



FINAL REPORT

Threat Assessment and conservation of Sclater's Monal at Mt. Gaoligong, China

(Project No.120409)

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Table of contents

1 SUMMARY	1
2 STUDY AREA	1
2.1 Mt. Gaoligong.....	1
2.2 Gaoligongshan National Nature Reserve	2
3 SPECIES INTRODUCTION	3
3.1 Taxonomic Status.....	3
3.2 Comparisons of Related Species.....	4
3.3 Ecological information.....	5
3.4 Endanger status.....	6
3.5 Why should we protect Sclater’s Monal at Mt. Gaoligong?	7
4 AIMS AND OBJECTIVES	7
5 METHODOLOGY.....	8
5.1 Training.....	8
5.2 Field Survey.....	9
5.3 Conservation Awareness Education	9
5.4 Lab protocols.....	10
6 RESULTS	11
6.1 Biological and ecological findings.....	11
6.2 Local community survey.....	12
6.3 Awareness education activities	13
7 ACHIEVEMENTS AND IMPACTS	16
8 CONCLUSION	18
9 PROBLEMS ENCOUNTERED AND LESSONS LEARNT	18
10 IN THE FUTURE.....	19
11 APPENDIX	19
11.1 Photos	19
11.2 Press cuttings	21
11.3 Scientific papers	22
12 BIBLIOGRAPHY	27
13 ADDRESS LIST AND WEB LINKS.....	27
14 DISTRIBUTION LIST	28

1 SUMMARY

This project aims to contribute to our understanding on Sclater's Monal and enhance the biodiversity conservation of Mt. Gaoligong, China. The objectives include: 1) collect the food, feces and habitat information of this species by field survey to understand its ecological needs; 2) investigate the local utilization of the wild plants and assess its impact on this species and its habitat; 3) building pheasant conservation awareness among the local people.

Till now, all the field work has been finished and some good results have been attained. Diet analysis shows that at least 60 plant species have been consumed by this pheasant in winter and spring, among which 18 species are also consumed by the local people as the medicine which means one third of the pheasant's food resources could be affected by the local communities' plant-gathering activities. This is a good threat to Sclater's Monal if the consume of these herb species is driven by the commercial need. On the other hand, nine villages, three primary schools and seven administration stations have been involved in the conservation awareness education activities. Two hundred T-shirts and one thousand copies of the project booklet have been spread to a broad audience.

Key words: Sclater's Monal, Threat assessment, Mt. Gaoligong,

2 STUDY AREA

2.1 Mt. Gaoligong



Fig 1. Bird-eye view of Mt. Gaoligong (photo by Li Liwei)

Located in western Yunnan of China, Mount Gaoligong (Gaoligongshan) is the watershed of Nujiang River and Ayeyarwady River and the topography of which falls from north to south. The peak of Mt. Gaoligong lies in the summit of karwagapu Mountain with its elevation of 5128 meters while the lowest point is in Yingjiang County with the height of only 210 meters. The maximum relative height of Mt. Gaoligong is 4918 meters between the highest and lowest points.

With its distinct vertical distribution of natural vegetation, Mt. Gaoligong has 9 vegetation types distributed in east and west sides, including seasonal ravine rainforest, valley savanna shrub and grass, warm coniferous forest, monsoon evergreen broad-leaved forest, warm and cool coniferous forest, mountaintop moss and copse, warm and chill coniferous forest, warm and chill brushes and meadow.

Mt. Gaoligong has abundant biodiversity, besides of that it is the origin center or distribution center of many taxa, such as ericaceae plants and babbler birds. Meanwhile, Mt. Gaoligong has some endemic species such as Roosevelt's Muntjak (*Muntiacus gongshanensis*).

2.2 Gaoligongshan National Nature Reserve

Gaoligongshan National Nature Reserve lies in the center top of Mt. Gaoligong. It straddles from E98° 08' to 98° 50' and from N24° 56' to 28° 22' with its total area of 405, 200 hectares. The reserve has been set to protect the vertical natural landscape of southwest China, various vegetation types as well as rare and endangered plants and animals.

The reserve is one of the most enriched biodiversity areas in China with recorded flowering plants of 4897 species belonging to 256 families and 1196 genera; 154 species of mammals; 419 species of birds; 56 species of reptiles; 21 species of amphibians and 49 species of fishes.

As one of the vital biodiversity reserves among China and the world, Gaoligongshan National Nature Reserve is assessed by World Wildlife Fund as A-level reserve of international importance in 1992 and is awarded as “World Biosphere Reserve” by United Nations Educational Scientific and Cultural Organization in Oct, 2000.



Fig 2. Study area of this project in Yunnan Province, China

3 SPECIES INTRODUCTION

3.1 Taxonomic Status

Sclater's Monal belongs to *Lophophorus* genus of Phasianidea family in Galliformes. There are distinguished differences between male and female birds of Sclater's Monal.

Male: White lower back, rump and upper tail coverts with shortish, white-tipped, chestnut tail diagnostic. Rest of upperparts is dark, with metallic gloss; underpart velvety black. Has short curly crest. Facial skin is blue and bill is yellowish.

Female: Pale lower back, rump and upper tail coverts contrasting with blackish brown remaining upper part and dark tail diagnostic. Tail blackish with narrow buffy bars and narrow, buffy white tip; dark parts of upperparts narrowly and boldly streaked with buff; throat whitish; rest of underparts finely vermiculated pale buff and dark brown. Facial skin is blue.



Fig 3. The male Sclater's Monal at Mt. Gaoligong (photo by Luo Xu)

3.2 Comparisons of Related Species

Altogether there are 3 monal species in the world; the other two are Chinese Monal and Himalayan Monal.

Sclater's Monal, the first-grade state protection bird, is a large pheasant roosting in mountain forests of southeast Tibetan region and north-west Yunnan Province, at altitude above 3,000 meters. The male bird is approximately 70 centimeters long with white back and tail-tip coverts. The female is smaller with dark brown coverts and pale yellow feathers on the back and tail.

Chinese Monal, the first-grade state protection bird, is endemic species in China distributing to west Sichuan Province, northwest Yunnan Province, east Tibet, southeast Qinghai Province and south Gansu Province, at altitude above 3,000 meters. The male is approximately 76 centimeters long with a large drooping purple crest, a metallic green head, a reddish gold mantle, bluish green feathers and black underparts. The female is dark brown with white on its back.

Himalayan Monal, the first-grade state protection bird, is distributing to mountain forests in north and southeast Tibet and northwest Yunnan Province, at altitude above 3,000 meters. The male is about 70 centimeters in length possessing a long metallic green crest like a peacock, and is feathered with multi-colored plumage throughout its body: white upper part,

black abdomen with uniformly rufous tail feathers. The female is comparatively small, dull in color with a prominent white patch in the fore neck and a white strip on the tail.

3.3 Ecological information

3.3.1 Daily movements

Normally speaking, Sclater's Monal would glide from the roost site to a lower altitude place in the morning and then turn upwards to feed. In the twilight, they would move to a much higher place and later glide to its roost site in the evening. This is in fact an energy-saving activity in Gaoligongshan considering its high mountains and deep valleys. In winter, Sclater's Monal would narrow down their activity ranges to both sides of the valleys where there is less wind and small temperature difference between day and night. The group would go to low latitude places when there is thick snow cover.

3.3.2 Feeding Behavior

Sclater's Monal are mostly feeding on plants. In seasons rich in herbs, like summer and fall, they would eat the tender parts of the herbs but in winter and spring, they would eat the underground part of the herbs by digging the ground using their curly bills considering of deficient plants resource. Because of their unique feeding ways, it is quite common to see feeding-holes on the ground.

3.3.3 Breeding Ecology

At Mt. Gaoligong, the species generally lay eggs at the end of March or the beginning of April, and hatch at the beginning of May, which can last for about 28 days. The female usually lays two or three eggs and hatch the chicks by herself. There are limited places in ridges of Mt. Gaoligong for Sclater's Monal to build their nests due to this species' strict nest-selection. Protecting the nesting-site is a vital part to protect this species.



Fig 4. Two eggs in the nest (photo by Han Lianxian)

3.4 Endanger status

Sclater's Monal is evaluated as Vulnerable on IUCN Red List of Threatened Species, the first grade national protected bird in Law of People's Republic of China on the Protection of Wildlife, and it is also listed on Appendix I of CITES. Four reasons should be considered for the species' endangered status.

(1) Small Habitat Capacity

The habitat of Sclater's Monal is confined to high mountains where the area available for living is limited; the productivity is low and the animal capacity is small. Small habitat capacity is the main factor affecting the small population size and limited range of Sclater's Monal.

(2) Low Reproduction ability

Small number of clutch size, long incubation time, and limited choices of nests lead to the species' low reproduction ability.

(3) Human Activities Disturbance

Human activities like local communities digging potherbs or medicinal herbs in the reserve would destroy Sclater's Monal's habitat or cause some disturbance to the individuals. Illegal by-hunting for food is another potential threat.

(4) Deficient Advocacy

Deficient advocacy is an important reason for not protecting Sclater's Monal effectively. Local communities know nothing or little about Sclater's Monal and its endangered status, biological value along with protection measures. Educating the public about the importance of protecting Sclater's Monal, its habitat and biodiversity is extremely urgent.

3.5 Why should we protect Sclater's Monal at Mt. Gaoligong?

For four reasons there is great importance to protect Sclater's Monal at Mt. Gaoligong. First, Sclater's Monal is mainly distributed to Mt. Gaoligong where the living conditions of Sclater's Monal are critical to the whole population of this species. Second, Sclater's Monal is an endemic species in high altitudes of east Himalayan region, which is a long time environment-adapting result. The population decline or disappearance of this species probably is an indicator of imbalance or destruction of the avian community-habitat in high altitude. It may also reflect the declination of water quality or other environmental degradations in local communities. Therefore, the living condition of Sclater's Monal can be regarded as an indicator of assessing the healthy status of that area's ecosystem. Third, in the same habitat of Sclater's Monal, there are many other endangered species that have not been concerned. As a "flagship species" or "umbrella species", Sclater's Monal bears the same significance of protecting the other species in this area. The last, as one of the chief protected species at Mt. Gaoligong, the conservation status of Sclater's Monal could be used to assess the management effectiveness of the nature reserve.

4 AIMS AND OBJECTIVES

Sclater's Monal is poorly known across almost all of its remote, inaccessible and relatively restricted range. By-hunting is the main threats to this species in China, as we investigated some years ago (Han lianxian et al., 2004). The remote nature of its habitats and range, to an extent, lessen the level of threat it faces from hunting, thus this species has been listed as Vulnerable in IUCN Red list. However, from a recently feces analysis research, we identified a major part of its diet is composed by some plants that commonly used in Chinese traditional medicine, such as *Paris polyphylla*, *Notopterygium forbesii*, *Fritillaria crassicaul* and *Arisaema tengtsungense*, etc al. (unpublished data). These plant species are intensely

consumed by local communities, for their own use or sell for money. This could probably be a long-time unrecognized threat to this species, and need to be assessed.

This project aims to contribute to our understanding on this species and enhance the biodiversity conservation of this area. The objectives include: 1) collect the food, feces and habitat information of this species by field survey to understand its ecological needs. Spring survey will last about 40 days and shall be finished before late May of 2010. Winter survey will last 20 days and to be finished before January of 2010; 2) investigate the local traditional medicine business and assess its impact on this species and its habitat. It is 20 days work, which will be finished by April of 2010; 3) building pheasant conservation awareness among the local people. This work will take around 15 days, and be finished before October of 2009.

5 METHODOLOGY

5.1 Training

All the team members and some volunteers have been trained at Southwest Forestry University and also at Kunming Botanical Garden. The training is a multidisciplinary program concerned the basic information of this project, the essential methods used in the field survey and some skills in the local community awareness education. The project referees, Mr. Han Lianxian and Mr. Yang Lan have been invited to train the team members. Mr. Wang Ximin and Mr. Han Ben have been invited as well to talk about their experience on carrying out the similar projects.



Fig 5. Volunteers are trained in botanic garden



Fig 6. Professor Yang Lan lecturing on Yunnan birds

5.2 Field Survey

Traditional field survey methods will be conducted to obtain elevation and vegetation data in addition to GPS data collection. Habitat will be sampled and assessed using quadrats, emphasizing on those plants used in traditional medicine.

All the plant species in the diet will be dried and be kept as specimen in Southwest Forestry University. The feces from winter and breeding season will be dried and stored as well. These materials would be used in future studies.

Traditional markets, medicine stores, local doctors and farmers will be investigated by local team members, without the recognition of the project intention. This could lead an unbiased result.



Fig 7. Questionnaire in local communities



Fig 8. Field survey in deep mountains

5.3 Conservation Awareness Education

The conservation awareness education will be carried out by lecturing, local-family visits, or some small face-to-face talks. T-shirts and booklets will be used in primary schools' activities.



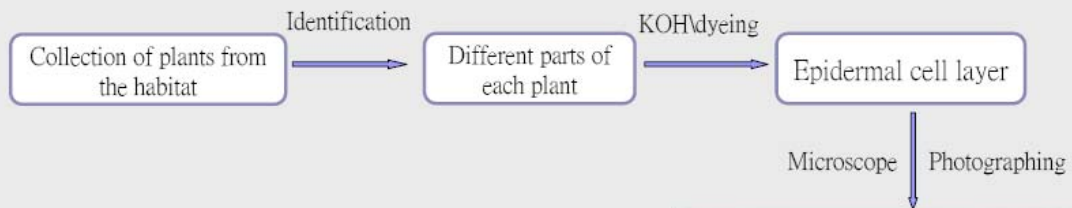
Fig 9. Lecturing on conservation of pheasants



Fig 10. Drawing competition in primary school

5.4 Lab protocols

(1) Plant epidermal cell morphological guide



We take 799 photos, which belong to different parts of 79 plant species.

Root of *Anaphalis bulleyana*, 10x10

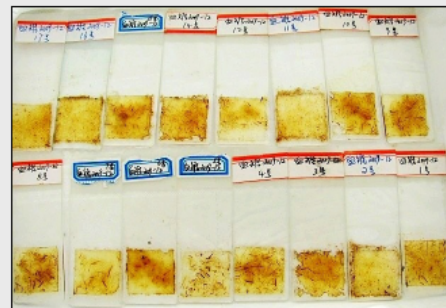


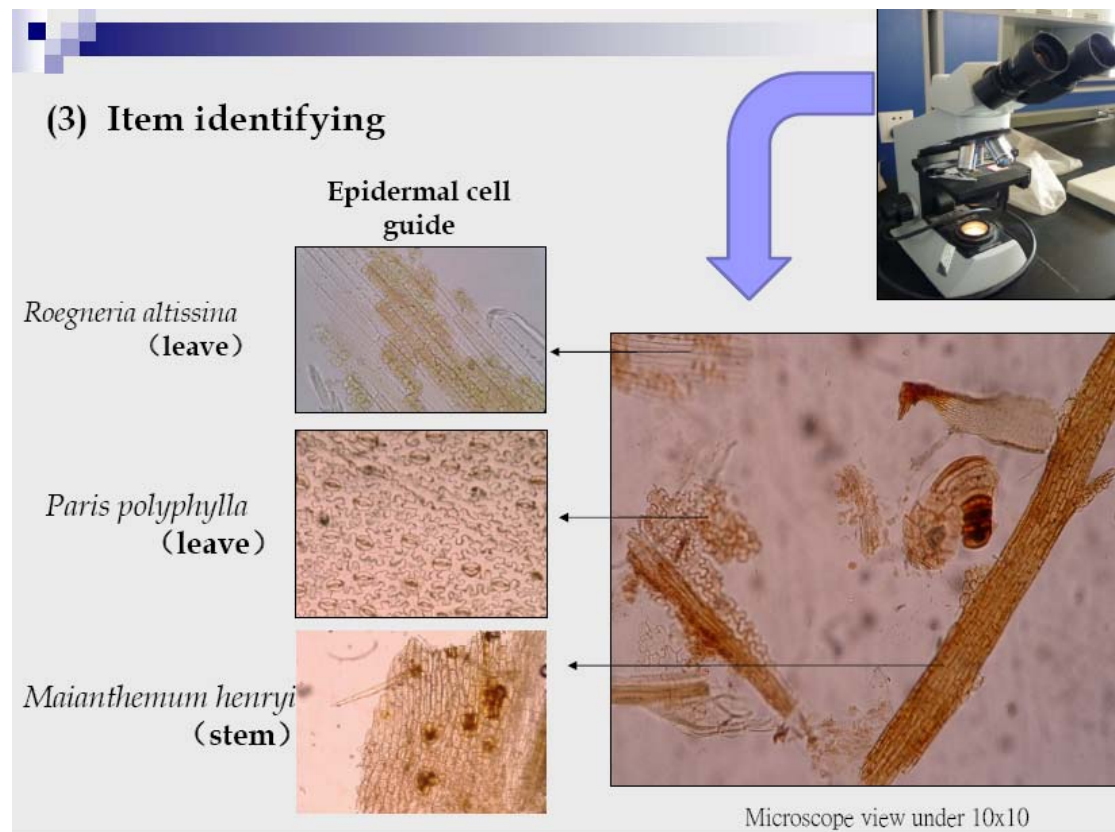
(2) Preserve and slide making of feces



We get 108 slides, which cover December, January and February.

December feces slide of Blood Pheasant





6 RESULTS

6.1 Biological and ecological findings

6.1.1 Foraging behavior

Due to the difficulty of observe this pheasant in the field and we are lack of enough behavior data for statistics, only some field observations are described here. In total, we made 11 observations of the foraging activity that last over 3 hours in total. From the limited field observations we hypothesize that the feeding activities always occur at morning and late-afternoon in sunny days, however in rainy or snowy days the occurrence of foraging behavior depends on when the rain or snow will stop.

Two case observations support that Sclater's Monal would join the foraging flocks with other bird species, Blood Pheasant. These two sympatric pheasant species would have food competition to some extent, which need more study to measure it.

6.1.2 Foraging habitat

For the foraging habitat study, we used some foraging plots and comparing plots in spring to

measure the preference of 5 ecological factors, that is habitat type, altitude, slope degree, slope direction and bamboo density. Another two factors are measured in the foraging plots as well but not in the comparing plots, which are the distances from foraging plots to bamboo edge and to the water resource. The results show that the pheasants prefer meadow and uncovered land in high altitude as its foraging habitat in spring where always near the bamboo edge or under the low density bamboo forest. The foraging sites should be steep and water resource doesn't restraint its foraging range (Table 1).

6.1.3 Diet component

We identified 45 species of plants in the spring diet and 47 plants species in its winter diet, among which 33 species occurred in both seasons. Meanwhile, 3 categories of Bryophytes fragments have been identified too (Table 2). Plants with higher content of oil and Calcium are preferred food items according to the nutrients analysis, which imply these two nutrients are important to Sclater's Monal in the breeding season (Table 3).

6.2 Local community survey

There are 18 sites belonging to 3 townships have been surveyed. Because the total people of these 3 towns are about 10000, we made a random sampling and interviewed 108 families with questionnaires on the utilization issues of the wild plants. According to the survey, 24 plant species have been confirmed to be used as the local food, 100 species used as medicine source. Compared to the bird's diet, there are 20 plant species are both used by the bird and local people, which indicates thirty percent ($20/60=33.3\%$) of food resources could be in deficiency if the gathering activities are not restricted.

At the same time, we did conservation awareness survey at 9 sites (including cities, towns and villages along Mt. Gaoligong) and 177 questionnaires have been received. The conservation awareness of the local people is analyzed according to the questionnaire scores. The results show notable differences existing between the survey sites. The highest to lowest score list of these sites are Liuku, Baihualing, Datang, Mangkuan, Jietou, Qushi, Bawan, Saige, Shangjiang. The scores are weakly correlate with sex, age, race or career of the interviewers, which means the former awareness education work conducted by the nature reserve management bureau got some positive consequences. The correlation analysis between the 3 sections of questions show that the knowledge positively affect the attitude,

but these two could not affect the behavior of the local people effectively, which suggests the nature reserve management need to enforce the law while doing awareness education.

6.3 Awareness education activities

We carried out awareness education activities at three different sites, which is April 1, 2010 at Datang village primary school, Tengchong County, April 6, 2010 at Bawan town primary school, Baoshan city, and April 8, 2010 at Longtang primary school, Lushui County. In total, 200 pupils and 20 school teachers attend the education activities that include lecture, picture show and drawing competition.

After the activities, most of the attendance could recognize the bird correctly when they were asked to pick the right one among a heap of bird photos. All the attendance would have the booklets and those who answered the question correctly or draw the picture better would get the T-shirts as rewards.

More detailed data could be found in five scientific papers that had been published relevant to this project (see Appendix 11.3).

Table 1 Habitat selection of Sclater's Monal in spring

Factors	Category	Utilization	Expected Utilization	Preference	Selection *
		percentage/%	percentage/%	Index(P)	
Habitat type	meadow	39.0	14.3	0.463	S
	bamboo	43.9	78.3	-0.282	NS
	uncovered land	17.1	7.4	0.396	S
Altitude/m	3300-3400	6.1	25.0	-0.608	E
	3400-3500	19.5	25.0	-0.124	RS
	3500-3600	35.4	25.0	0.172	RS
	3600-3700	39.0	25.0	0.219	S
Slope direction/(°)	North	1.2	1.3	-0.040	RS
	East	14.6	21.3	-0.187	RS
	South	67.1	64.0	0.024	RS
	West	17.1	13.3	0.125	RS
Slope degree/(°)	Slow	11.0	26.0	-0.405	NS
	Middle	68.3	54.0	0.117	RS
	Steep	20.7	20.0	0.017	RS
Bamboo density/(m ⁻²)	<5	44.4	12.5	0.561	S
	5-10	31.2	18.2	0.263	RS
	10-20	24.4	39.3	-0.234	RS
	>20	0.00	29.9	-1.000	E

*Selection: When $-1 \leq P < -0.6$, indicates the bird always escape from this factors, marked by E; when $0.6 \leq P < -0.2$, indicates no selection to that factor, marked by NS; when $-0.2 \leq P < 0.2$, indicates random selection, marked by RS; when $0.2 \leq P < 0.6$, indicates selection, marked by S; when $0.6 \leq P \leq 1$, which indicates that is the favorite factors for the bird, marked by F.

Table 2 Diet component of Sclater's Monal in spring and winter

	Plant species	Number of fragments/Percentage(%)	
		Spring	Winter
1	<i>Smilax stans</i>	40/1.57	—
2	<i>Valeriana jatamansi</i>	200/7.87	164/3.11
3	<i>Ranunculus felixii</i>	1/0.04	14/0.26
4	<i>Chaetoseris grandiflora</i>	—	3/0.06
5	<i>Chaetoseris frandiflora</i>	60/2.36	262/4.96
6	<i>Aconitum nagarum</i>	33/1.30	—
7	<i>Meconopsis napaulensis</i>	791/31.14	1257/23.81
8	<i>Gentiana stellulata</i>	57/2.24	—

9	<i>Gentiana heleonastes</i>	1/0.04	187/3.54
10	<i>Gentiana cephalantha</i>	—	13/0.25
11	<i>Crawfurdia angustata</i>	—	8/0.15
12	<i>Cyananthus inflatus</i>	—	41/0.78
13	<i>Cardamine tangutorum</i>	1/0.04	130/2.46
14	<i>Polygonum runcinatum</i>	5/0.20	7/0.13
15	<i>Polygonum nepalense</i>	—	37/0.70
16	<i>Polygonum viviparum</i>	1/0.04	—
17	<i>Daphne yunnanensis</i>	—	104/1.97
18	<i>Rubus erythrocarpus</i>	12/0.47	27/0.52
19	<i>Potentilla leuconota</i>	5/0.20	5/0.09
20	<i>Fragaria nilgerrensis</i>	167/6.57	89/1.69
21	<i>Polygonatum verticillatum</i>	13/0.51	137/2.59
22	<i>Polygonatum cathcartii</i>	1/0.04	—
23	<i>Notopterygium forbesii</i>	6/0.24	—
24	<i>Fritillaria crassicaulis</i>	11/0.43	212/4.01
25	<i>Diplarche multiflora</i>	5/0.20	—
26	<i>Rhododendron forrestii</i>	—	156/2.95
27	<i>Anaphalis bulleyana</i>	15/0.59	5/0.98
28	<i>Dubyaea atropurpurea</i>	5/0.20	—
29	<i>Pseudocystopteris atkinsonii</i>	4/0.16	—
30	<i>Myriactis wightii</i>	1/0.04	35/0.66
31	<i>Corydalis yunnanensis</i>	49/1.93	67/1.28
32	<i>Senecio pteridophyllus</i>	—	31/0.59
33	<i>Impatiens chimiliensis</i>	2/0.08	—
34	<i>Roegneria altissima</i>	125/4.92	37/0.70
35	<i>Swertia forrestii</i>	2/0.08	21/0.40
36	<i>Aruncus gombalanus</i>	1/0.04	16/0.30
37	<i>Geranium delavayi</i>	—	3/0.06
38	<i>Codonopsis macrocalyx</i>	2/0.08	25/0.47
39	<i>Erihichium brachytubum</i>	—	23/0.44
40	<i>Nepeta laevigata</i>	—	16/0.30
41	<i>Veratrum grandiflorum</i>	13/0.51	20/0.38
42	<i>Thalictrum delavayi</i>	14/0.55	162/3.07
43	<i>Elsholtzia strobilifera</i>	—	29/0.55
44	<i>Smilacina henryi</i>	3/0.12	102/1.93
45	<i>Smilacina purpurea</i>	2/0.08	76/1.44
46	<i>Selinum candollei</i>	1/0.04	—
47	<i>Aletris stenoloba</i>	—	32/0.61
48	<i>Aletris pauciflora</i>	—	109/2.06
49	<i>Angelica dahurica</i>	17/0.67	—
50	<i>Paris polyphylla</i>	176/6.93	289/5.47
51	<i>Dichrocephala benthamii</i>	—	32/0.61
52	<i>Ophiopogon bodinieri</i>	347/13.66	188/3.56

53	<i>Deyeuxia scabrescens</i>	14/0.55	38/0.72
54	<i>Juncus megalophyllus</i>	31/1.22	53/1.00
55	<i>Allium wallichii</i>	109/4.29	138/1.61
56	<i>Allium prattii</i>	14/0.55	—
57	<i>Kobresia uncinoides</i>	2/0.08	22/0.43
58	<i>Carex finitima</i>	1/0.04	52/0.98
59	<i>Mahonia polydonta</i>	5/0.20	15/0.28
60	<i>Lysimachia chenopodioides</i>	2/0.08	15/0.29
	<i>Bryophytes</i> spp.	124/4.88	112/2.12
	Unidentified fragments	49/1.93	130/2.46
	Sum by season	2540/100	5280/100
	Diversity index(H')	2.54	3.13

Note: “—” means the item do not occur in the diet

Table 3 Nutrient contents (%) of the plant samples in spring

Samples	Water	Crude protein	Crude ash	Crude fat	Ca	P	Percentage
<i>Meconopsis napaulensis</i> (leaf)	9.78	18.47	9.29	3.38	0.97	0.37	7.58
<i>Ophiopogon bodinieri</i> (leaf)	7.60	15.07	8.41	4.12	0.37	0.49	4.69
<i>Roegneria altissima</i> (leaf)	7.34	10.60	5.36	2.27	0.23	0.30	2.96
<i>Fritillaria crassicaulis</i> (leaf)	7.61	19.53	9.35	2.90	0.82	0.50	2.21
<i>Polygonum runcinatum</i> (leaf)	9.22	16.18	7.50	2.26	0.61	0.48	1.81
<i>Notopterygium forbesii</i> (root)	9.36	8.10	11.15	2.24	0.19	0.53	3.43
<i>Meconopsis napaulensis</i> (root)	9.09	7.12	8.99	1.03	0.12	0.16	3.85
<i>Codonopsis macorcalyx</i> (root)	8.75	5.43	5.50	2.63	0.41	0.20	3.41
<i>Corydalis yunnanensis</i> (root)	8.33	7.03	6.06	0.18	0.89	0.29	3.21
<i>Allium wallichii</i> (root)	8.53	10.54	15.29	0.84	0.09	0.33	1.63
<i>Aruncus gombalanus</i> (root)	9.19	7.83	20.02	0.53	0.10	0.21	0.00
Correlation index(r)	0.1809	0.3080	-0.4896*	0.5776**	0.4683*	0.1338	----

* $\alpha=0.05$; ** $\alpha=0.01$

7 ACHIEVEMENTS AND IMPACTS

7.1 On the species conservation

According to our community survey, interviewers from cities and villages varied a lot on three elements of conservation awareness, which are attitude, knowledge and behavior. For the future conservation actions needed on this species, we suggest more propaganda on

this species' biological information and conservation status should be carried out in nearest cities such as Liuku, but for the vicinal villages, the knowledge of wildlife protection law need to be enforced.

7.2 On the team members

Supported by this project, three members who used to be undergraduate students from SWFU finished their dissertation and got their bachelor certificate successfully. They are Ms. Zhang Xuelian, Mr. Huang Anqi and Mr. He Mingchan. Some lately joining members got the experience on fecal analysis and nutrients analysis methods, such as Ms. Xu Maioyang and Mr. Liang Dan, both of whom are master candidates now, majoring in biology.

On the accomplish of this project in 2011, the team leader, Mr. Luo Xu got promoted to Associate Professor by SWFU at the end of the year. This project made the vital role in his early scientific and conservation career, as said by himself.

7.3 On the scientific board and media

At August 10 of 2011, the team leader Luo Xu attend the XI national conference of ornithology in Lanzhou, China and gave a presentation entitled "Food Competition of Two Sympatric Pheasants at Mt. Gaoligong in winter". Two hundreds of audience was present and this report raised a long discussion at the meeting room. Luo Xu also attended the first International Ornithological Congress of Southeast Asia (Nov. 2012, Thailand) and gave an oral report entitled "Diet Analysis and Feeding Strategy of Two Sympatric Pheasants at Mt. Gaoligong in winter". CLP was the main supporter of this work, as mentioned during the talk.

The national newspaper PEOPLE'S DAILY (overseas version) reported our field work at April 16 of 2010. The link site is http://paper.people.com.cn/rmrbhwb/html/2010-04/16/node_879.htm. This newspaper is widely read among Chinese outside China. This news had also been forwarded at the homepage of Southwest Forestry University: http://www.swfu.edu.cn/artc_list/5638.html.

8 CONCLUSION

From the field survey and lab analysis, we identified 60 plant species occurring in the spring and winter diet of Sclater's Monal. From the local community survey, we confirmed 124 plant species being collected and consumed by the local people. When comparing these independent data, we found that one third of the pheasant's food resources could be affected by the local communities' plant-gathering activities.

We carried out the field observation on foraging behaviour, breeding behaviour and measured the ecological factors in the foraging plots. The steep meadow scattered among the bamboo forests are good foraging habitat for this pheasant and it lays eggs on the ledge of a large boulder. The single nest site that we found was used for at least two years, possibly three, suggesting that nest sites might be a limiting factor for its population.

Conservation awareness education activities are kindly welcomed in the local primary schools, both by the teachers and students. That encourages us to engage more efforts on the awareness education, not only to the schools but also to the nature reserve employers and local government staffs.

9 PROBLEMS ENCOUNTERED AND LESSONS LEARNT

The plant resources consumed by the local people seems very hard to be quantified because the species and consume quantity varies a lot among the local families. This results in the statistic problem in the analysis, we call it problem one.

Problem two is due to the time limits of this project at the most one year. After we analysed the attitude and behaviour towards conservation among the local people, we found that the attitude could easily be affected by some awareness education activities however their behaviour need long-time efforts in the same area. Otherwise the farmers' behaviour could easily go backwards to what it was.

When doing the interview with the local people, we need to avoid the influence by the emotion and try to lead the talk and get the information in 15 to 20 minutes. Otherwise, some interview might last over one hour. This is the first lesson we learnt. The second lesson is the choice of sites to carry out the awareness-raising activities. We found that the local

people will show more interests to the conservation policy and official plan where their villages locate closer to the nature reserve. Meanwhile their daily life depends more on the natural resources inside the nature reserve, such as food and medicine, and their attitude and behaviour affect much to the conservation effects. So, the education activities need to be done in these villages and we need more skills and patience while doing these activities.

10 IN THE FUTURE

For this species, we think population movements, breeding ecology and habitat requirements need to study more detailed in the future. Although it is quite difficult to estimate the whole population number across its range, population density and population ecology could be studied at a local scale. To improve the management, the home range and population growth rate of this pheasant need to be known either.

Because the small populations of Sclater's Monal scattered at Mt. Gaoligong to a large area, the local community survey needs to be done in more broad range and awareness education should be carried out to more stakeholders. Many local people do not see the importance of the conservation efforts on this species, especially in the local government. So we are planning to raise their awareness through local TV and other media.

11 APPENDIX

11.1 Photos



Fig 11. Awareness education class to local students



Fig 12. Field camping



Fig 13. Questionnaire to local families

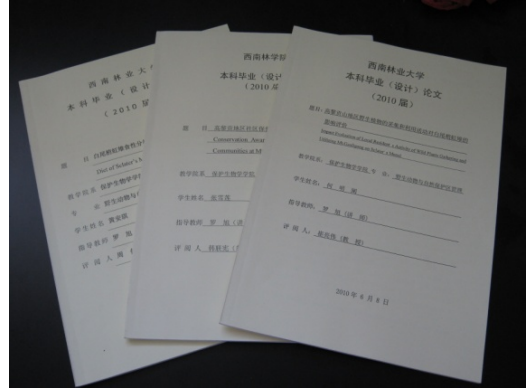


Fig 14. Dissertation supported by this project



Fig 15. Drawing competition in the local primary school



Fig 16. Some student winners got our booklet and T-shirts as the rewards

11.2 Press cuttings



http://paper.people.com.cn/rmrbhwb/html/2010-04/16/node_879.htm



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人民日报海外版报道我校科研考察活动

4月16日,人民日报海外版对我校保护生物学院院长罗旭博士带领的研究团队在高黎贡山国家级自然保护区开展的野外科研考察工作作了专题报道。此次考察是罗旭博士主持的高黎贡山白尾梢虹雉(Sceler's Monal)保护项目工作中的一部分。该项目由国际动植物保护先锋项目(Conservation Leadership Programme)资助,旨在评估一种野生濒危鸟类白尾梢虹雉在高黎贡山的生存状况和濒危因素。项目于2009年5月启动,工作内容包括春季和冬季野外种群和栖息地调查、社区访谈以及公众保护意识教育等,研究团队由我校师生和高黎贡山国家级自然保护区工作人员组成。

附:报道内容链接地址为http://paper.people.com.cn/rmrbhwb/html/2010-04/16/node_879.htm。

- 办公自动化
- 图书资源
- 人才招聘
- 招生信息
- 校务公开
- 质量工程



http://www.swfu.edu.cn/artic_list/5638.html

11.3 Scientific papers

Till now, seven related papers have been submitted to scientific journals and five of them have been accepted and published. Here are the first pages of these published papers:

高黎贡山白尾梢虹雉和血雉的食物关系*

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摘要 本文采用粪样显微分析法对云南高黎贡山白尾梢虹雉(*Lophophorus sclateri*)和血雉(*Ithaginis cruentus*)进行食性分析,旨在弄清两种同域分布的雉类食物组成情况和夏、秋、春三个季节的食物变化及两者对食物资源的竞争状况。白尾梢虹雉粪样中共检出100类植物碎片,鉴定出其中58种植物的不同部位,夏秋春三个季节分别取食43种、44种、46种,各季节多样性指数分别为2.60、2.59、2.54;血雉粪样中共检出108类植物碎片,鉴定出55种植物的不同部位,三个季节分别取食48种、41种、40种,食物多样性指数分别为3.04、2.94、2.44。叶是两种雉类的主要取食部位,以夏季最为显著,春秋季节白尾梢虹雉取食根、血雉取食茎以补充叶资源的不足。两种雉类的食物生态位重叠度在三个季节均不高,夏季0.434、秋季0.399、春季0.344,表明两种雉类在食物生态位上发生分化,体现在食物种类和取食部位上,这是两种雉类在初级生产力低下的高黎贡山高海拔地带得以共存的基础。

关键词 取食生态学,粪样显微分析,白尾梢虹雉,血雉,高黎贡山

1 前言

食性是野生鸟类最为基础的生态学资料,也是取食生态学研究的基础,它对于野生濒危雉类的保护和笼养繁殖尤为重要。研究野生鸟类食性的方法有直接观察法、胃(嗉囊)内容物分析法、取食痕迹观察法以及粪便显微分析法(单继红和吴建平,2005)。以往对雉类食性的研究多采用直接观察法和胃(嗉囊)内容物分析法,如郑光美等(1986)采用直接观察法和嗉囊解剖法对黄腹角雉(*Tragopan caboti*)食性进行的研究、高育仁(1993)利用胃和嗉囊解剖法对白鹇(*Lophura nycthemera*)食性的研究、以及利用无线电遥测装置,以直接观察法、取食痕迹观察法对红腹角雉(*T. temminckii*)食性进行的研究(史海涛和郑光美,1998)。近年来由于保护生物学的兴起,在野生动物研究中越来越强调非损伤性取样,粪便显微分析法因其实验步骤简单、资金投入少,结果较为精确,易于取样,且对动物无伤害,而被许多研究者采用,如Moreby(1988)利用粪检技术对环颈雉(*Phasianus colchis*)粪便中的节肢动物碎片进行了研究、Tiger和Osborne(2000)对大鸨(*Chlamydotis macquae*)食性的研究,以及李凤山等(1997)对贵州省

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高黎贡山白尾梢虹雉春季食谱及食物营养成分分析

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摘要:白尾梢虹雉是东喜马拉雅地区特有珍稀雉类, 本文运用粪样显微分析方法研究了该种雉类春季的食谱, 并对栖息地中部分常见植物进行了营养成分分析, 以探讨营养成分对白尾梢虹雉取食偏好的影响。粪检结果表明白尾梢虹雉春季食谱中至少有 23 种植物种类, 从 3 月到 5 月食谱结构逐渐变化, 体现在植物的叶逐渐取代根成为主要取食部位, 这与高山草甸植被的季节相关, 因为高黎贡山地区 5 月初进入雨季, 草本植物才大量萌发。植物营养成分中的粗脂肪和钙元素与白尾梢虹雉的取食偏好显著正相关, 推测分别与食物的适口性和繁殖期的钙消耗相关。

关键词:白尾梢虹雉; 食谱; 粪便显微分析; 营养成分; 高黎贡山

中图分类号: Q959.7; Q958.1 **文献标识码:** A **文章编号:** 1000-7083(2012)01-0017-06

Spring Diets and Food Nutrients of Sclater's Monal at Mt. Gaoligong, China

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Abstract: By means of microscoping, we analyzed fecal samples ($n = 93$) of Sclater's monal *Lophophorus sclateri* collected from Mt. Gaoligong in spring of 2003, to study the diet component of this rare and threatened pheasant species. Totally, 23 species of plants have been found consumed by Sclater's monal and 5 categories of fragments in the feces left unknown comparing to our collections. Plant roots, leaves and flowers were found in their diet and each account to 46.90%, 36.63% and 1.45%, respectively, while the other 6.54% are from one species of Bryophytes. From March to May, monthly roots decrease were replaced by leaf increase, which we considered to be the consequence of the grassland growth that closely related with the rainy season begins in May. Plants with higher oil and calcium proportion were preferred aliment according to our correlation analysis, which implied these two nutrients were significant to Sclater's monal in breeding season.

Key words: *Lophophorus sclateri*; diet; fecal analysis; nutritional composition; Mt. Gaoligong

食谱是野生鸟类的基础生态学资料, 也是取食生态学的基础, 对于濒危鸟类的保护和笼养繁殖尤为重要。研究野生鸟类食谱的方法有直接观察法、胃(嗉囊)解剖分析法、洗胃法、取食痕迹观察法以及粪便显微分析法等(Moody, 1970; Chou *et al.*, 1998; 单继红, 吴建平, 2005)。在雉类食谱研究中多采用直接观察法和胃(嗉囊)解剖分析法, 如对黄腹角雉 *Tragopan caboti* 的研究采用直接观察法和嗉囊解剖法(郑光美等, 1986); 对白鹇 *Lophura nycthemera* 的研究利用胃和嗉囊解剖法(高育仁, 1993); 对红腹角雉 *Tragopan temminckii* 的研究利用无线电遥测装置, 以直接观察法、取食痕迹检查法为主, 辅以粪便和嗉囊及胃内容物分析法进行(史海涛, 郑光

美, 1998)。近年来由于保护生物学的兴起, 在野生动物研究中越来越强调非损伤性取样, 粪便显微分析法因其实验步骤简单、资金投入少, 结果较为精确(Verkuil, 1996), 易于取样, 且对动物无伤害, 而被许多研究者采用, 如环颈雉 *Phasianus colchis* 粪便中的节肢动物碎片的粪检研究(Moreby, 1988)、贵州省威宁县草海的黑颈鹤 *Grus nigricollis* 越冬期植物性食物组成的粪检研究(李凤山等, 1997)以及黑纹背林莺 *Dendroica kirtlandii* 粪样中节肢动物和植物碎片的研究(Deloria-Sheffield *et al.*, 2001)等。

食物的营养成分是影响野生动物取食的因素之一, 迄今有关野生动物的食物营养成分分析的研究颇多, 如贵州麻阳河自然保护区黑叶猴 *Trachypithecus*

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致谢: 西南林业大学郭爱伟副教授指导本文的植物样本营养成分实验分析、植物学硕士研究生杜小浪鉴定植物标本, 在此表示感谢!

高黎贡山白尾梢虹雉繁殖生态观察

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摘要:2002~2004年连续3个春季在高黎贡山自然保护区对白尾梢虹雉(*Lophophorus sclateri*)的繁殖习性进行了观察,对白尾梢虹雉的巢、卵和雏鸟进行了详细描述。在高黎贡山南段,白尾梢虹雉的产卵孵化始于3月底,止于5月初,窝卵数为2~3枚,孵卵期为28 d。窝卵数低、适宜巢址缺乏有可能是白尾梢虹雉种群增长缓慢的重要因素。

关键词:白尾梢虹雉;巢址;孵卵节律;繁殖行为

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The Breeding Behavior of the Sclater's Monal (*Lophophorus sclateri*) at Mt. Gaoligong

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Abstract: We conducted field studies on the breeding behavior of Sclater's Monal (*Lophophorus sclateri*) on Mt Gaoligong in spring (March – May) at the year of 2002 to 2004. The single nest site found locates on a ledge (3.8 m) on the side of a large boulder (6.3 m). Egg-laying began in late March, incubation in early April, and chicks hatched in early May. Clutch size varied between 2 and 3 eggs ($n=2$) and the laying interval between eggs was 2 days ($n=1$). The eggs are cream-coloured, have fine reddish brown spots and average 85.8 g ($n=5$). The incubation period is 28 days ($n=2$) and chicks average 57.3 g ($n=3$) at hatch. All of the eggs were fertile and hatched successfully. The single nest site that we found was used for at least two years, possibly three, suggesting that nest sites might be a limiting factor for this population.

Key words: Sclater's Monal (*Lophophorus sclateri*); Nest site; Incubation rhythm; Breeding behavior

繁殖是鸟类生活史中最重要的环节。对鸟类繁殖的研究,是鸟类生态学研究的重要内容,有助于探讨环境因子对鸟类繁殖的影响。其中,巢、卵等生物学基础数据对于探讨野生鸟类濒危机制及就地保护有重要意义。

白尾梢虹雉(*Lophophorus sclateri*)是国家Ⅰ级重点保护野生动物,在国际上被IUCN列为易危物种,在中国仅分布于西藏和云南^[1]。其巢、卵数据目前只有一些零星记录,例如在印度阿萨姆邦北部海拔约3 000 m的高度上观察到1巢5枚卵^[2];在高黎贡山曾有访问记录本种

每窝产卵10~12枚^[3],以及实地调查记录产卵2~5枚,营巢于树洞内或倒木下^[4]。对于孵卵行为及时间,在西藏于5月中旬采获标本中有一只已具孵卵斑,在另一只的生殖道内发现一

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高黎贡山白尾梢虹雉取食行为及春季取食地特征

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摘要:以分布在高黎贡山大脑子的白尾梢虹雉群体为研究对象,在野外直接观察其取食行为,用样方法研究其春季取食地特征,以探讨野外白尾梢虹雉的取食习性。结果表明:天气会对白尾梢虹雉取食行为产生影响,晴天其取食行为多发生在晨昏,而雨雪天气时则多在雨雪停歇后取食;取食地点偏好选择草坡和裸地,而避开箭竹林,尤其是箭竹密度超过20株/m²的密集林;在草坡和裸地取食时,60%的觅食地点在距离林缘2m内的范围;取食地多选择坡度较大的地带;水源对白尾梢虹雉取食地点选择的影响不大。

关键词:白尾梢虹雉;生境选择;取食行为;高黎贡山

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Feeding Ecology of *Lophophorus sclateri* at Gaoligong Mountain

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Abstract: The foraging behavior of *Lophophorus sclateri* was studied by means of directly observing its foraging activity in the field and by plot study on features of the spring foraging habitats distributed in Danaozi area of the Gaoligong Mountain. The observation indicated that the foraging activity of *L. sclateri* could be influenced by the weather, i. e., the bird usually fed in the dawn or dusk time during the sunny days, whereas it fed during the intervals in the rainy or snowy days. The results showed that *L. sclateri* preferred meadow or bared areas to feed and avoided bamboo grove, especially the dense bamboo forests denser than 20 plants/m². When *L. sclateri* fed in the meadow or bared localities, 60% of the foraging localities were distributed within 2 m apart from the forests. *L. sclateri* preferred to feed in the slopy areas, water resource did not influence very much on its selection of foraging locations.

Key words: *Lophophorus sclateri*; habitat selection; foraging behavior; Gaoligong Mountain.

食物是影响野生鸟类繁殖率最主要的因素之一,也是影响鸟类生境选择和利用最主要的因素^[1-3]。野生鸟类对食物丰富程度的响应表现在取食行为上。鸟类的取食行为是指鸟类获得和处理食物的相关活动,包括搜寻食物、获取食物、处理食物等,与之密切相关的问题是在何处发生取食行为,即

鸟类取食地选择的问题,这不仅与鸟类本身的食性相关,也与栖息地结构以及食物资源状况相关^[4]。对于野生鸟类而言,在特定生境条件下发展出的取食行为,能够使个体在特定取食地得到最大的能量净收益,确保繁殖成功^[5]。

白尾梢虹雉(*Lophophorus sclateri* Jerdon)为中国

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云南高黎贡山中、南段周边社区保护意识调查

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[摘要] 高黎贡山自然保护区中段和南段的9个调查点进行保护意识调查。结果表明9个调查点之间存在明显的保护意识差异, 保护意识得分由高到低依次是: 六库、百花岭、大塘、芒宽、界头、曲石、坝弯、赛格、上江。相关性分析表明性别、年龄、民族和职业等因素对保护意识高低影响不大; 保护知识和态度之间呈明显的正相关, 然而知识和态度都对行为影响不大, 说明自然保护区在开展保护知识宣传的同时还要加强执法力度。

[关键词] 高黎贡山; 保护意识; 结构访问; 农村社区

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1. 前言

高黎贡山国家级自然保护区位于云南省西部, 高黎贡山山脉的中上部, 北纬 $24^{\circ}56' - 28^{\circ}22'$, 东经 $98^{\circ}08' - 98^{\circ}50'$ 之间, 核心区面积183789.5ha, 占保护区总面积的45.3%^[1]。高黎贡山国家级自然保护区涉及周边行政区域包括怒江州的贡山、福贡和泸水三县以及保山市的隆阳区和腾冲县两县区, 其中贡山县境内有独龙江、丙中洛、茨开和棒打4个乡镇, 福贡县境内有架科底、子里甲和匹河3个乡镇, 泸水县境内有洛本卓、古登、上江、六库、鲁掌和片马6个乡镇, 隆阳区境内有潞江和芒宽2个乡镇, 腾冲县境内有明光、界头、曲石和上营4个乡镇, 共19个乡镇。自然保护区周边总人口21.36万, 是多民族聚居区, 有汉、傣、傈僳、怒、回、白、苗、纳西、独龙、彝、壮、阿昌、景颇、佤、德昂、藏等16个民族, 因保护区地处多民族地区, 周边环境复杂, 给保护工作带来了较大的难度^{[1], [2] 98-71}。

从1994年开始, 在高黎贡山自然保护区及周边地区组织实施了许多科技和保护项目, 其中不乏环境保护意识教育工作, 比如1997年中国科学院昆明动物所对高黎贡山地区的1000余人以互动式做过保护教育, 历时97天, 这是开创及探索性的在高黎贡山地区进行保护意识教育, 引起了当地公众对资源现状与问题的关注和思考^{[3] 151-154}。1994-1997年, 在美国麦克阿瑟基金和云南省科委的赞助下, 在隆阳区芒宽乡的百花岭村实施了“高黎贡山森林资源管理与生物多样性保护”项目, 创建了第一个农民生物多样性保护协会, 最早在自然保护区建立了资源变化监测体系。1997年, 在(香港)中国探险学会的资助下, 在高黎贡地区开展了当地居民民族采集、渔猎与生物多样性保护相互关系的研究。1998年8月-2004年6月, 在国家林业局、云南省林业厅的领导下, 实施了荷兰政府资助的“云南省中荷合作森林保护与社区发展(FCCD)”一期项目, 2004年7

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12 BIBLIOGRAPHY

- Han L. X., Huang S. L., Luo X. and Yang H. J. 2004. The distribution and conservation of Sclater's monal in Yunnan, China. *Biodiversity Science*, 12(5):523-527. (in Chinese)
- He F. Q. 1991. *Lophophorus sclateri*[A]. In: Lu TC. Chinese Rare and Endangered Wild Pheasant[M]. Fuzhou: Fujian Science and Technology Press. 211-214. (in Chinese)
- Kunming Institute of Zoology, Chinese Academy of Sciences, Bird Group. 1980. *Survey report of vertebrates in Gaoligongshan region, Vol-2, Birds*. Science Press, Beijing, 30-31. (in Chinese)
- Luo X., Han L. X. and Ai H. S. 2002. Preliminary Report on the Movement and Habitat Preference of Sclater's Monal at Mt. Gaoligongshan in winter. *Zoological Research*, 25(1): 48-52. (in Chinese)
- Luo X., Han L. X., Li T. J., Liao L. J. and Luo X. J. 2002. Observation on the Behavior of Captive Sclater's Monal. *Zoological Research*, 23(4): 345-350. (in Chinese)
- Shi X. C. 1999. Preliminary observation on *Lophophorus sclateri* in Mountain Gaoligongshan[J]. *Zoological Research*, 20(1): 50-54. (in Chinese)
- Tang, C. Z. 1996. *Birds of the Hengduan Mountains Region*[M]. Science Press, Beijing, 113-114. (in Chinese)
- Xue J. R. 1995. *Gaoligong Mountain National Nature Reserve*[M]. China Forestry Publishing House, Beijing. 206-208. (in Chinese)
- Yang X. J. 1995c. *Lophophorus sclateri*[A]. In: Yang L *et al.* The Avifauna of Yunnan, China[M]. Yunnan Science and Technology Press, Kunming, 278-280. (in Chinese)
- Zheng, Z. X. 1978. *Fauna Sinica, Aves, Vol-4, Galliformes*[M]. Science Press, Beijing, 124-126. (in Chinese)

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14 DISTRIBUTION LIST

Liang D., Li D., Li Q. S., Ma G. Q. & Luo X. 2012. Differentiation of feeding niche of Sclater's Monal and Blood Pheasant detected with fecal analysis in Mt. Gaoligong in Yunnan Province[A]. In: Chinese National Committee of DIVERSITAS(ed). *Advances in biodiversity conservation and research in China IX*[C]. Beijing: China Meteorological Press. 181-190.[梁丹, 李丁, 李奇生, 马国强, 罗旭. 2012. 高黎贡山白尾梢虹雉和血雉的食物关系[A]. 见: 国际生物多样性计划中国委员会等主编. 中国生物多样性保护与研究进展 IX[C]. 北京: 气象出版社, 181-190.]

Luo X., Xu M. Y., Wu L. X. 2012. Spring Diets and Food Nutrients of Sclater's Monal at Mt. Gaoligong, China[J]. *Sichuan Journal of Zoology*, 31(1): 17-22. [罗旭, 许淼洋, 吴良旭. 2012. 高黎贡山白尾梢虹雉春季食谱及食物营养成分分析. *四川动物*, 31(1): 17-22.]

Luo X., Han L. X. 2011. The breeding behavior of the Sclater's Monal (*Lophophorus sclateri*) at Mt. Gaoligong[J]. *Chinese Journal of Zoology*, 46(1): 52-55. [罗旭, 韩联宪. 2011. 高黎贡山白尾梢虹雉繁殖生态观察. *动物学杂志*, 46(1): 52-55.]

Luo X., Ai H. S., Han L. X. 2010. Feeding ecology of *Lophophorus sclateri* at Gaoligong Mountain[J]. *Journal of Southwest Forestry University*, 30(6): 64-67. [罗旭, 艾怀森, 韩联宪. 2010. 高黎贡山白尾梢虹雉取食行为及春季取食地特征. *西南林学院学报*, 30(6): 64-67.]

Luo X., Zhang X. L. 2010. Conservation awareness survey of local communities at Mt. Gaoligong[J]. *Journal of Baoshan College*, 29(5): 1-5. [罗旭, 张雪莲. 2010. 云南高黎贡山中、南段周边社区保护意识调查[J]. *保山学院学报*, 29(5): 1-5.]

Zhong J. 2010. Three nights and four days on Mt. Gaoligong[N]. *People's Daily*. [钟嘉. 2010. 高黎贡山三夜四天: 白尾梢虹雉野外考察侧记. *人民日报海外版*.]

This final report could be find and bought through anyone of the project members, or from Faculty of Forestry, SWFU and Management Bureau of Baoshan and Lushui, Gaoligongshan National Nature Reserve.