

**Final Report to
BirdLife International, FFI, BP Conservation Programme**

**Project name: Conservation biological study on the Chinese Grouse *Bonasa Sewerzowi*
- Follow-up 2000**

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Abstract: The Chinese Grouse is an endemic and rare bird in China, which inhabits the mountain conifer forests. During spring-summer 1999 to 2002, using satellite images, we determined habitat fragmentation patterns, and surveyed forest patches at Lianhuashan Mountains. We found that the Chinese Grouse at Lianhuashan Mountains is an isolated population, and divided into two sub-populations. The forest in our study area were seriously cut in past 30 years, with vegetation analysis, we found that the Chinese Grouse could survive in poor habitat, with cut rate of 60%, however, in low density. Conservation suggestions were proposed. With our efforts, the Lianhuashan Natural Reserve up-grades as the national natural reserve in 2002, and our next step is to enlarge the reserve from 12,000 ha to about 80,000 ha, covering the whole area of conifer forest in the Lianhuashan Mountains.

Introduction

The Chinese Grouse is an endemic and endangered Tetraonidae bird in China, distributed in the high mountains of Gansu, Qinghai, Sichuan, north-western Yunnan, and eastern Tibet. In Gansu, the bird inhabits in the conifer forests at the altitude between 2500m to 3600m (Li 1996, Liu & Geng 1994).



The bird is listed as "Endangered" in the China Red Data Book (Zheng and Wang 1998), and its population is well believed to be in declining, caused by habitat isolation and fragmentation, naturally by aridity of the area with the rise of the Himalayan Mountains and artificially by agriculture, logging and deforestation of the mountain forest. However, no practical work has been done concerning this problem.

Starting from 1999, using satellite images, we are investigating how the habitat of Chinese Grouse being destroyed and how the habitat isolation and fragmentation situation at Lianhuashan Mountains in Gansu Province. We also surveyed the selected forest islands to see how the Chinese Grouse were affected by the habitat fragmentation and managed to give conservation suggestions in our study area.

Study area

Our study area is located at Lianhuashan Mountains ($34^{\circ}45' - 35^{\circ}06'N$, $103^{\circ}27' - 103^{\circ}51'$), which including the Lianhuashan Natural Reserve, parts of Yangsha and Yeliguan forestry farms in Kangle, Lintan and Zhuoni County, Gansu Province, China. Shown by the RED square on the map.



The altitude of forest around this area is between 2600 m to 3600m, with the highest peak of 3616 m. The yearly average temperature in the Lianhuashan Natural Reserve was 5.1-6.0°C, with a high of 34°C and a low of -27.1°C.

The forest occurred on northern slopes and some north-east or north-west slopes; it was too dry for forest on the southern slopes, there only grass and shrubs. The forest is dominated by fir (*Abies fargesii*), spruce (*Picea asperata*), birch (*Betula* spp.), and many kinds of willow (*Salix* spp.).



Methods

Satellite image analysis

First-step satellite image was bought in Beijing Satellite Ground Station, Chinese Academy of Sciences, taken on 8 December 1996. In former studies, we know that the male Chinese Grouse hold territories in the habitat of the mountain spruce-fir forest mixed with deciduous trees (mainly willow and birch)(Sun and Fang 1997). Also, all nests were found in the same habitat, we believe that the spruce-fir forest is the key habitat for the survival and reproduction of the bird. Combining with local topographic maps, we were able to determine the distribution of possible spruce-fir forest at Lianhuashan Mountains. The preliminary work covered an area of about 200 km².

In August 1999, to identify the forest islands more carefully, we bought the SPOT satellite image (data disk) taken on 11 September 1998. The image covers our main study area with the center at N345341/E1032722.

Vegetation analysis

Five vegetation plots were arranged randomly in each forest patch, with the size of 10m x 10m. The slope direction, slope angle were measured, and the canopy cover was estimated to nearest 10 %. Alive trees bigger than 3 cm dbh (diameter-at-breast-height) were counted and their dbh were measured. The diameters of cut stems were also measured. Shrub cover were estimated from the average of four sub plots with the size of 2m x2 m, similarly the grass and forb cover were estimated from four sub plots with the size of 1m x 1m. Main shrub species were recorded.

To calculate the rate of the forest cutting, we use the stem area as an index. The ratio of stem area of cut stems to that of all living and cut stems bigger than 3 dbh was defined as forest cut rate.

Investigation on the presence of Chinese Grouse

Male Chinese Grouse flutter-jumped to mark their territories in spring (Sun & Fang, 1997), this would also help us to discover the bird. So we surveyed the birds by line transect method in the morning, each patch was surveyed for about 1 km long if the patch was big enough. During our investigation, we took a specimen of Chinese Grouse with us and inquired local people



From our radio-tracking studies, we noticed that in spring the birds fed on willows near conifer trees in the morning and late afternoon, and were easy to be observed. Also, the



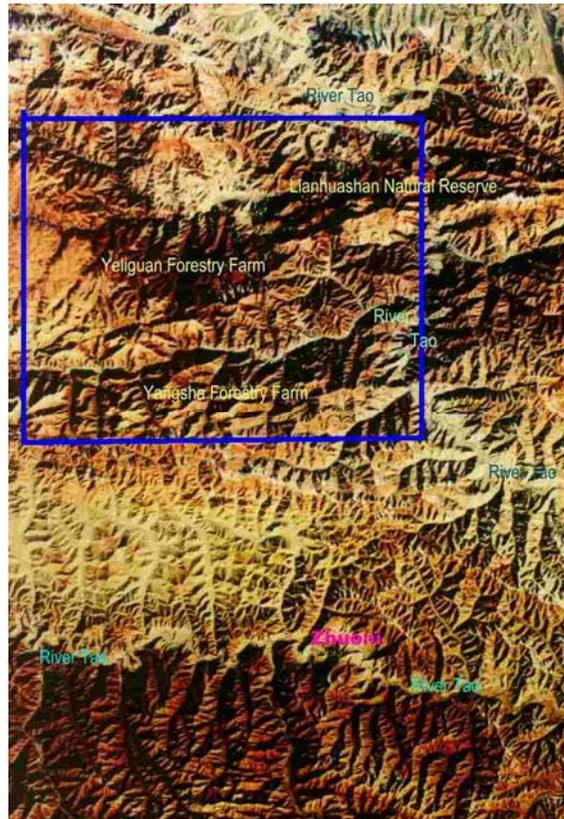
male Chinese Grouse flutter-jumped to mark their territories in spring (Sun & Fang, 1997), this would also help us to discover the bird. So we surveyed the birds by line transect method in the morning, each patch was surveyed for about 1 km long if the patch was big enough. In winter and spring, the Chinese Grouse mainly spent nights in the conifer trees (Klaus et al., 1996), where they would normally leave droppings for more than 30 pieces one night. We determined if the birds are present mainly by searching for droppings under the possible night-roosting conifer trees.

Night roosting site of Chinese Grouse

Results

Habitat isolation of Chinese Grouse at Lianhuashan Mountains

Combining the forest distribution map of Gansu and TM satellite image, we found the Chinese grouse at Lianhuashan Mountains is an isolated population (Figure 6). This population is about 120 km far from its known western neighboring population in Xunhua county of Qinghai province. To the north, the neighboring Chinese grouse distribution area is in the Liancheng Natural Reserve in Yongdeng county of Qilianshan Mountains, with the distance of 200 km. The nearest neighboring population is at the Kache and Muer forestry farms in Zhuoni (Jone) county, with the distance of 30 km and 10 km of non-forest mountains in between.



Forest destroy and fragmentation situation at Lianhuashan Mountains

In 1998, combining data from satellite images with local topographic maps, 10 forest patches were selected for investigation. During our investigation, we found that the forest outside the reserve had been seriously destroyed in the past 30 years. In Yeliquan Forestry Farm, the selective cutting started since 1970's, some forest was cut again during 1995-1998.

Normally the rule for selective cutting was less than 40% of trees being selected for cut, however, the practical situation was different.

There were two main causes that made the forest much more destroyed, one was the real cutting extent being more seriously than the rule, the other was after the formal selective cutting by the forestry farms, some local people illegally cut the trees left.

Figure 1. The study area and the forest patch distribution at Lianhuashan Mountains. Shadowed areas showed the possible conifer forest we detected from the satellite image combined with the local topographical map, the crosses and triangles showed the villages and towns respectively.

Survey the Chinese grouse in forest patches

Preliminary results from the census of Chinese grouse in the forest patches:

From our preliminary analysis of 31 forest patches checked in the springs from 1999 to 2001, the Chinese grouse was found in 16 patches, and in 15 patches were not found (Figure 10). The Chinese grouse was found to have survived at the forest patches with the cut rate over 60%, however, in very low density. Forest patches occupied by Chinese grouse were bigger (102 vs. 8.6 ha) and closer to occupied patches (583 m vs. 2325 m) as compared with empty ones (Figure 11). We did not find the Chinese grouse in the 5 forest patches between the two sub-populations in the Lianhuashan Natural Reserve and in the Yeliguan Forestry Farm.

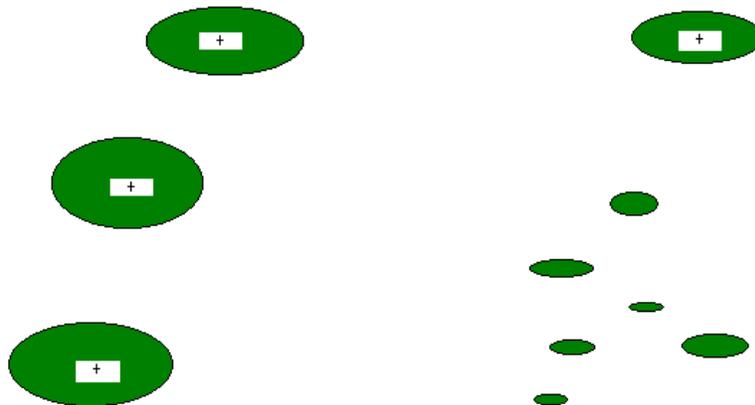


Figure 10. Islands occupied by Chinese grouse were bigger (102 vs. 8.6 ha) and closer to occupied islands (583 m vs. 2325 m) as compared with empty ones.

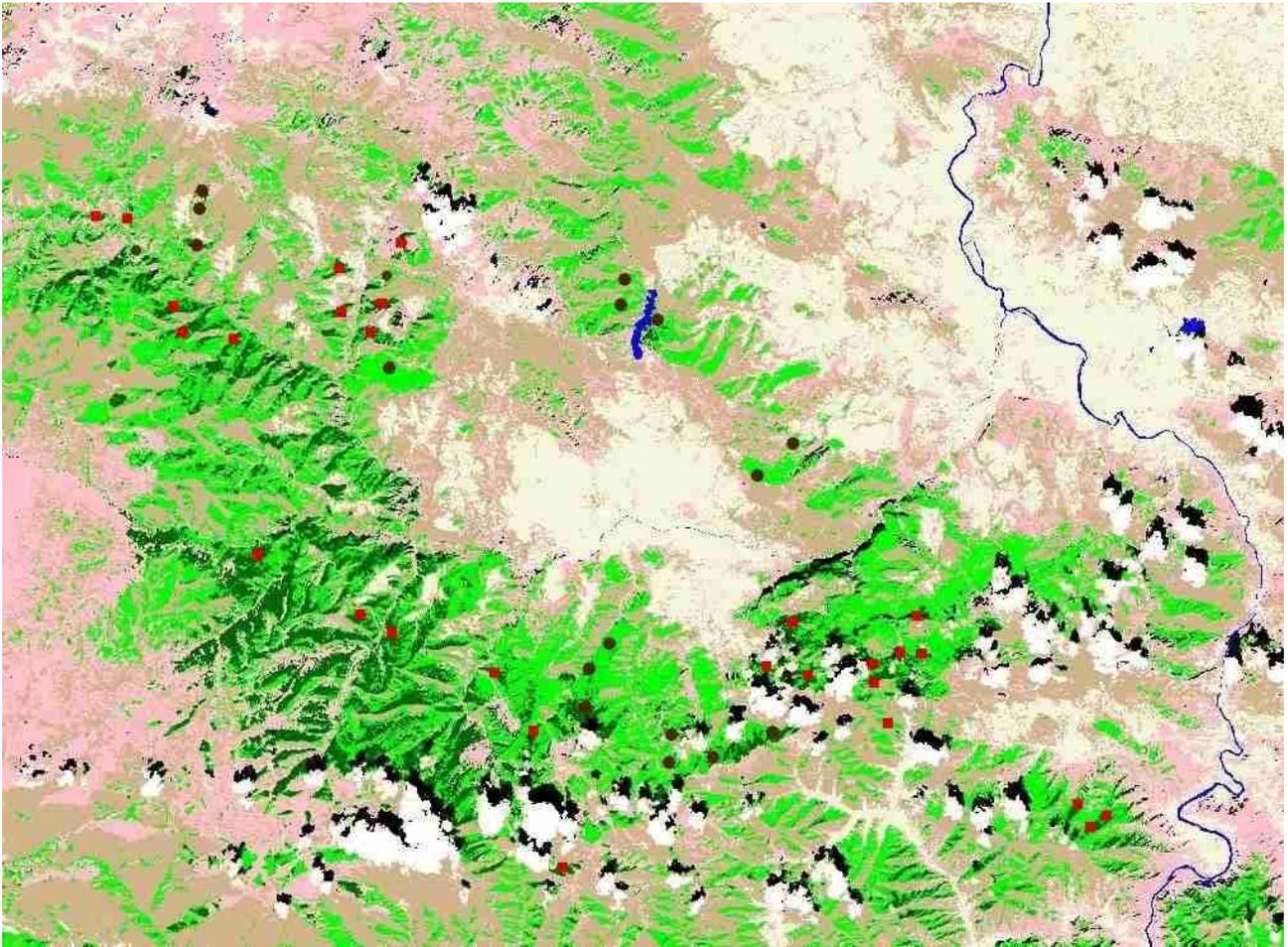


Figure 10. The forest patches we surveyed during 1999-2001, red points showing the Chinese grouse was found, and the brown points showing we did not get the bird. The corridor area between the reserve and the forest farm was seriously illegal logged and no grouse was found. (dark green showing the conifer forest and light green showing the deciduous dominated forest, the river at right is the River Tao).

Present main threat to the forest: Illegal logging. (Figure 12,13).



Figure 12. The local villagers carried the illegally logged timbers to the black wood markets.



Figure 13. Photo taken at the corridor area, the forest was heavily logged, no grouse found.

Conservation suggestions

We have been studying the population biology of the Chinese grouse at the Lianhuashan Natural Reserve since 1995, and found that the bird had a stable high density at the reserve during 1995 to 2000 (Sun *et al.* 2003). We believe that the Lianhuashan Natural Reserve has great conservation importance in our study area. In 2002, with our efforts, the Lianhuashan Natural Reserve succeeded in upgrading the national reserve, this is important for the conservation of this area in the future.

Presently the Lianhuashan Natural Reserve is about 12,000 ha, only protects about 20% of the local ecosystem. We suggest that the reserve should be enlarged, to protect the whole Chinese Grouse habitats in Lianhuashan Mountains, that is to say, to include main parts of the Yeliguan Forestry Farm and some areas of Yangsha Forestry Farm. Then the reserve would be about 80,000 ha in size.

From our study, we found the reserve and the Yeliguan Forestry Farm is connected by a forest corridor with the width less than 1 kilometer (Figure 14), and at some places the forest corridor is interrupted, also we did not found the Chinese grouse in the forest patches between those two sub-populations. Local planting plan should pay more attention in this area to connect these two forest areas. The Lianhuashan Natural Reserve has great conservation importance in this area.

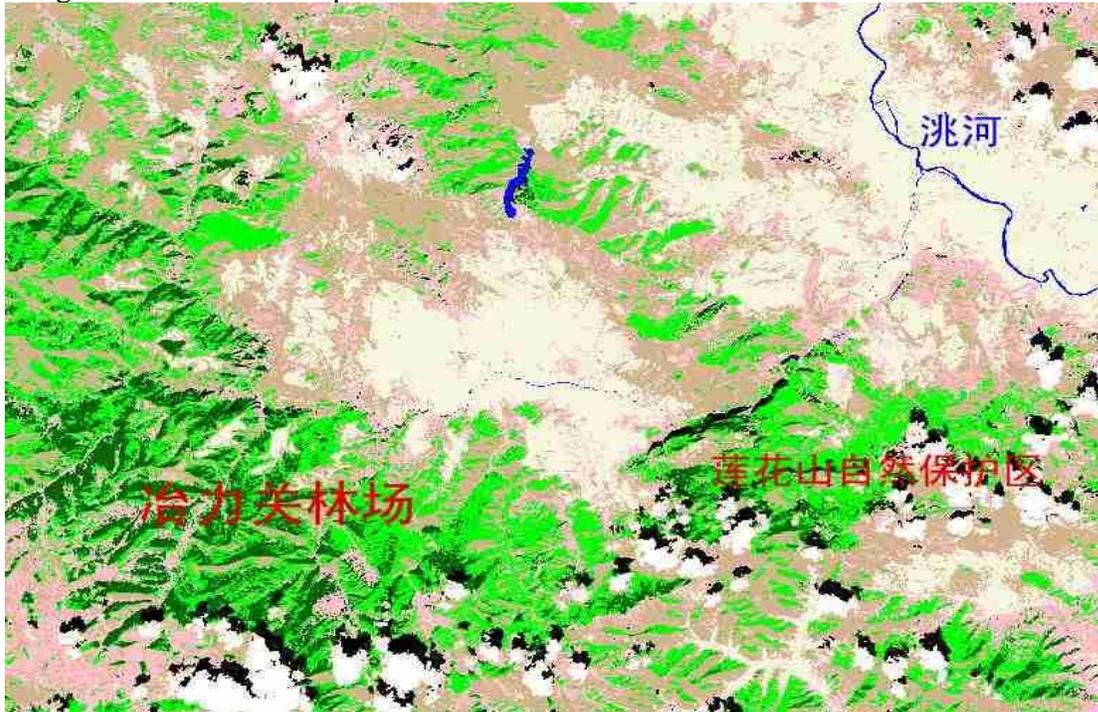


Figure 14. There is a corridor between the Lianhuashan Natural reserve and the Yeliguan Forest Farm, which will be most important to protect the whole population in this area.

Many other endemic birds inhabit in the conifer forest at the Lianhuashan Mountains, such as the blood pheasant (*Ithaginis cruentus*), the blue-eared pheasant (*Crossoptilon auritum*), the chestnut-throated partridge (*Tetraophasis obscurus*) and the snowy-cheeked

laughingthrush (*Garrulax sukatschewi*). During our study, we also found the Sichuan wood owl (*Strix davidi*) occurred in this forest (Sun *et al.* 2001). We think the Chinese grouse is served as an umbrella species for protecting these endemic birds (Figure 15). As the next step, we suggest the Lianhuashan Natural Reserve should be enlarged to cover the whole conifer forest in the Lianhuashan Mountains. From October 1998, Chinese government stopped logging the virgin forest in Gansu, and some other provinces; however, illegal logging by local people is still seriously occurred in the Lianhuashan Mountains. We suggest that the local government should pay more attention on forest management, to stop the illegal logging on the conifer trees.

Our work was presented at the 23rd International Ornithological Congress and the 9th International Grouse Symposium in 2002.

The work was also reported by the CCTV-1 program “Man and Nature” in 2001.

During our field surveys, we found the Sichuan Wood Owl first time in Gansu, and re-discovered the Boreal Owl after its missing for more than 70 years. To conserve the endemic owls, Mr. Fang Yun has been conducting another BP Conservation Programme project since 2002.