

Zhang Jiachong Study Site Description

Location

The Changjiang (Yangtze)/Pearl River Watershed Rehabilitation Project area was chosen as case study area for LEDDRA program; in detail the *Zhang Jiachong* area within the *Zi Gui* county, *Yi Chang* city and *Hu Bei* province.

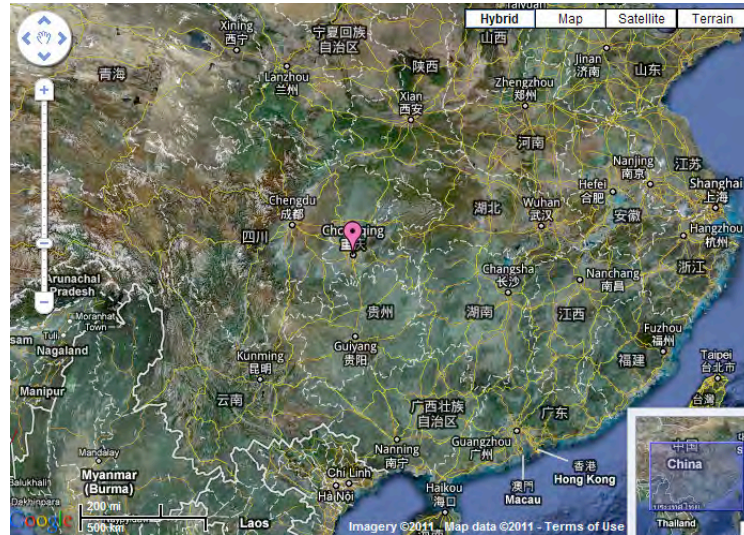


Figure 1. The Zhang Jiachong area (Zi Gui county, Yi Chang city) in Hu Bei province

Regions selected lie in the Yangtze and Zhujiang Rivers. 31 counties locate in the Yangtze River with total area of 5,600.43 km², and other 7 counties belong to the Zhujiang River with area of 1,623.96 km². The counties in the Yangtze River are all parts of priority conservation areas determined in 'National ecological environment construction layout'. The counties in the Zhujiang River are in the upper reaches of the Panjiang River. The total area of the project regions is 7,224.39 km², including 3,430.13 km² of soil erosion area, 47.5% of the total.

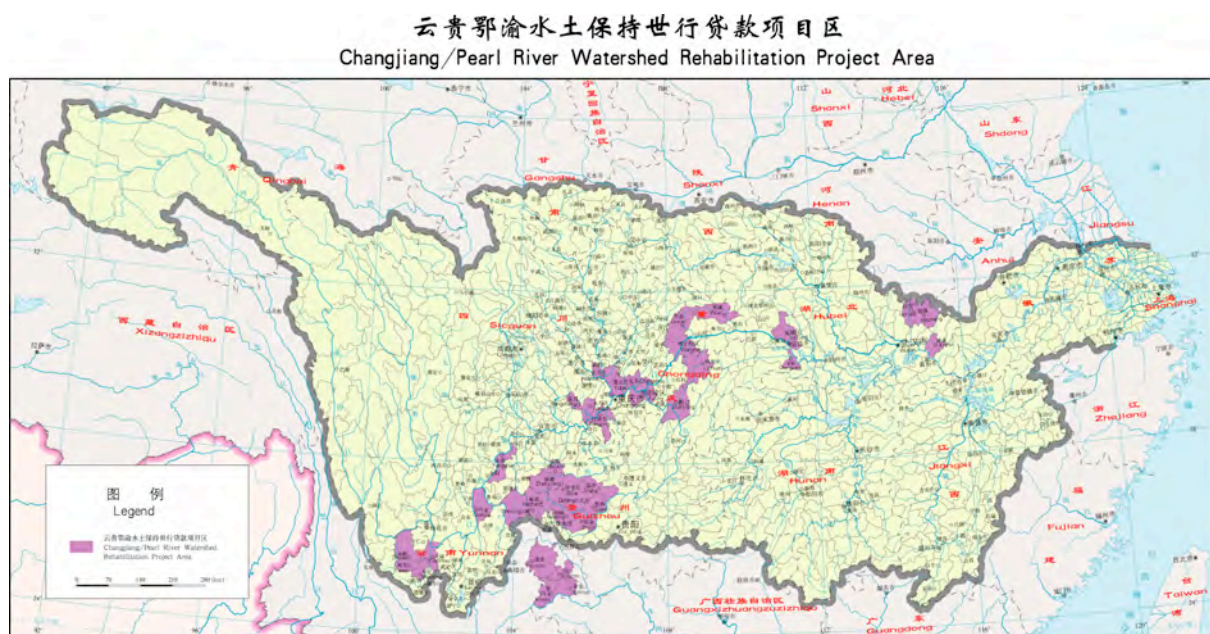


Figure 2. Map of Changjiang River Watershed Rehabilitation Project Area

Environmental profile

Climate

The regions are located in subtropical monsoon climate zones with the typical plateau climate features of dry winter and wet summer. There has no frost during the winter and no broil during the summer. The four seasons are not clear with the following features:

- The annual temperature range is small while the daily one is large. Average annual temperature is 16,5°C.
- Daily temperature degree accumulated for higher than 10°C in one year is 4,8°C.
- For sunshine hours in a year, it is as high as 2,387h with a total radiation of 512.5kJ/cm².
- The annual and seasonal distributions of precipitation are uneven. Average annual precipitation is 854mm. Rainfall of flood seasons from July to September accounts for 56.0% of annual amount.
- The main natural disasters are mainly cold, frost, hail, flood and drought.



Figure 3. Before and After Interventions

Hydrology

The main water system in the project region of the Chuxiong Canton is the Longchuanjiang River. Average annual runoff is 82.5394 million m³ and 132.78m³/s. The annual runoff changed very differently with the largest runoff of 99.0473 million m³ and the smallest runoff of 66.0316 million m³. The seasonal runoff distributes unevenly in a year. Normally the runoff from July to September is the largest that accounts for 65% of annual value. So that results in uneven distribution of annual and seasonal sand transported concentration correspondingly. Average annual sand transported modulus of the project region is 1,486t/km².a. Water resource in the project region is mainly surface water. The average water resource possessed by farmland per Mu is lower than the average level of the whole province. And restricted by the land condition, pumping and irrigation instrument the usage of water resource is low and most regions here are heavily short of water.

Soil

There are 4 soil groups, nearly 14 subgroups, 24 soil categories, 59 soil species and 37 variations in the project regions. The distribution of red earth is most extensive with yellow brown earth, purple earth, and paddy soil also distributed widely. Red earth mainly distributes in warm and cool dam regions and coteaus with the elevation of 1,690m~2,400m. Yellow brown earth is belong to cold zone soil and mainly distributes in ridges and slope belts with the elevation of 2,400m. The precipitation in that area is relatively larger. Purple earth is lithology soil and distributed in region. Paddy soil mainly distributes in river valleys with much more soil types. Good water and fertility conditions bring high land productivity, where have high and stable yield fields concentrate for the whole project regions.

Vegetation

Yunnan Province is one of the provinces in China, which have the most abundant vegetation types. According to "Yunnan Vegetation", there are 12 vegetation groups, 169 biomes and 209 species in Yunnan Province. The vegetation coverage degree in the project region is 25.5% while most woodland is sparse tree and boscaje. Woodland with canopy density less than 30% accounts for 36.1% of the total woodland area.

Vegetation types in the project regions are subtropical half-wet coniferous and broad-leaved mixed forest with everagreens and deciduous mixed. There also exist other vegetation types such as shrubbery of hot river valley, cold shrub sward, sparse sward, brushwood of slow slope and low hill, krummholz, etc. The types of virgin forest are various. Yunnan pine occupies the largest area, following by armond pine, Dianyou Cedar, white gourd in dryland, Dian poplar, Dian oak, etc. The main types of shrubbery are birchleaf pear, bureja gooseberry, scree etc. Types of planted forest include eucalyptus, willow, robust silk oak, etc.

Wildlife

Complicated landform and variable climate conditions turn Yunnan Province into the "kingdom" of animals. Altogether there are 1,704 amniotes. In 257 wildlife under special state protection published in 1998, Yunnan has occupied 164. Among them, wildlife under the first class protection includes Dian golden monkey, gibbon, Asian elephant, green peafowl, etc and under the second-class protection includes stump-tailed macaque, zibet, etc.

Most wildlife under special state protection in Yunan Province is belonging to forest and tropic types. Their living and distribution are correlated with forest especially tropic forest. Normally they live in the natural protection regions. There have not carried out wildlife investigation for nearly 20 years in the project area. But only secondary vegetation and farmland leave with sparse trees. Wildlife here is mainly minitype animals like snake, rat, bird, squirrel, owl, etc. as the project regions destroyed by human activities for long periods.

Demographic and socio-economic profile

Administrative division

The project regions cover 9 prefectures (city) and 38 counties (district) in 4 provinces (municipality) of Yunnan, Guizhou, Chongqing and Hubei, including 193 towns, 1,686 villages and 559,863 households. Three minority autonomous states are involved in the regions: Chongxiong Yi nationality autonomous state of Yunnan, Qianxinan Miao and Buyi nationality autonomous state of Guizhou, and Enshi Tujia nationality autonomous state of Hubei. Two of minority autonomous counties are included which are Xianning Hui and Yi and Miao nationality of Guizhou, and Changyang Tujia nationality of Hubei.

Population, labors and their prediction

In 2001, the total population of regions is 2,214.1 thousands with the density of 306 persons/km². The highest density of 534 persons/km² is in Chongqing, and the lowest of 202 persons/km² is in Hubei. Agricultural population is 1,985 thousands, 89.7% of the total. Agricultural labors are 1,056.9 thousands. Assuming 12‰ as the natural increasing rate, the population will be 2,378.4 thousands at the end of the project, of which agricultural population will be 2,133.4 thousands.

The minorities mainly are Yi, Miao, Buyi and Tujia nationalities, followed by Bai, Hani, Zhuang, Dai, Miao, Lisu, Hui, Man, and Naxi nationalities. Most of minority population lives in distant mountainous area. Part of them mix-lives with Han nationality. They make a living mostly by plantation through cultivating large area land but with little harvest. This caused their low income.

The farmers in the regions are engaged in planting, possessing and breeding industry, and a great many of them go outside to work. For example, farmers working outside were one third of total farmers in Chongqing. This is an important income source for local people. However, in minority regions, constrained by traditional custom, farmers would stay in their habitation and be free during non-farming period rather than go outside for making earning.

Principle LEDD Problems

Destroying land resources and endangering survival environment

Intensive soil erosion directly washes soil away, which makes soil depth thin, reduces soil fertility and crop productivity, and even causes desertification. Average farmland area per capita is only 0.12hm², and 55% is slope cropland. Soil loss not only destroys inadequate land resource but also endangers survival environment.



Figure 4. Degradation Status

Deteriorating ecological environment and restricting agriculture development

Due to destroy of vegetation, thinning of soil depth and reducing capacity of water storage, the streams and rivers dry up during winter and spring. Consequently, There are not enough water supplies for irrigation, even for domestic uses, especially in areas with carbonate rock distribution. Soil loss also aggravates drought and flood hazards, landslide and mud-rock flow, which cause great loss to human life and fortune. For instance, on 7th may, 2000, the mud-rock flow occurred in Huashi village of Dafang county caused 16 people death, 2 people lose, 18 people injuring, 24 houses and 12 hm² farmland destroy. The direct economic loss was about one million yuan.

Sediment in rivers, lakes and reservoirs and endangering the safety of downstream areas

Soil eroded from land enters rivers, lakes, reservoirs, and channels in downstream regions, resulting in benefit reduction and life span decrease of water conservancy projects. Sediment has built up in rivers. The result is a decrease in the holding capacity of rivers and flood discharge capacity of natural waterway, which worsens safe in sownstream areas.

Aggravating poverty and restricting sustainability

Soil loss results in poverty and vice versa. Where soil loss is severe is the poor region. Soil loss reduces land productivity and crop production. This causes not enough supplies of necessary materials for agricultural production and farmers living such as timber, firewood, fertilizers and forages. To meet needs, more reclamation results more vegetation destroy and more soil loss. Soil loss also affects the improvement of agricultural conditions. As a result, local economy is in a low level, farmers live in poverty. This cinstrains investment for soil and water conservation further, and keeps agricultural production in a low level.

Responses to LED

The main objective is to improve ecological environment and relieve local poverty to stimulate local social and economic sustainable development by soil loss control. Based on principles of prevention first, planning in a whole, comprehensive control, stressing management, and focusing on benefits, possible strategies are as follows: control slope land within small watersheds; develop a unified and comprehensive management planning, integrate control and exploration. As the result, systems for soil and water conservation and demonstration examples will be developed.



Figure 5. Monitoring and Evaluation

- The rehabilitation activities for soil and water conservation in the project are as follows:
- Conversion of slope cropland to basic farmland for agricultural condition improvement;
- Vegetation plantation for adjustment rural economic structures by planting local specific economic fruit trees;
- Construction of small water conservancy projects for runoff control and water use efficiency increase. The system with combination of storing, pumping, and draining will be developed;
- Protection of forests for ecological self-rehabilitation. In addition, new energy should be developed;
- Development of supporting systems for the project, including technology training, topic studies, and demonstration extension.

再造秀美山川

综合治理 成效显著



嘉陵江下游石坎坡改梯工程（四川华蓥）



嘉陵江流域坡改梯工程（四川仪陇）



金沙江流域上坎坡改梯工程（贵州威宁）



兰州市石山区坡改梯工程（甘肃陇南）



三峡库区坡改梯工程（重庆巫山）



兰州市石山区坡改梯工程（甘肃静宁）

Zai Zao Xiu Mei Shan Chuan

在治工程二十年成就的写真

CHANGJIANG RIVER BASIN 20 YEARS OF TERRACE RECONSTRUCTION

Figure 6. Terraces