

Study on Ecological Relationships among Different Ethnic Groups in Yuanyang County, Yunnan Province, Southwest China

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Summary: By adopting Geographical Information System (GIS) Analysis, the authors conduct the field survey in Yuanyang County in the south of Ailao mountain, overlap the ethnic villages settlements distribution with digital topographical model, and compare the spatial distribution of 7 different ethnic group. According to the difference of spatial distribution and resource use among those ethnic groups, the authors implement the quantitative analysis and draw conclusion on the ecological relationships among different ethnic groups.

Key Words: Ailao mountain, GIS, distribution of ethnic group, ecological relationships, Ethno-ecology?

Introduction

The study on ecological relations among different ethnic group in multinational region origins from an anthropologist, Fredrik Barth (1956), who adopted a concept of niche to explore the ecological relations among three different ethnic groups in North of Pakistan. After that, the concept of niche and related methodology are promoted by several anthropologists (Biersack,1999; Kottak,1999; Hardesty,1975). Recently, landscape ecology also initiates to discuss more about relations between culture and ecological environment. Wiens J. A. (1999) believes that the landscape ecology based on culture study should be focused on, not marginalized. Xiao Duning (1997) shows us that how to study on landscape impact of two migration culture in northeast China, and compare the difference of the decision-making on shaping the landscape by these two groups.

Yunnan is a province with high diversity of physical environment and ethnic culture. There are 26 officially-identified ethnic groups living in this mountainous region, who intermingle with other groups but stay by themselves in a relatively small area. In a broader context, the spatial distribution of those ethnic groups shows the strong links between physical territory and ethnic culture. But in the relatively small area, the

distribution of ethnic groups is controlled by the distribution of the specific ecologic niches which influence by local social economic situations. In China, there was the research on the physical distribution of ethnic groups and their culture in 1930s (Lin Chunsheng, 1936). Until now there are more literatures discussing this relationship between the spatial distribution and culture of ethnic groups. But most of them is limited to give only qualitative and broader description (Yin Shaoting, 1997).

This study is conducted in Yuanyang County, Honghe Hani and Yi people Autonomous Prefecture, Yunnan Province. By adopting GIS technology, the researchers overlap the maps of physical location of local communities composed by 7 ethnic groups with topographical maps. With the rich secondary data and anthropological survey data, the authors implement the quantitative and comparative analysis on spatial distribution of 7 different ethnic groups and their use and management of natural resources. The findings and research results is useful for the conservation of biodiversity and cultural diversity as well.

Study area and methodology

Physical setting of study area

Yuanyang County, situated in the south of Yunnan Province, and the southern bank of Honghe river, is located from 22°49' to 23°19' north latitude and 102°27' to 103°31' east longitude. The total land area of Yuanyang county is 2207.9 square kilometers. The landscape of Yuanyang County as a whole is slopping from the northwest to the southeast. The range of altitude is from 144 meters to 2939.6 meters above sea level. The first type of area is below 700 meters altitude, classified as 'valley' or 'lowland', covered 5 percent of total land area of whole county. The second type of area is from 700 to 1400 meters altitude, classified as 'lower-upland', covered 53 percent of total land area. The third type of area is from 1400 to 1800 meters altitude, classified as 'upland', covered 31 percent of total land area. The fourth type of area is above 1800 meters altitude, classified as ' higher-upland', covered 11 percent of total land area.

Yuanyang County is located in the south of the Tropic of Cancer with six different climate types, which are north tropical, south sub-tropical, central sub-tropical, north sub-tropical, south temperate and central temperate. The most influential climate element is central sub-tropical monsoon. In general, the climate changes obviously with the altitude. So does the average temperature with the altitude. Normally, for every 100-meter-rise of elevation, the temperature gets 0.7 °C lower. The average

temperature of higher-upland is lower as 4? , and the average temperature of valley is higher as 26? . On the other hand, the rainfall gets higher in correspond to the increase of elevation. The year-round average rainfall of higher-upland is above 1700mm, but below 700mm in the valley. The hours of sunlight is more in the dry season (from March to May), and less in the raining season (from June to October).

The plantation of Yuanyang County is major to southern sub-tropical ever-green broadleaf forest. In Yuanyang, the subtropical grassland and seasonal rainforest locate in the area below 900 meters above sea level. The conifer-broadleaf mixed forest locates from 800 to 1400 meters altitude. Ever-green and deciduous broadleaf forests locate from 1400 to 1800 meters altitude. Ever-green broadleaf trees and bamboo mixed forest is distributed around 1800 meters altitude. There is the ever-green fogging forest located from 1800 to 2500 meters altitude. The shrub with moss is distributed above 2500 meters altitude.

Ethnic groups in the study area

There are 7 ethnic groups living in Yuanyang County, which are Hani, Yi, Han, Dai, Miao, Yao, and Zhuang. The total population is 354,739 in 1999. There is 86 percent of total population to be minority nationalities. Therein to, Hani and Yi ethnic groups are indigenous people in Yuanyang, who belong to Tibetan-Burmese language ethnic groups. Han people migrated from inland after Ming Dynasty. Dai belong to Zhuang-Dong language ethnic group, migrated from Xishuangbanna, south of Yunnan, at the end of Song Dynasty or the beginning of Yuan Dynasty, almost 700 years until now. Miao belongs to Miao-Yao language ethnic group, migrated from Guizhou Province or today's Wenshan prefecture in southeast Yunnan around mid-period of Qing Dynasty, 200 years until now. Yao also belongs to Miao-Yao language ethnic group, who have lived in Yuanyang for more than 270 years already. Zhuang belongs to Zhuang-Dong language ethnic group, migrated in Yuanyang for 400 years (Compiling committee of Yuanyang County Chorography, 1990).

According to the official documents and author's survey data, there were totally 928 local communities or natural villages in Yuanyang County in 1992. Some of them belong to solo-type ethnic village, which means the residents only from the same ethnic group; some of them are mixed-type ethnic village, which means the residents from different ethnic groups. There are 826 Solo-type ethnic villages, including 424 Hani villages, 166 Yi villages, 120 Han villages, 62 Dai villages, 27 Miao villages, 29 Yao villages, and 8 Zhuang villages. There are only 92 mixed-type ethnic villages in

Yuanyang.

Methodology

1. Based on the official maps with local villages' name, the researchers investigate, verify, and revise the exact name and location of each villages in Yuanyang County. Then, draw out the digital map of village location by ARC/INFO software.
2. Based on the official chorographical data and field research, the researchers make clear about the ethnic composition of each village; establish the database on village code, village name, ethnic composition, and related information. Then, link with the map of village location to finalize the distribution map of ethnic villages in Yuanyang County.
3. Through the national geo-info system database, the researchers get the topographical map of Yuanyang County in the scale of 1: 250000. By using ARCVIEW, the researchers create the digital model of topographical characteristics for Yuanyang County.
4. Supported by ARCVIEW, the researchers conduct the overlapping analysis on the distribution of ethnic villages and digital model of topographical characteristics. The results show that different solo-type ethnic villages and mixed-type ethnic villages distribute well-regulated and statistical-significantly. Then, the researchers analyze and compare the spatial relationships among different ethnic groups.
5. Comparing the spatial relationships together with their habitats and natural resource use and management among different ethnic groups, the researchers discuss the ecological relationships of different ethnic groups, competition or complementary relationships, by adopting the concept of niche.

Findings and discussion

One-dimension spatial distribution of ethnic groups

The distribution map of ethnic villages is based on the data from official documents in 1992 and author's field research data in 2001 (See Fig. 1). It shows that Hani is major ethnic group together with the small amount of Yi, Dai and Yao ethnic groups in the southwest of Yuanyang County. Han group distribute mainly in the central and eastern part of Yuanyang County. And Dai ethnic group mainly live in the valley of Honghe

river.

Fig.1 Distribution of different ethnic villages

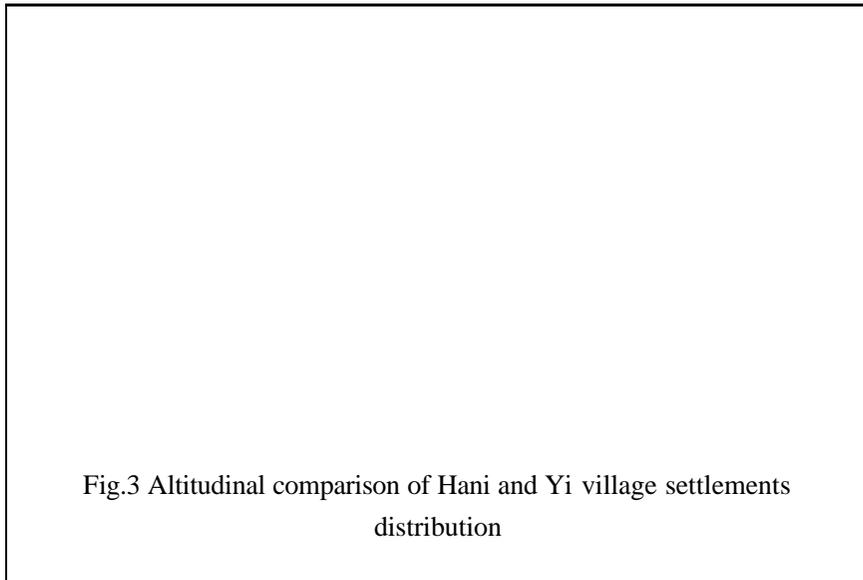
Two-dimension distribution of different ethnic groups

By overlapping the distribution map of ethnic villages and digital topographical model, the researchers find out that, within the solo-type ethnic villages, the ethnic villages distribution is vertically well-regulated corresponding with local climate, soil type, plantation, and different ethnic composition. According to their language and cultural similarity, the researchers classify 6 minority ethnic groups into 3 broad groups, which are Dai and Zhuang into a Zhuang-Dong language ethnic group, Hani and Yi into a Tibetan-Burmese language ethnic group, Miao and Yao into a Miao-Yao language ethnic group. Different language ethnic group spatially distribute differently from other groups obviously (see Fig. 2). There are totally 70 ethnic villages belong to Dai-Zhuang group, which distribute in the area near river bank below 700 meters above sea level. Most of their villages distribute concentrated in the area below 400 meters elevation. There are 590 ethnic villages belong to Hani-Yi group, which distribute from 800 to 2000 meters above sea level. Most of their villages distribute mainly from 1300 to 1600 meters elevation. There are 56 ethnic villages belong to Miao-yao group, which mainly distribute in the higher upland from 1600 to 1800 meters elevation.

Fig.2 Altitudinal variance of settlements distribution of different language ethnic groups

The difference of vertical distribution of Hani and Yi ethnic group

There are totally 826 solo-type ethnic villages in Yuanyang County. Among those villages, there are 424 Hani villages and 166 Yi villages. Compared with Miao and Yao villages in higher upland, Dai and Zhuang villages in the valley, Hani and Yi village distribute in the area between the higher upland and the valley. Generally, the average elevation of Hani village settlements is higher than those of Yi village settlements. Hani villages mainly locate around 1500 meters above sea level, but Yi villages around 1300 meters above sea level (See Fig. 3).



Conclusions

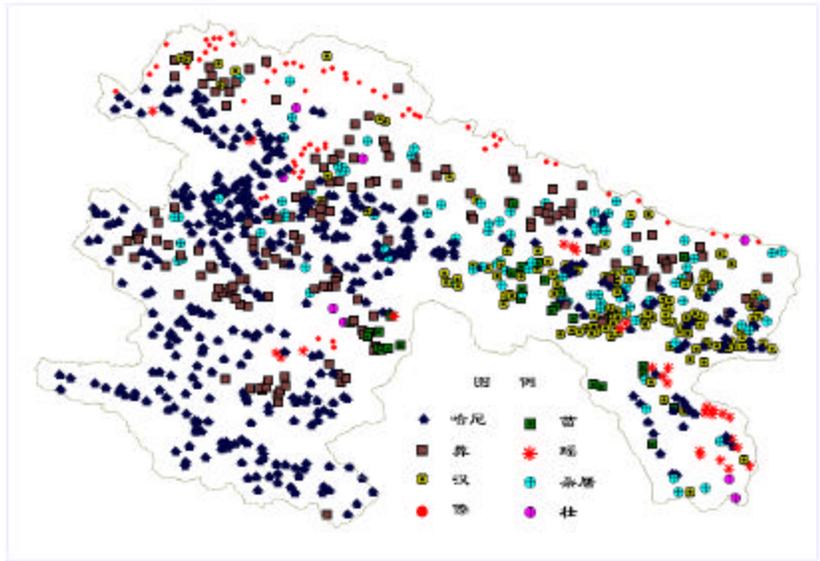
1. In Yuanyang County, the productivity decrease gradually from the area of low elevation to high elevation. At the meanwhile, the labor input per land area unit increase accordingly. But there is no conflict caused by the competition of resource use among these ethnic groups. The three different language ethnic groups, such as Dai and Zhuang, Hani and Yi, Miao and Yao, distribute from low elevation to high elevation occupy the different niche to maintain their livelihood and natural resource use. The occupied niche of different language ethnic group is complementary to avoid the vicious competition on resource use in the same area (See Tab. 1).

Tab.1 Spatial distributions of ethnic groups and resource uses

Cultivation Types		Altitude (Meter)	Main Crops Land	Main Crops	Ethnic Groups	Language
Rice cultivation in the valley		<1000	Paddy field	Rice	Dai, Zhuang	Zhuang-Dong language
Terraced rice cultivation	Lower upland	800-1500	Paddy field	Rice	Yi	Tibetan-Burm ese language
	Middle upland	1200-1800	Paddy field	Rice	Hani	Tibetan-Burm ese language
Dry land cultivation in the higher upland		1600-2300	Dry land	Maize Wadi	Miao, Yao	Miao-Yao language

2. Within the same language ethnic group, the different ethnic groups occupy the similar niche. For example, Dai group and Zhuang group all locate in the valley with hot climate. Their livelihoods all depend on paddy rice plantation in the valley and river bank. Hani group and Yi group live in the upland with mild climate. Their livelihoods are terraced paddy rice plantation. But Miao group and Yao group make a living in the higher upland with cold climate. Their livelihoods rely on wadi and maize plantation in the dry upland. No matter how similar their occupied niche is within the same language ethnic group, their villages are allocated in the different area to avoid the resource conflict between two different ethnic groups. Only the distribution of Hani group and Yi group's settlements is more mixed up. But Hani ethnic group has more population and larger number of villages so that their distribution is much broader than other groups.

Fig.1 Distribution of different ethnic villages



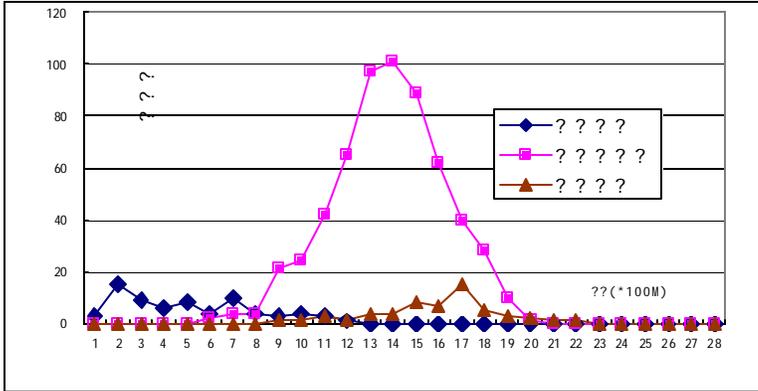


Fig.2 Altitudinal variance of settlements distribution of different language ethnic groups

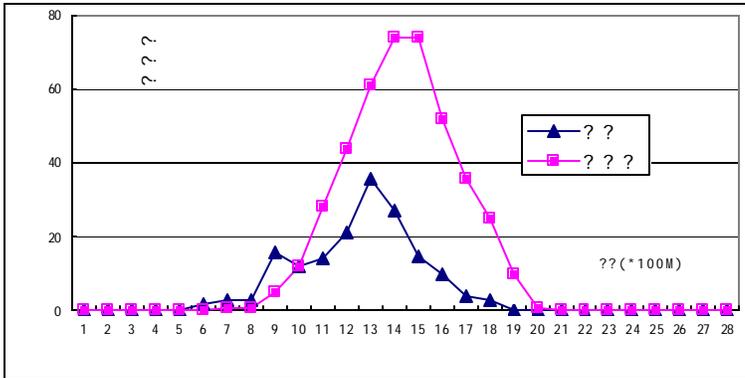


Fig.3 Altitudinal comparison of Hani and Yivillage settlements distribution