *et al* - is considered to be of sufficient interest to warrant inclusion.

Jiangyong is the most south-westerly county in Hunan province. The county has a total area of 1817 km² with much of the land being at an elevation of 200 to 500 metres above sea level. However, in the South and North West, mountains rise to 1950 metres above sea level (see Figure 4). The low-lying hills - that is to say 200 to 500 metres above sea level - are predominantly karst formations with slopes of 10-15° with an abundance of valleys and flatland scattered throughout, such valleys and flatland being ideal for grassland utilization (Chen Yunlong *et al*).

Similarly the warm, moist climatic conditions are considered ideal for the development of a livestock fodder industry:

TABLE 8. Jiangyong county : climatic conditions

Annual average temperatures °C	18.2
Lowest monthly average temperatures °C	7.2
Highest monthly average temperatures °C	29.7
Stored-up temperature values, °C, (of daily temperatures above 10°C)	5789.7
Frost-free period (days)	c 300
Precipitation (mm)	1435.8
Rainy days	165

Compiled from materials in Chen Yunlong *et al*, p.32

There are abundant water resources, especially the three major rivers - Xiaoshui, Tuoshui and Taoshui. Soils, predominantly red and yellow earths, with some lime earths, are generally considered of good quality.

Chen Yunlong *et al* state that the total area of suitable grassland resources is 1265436 mu (46.4% of the total land area) the bulk being found in the more low-lying eastern half of the county. About half of this grassland is managed by collective farms. This compares favourably with the 316359 mu of cultivable land, with forestry resources also of some significance (see Figure 5). The development of these grasslands would appear to be a significant part in developing the rural economy of Jiangyong, especially given the advantages which Jiangyong's grasslands possess. First, there is an abundance of varieties of forage grass. Chen Yunlong *et al* estimate that in all, 121 varieties of pasture are to be found including 62 varieties of the grass family (51.2%) and 26 varieties of the pulse/bean family (21.5%). Such a variety is considered important in the development of a livestock breeding base.

Again, the nutritious content of these varieties is considered balanced, with a good mixture of high protein or high fibre grasses. Similarly, the palatability of these varieties is considered good, palatability an important element in animal husbandry often directly reflecting nutritional value. A selection of the more important grass varieties found in Jiangyong and their palatability is given in the following table:

TABLE 9. Jiangyong county : grass palatability - selected varieties

Family	Utilization rate	Grade	II	III	IV	V
			Excellent	Good	Satisfactory	Poor
Grass	> 60%		50-59%	40-49%	30-39%	29%
Matang Bamboo leaves		Huangbeitiao	Youmang		Bamboo reed	
Green bristle grass		Chinese sorghum Maoluoshi	White cogongrass Mang			
Barnyard grass		Yajurao	Wujiemang			
		Yellow cogongrass	Shuizhicao			
		Wild green grass	Wild gu grass			
		Golden cogongrass				
Pulse/bean		Conggrass Hind soybean	Lespedeza			
		Kutzu vine Laoshidou				
Others		Leiqiancao Leaf				
%age of county's total grass varieties	10.76	55.94	31.45	1.85	0	

Materials selected from Chen Yunlong et al., Table 3, p.34. Also p.40.

Finally, per-unit yields of grass are considered high, an average throughout the county of 1672 jin/mu, with high yields reaching 5612 jin/mu of biomass. From this assessment of Jiangyong's grassland resource base, Chen Yunlong *et al* are able to calculate the theoretical livestock capacity for the county as being as follows:

TABLE 10. Jiangyong county. Grassland yields and livestock capacity¹

Grassland type	Grassland areas (mu)	Grassland yields (jin/mu)	Forage grass utilization rate (%)	Cattle density (Mu/head)	Theoretical cattle capacity (head)
	Total area	Usable area			
Mountain and marshland	117534	117534	2370	45	18
Hilly grasslands	48902	46457	1512	50	24
Scrublands	229326	217860	1210	50	31
Dense grasslands	591805	562215	1112	50	34
Sparse woodlands	141669	134586	1240	45	34
Unoccupied 2nd category agricultural land	136200	136200	2600	70	10
County totals	1265436	1214852	1672	24.5	49606

¹ Livestock capacity is calculated throughout in terms of head of cattle. A 1966 Hunan province formula (Chen Yunlong, Table 6 footnote) explains the formula as follows:

1 head cattle	= 1 head cattle
1 head water buffalo	= 1.5 head cattle
1 head horse/mule	= 1.2 head cattle
1 head donkey	= 0.5 head cattle
1 head sheep/goat	= 0.1 head cattle
1 head pig	= 0.2 head cattle
1 head poultry/rabbit	= 0.005 head cattle

Materials source : Chen Yunlong *et al*, p.35.

Clearly it is important that this theoretical cattle capacity maximum of 49606 head should not be exceeded. Data for 1979 indicates that at that time this theoretical maximum was not yet reached:

TABLE 11. Jiangyong county. Livestock, 1979

	Cattle	Water Buffalo	Horses	Sheep/ goats	Rabbits	Total
Head at hand	10525	21768	13	1307	2981	36594
Expressed as a unit of cattle ¹						
1. head	10525	32652	16	131	15	43339
2. %age of total	24.3	75.3	0.05	0.3	0.05	100

¹ Using formula given in Table 10, footnote 1.

Materials source : Chen Yunlong *et al*, p.36

Indeed, after including a correction for the time-period (usually 3 months of the year) when livestock is enclosed, this total livestock capacity figure is further reduced to 32652 head of cattle. This leaves the equivalent of 17000 head of cattle in spare capacity. Given this knowledge, Chen Yunlong *et al* believe that Jiangyong should expand the amount of livestock kept as well as further developing the potential livestock capacity. They recommend this expansion of livestock should follow three principles.

First, using some form of production responsibility system to encourage and reward effort. Recently, following the implementation of this kind of policy collectively-run farms have emerged in numerous livestock undertakings including cattle, sheep/goats, and rabbits. Similarly, specialized households have emerged in animal husbandry. Whatever form of management is adopted, Chen Yunlong *et al* note that incentives should be kept as high as possible to maintain peasant enthusiasm for production.

Secondly, all aspects of livestock management should be strengthened. More households, for example, should be encouraged to develop small-scale animal husbandry such as rabbit-breeding where investment requirements are

low and returns both quick and relatively high. The county must move away from the prejudices of former years where "one household bred livestock while ten rebuked it".

Thirdly, the grassland utilization rate should be improved. Grazing, for example, should be more rationally dispersed so as to avoid over-grazing in any one particular area, with suitable winter grazing arrangements being made to alleviate the phenomenon of "lean winters".

It would appear that the grassland resource base of Jiangyong county is suitable for development as a livestock fodder base, despite the reservations already noted of Hou Xueyu. Nevertheless, the material presented is more concerned with a rational investigation of the available resource base and the orientation of its possible development, than with the development itself. Key issues, in particular the effectiveness of commercial organisations, transport systems, the level of grain production and so forth are not dealt with by Chen Yunlong *et al.* Clearly there is much potential for the development of Jiangyong as a livestock fodder base, especially if effectively managed, but just as clearly there are many obstacles standing in the way of the full realisation of this potential.

6. Conclusions

"The distribution of rich counties and poor counties makes one uneasy Poor counties are concentrated in regions where the natural resources and ecological equilibrium have been destroyed. And this destruction of natural resources and environment has to date not yet stopped. If it continues, the number of poor counties will increase further".

Shi Shan.

Although he does not specify mountain regions, Shi Shan would certainly include them as being regions made up of poor counties "where the natural resources and ecological equilibrium has been destroyed". In addition, commercial difficulties, long-standing neglect from the state, inability to generate capital investment funds and so forth might be added to any discussion of the problems to be found in the mountain regions of China. Certainly the material from Southern China - in the main concerned with relatively favourable mountain environments - make such points.

Nevertheless, this does not preclude recognition of the fact that some development of the mountain economy has occurred in the current phase. Tian Jijin, using material from a survey of households in 800 mountain counties throughout China, notes the rise in per capita incomes and livelihoods between 1978 and 1982:

TABLE 12. Selected mountain households : incomes and livelihood, 1978, 1982

	1978	1982
Average per capita net incomes (yuan)	118.3	233.8
Income from sideline occupations (yuan)	39.89	111.7
Average per capita consumption of:		
1. processed food grains (jin)	462	492
2. edible oil (jin)	3.7	6.3
3. meat (jin)	12.3	20.2
Bicycles per 1000 population	22	46

Compiled from materials in Tian Jijin, p.19-20.

However, such figures do not fully reflect the unevenness of development in the mountain areas, and likewise does not reflect upon the substantial rises in peasant income and livelihood throughout much of rural China. Material for Shanxi province - in the North of China - illustrates the different development rates between mountains and plains as follows:

TABLE 13. Shanxi : income data, 1978, 1982 (yuan)

	Average per capita incomes	
	Mountains	Plains
1978	78.3	113.9
1982	237.7	298.9
Difference between 1978 and 1982 figures	159.4	185.0

Compiled from materials in *Shanxi Ribao* 13.3.1984, p.90.

Furthermore, as already noted, the selection of "mountain counties" may well be misleading. As already noted, Qingyuan county is given as an example of a mountain county in Northern Guangdong, yet much of its

land is considered to be plain land. In interpreting materials on mountain economies in China, it is useful to note that such potential diversity in mountain counties and the production possibilities within them does exist. Inevitably generalisations in interpretation of material are made, but as has been indicated, ultimately such local factors as relief, land quality, proximity to major urban centres and so forth make significant contributions in determining the scale and degree of development which might be possible within the mountain economy of any particular area. Indeed, from the development shown within the materials used in this paper, some doubt must be expressed as to the extent of development which is actually possible in the more remote mountain areas of China.

The issue of grain remains paramount in any discussion of mountain regions - just as it does elsewhere. The state's perception of mountain regions is such that it urges the mountains to become, at the very least, self-sufficient in grain. As long as the mountain regions are self-sufficient in grain, it is unlikely that the state will do much to actively develop them - only if they remain grain-deficit areas might the state be tempted to invest capital construction funds, and then only to increase grain production. As a result, what development occurs will essentially be internally generated, inevitably uneven and certainly slow. Such state attitudes being little different to those shown towards the mountains by the Maoists.

It is, however, perhaps inevitable that the state's attitude should be such. If it relaxed grain policies in the mountain areas, not only would the state have to continue to carry the burden of making good the shortfalls in grain supplies, but such policy relaxation would almost certainly be taken up in areas which the state sees as major suppliers of commodity grain leading to reductions in total grain output, something the state is unlikely to tolerate despite current bumper harvests.

Thus, current state attitudes towards grain production are unlikely to change. It will allow productive areas in Southern Jiangsu for example to indulge in local grain subsidies to maintain fulfillment of quotas at little cost to their development of other production possibilities, while at the same time the bulk of the mountain areas - even favourable mountain economies such as Northern Guangdong which remains a grain-deficit area - will continue

to struggle towards grain self-sufficiency, a struggle which requires much land, labour and investment limiting production possibilities and adding yet another obstacle to rural economic development in mountain areas.

Furthermore, unless there is some real progress to solve the serious ecological problems which still very much afflict mountain regions, any short-term economic development which is possible, may prove fruitless in the long-term. The evidence presented here is not promising. The awareness of ecological difficulties is all too often found only in more academically-related materials while the production units themselves concentrate on short-term economic growth. This contradiction casts much doubt upon the possibility of long-term economic development in the Chinese mountain areas.

References

- Bai Shanhua "Yangshan county accelerates the development of the mountain economy", *Nanfang Ribao* (Southern Daily) 7.5.1983, p.1.
- Chen Qilei, Wang Zhuxi, Yang Shenghua, Yang Lihua "On comprehensive development of the hilly area in Yongshun county", *Jingji Dili* (Economic Geography), 1984 (2) 92-97.
- Chen Yunlong and Liu Zhengde "The development of grassland resources in Jiangyong county, Hunan province", *Jingji Dili* (Economic Geography) 1982 (1) 32-40.
- Cheng Weimin (1982) "Some questions on the rational utilization of land in southern Hunan", *Jingji Dili* (Economic Geography) 1982 (1) 26-32.
- Cheng Weimin (1984) "Problems of rational utilization of hilly areas in Hunan province from the ecological viewpoint", *Jingji Dili* (Economic Geography) 1984 (2) 112-116.
- Chinese statistical yearbook 1981* (Beijing) 1982.
- Diu Qingqi and Yu Zhan "Study comrade Deng Zihui's viewpoint on the agricultural production responsibility system", *People's Daily* 23.2.1982 tr. FBIS/DR/PRC 5.3.1982 k.16-20.
- Geographical Society of China "Comprehensive development and management of China's mountainous areas", *Jingji Dili* (Economic Geography) 1984 (2) 83-85.
- ...
Guan Jian and De Ming "Nanxiong mountain area conveys a much-told tale", *Nanfang Ribao* (Southern Daily) 20.4.1983, p.2.
- He Shibing and Fu Jinbo (14.5.1983) "Qingyuan locality torrential rainfall becomes a disaster", *Nanfang Ribao* (Southern Daily) 14.5.1983, p.1.
- He Shibing and Huang Jinchi (17.9.1984) "Ye Jinyang initiates a household copper-refining factory", *Nanfang Ribao* (Southern Daily) 17.9.1984, p.1.
- He Shibing (29.5.1983) "Qingyuan's town and country markets are greatly flourishing", *Nanfang Ribao* (Southern Daily) 29.5.1983, p.2.
- He Shibing (19.6.1983) "Qingyuan and Longhua counties rush to prevent flooding", *Nanfang Ribao* (Southern Daily) 19.6.1983, p.4.
- He Shibing (20.6.1983) "In the light of the serious disasters in Shitan and Baiwan communes, Qingyuan county, the county committee and authorities have already appointed people to aid the stricken masses", *Nanfang Ribao* (Southern Daily) 20.6.1983, p.1.
- Hou Xueyu "On the direction of exploiting the mountainous and hilly areas in Southern China", *People's Daily* 9.12.1984 tr. FBIS/CR/A 1.2.1983, p.36-40.
- Hu Cheng (1.6.1983) "Within the mountains people are buying motor vehicles", *Nanfang Ribao* (Southern Daily) 1.6.1983, p.2.
- Hu Cheng (16.9.1984) "Wengyuan mountain area does not return to travel difficulties", *Nanfang Ribao* (Southern Daily) 16.9.1984, p.2.
- Hunan Radio* "Discussion on rural policies", 22.2.1984 tr. FBIS/DR/PRC 27.2.1984, p.3-5.
- Hunan Radio* "Hunan vice-governor sets agricultural tasks", 25.2.1984 tr. FBIS/DR/PRC 28.2.1984, p.3-4.

- Li Guifang "Guangdong's Wuhan county sternly handles a case of destroying forests in Rongfu township", *People's Daily* 1.9.1984 tr. FBIS/DR/PRC 10.9.1984 k.14.
- Li Qingyu and Shi Dexiang (3.4.1983) "From now on Liannan county's surplus electricity capacity will be transferred out of the county", *Nanfang Ribao* (Southern Daily) 3.4.1983, p.2.
- Li Qingyu, Wu Liguan, Huang Kuang (9.4.1983) "Forestry centre work is on the verge of 'eruption'", *Nanfang Ribao* (Southern Daily) 9.4.1983, p.2.
- Li Qingyi and Shao Tiao "Why are large numbers of fish ponds and orchards in Northern mountainous Guangdong not put on a contract basis?", *Southern Daily* 16.10.1983 tr. FBIS/CR/A 7.11.1983, p.42-43.
- Li Yong "Breeding by specialized households - a good way to develop animal husbandry", *Red Flag* 1.10.1983 tr. FBIS/CR/RF No. 19, 41-46.
- Li Zhuchen "Some problems of the utilization of China's mountain areas", *Jingji Dili* (Economic Geography) 1984 (2) 107-111.
- Liang Rencai ed. "An economic geography of Guangdong" tr. JPRS/DC-389 21.11.1958.
- Liannan county authorities "Take advantage of the favourable natural conditions of mountain areas to greatly develop rural hydro-electric power", *Nongye Jingji Wentu* (Problems in Agricultural Economics) 1984 (3) 44-46.20.
- Lin Zili "The new situation in the rural economy and its basic direction", *Social sciences in China* 1983 (3), 112-146.
- Mao Zhiyong "Speech", *Hunan Radio* 24.2.1984 tr. FBIS/DR/PRC 27.2.1984, p.5-6.
- Nanfang Ribao* "Lian county's supply and marketing co-operative undergoes great change", (Southern Daily) 27.3.1983, p.1.
- Nanfang Ribao* "Torrential rain in Northern and Eastern Guangdong becomes a disaster", (Southern Daily) 17.6.1983, p.1.
- People's Daily* "State council forestry circular" 6.12.1980 tr. FBIS/DR/PRC 24.2.1981, L.19-20.
- People's Daily* "Further develop the new phase of agriculture which has already opened up" 23.12.1982 tr. FBIS/DR/PRC 4.1.1983, k.2-20.
- People's Daily* "Be concerned with poor areas" 24.6.1984 tr. FBIS/DR/PRC 29.6.1984, k.6-7.
- People's Daily* "Carry out strict forestry management and protection while relaxing the policy on forestry" 1.9.1984 tr. FBIS/DR/PRC 10.9.1984, k.14-15.
- People's Daily* "Let the peasants be masters of wooded and hilly lands" 19.10.1984 tr. FBIS/DR/PRC 26.10.1984, k.6-7.
- Qing Yu and He Shibing "Qingyuan develops production of traditional chickens", *Nanfang Ribao* (Southern Daily) 6.6.1983, p.2.
- Qiu Fusheng "In Qujiang county, over 70 households sell in excess of 10000 jin of grain", *Nanfang Ribao* (Southern Daily) 17.1.1983, p.2.
- Shanxi Ribao* 13.3.1984 tr. FBIS/CR/A 20.4.1984, p.90.
- Shi Shan "Where is the breakthrough in our nation's high speed development in agriculture", *Problems in Agricultural Economics* 1980 (2) 33-36. in. V.Smil op.cit.
- V. Smil "The bad earth - environmental degradation in China" (London, 1984).

- Tian Jijin "Agricultural production speedily develops in more than 800 counties in the mountain areas throughout the country", *Economic Daily* 21.11.1983 tr. FBIS/CR/A 12.1.1984, 19-20.
- Wang Jifu "How the system of contracted responsibilities with payment linked to output is implemented in the rural areas of Yantai prefecture", *Red Flag* 16.2.1983 tr. FBIS/CR/RF no.4, 26-33.
- Wang Shaoju "Poor hilly areas hope that special policies will be implemented to help them get rid of poverty and attain prosperity", *People's Daily* 24.6.1984 tr. FBIS/DR/PRC 29.6.1984, k.5-6.
- Wang Songpei "China's agricultural-industrial-commercial integrated enterprises", *Jingyi Yanjiu* (Economic research) 1980 (7) 42-47.
- Wang Youchen "A discussion of forestry construction in the mountain areas of Southern China", *Jingji Dili* (Economic Geography) 1984 (3) 191-194.
- Wu Xiang "The open road and the log bridge - a preliminary discussion on the origins, advantages and disadvantages, nature and future of the fixing of farm output quotas for each household", *People's Daily* 5.11.1980 tr. FBIS/DR/PRC 7.11.1980, L.21-29.
- Wu Yuwen "Comprehensively develop mountain areas and the promoting of the local economy in Guangdong province", *Jingji Dili* (Economic Geography) 1984 (2) 102-106.
- Xie Yifang, He Shibing and Liang Gewen "Qingyuan county commends specialized and key households", *Nanfang Ribao* (Southern Daily) 29.1.1983, p.2.
- Xinhua* "Resolution on a nationwide voluntary tree-planting campaign", 12.3.1981 in V. Smil, op.cit.
- Zhongguo Tongji Nianjian*, 1983 (Chinese statistical yearbook, 1983) (Beijing), 1983.
- Zhonghua Renmin Gongheguo Fensheng Dituji* (People's Republic of China : a provincial atlas), (Beijing)1971
- Zhu Zuzhou "Mountain area fish breeding has bright prospects", *Nanfang Ribao* (Southern Daily) 17.5.1983, p.2.
- ...

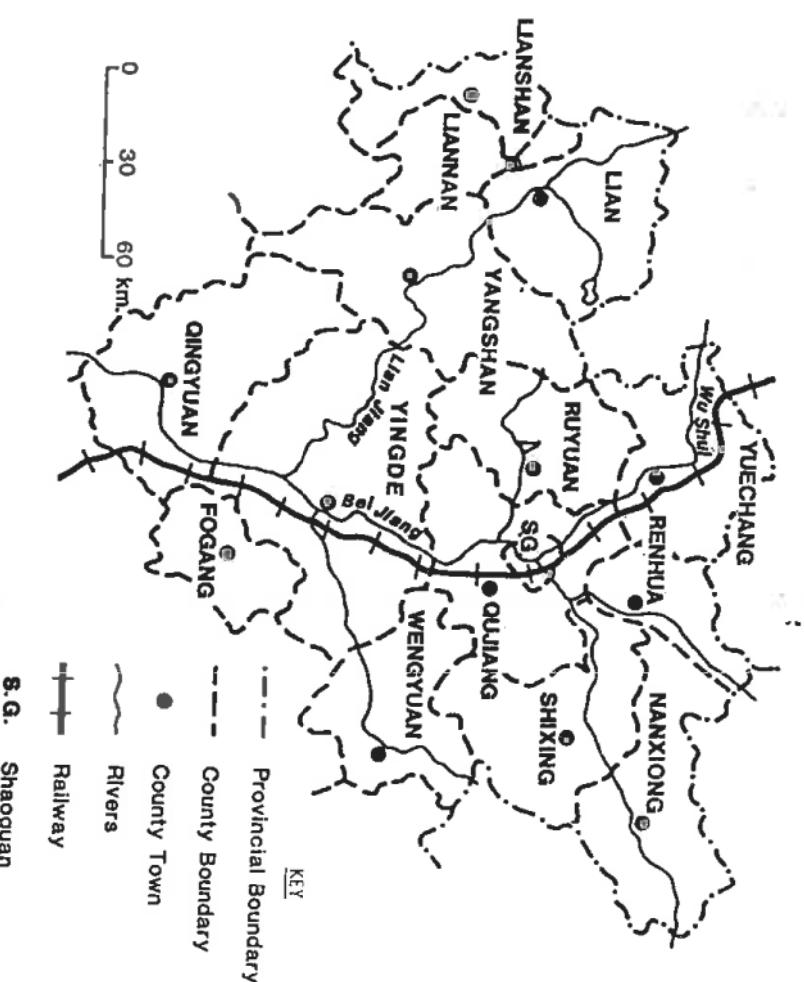


FIGURE 1.
The mountain region of Northern Guangdong

Material's source: Wu Yuwen, p.106.

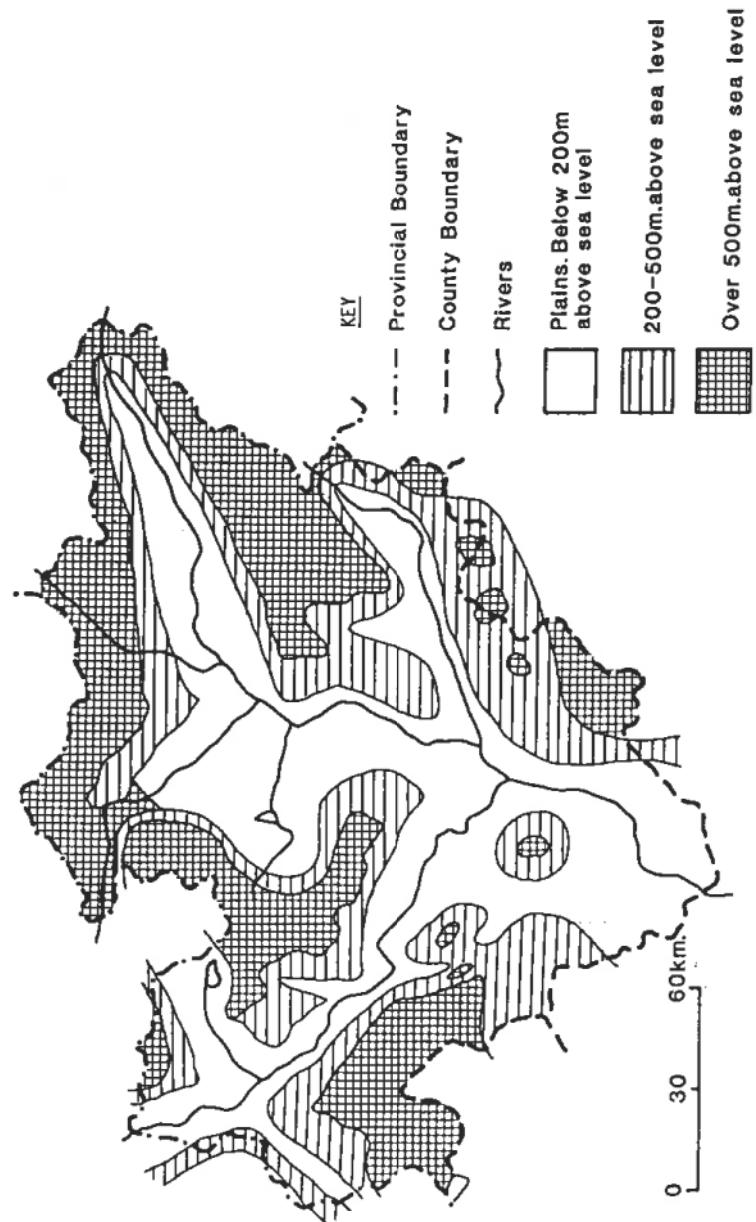


FIGURE 2. The mountain region of Northern Guangdong : a sketch map of relief

Compiled from materials in: Wu Yuwen, p.106.
Zhonghua Renmin Gongheguo Fensheng Dituji, p.45.

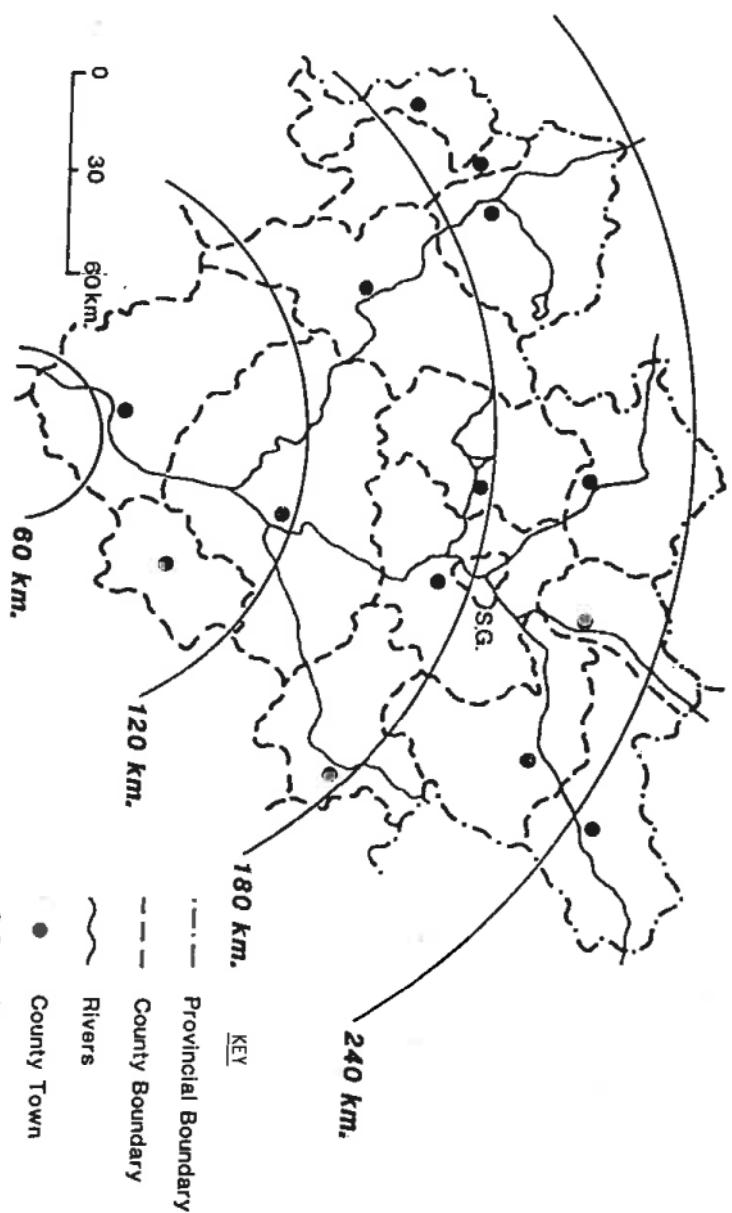


Figure 3. The mountain region of Northern Guangdong : distance from Guangzhou

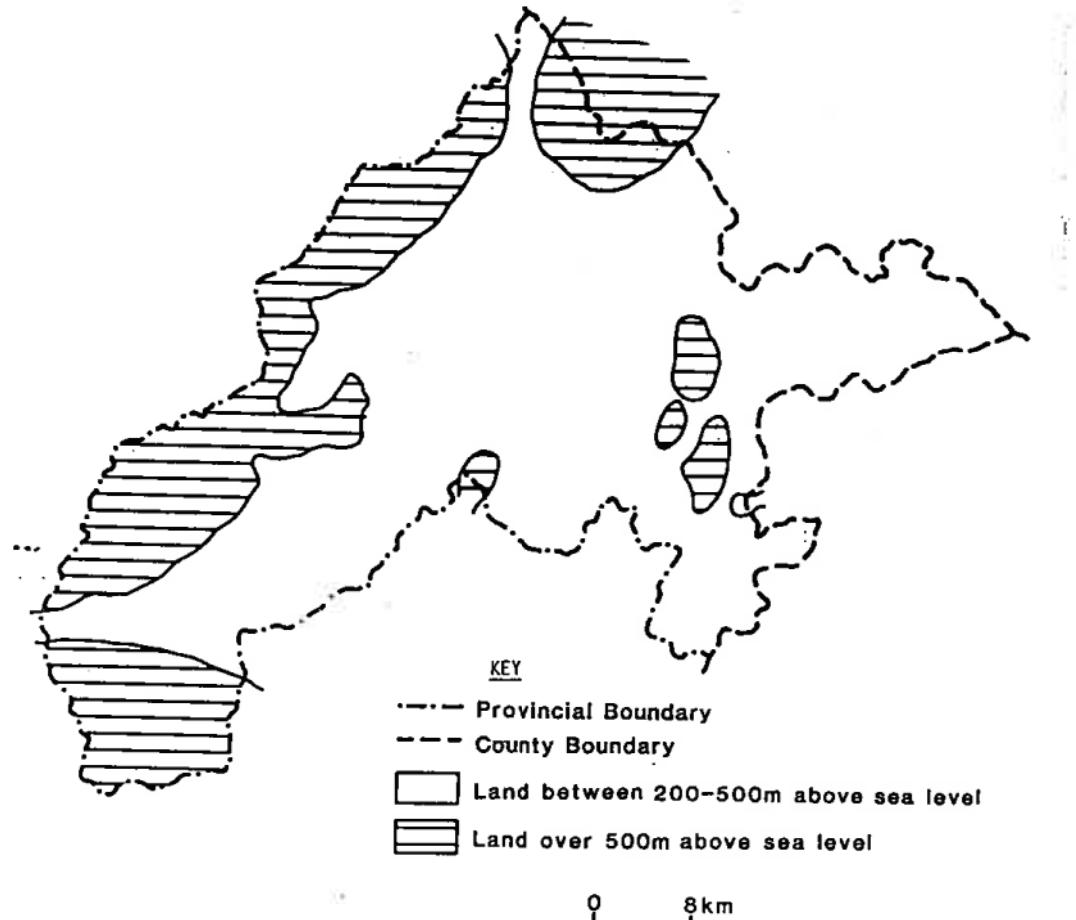


Figure 4. Jiangyong county : sketch map of relief

Compiled from materials in Chen Yunlong et al, p.38.

Zhonghua Renmin Gongheguo Fen sheng Dituji,
p.44

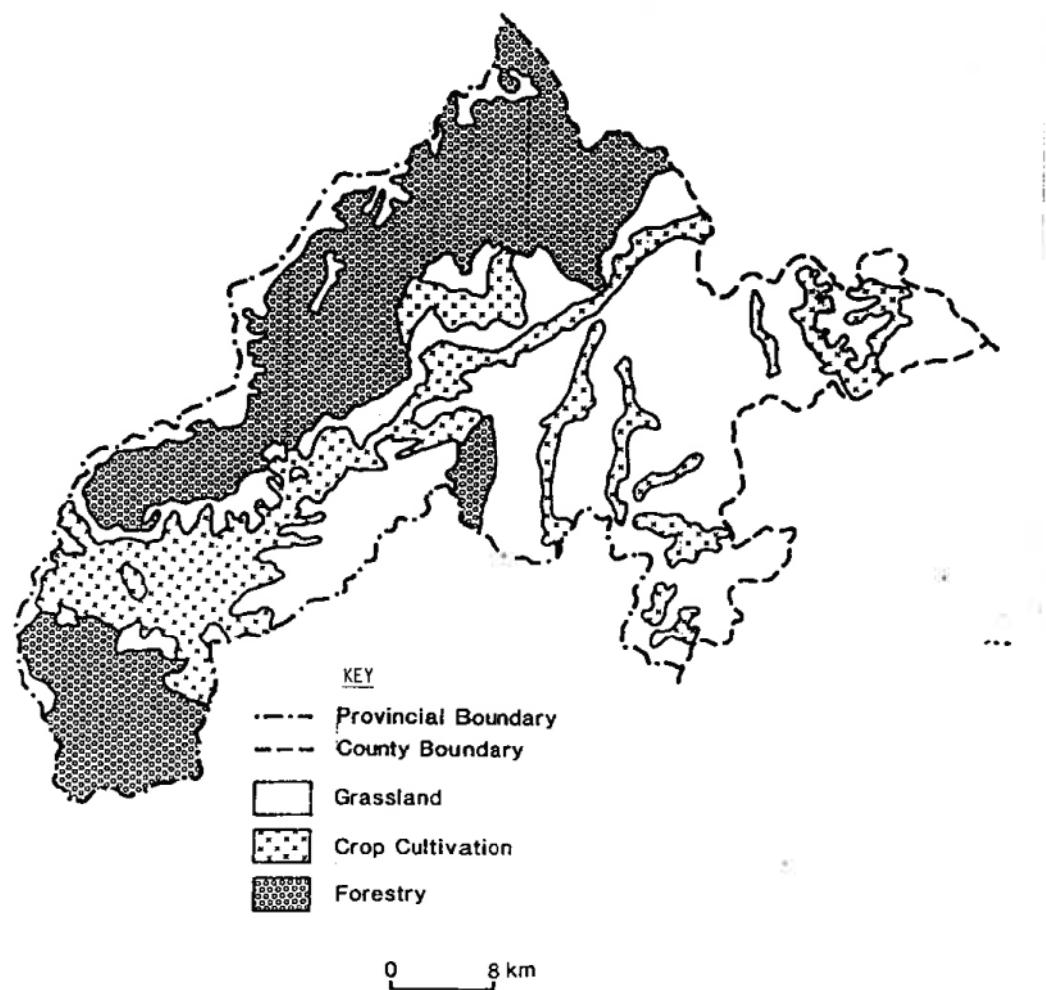


Figure 5. Jiangyong county : simplified map of land use

Materials taken from Chen Yunlong et al., p.38.

