

Chapter 1

Introduction

This monograph deals with strategic planning for integrated development in the Panxi Region of China. The context of this planning includes natural resources, the environment, and hazards. The Panxi Region is located on the eastern front of the Hengduan Mountains of southern China. Problems in strategic planning, related to the conditions of natural resources and the environment, are discussed. For effective implementation of planned engineering projects, a system of engineering facilities is suggested and a geo-environmental evaluation given. Measures for environmental protection and hazard mitigation are also discussed. Such a systematic study can form the basis for a scientific approach to the strategic planning of integrated development of the Hengduan Mountains of the Hindu Kush-Himalayas.

To determine the strategic goals of economic development, the condition of natural resources and the characteristics of the natural environment in the region should be taken into account. At the same time, the surrounding system and the status and level of socioeconomic development should also be studied. According to the strategic goals of regional development, a series of engineering projects should be planned and the locations of these key projects considered in accordance with the regional geo-environment. Then the environmental protection and hazard reduction

measures should be studied in order to design corresponding counter-measures. Therefore, sound and reasonable planning of regional development should be based upon systematic study and an in-depth understanding of the geo-environment of the region. Because economic development can not be realised without engineering development, the conditions for engineering construction should be taken into account in regional planning. The integration of resource development and environmental protection into economic and engineering development is one of the important characteristics of this research.

This monograph consists of seven chapters. Chapter One gives an introduction to and the background of natural and socioeconomic conditions for development in the region. The descriptions of natural resources and the environment are included in Chapters Two, Three, and Four. Chapter Five is devoted to the strategic planning of economic development in the region. The geo-environmental considerations for the development of engineering are given in Chapter Six, and the last chapter discusses measures for environmental protection and hazard mitigation.

The aim of this research paper is to help attain rapid progress in the integrated development of the Hengduan Mountain Region.

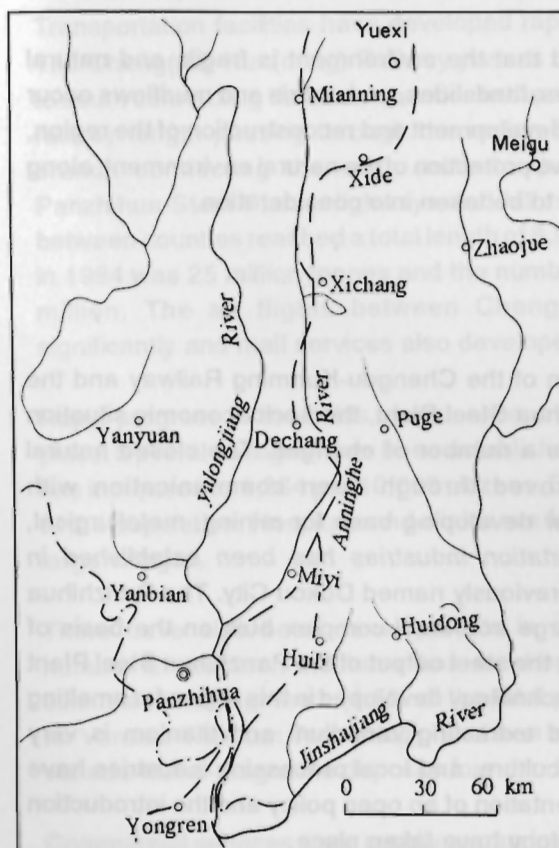
Background of Strategic Development

Natural Resources and Environment

In order to carry out a case study of the conditions for integrated development, its planning, and policies pertaining to it in the Hengduan Mountains, detailed investigation and an appraisal in a selected second order region are required. This would be a practical and feasible approach. The territory of the Hengduan Mountains is vast, and the characteristics of natural resources and environment vary from place to place although they do have certain commonalities. Therefore, investigating and comparing several sub-regions are useful exercises. The eastern front of the Hengduan Mountains is the most suitable region in which to carry out such an investigation. The topographical elevation is not too high, although incised canyons do exist. The region is rich in natural resources and has a rather rugged topography. Panxi is one of the most suitable regions for a case study. A good selection of mineral resources and hydropower

potential, as well as convenient transportation, will make this region one of the key developing regions in southwestern China by the end of this century. Therefore, a study of this region is of practical significance.

Panxi Region is in the southern part of Sichuan Province, stretching from Panzhihua to Xichang City and between the Yalongjiang River and the Anninghe River. This region belongs to the Liangshan Yi Autonomous Prefecture and includes Xichang and Panzhihua municipalities and Dechang, Miyi, Yanyuan, Yanbian, Mianning, Huidong, Huili, Yuexi, Meigu, and Zhaojue counties (Figure 1).



The Anninghe River and the Chengdu-Kunming Railway pass longitudinally from north to south through the middle of the region. Located where Yunnan, Sichuan, and Guizhou provinces meet, Panxi Region is in an economically strategic position.

In this region the topography in the north-western region is higher than in the southeast. The elevation varies from 4,000m in the high mountains to 2,000m in the middle mountains. The mountain ranges extend from north to south. The large rivers, such as the Jinshajiang, Yalongjiang, and the Anninghe, flow from north to south. The Jinshajiang and Yalongjiang rivers

Fig. 1: Sketch of Prefectural Administration of Panxi Region

have narrow valleys, but the Anninghe River has a wide one, and the fault depressions are distributed between the mountains.

The region is characterised by the monsoon climate of the southern subtropics which has abundant precipitation. As a result of spatially different climates, it is rich in agricultural and forest resources. Quaternary alluvial deposits are distributed throughout the wide valleys and inter-montane basins, forming the basis for grain production, therefore the region is known as the "granary" of southern Sichuan. Forests, rare birds, animals, and valuable plants are abundant in the mountains. As a result of the Paleozoic rift process (Bolin 1988), metallic mineral deposits, especially vanado-titano-magnetite, and base metals, such as zinc, copper, and lead, are widely distributed throughout the region. Therefore, the conditions are extremely favourable for industrial development.

However, it should be noted that the environment is fragile and natural hazards, such as earthquakes, landslides, and debris and mudflows occur frequently. Therefore, in the development and reconstruction of the region, rational utilisation and effective protection of the natural environment, along with hazard mitigation, have to be taken into consideration.

Socioeconomic Situation

Since 1960, after completion of the Chengdu-Kunming Railway and the establishment of the Panzhihua Steel Plant, the socioeconomic situation in the region has undergone a number of changes. The closed natural economy was partly improved through open communication with neighbouring regions. A new developing base for mining, metallurgical, coal, electric, and transportation industries has been established in Panzhihua City which was previously named Dukou City. The Panzhihua Steel Plant (Plate 1) is a large iron-steel complex built on the basis of national technology. In 1984, the steel output of the Panzhihua Steel Plant was fifth in the country. The technology developed in this region for smelting vanado-titano-magnetite and extracting vanadium and titanium is very advanced. The forestry, agriculture, and local processing industries have developed recently. Implementation of an open policy and the introduction of foreign capital and technology have taken place.

In 1984 the total industrial and agricultural production reached 2.78 billion *yuan*¹ (equivalent to one billion U.S.dollars), 65.8 per cent of which was of

⁽¹⁾There are approximately 5 *yuan* to one U.S. dollar.

industrial production quality. The main products were iron ore, iron steel, rolled steel, vanadic powder, coal, coke, cement, wood, and sugar. The total installed capacity of electricity reached 456 MW. Some of the products of rolled steel and vanadic powder are exported to more than 10 Asian and European countries.

In 1984 the total agricultural production reached 0.95 billion *yuan*, with grain production of 1.5 million tonnes. Agriculture partly supplied the needs of the mining industrial complexes and urban needs. The main agricultural products were tobacco, pigs, and sheep.

Transportation facilities have developed rapidly during the last 20 years. The Cheng(du)-Kun(ming) Railway passes through the region from north to south connecting the main counties in the region with Kunming. The total railway length passing through the region is 526km. There is a railway branch connecting the main route to the Panzhihua Mine and the Panzhihua Steel Plant. Highways and hill roads built for communication between counties reached a total length of 8,924km. The cargo transported in 1984 was 25 million tonnes and the number of bus passengers was 12 million. The air flights between Chengdu and Xichang improved significantly and mail services also developed.

Rapid progress in the fields of education, culture, and science has taken place. Several colleges have been established and the number of students has increased to 1,364 per 10,000 citizens. Doctors make up 2.18 per cent of the population. Hospitals and clinics are found in most of the towns and large villages.

There have also been developments in science and technology. The number of research institutes has reached 36, with more than 36,000 scientists and engineers (1.5% of the total population). A National Centre for Vanado-Titanium Technology has been established because of the rich vanado-titano-magnetite deposits found in the region.

Commercial services were rapidly expanded in order to promote economic development. More than 16 thousand commercial service centres have been established with 600,000 thousand persons involved.

In general, the socioeconomic situation has improved substantially during the last two decades. This provides a sound basis for further modernisation.

However, the development in the region is unbalanced and the resources are still not used rationally. The development potential in the region is sufficient to enable the establishment of an economic centre in southwestern China to support the future development activities of the Hengduan Mountains and the Qinghai-Tibetan Plateau. Therefore, a comprehensive study for strategic planning is urgently needed.

Strategic Position and Conditions for Development

After the founding of the People's Republic of China, the national government, in its attempts to establish this area as an important industrial and agricultural base in the southwestern area of the country, paid more attention to its development and construction. In the middle of the 1980s, this area became well developed in energy and mineral resources. The development of this region plays an important role in bringing about strategic changes in the production pattern of southwest China and of the country as a whole. Harnessing of large-scale hydropower resources; development of mining, metallurgical, and chemical industries; and agriculture will be the objectives of reconstruction in the 1990s.

Abundant mineral and energy resources exist in the region. The hydropower resources in this area account for 22 per cent of the total resources in southwestern China (including Yunnan, Guizhou, and Sichuan). The iron resources account for 71 per cent, and the non-ferrous metals, such as zinc, copper, and aluminum, account for 20 per cent. At present, national steel production is concentrated mainly in the eastern part of the country, and the steel output in the southwest is only seven per cent of that of the whole country. Therefore, a lot of steel has to be imported over a long distance. The production of steel in this region is expected to reach about one million tonnes per annum by the end of the century, and, correspondingly, different types of steel are also to be developed.

In the present energy structure of the country, coal accounts for 73.2 per cent, oil 20.9 per cent, and hydropower for only four per cent of the total power. The development of hydropower in this region, including the Yalongjiang, Ertan, and Jinping hydropower projects along the Jinshajiang River, with a total installed capacity of two million kilowatts, will play an important role in improving the energy structure of the country as a whole.

Hydropower, which is an important energy resource in this area, is cheap and does not pollute the environment.

The production of steel products and the harnessing of hydropower energy and vanadium and titanium metals will facilitate the comprehensive use of associated rare valuable metals and will contribute to the modernisation of science and technology. Titanium metal, with its low specific gravity, erosion resistance, and high strength, has an important function in aviation and space technology. Vanadium is an important element in the production of metal alloys. Using vanadium dregs to extract gallium is important for the development of third generation semiconductors. To use high quality resources fully in this area will be a key step in the modern development process.

Proper environmental management of the middle and lower stream regions of the Yangtze River Basin should be undertaken. Soil erosion in this area affects about 30,000 kilometres. Up to 233 million tonnes of sand is silted into the Jinshajiang River annually, accounting for 28 per cent of the total sand silted into the Yangtze River. The use, management, and protection of the land resources in this region will not only control mountain disasters but will also mitigate the problem of siltation to a certain extent.

In addition, this is a region where minority nationalities (principally the Yi nationality), whose economy and culture are underdeveloped, live in compact communities. Therefore, the development of this region can provide a number of lessons and experiences for the development of the southwestern mountainous regions.

To sum up, economic improvement and industrial and agricultural development occupy an important strategical position in the development of southwestern China and in the improvement of the production pattern of the country as a whole.