

CONTRADICTIONS OF ECOLOGICAL CONSTRUCTION AND URBAN DEVELOPMENT IN HOT-DRY VALLEY AREAS –CASE STUDY ON WENCHUAN COUNTY

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ABSTRACT: This article is on purpose of explore the method developing ecologically and scientifically.

Ecology is the hotspot issue in the realm of urban study. Hot-dry valley area is a typical ecotone, of which specific status in ecology makes the differences on geography, geology, climate, vegetation and hydrology. Simultaneously, in the process of urbanization of China, this area faces the problem and dilemma of ecology other than the metropolitan area. That brings some special value for urban planning research. As a example, Wenchuan county represents these characteristics in hot-dry valley area. I did the fieldwork in this county to get its ecological elements, and explore the contradiction between its urban development and ecological construction on aspect of man-land relationship, industry development, water area security and so on.

KEYWORDS: Ecological construction, hot-dry valley area, Wenchuan, urban development, contradiction

1 ECOTONE

Literally ecotone is the most sensitive areas in eco-system. In September 2008, Environmental Protection Department (EPD) of China released a program: *Outline of Chinese Ecotone Protection Plan*, to stress on ecotone has become the important realm of ecology conservation. Some scholar defined 4 ecotone: hot-dry valley area, cold wet subalpine belt, Karst mountain area and tropical rain forest area¹. Wenchuan County and more than 40 counties belong to the transition of Hengduan Mountains—Southwest Mountain from Tibetan Plateau to the Sichuan Basin. This farming-pastoral ecotone is hot-dry valley area. Eco-environmental vulnerability here is as follows: the terrain is hilly, complex geological structure, climate conditions changes vertically; barren soil, sparse vegetation; strongly influenced by human activities. And the regional ecology degrades significantly.

Ecotone can be interpreted as the edge of patches, which is a complex region with energy flow fairly frequently. In practice, however, the edge in ecological significance often does not coincide with the actual administrative boundaries. Because of the immature regional planning and practical operation, political and economic activity in administrative boundaries which relates to the energy flow, is conservative and barbaric. Since in the process of urbanization, it gradually evolved into a set of patch systems which is not fully in line with the natural system. This patch system is based on artificial environments that formed a large outside area with fragmentation of natural habitats as a buffer in it. This process is actually a reconstruction of the whole natural environment, resulting in the formation of non-natural and man-made “eco” system.

2 HOT-DRY VALLEY AREAS

2.1 Climate

The upper reaches of Mingjiang River are plateau monsoon climate. As the unique geographical alpine valleys, climate here was horizontal and vertical zones of dual characteristics². For influence of foehn effect, there has been the implicit domain of the differentiation phenomenon, and airflow sink significantly, going

1 Ma Xianhui; Li Ying. Research on Ecotone Environment and Coordinated Economy Development of Southwest. Guiyang Jinzhu University. 2002 04

2 Huang Bing-wei, Zheng Du, Zhao Mingcha. Modern Physical Geography. Beijing: Science Press, 1999,36

with increasing temperature and reducing humidity, also low precipitation, and strong evaporation as well³. As the result of this, the lower valley region is serious drought with the least rainfall in the whole basin. On the north of Caopo village, Wenchuan County in particular, hot-dry valley climate is the most obvious.

Basin area from northwest to southeast: hot-dry valley belongs to hilly ravine area with least rainfall only 500-600mm, while the evaporation here is the highest, almost three times than rainfall. Therefore, the ecological environment is very barren and vulnerable. In Habitat Suitability Assessment of the environment, there are 12 villages in Wenchuan are not suitable for construction and living, 1 village is inappropriate.⁴

2.2 Geology

In the west of Minjiang River, valley is wide; stream is meandering, and significantly different canyons, cliff valley in the east. Here at borders with violent geological activity. In Shunzhi Dynasty, the history of major earthquake in Wenchuan was 6 times, (since the Ming Dynasty) while 137 times in the whole period. The maximum magnitude was 7.9 and the maximum intensity of 8 degrees. Because of the 3 major faults through the county, tectonic development is a complex structure, showing northeast-southwest direction and spreading at about 45 degrees. Intensive faults and broken rock structure are easy to form the disasters of landslide, debris flow and landslide. In the records of Wenchuan County Annuals, the geology here is mainly gneiss, schist, as well as some limestone, sandstone, etc.; soil is mainly black gravel, brown gravel, sand, etc.

2.3 Hydrology

Minjiang is a stem flow, and some main rivers like Zagunao River, Yuzi River, Shou River, Caopo River. The length is 88 km and watershed of 1429 km². Theoretically rich water resources have estimated reserves of 3.48 million kilowatts, but the actual volume of 1.75 million kilowatts can be developed, which has been developed about 1.60 million kilowatts. Some report calculated using the theoretical number as the base, said water resources is still "huge potential", is indeed not true. But after all, rich mine and water resources do bring Wenchuan a big economic advantage, so resource-oriented industries have become the backbone to enhance economy. However, while rich in hydropower resources, the eco-environment here is fragile too.

The growing sewage pollution and soil erosion is increasing rapidly in the process of urbanization⁵. Soil erosion caused not only economic loss, but also the further deterioration of environment. This vicious cycle is the main reason for the substantial increase in recent years. Soil erosion, ecological degradation and low productivity of land gradually constrained the economic development of mountainous areas.

3 URBANIZATION OF WENCHUAN

Though multi-ethnic regions are not ideal for urban expansion, it also faced with the process of urbanization. In this process, the administrative, economic and political status is still strong with the "boundary" character in Wenchuan. It is the regional portal of Aبا to the Chengdu Plain; secondly, it is the beginning of the industrial chain for tourism from State Road 213 line and an important industrial base as well; thirdly, it is multi-ethnic area; at the end, Wenchuan is the source and ecological backyard of the Chengdu Plain.

3.1 The Level of Urbanization

Wenchuan County in 2002 the urbanization level is 35.8%, much higher than the 18.7% of the state, the average level of 20% of the province. This is almost the same level of the nation (39.09%), which is not irregular. However, as all the constraints, the levels of urbanization are significant differences between towns. County town Weizhou's urbanization level has reached 71%, other industrial towns are close to or above the

3 Chen Guojie. Theory and Practice of Ecological Construction on upper reaches of Minjiang River. Chongqing: Southwest China Normal University Press, p. 8

4 Yin Zhi. Several Pressing Issues on the Wenchuan Earthquake Reconstruction Planning. Beijing: Tsinghua Urban Planning & Design Institute, July 22, 2008

5 The soil erosion amount of Wenchuan County reached 7.0047 million tons per year, and potential risk of the soil erosion involved is very high. Compared to 1985, the loss of the county area increased an average erosion modulus 1530.43 tons / km². years, and total soil erosion increased 5.122 million tons. Source: Wenchuan County Water Conservancy Bureau

average level; towns with farming and animal husbandry characteristics still have been very low level.

3.2 Urbanization Structure

Corresponding to the natural conditions, Minjiang flood land formed the oldest structure of Wenchuan. However, in the stage of rapid economic development, they have become a constraint.

Most small and inconvenient towns are difficult to form aggregation effect. From 1982 to 1999, the urbanization rate of Weizhou rose from 66.3% to 70.7%, while the county's urbanization rate rose from 27.8% to 34.8%. However, the natural growth of agricultural population is in fact extremely slow or even declining (except for Wolong). It illustrates the trend that population flew to the county town and major cities.

Here are the unbalanced industries too. The main output value of township enterprises lies in the industry, transportation, tourism and restaurant services. The major industries depend on natural conditions and geographic conditions, high energy industries. And agricultural development in remote rural towns lags especially behind and slow.

4 ANALYSIS ON CONTRADICTIONS BETWEEN ECOLOGICAL ENVIRONMENT AND URBANIZATION

4.1 Ecology Zone and Functional Domain

It can be seen that most of the region are inappropriate habitat areas, while the Wolong and Gengda are medium suitable. No suitable, natural disasters most frequently, most fragile area is along the Minjiang River, where is relatively better conditions for development. Due to this, Minjiang River flood land aggregated more and more population and industries.

Like most counties in China, China's smallest administrative unit is also facing the contradictions of urbanization. Urbanization, lack of industrial motivation, has to develop the high energy-consuming industries in the low-cost, high-profit, high-consuming way. Because the difficulty to quantify and invisible short-term effects, it has repeatedly ignored.

In such a typical hot-dry valley area, contradictions are particularly apparent, towards to a vicious circle. Dry and hot climate, the deteriorating habitat conditions, and decreasing precipitation, while higher evaporation, even the large number of small hydropower station on the river water, all of this directly impact on the environment. Accompanied by changed waterway in urban construction and man-made land, as well as the impact of climate changes on the flood period and evaporation, changed energy flow as the result of urbanization have been gradually approaching the critical point.

4.2 Land-use Contradiction

Whether "the physical - chemical - biological processes system"⁶, or "complex ecological system,"⁷ ecosystem should be multi-layer. This means that ecological problems must not only nature itself, but integrated with the entire biosphere. The process of urbanization focuses on economic development based on natural resources, so that the entire biosphere system's development objective is one-sided and unbalanced.

As the urban structure, it results uneven distribution of population and a large influx of migration in the land of 1.29 km² in Wenchuan. In 2008 the resident population is 36000 (22800 registration population), with high population density of only 35.8 m²/person, while green space, roads, infrastructure land is seriously inadequate. Because of land shortage, arable land is occupied for industry to improve the effectiveness of land. Inevitable invasion and occupation of river transformed nature. To revenge, habitat fragmentation greatly damaged the ecosystem, in the restructuring process, the new energy flow affects in opposite way on and on. Ecological construction has gradually decline and land-use conflicts deepen this imbalance.

4.3 Contradiction between the Industrial Structures

Wenchuan County's backbone is industry and transportation. In 2002, value of industrial output

6 By the cooperation of United Nations University, IGU, International Mountain Society (IMS) and the UNESCO Man and the Biosphere Program (IBM), on September 14 to 19, 1981, in Berne-Riederalp Switzerland, at the mountain ecosystem stability and instability of the symposium, O 'Connor made the definition of mountain ecosystems.

7 In 1984, famous Chinese ecologist Mr. Ma Shijun proposed. His view of the complex eco-systems includes social, economic and natural systems of different nature

amounted for a large proportion of 59.63% of total⁸. In 2007, the number increased as 67.6% of the county GDP, whose industry ranks first in Aba, which makes Wenchuan the main industrial and export base. But the rapid development of tertiary industry grows rapidly. Rapid industrial development has several reasons: lack of capacity for independent innovation so that they have to turn to developing mature but abandoned industrial systems; rich natural resources as mine and waterpower, also the transportation pattern of obvious advantages; relatively low level education and cheap labor; location nearby Chengdu Plain, and more economic, and low cost on land; urban management is insufficient, operating principles and methods are difficult to take into account of the ecological problems.

In view of high-energy-intensive industries, there are only 3 types of land-use classification of industrial land for Planning, which has not related to the impact on the environment. Water body is also a multi-functional and complex ecosystem, which should be based on geographic location, functional requirements, utilizing and potential to build various ecosystems. Nevertheless, not only the development of small hydropower stations changes physical and chemical foundation of Minjiang River, but also further affects the entire watershed of the landscape and pattern. In holistic view, part of the landscape will disappear, landscape structure will be change, and relevant geography and environmental elements will in the face of new challenges. A large number of tourists and the domicile migrated population, contributed to the development of tertiary industry on hotels, restaurants and services. Natural resources as a basement of whole ecosystem, hot-dry valley area brings diversity and complexity eco-conditions. Spontaneously, tourism infiltrates through economic structure including urban planning, social structure and consciousness of people, driven by the industrial transformation of urbanization, bringing about the reorganization of the entire physical space.

Conflicts of industries and ecological construction also includes the ecological construction of Minjiang River. Increasing demand for land to urbanize, the original narrow space of River is not enough. During the survey can be found, by reclamation of arable land every year, even occupying flood land and solid waste of construction to fill river, it turned to the newly reclaimed land to survive. The loss of arable land and forest land can only worsen the ecotone climate, thus react on agriculture and human settlements environment.

5 SUMMARIES

All above highlight the contradictory relationship between ecological construction and urbanization. Industrial transfers grow in the small cities and towns in demand, accompanied by negative effects. From the perspective of traditional economics, although revenue maximizes, such spatial transfer deeply affects on the existing land-use pattern and structure of the local eco-system indeed. "Development and protection" is an old topic. But from the above analysis, industry, size, structure and ecological construction, etc., they are not just staying in the ecological principle establishment like framework which cannot be unable to implement. Here the idea of urbanization development needs for further parsing the organizational structure of the administrative unit, administrative mechanisms, and practical approach. To recognize scientific uncertainties, on the basis of a clear understanding and identifying on problems, it can be sort out the ecological indicators of management mechanisms and quantifications, and finally implement the relationship between various department and cooperation on the operational level, so that can find a way for west underdeveloped ecotone areas in ecological construction and urban development.

REFERENCES

- [1] The Main Economic Data of Aba in 50 Years
- [2] Chen Guojie. Theory and Practice of Ecological Construction on upper reaches of Minjiang River. Chongqing: Southwest China Normal University Press
- [3] Wenchuan County Urban Master Plan (2004-2020). Urban and Rural Planning Design Institute of Sichuan Province, June 2004
- [4] Wenchuan County Statistical Yearbook 1982-2007
- [5] Huang Bing-wei, Zheng Du, Zhao Mingcha. Modern Physical Geography. Beijing: Science Press,

⁸ Wenchuan County Urban Master Plan (2004-2020). Urban and Rural Planning Design Institute of Sichuan Province, June 2004

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- 1999,36
- [6] Weather information from Sichuan Provincial Meteorological Bureau before 1980
 - [7] Yin Zhi. Several Pressing Issues on the Wenchuan Earthquake Reconstruction Planning. Beijing: Tsinghua Urban Planning & Design Institute, July 22, 2008
 - [8] National Planning Framework for Protecting Ecologically Fragile Zones. Department of Environmental Protection, September 2008

