

**Utilizing the Giant Panda as a flagship species for nature conservation in ethnic minority regions of southwest China (Ref: 10.11.05)**

**Final Report**

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to

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## **1. Summary**

This report derives from the field project generously supported by Rufford Small Grant program, which was implemented in 2006 to 2007. The aim of the project was to document all sites of giant panda activities, within Shenguo Zhuang Provincial Natural Reserve (SPNR), using geographical position technology, for extensive GIS mapping and statistical analysis. Through this work we quantified the status of the Giant Panda and other flagship species including population estimates and habitat. In addition we conducted door to door interviews with local minority households to collect socio-economic information (ie: income, production, energy use etc) which formed a preliminary investigation into the conflict between humans and wildlife. An education component of the program was conducted both through a local primary school and public presentations targeted at the local Yi Nationalities community. We exhibited specimens showed scientific video recordings and discussed conservation value of endangered species, such as Giant Panda, musk deer and Red Panda.

We discovered large areas of primitive forest with rich resources in the SPNR. This natural environment provides excellent habitat for a number of rare species including the Giant Panda. However, there are sharp contradictions between human activities and wildlife, which lead to the decreasing of Giant Panda population and slow economic development of local community. In surveying we found the local people have traditional culture and awareness of natural protection, however, natural protection may become less important when compared with the stress from negative economic situation and growing population. There are many factors contributing to reduced efficiency of protection. This study area is relatively isolated, with limited communication with modern society, and slow to static economic and social development. Secondly, the traditional livelihood, such as biomass collection, hurdling, deforestation for planting, also increases pressure on suitable wildlife habitat, for which local communities have been unable to find alternative economic means. Thirdly, the personal skills of the Reserve staff needs to be expanded to encompass basic scientific management and animal protection, and their relationship with community needs.

## **2. Study area**

This project was carried out from between January and August, 2006 and 2007 in the Shenguo Zhuang Provincial Natural Reserve (SPNR).

Situated in eastern Yuexi Prefecture, Liangshan of Sichuan province, the Shenguo Zhuang Provincial Natural Reserve (SPNR) was set up in 2002 to protect the Giant Panda population. The reserve (102 ° 42 ' to 102 ° 54' E, 28 ° 28 'to 28 ° 41' N), cover approximately 3.37 km<sup>2</sup>. The reserve borders the Meigu Dafending Natural Reserve on the east, Wabo Liangzi on the south and faces Maanshan Province Natural Reserve to the north. This area plays important role as an ecological corridor for Giant

Panda migration within Ganluo, Meigu and Ebian, and also is a key area of Giant Panda population protection.

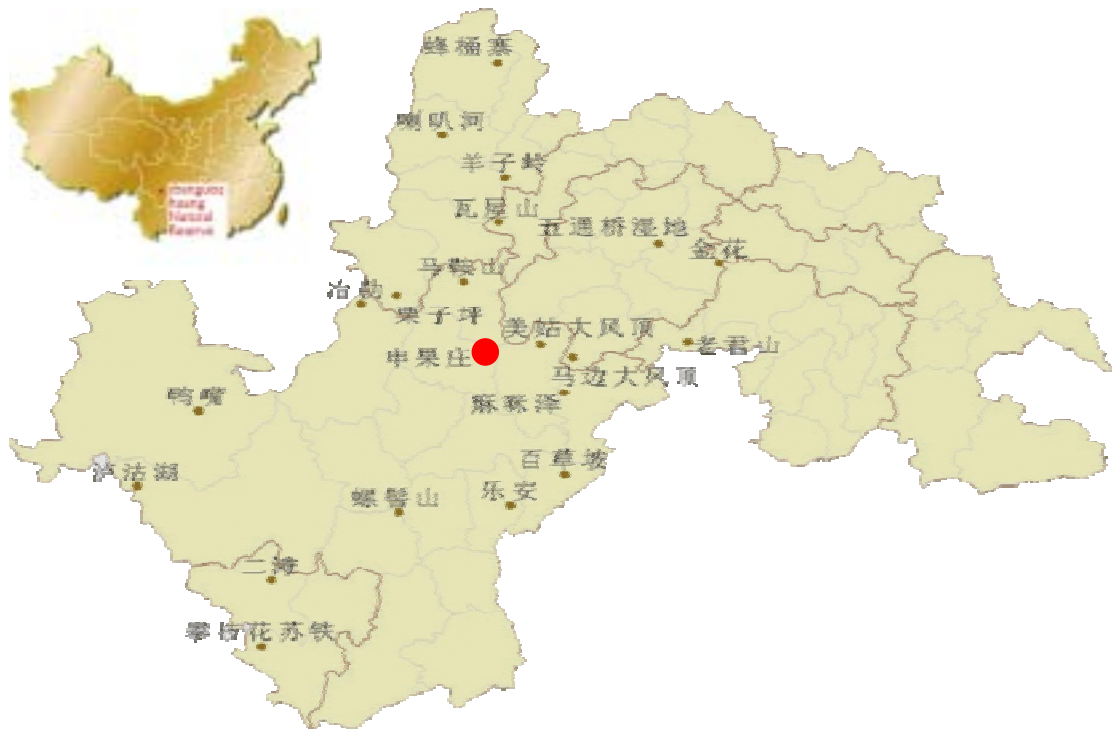


Fig.1 The location of SPNR



Fig.2 Giant panda (*Ailuropoda melanoleuca*)

Unpredictable weather, including frost and hail, and potential to catch hypothermia, often restricts the activities of the nature conversation. The natural environment of the reserve is fit for the revival and offspring of many species. The area contains over 1000 endemic plants include 10 rare and endangered species, which have been included in the state focusing on protecting. There are 258 species of animals (mammals 58, birds 186, amphibians 7, and reptiles 10) including nearly 20 species of under key national protection, such as giant panda, takin, sihuang partridge,

The SPNR is at the higher and middle reaches of Daduhe River in the southwest of Sichuan. With an elevation between 2130m to 3957m, it is rich in mountains and rivers.. The climate in summer is humid climate with subtropical monsoon, whilst winter is dry, sunny, with low rainfall. The mean annual temperature is 7.2 , and the annual sunshine hour is about 1627 hours, with 247 frost-free days. The mean annual precipitation is 1350 mm.



green-tailed monal, forest musk deer, red panda, bifurcates, black bear, wolves, pangolins.[1]

Although there are large areas of primitive forest with rich resources, the geographical conditions make the weak ecosystem. Historically the landscape has been utilized for over one thousand years, with some areas unable to be restore to previous status. Therefore, with advancements in technology and socioeconomic development, it becomes increasingly important to improve the protection of this species area.

Fig.3 The habitat of Giant panda

### 3. Status of giant panda population and protection

The giant panda is a lovable and sweet tempered wild animal, which attracts much attention from scientists and the public. Pandas have a white coat with black fur around their eyes, on their ears, muzzle, legs and shoulders. The unique physical features of the species include their broad, flat molars and an enlarged wrist bone that functions as an opposable thumb - both of these adaptations are used for holding, crushing and eating bamboo.



The Giant panda (*Ailuropoda melanoleuca*) is called *Woqu* by local Yi people, meaning white bear. At SPNR, under the stress of human activities, pandas occupy a narrow area. The panda lives at altitudes of 3000m or higher, especial 3400~3600m, represented by 50 percents of SPNR range. In the

Fig.4 The habitat of Giant panda

field study, guided by local villagers, we often moved along gullies. The panda is inclined to appear in the mixed coniferous and broad-leaved forest during spring and autumn. Pandas at the reserve tend to inhabit dark conifer forest in summer, and sunward areas within coniferous and broad-leaved forest during winter.



Fig.5 The habitat of Giant panda

The reserve borders with the terrain gradually, and pandas maintain relatively concentrated active areas However, over the past 20 years an increase in deforestation, has disturbed large areas of

forest vegetation, resulting in patchy distribution of the giant pandas. Since the 1960's large plantations have been instigated by management of the reserve to increase the habitat of pandas. Thanks to management and conservation for near 50 years, the artificial reforestation has played a positive role of panda habitat conservation.



*Fig.6 The microhabitat of the Giant panda*

There are many difficulties in panda protection. First, the traditional livelihood of the local communities is the first key factor to influence giant panda protection. Second, deforestation and forest fragmentation is a severe threat to the panda's long-term survival. Third, problems of lack of funds and skilled personnel, poor equipment and facilities, poor working conditions and low pay, are a number of factors that contribute to ineffective management of the reserve. The conservation of giant panda and other wildlife is not positive.



*Fig 7 Surveying in giant panda habitat (Baboo)*



*Fig.8 Giant Panda feeding site*



*Fig.9 Feeding site of panda*



*Fig.10 Fecal sample of panda*



*Fig.11 Fecal sample of panda*



*Fig.12 Surveying in the panda habitat*

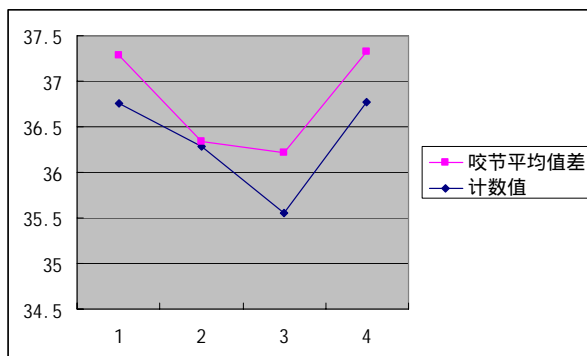
We used transect surveying method and cluster analysis with the droppings as indirect indication to survey the number of the giant panda in sampling regions. The authors used furthest neighbor method and Ward's method with biting bamboo fragment, fecal width, fecal length and height as variables in cluster analysis. Combined with practical situation, the result shows there are 3 giant pandas in the 6.6 km<sup>2</sup> areas, and the ecological density is 0.455 giant pandas/ km<sup>2</sup>. Furthermore, we analysed the method we used and the result.



*Fig.13 Sampling belt in the panda habitat*



*Fig.14 Historical deforestation site*



*Fig.15 Analyzing of the biting bamboo of panda*



*Fig.16 Biting bamboo shoots*



*Fig.17 Fresh biting site of panda*



*Fig.18 Historical deforestation site*



*Fig.19 Difficult survey in summer*



*Fig.20 Fecal site of red panda*



*Fig.21 Difficult survey in winter (Panda)*





Fig.22 Difficult survey in winter (Panda)



Fig.23 Fresh fecal site of red panda

Table 1 Variables recorded in habitat surveying of giant panda

● Canopy: Canopy of overstory vegetation in the sampling plot
● Slope: Slope of the plot, from 0° to 90°; every 10° is a category;
● Slope aspect: Aspect of the plot, four categories: east-facing (45–135°), south-facing (135–225°), west-facing (225–315°), and north-facing (315–45°)
● Slope position: Position of the plot on the hillside; three categories: upper (>2700 m), middle (2000~2700 m), and lower (<2000 m);
● Vegetation type: Six categories: mixed evergreen and deciduous broadleaf forest, mixed conifer and broadleaf forest, conifer forest, shrub, grassland, and bare land
● Bamboo density: Average number of culms in bamboo plots;
● Bamboo height (cm) : Average height of culms plots
● Tree density: Average number of trees in two 20-m <sup>2</sup> rectangular transects;
● Tree size (cm): Average diameter at breast height (DBH) of the trees nearest the center in each plot;
● Tree dispersion (m): Average distance to the trees nearest the center in each plot;
● Shrub density: Average number of shrubs in transects;
● Shrub size (cm) :Average DBH of the shrubs nearest the center in each plot;
● Shrub dispersion (m) :Average distance to the shrubs nearest the center in each plot;
● Tree-stump density: Average number of tree stumps (>15 cm in diameter) in each plot;
● Tree-stump size (cm): Average diameter of the tree stumps (>15 cm in diameter) nearest the center in each plot;
● Tree-stump dispersion (m): Average distance to the tree stumps (>15 cm in diameter) nearest the center in each plot;
● Fallen-log density: Average number of fallen logs (>15 cm in diameter) in each plot;
● Fallen-log size (cm): Average diameter of the fallen logs (>15 cm in diameter) nearest the center in each plot;
● Fallen log dispersion (m): Average distance of the fallen logs (>15 cm in diameter) nearest the center in each plot
● Herb-cover proportion (%): Proportion of herb-cover area in the plot;
● Water-source dispersion (m): Estimated straight-line distance from the sampling plot to the nearest water source
● Concealing condition (m): Mean greatest distance looking eastward, southward, westward, and northward at a height of 1.0 m at the center of the sampling plots;
● Open-land proportion (%): Proportion of land area without bamboo cover in the plot;

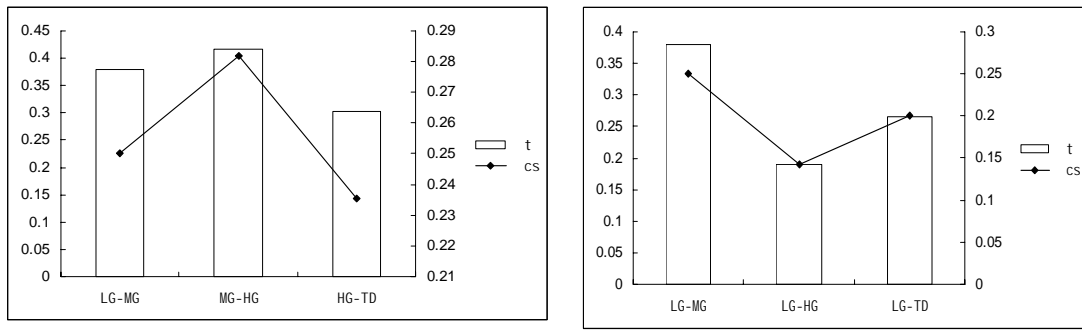


Fig.24 The  $\beta$  biodiversity index in panda habitat

7 P004中心	155	71	32.681	5.05882	21 1年前	7.16, 15:5
8 P004. EN	135	58	30.2526	2.61627	19 老	7.16, 15:5
9 P004. WS	135	63	31.6518	5.02159	56 老	7.16, 15:5
10 P006中心	140	50	29.944	4.68812	75	7.16, 17:0
1 P002中心	127	57.1	36.3438	6.51672	32	7.13, 13:3
2 P002. 1	95	60	37.0063	9.47554	32 新鲜	7.13, 13:3
3 P002. 2	130	70	38.6094	6.67737	32 新鲜	7.13, 13:3
4 P003. W2	140	58	38.6794	4.54024	34 较老	7.13, 13:4
5 P003. N2	170	50	39.8971	7.37076	34 新鲜	7.13, 13:4
17 P010. E1	135	60	35.9558	3.11397	43 2、3个月	7.17, 12:0
18 P010. W1	130	50	39.1125	4.40655	24 4个月左右	7.17, 12:0
21 P012中心	165	65	39.3903	5.84992	31 3天前	7.17, 13:0
22 P012. N2	135	65	38.2237	8.05577	38 3天前	7.17, 13:0
24 P013. W1	130	50	34.2188	8.8731	32 一个月内	7.17, 14:1
25 P013. W2	125	70	37.8563	6.61669	32 一月内	7.17, 14:1
26 P014中心	155	60	38.5333	6.41094	39 一周前	7.17, 14:4
27 P014. E1	125	60	38.7676	8.51545	37 一月内	7.17, 14:4
28 P014. E2	150	60	38.3	8.55834	24 一月内	7.17, 14:4
30 P016中心	130	65	38.2286	6.29357	56 当天早上	7.17, 16:3
31 P016. S1	110	50	35.8182	6.63276	45 当天早上	7.17, 16:3
32 大11. NO. 1	128	60	36.7135	4.04832	74	7.11, 12:2
34 大13NO. 2	95	65	40.0269	7.28001	93 1-3天	7.13, 13:2
37 大17A	175	68	40.2302	6.61754	86 1天左右	7.17, 11:4
38 大17B	130	65	38.9321	7.1293	78 1天左右	7.17, 13:1
39 大17C	145	68	37.2611	6.69891	90	7.17, 14:0
6 P003. N1	160	75	37.1533	4.32441	30 较老	7.13, 13:4
11 P007中心	150	70	34.0915	4.18026	59 老, 一年前	7.17, 10:2
12 P008中心	170	65	34.336	2.76656	100 7、8个月	7.17, 10:5
13 P009中心	170	60	34.5032	4.55027	31 老	7.17, 11:3
14 P009. W1	210	80	37.5622	3.8012	37 老	7.17, 11:3
15 P009. E1	160	70	35.85	6.10616	32 老	7.17, 11:3
16 P010中心	155	60	35.4697	3.80037	33 2个月前	7.17, 12:0
19 P011中心	190	65	36.452	5.90677	50	7.17, 12时
20 P011. S1	180	70	34.51	2.88326	50	7.17, 12时
23 P013中心	175	70	40.5028	6.52492	36 5、6天前	7.17, 14:1
29 P015中心	155	65	35.1763	6.30441	38 一月内	7.17, 15:1
33 大13NO. 1	170	80	37.4267	3.97768	105 一年左右	7.13, 13:2
35 大16A1	167	75	37.0194	4.10459	93 10天左右	7.16, 14:4
36 大16C中心	165	76	36.6023	9.24374	44 15天左右	7.16, 18:2
40 大17E	172	77	34.8776	9.64183	67 1-3天	7.17, 16:5

Fig.25 Analyzing of the sampling plot

Fig.9 Analyzing of the sampling plot



Fig.26 Fecal driedness

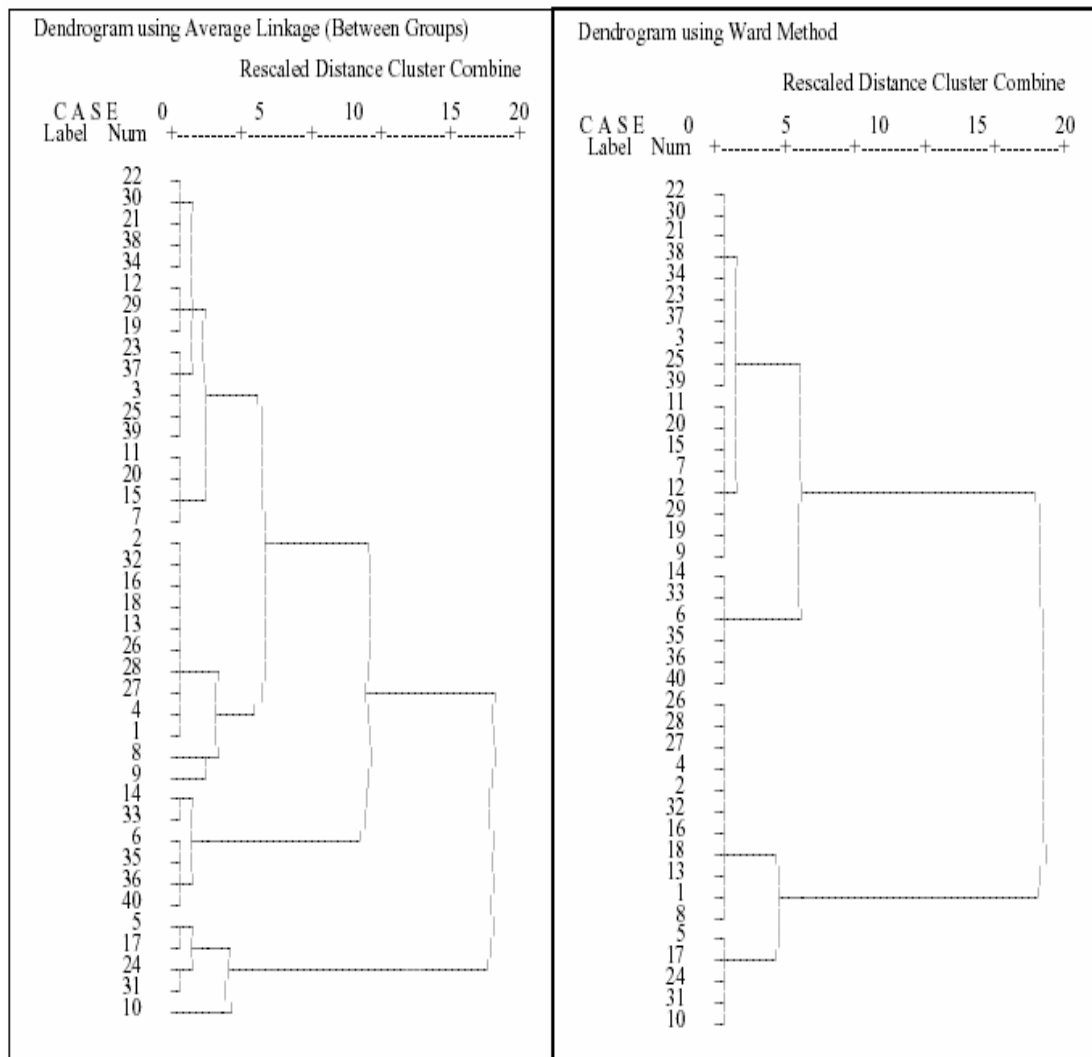


Fig.27 Population computation of panda in the sampling plot

## 4. Human activities

The study area of Shenguo Zhuang Nature Reserve, includes 4 townships (Laji, Waqulaiwu, Walijue, Shenguo) and 6 villages (Laji, Hongqi, Zhulumen, Zhulin, Pingqiao, Masijue). The socio-economic survey included interviews with key figures, rapid assessment and participatory rural (Participatory Rural Appraisal. (PRA)) appraisal, random visits, field observations, and typical household survey. Investigators utilised questionnaire survey of households and conducted interviews with farmers to gather relevant information for study and analysis.

The total population in currently 8294 people, made up of 2122 families, predominantly from the Yi Nationality. Over 87 percent of people are farmers, with 73 percent receiving no formal education. A large proportion of Yi people in this region retain linguistic dialect and do not speak Mandarin Chinese.

### 4.1 farming

Yi people are mainly engaged in agriculture, animal husbandry, collecting, fishing and hunting. Since the establishment of the natural reserve, hunting and logging are prohibited however due to the lack of alternative forms of economic activity, these are in the process of being phased out. Farmlands include watered lands, dried lands and gardens. Food crops include tomatoes, rice, buckwheat, barley, corn and other vegetables. Agricultural farming is very basic in the region, with tools predominantly constructed from wood, with the exception of a small number of iron and long knives. The 'slash and burn' approach is used, as in many arid regions. As the grain output is so low, supplementary means of food production such as livestock, hunting and gathering are required. In particular, seasonal herbs illegally collected on protected areas and resulting habitat fragmentation has become increasingly serious management issues. Thus, over a long period of time conflicts between protected areas and local communities have existed



*Fig. 28 Yi community surrounding the panda habitat*

#### 4.2 Livestock Predation

Animal husbandry and farming is another way of living for Yi people, representing 77 percent of families. Livestock include pigs, yaks, cattle, horses and sheep with the number of the livestock often representing the family fortune. Yi people seldom drink milk, so the livestock are predominantly used for wool, and meat during Festivals and religious activities. Previously there were many lush natural pastures in the area, providing a good place to engage in livestock production. But now, as we surveyed, the low utilization of resources and high consumption



*Fig.29 Pig farming and Yi children*

leads to negative impacts on the ecological of the nature reserve. Due to primitive methods and long-term excessive herding and grazing, large tracts of grassland degradation, to the point of desertification, have been the result. Livestock restocking has led to an increased number of grazing animals within the Nature Reserves, with vegetation affected to varying degrees. Wildlife habitat has been destroyed to various extents, whilst fragmentation has occurred which undermines the basic conditions for the maintenance of biological diversity



*Fig.30 Livestock and range*

#### 4.3 Biomass collection



*Fig. 31 Mushroom collection*

Frequent illegal herb collecting from the Reserve has contributed to declining biological resources. From April to September, 80 percent of the residents (mainly women and children) gather to the natural reserve to collect various luxurious ingredients, including fungi, bamboo shoots. However, through long-term over-harvesting and large-scale human activities, local wildlife resources are diminishing. In the past, luxurious ingredients such as *Eucommia*, *Tianma*, *Ganoderma* were commonly found, however due to unsustainable and excessive gathering over a long time period, these ingredients are becoming endangered and even endemic.



*Fig. 32 Endemic lizard in reserve*



*Fig. 33 Bamboo utensil in market place*

Gathering and felling the fuel wood is also a considerable problem. Yi people reside in high-altitude, low temperature, mountainous regions, where wood fires are used almost continually throughout the year. Simple custom cooker are built on three pieces of rock placed on the ground, consumption high volumes of firewood nearly 500 kg one year. With such high fire wood demands, the community has severely damaged vegetation, resulting in forest decline, and the gradual eroding of resources within the nature reserve. The construction, development and long term success of protected areas face a serious threat.





*Fig.36 Typical panda habitat*

## **5.2 Environment education**



The purpose of the text is to realize the problems of environment and education which consist in the area of minority cultures. Through investigations and analyzing situation of Yi community, we focused on the issues of remote traffic, lack of environment understanding, limited formal education and traditional culture, and how to develop ways of solving these problems. By the integrative education modes including the theory

*Fig. 37 Local Yi Communities*

knowledge conveying in simple classroom, the direct environmental education in local communities, interaction between team members and the local pupils, and the family education in local households, the surveying team conducted the comprehensive education in local minority school and communities. At the same time we offer some suggestions in report submitted to local government to improve the environment awareness of minority communities in the southwest area. The primary goal was to provide information and promote education of our comprehensive understanding of the status quo. To expand our message we also included other people such as local educators and protection stations cadres' staff. They have a profound understanding of the local situation, and are able to play a complementary role in our survey. We managed the related activities as follow:





*Fig.38 Local Yi household*



*Fig.39 Local Yi pupils*

Screenings of films about animals, showing slides, telling traditional stories, taking small lectures on wildlife protection, drawing and interactive games to local primary students and other local residents to learn more about the outside world and to promote the importance and benefit of wildlife protection. We also showed provided interesting facts about habit and behavioral characteristic of wild animals, such as giant panda, red panda, and forest musk deer. Furthermore, we played eight environmental education films such as Kekexili, March of the Penguins. PPT slides covered topic of solid waste, indoor air pollution, water floated, the destruction of biological diversity and other environmental issues. Whilst these problems may not directly affect the communities we wanted to provide examples of wider environmental problems the how preventative measures are implemented. PPT displayed mainly students involved in each aspect.



*Fig.40 Environment education in school*



*Fig.41 Environment education in school*

We took alternative approaches, such as common sense completion and playing games. In the process, we achieved education through enjoyment and participation. Activities were aimed at four and five year old children.

We showed the large-scale photo exhibition in two local markets. These pictures are our own design, flexible and diverse forms, highlighted themes of economy-education-biodiversity, and displayed alternative methods for them to get out of poverty. We also provided education about recycling of daily waste and personal hygiene.

### **5.3 Association establishment**

We assisted local residents to establish a wildlife protection association named “the home of eagle”. The association is the first non-government organization comprised and co-ordinated by Yi people, including 16 communities (man 41, women 8).

The aim of the association is to assist the natural reserve managers in protecting animals. It would make the residents pay more attention to conservation work, to encourage more people to support and join this work. The staffs of the association are responsible for promoting environment knowledge, educating their families and other residents in the neighborhood, assist rangers, dispute mediation, rescue wildlife, and manage and conserve plantations

## **6. Suggestions of Giant Panda protection**

### 6.1 Environment education in primary and secondary classes

We acknowledge that environment education can't produce expected results in a short time. We suggest schools conduct weekly environment education classes, to introduce systemic environment knowledge such as waste management, habit and behavioral characteristic of wild animals, and to promote more communication between adults and children. In the discussion, they would discuss idea about wildlife conversation, and such idea are not imposed by external groups but grow themselves.

### 6.2 Strengthen function of association

For years non-government associations have played an indispensable role in panda protection, and have gained much experience..There still however, remains many challenges such as lack of guiding of skilled personnel, poor equipment and facilities and low pay. In the future, we suggest visiting scientists from institution and university to teach the professional knowledge and find more cooperation with international and national NGO to assist in the community's development.

### 6.3 Enrich the biodiversity of plantations

Whilst the natural reserve has massive area of plantations, our surveys found these plantations are only made up of a single species, maple or huashan pine. Hence, we advise the Forestry sector to increase the biodiversity of plantations. For example, through the study we find the local climate and other natural situations are fit for many taxa. Planting economic forest is not only improving the biodiversity of plantations, but also increasing income of local residents. And we think the way is a good supplement of protection.

### 6.4 Develop herbal artificial planting

There are many herbal resources in this area, which in recently years have deteriorated in quality and quantity due to overuse.. We infer the use of artificial herbal is a good solution to ease this problem, which are well suited to the local environment . We suggest that governments help the local community search for business partner to get the technical support. Gradually we proposed changes from the traditional means of livelihood, to reduce community dependence on the resources for the long term protection of wild animals and plants.

### 6.5 Improve road traffic conditions

Through the investigation, we found that local traffic is very inconvenient, leading to few

exchanges between the local people and the outside world, with limited export potential of goods. To achieve the development of the production and increasing of the income of farmers, the government must strengthen the building of rural infrastructure and improving road traffic conditions.

## 7. Further Plans for Research & Conservation

Further research and conservation actions are urgently needed to incorporate the following priority issues:

1. Assessment of green biomass collection and hunting on biodiversity.
2. Enforcement of protection regime through mobilization of existing human resources (guards), logistics (ammunition, off-road vehicles and firearms) and fundraising for covering field expenses and local involvement.
3. Effect of livestock grazing on local ecosystems and especially on forests.
4. Alternatives for production style.

## 8 Papers and reports

- We collected a lot of data about the habitat and population surveying. Now, we have been analyzing and compose the paper, which will published in international and local peer reviewed journals.
- We submitted the stage and final reports to local government.

## 9. Financial information

Table 2 Financial information of RSG project

Activities	Cost
Local Guide (2 £×100× 5 guides)	£ 1,000.00
Conservation awareness raising and education	£ 1,000.00
Living cost (300 man days×\$5 in 1year duration)	£ 1,000.00
Transport (fuel, vehicle use)	£ 1,000.00
Paper based Maps and publication	£ 500.00
Contingency	£ 500.00
Total	£ 5000.00

## 10. Acknowledgement

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