



Report of Rapid Biodiversity Assessments at Maoershan Nature Reserve, Northeast Guangxi, China, 1998 and 2001

Kadoorie Farm and Botanic Garden
in collaboration with
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Guangxi Institute of Botany
Guangxi Normal University
South China Institute for Endangered Animals
South China Normal University
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Background

The present report details the findings of visits to Northeast Guangxi by members of Kadoorie Farm and Botanic Garden (KFBG) in Hong Kong and their colleagues, as part of KFBG's South China Biodiversity Conservation Programme. The overall aim of the programme is to minimise the loss of forest biodiversity in the region, and the emphasis in the first phase is on gathering up-to-date information on the distribution and status of fauna and flora.

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Common geographical descriptions and their Chinese phonetics

English meaning	Chinese phonetics (pinyin)
East	dong
South	nan
West	xi
North	bei
mountain	shan
range	ling
peak	feng, ding
valley	keng, gu
island	dao
river	he, chuan, jiang
stream	xi, yong
lake	hu, chi
sea	hai
harbour	gang
bay	wan
outlet	kou
city	shi
county	xian
village	xiang, cun
hamlet	tun
the Chinese system of geomancy	feng shui

Report of Rapid Biodiversity Assessments at Maoershan Nature Reserve, Northeast Guangxi, China, 1998 and 2001

Objectives

- The aims of the survey were to collect up-to-date information on the fauna and flora of Maoershan Nature Reserve, and to use this to help determine conservation priorities within South China.

Methods

- From 21 to 24 August 1998, a survey team from Kadoorie Farm and Botanic Garden (BH, ML, JRF, LKS, GTR), Guangxi Forestry Department (XZH), Guangxi Institute of Botany (LGZ, TSC), South China Institute for Endangered Animals (ZFS), South China Normal University (LPK), Xinyang Teachers' College (LHJ) and Guangxi Normal University (LLR, ZSY), conducted a rapid biodiversity assessment at Maoershan Nature Reserve.
- On 3-4 October 2001 a brief visit to Maoershan was made by NSC of Kadoorie Farm and Botanic Garden. Some further observations on vegetation and flora were made.
- During fieldwork visual searching for plants, mammals, birds, reptiles, amphibians, fish, ants, butterflies and dragonflies was conducted. Calls of birds and amphibians were also used for identification. Status of large and medium-sized mammals (excluding Insectivora, Chiroptera and Muridae) at Maoershan was inferred based on interviews with three local people (with reference to colour pictures), and on habitat availability. For purposes of the interviews a list of South China mammals was compiled from various sources including Guangdong Forestry Department and South China Institute for Endangered Animals (1987), Corbet & Hill (1992) and Zhang Y. *et al.* (1997).
- Records of vascular plants were made or verified by LGZ, and edited by NSC, except in the case of orchids, which were verified by GS. Mammal records were made by LKS, BH, GTR, ML or JRF. Records of birds were made or verified by LKS, reptiles and amphibians by ML, fish by LPK and BC, ants by JRF, butterflies by GTR and dragonflies by KW of Hong Kong.
- Nomenclature in the report is standardised based, unless otherwise stated, on the following references:
 - Flora (Pteridophyta, Gymnospermae and Angiospermae excluding Orchidaceae): Anon. (1959-2000); Anon. (1996-2000); Anon. (1991); Anon. (2001); and The Plant Names Project (2001);
 - Orchids (Angiospermae: Orchidaceae): Chen (1999);
 - Mammals (Mammalia): Wilson & Cole (2000);
 - Birds (Aves): Inskipp *et al.* (1996);
 - Reptiles & Amphibians (Reptilia and Amphibia): Zhao E. *et al.* (2000);
 - Fish (Actinopterygii): Nelson (1994); Wu *et al.* (1999);
 - Ants (Insecta: Hymenoptera: Formicidae): named species according to Bolton (1995); unnamed species with reference numbers according to the collection currently held by KFBG.
 - Dragonflies (Insecta: Odonata): Schorr *et al.* (2001a, 2001b);
 - Butterflies (Insecta: Lepidoptera): Bascombe (1995).
- Information on the global status of species is from IUCN publications, notably IUCN Species Survival Commission (2002). Certain taxa, including orchids, reptiles, amphibians, fish and invertebrates, have yet to be properly assessed for global status.
- Protected status in China is based on Hua & Yan (1993) for animals, and State Forestry Administration & Ministry of Agriculture (1999) for plants.

Location and management

- Maoershan Nature Reserve is at the junction of Xingan, Ziyuan and Lingchuan counties, Northeast Guangxi. The coordinates have been given variously as 25°48'-25°58' N, 110°20'-110°35' E (Forestry Department of Guangxi Zhuang Autonomous Region, 1993), 25°46'-26°00'N, 110°15'-110°32'E (MacKinnon *et al.*, 1996), and 25°48'-25°58' N, 110°20'-110°25' E (Liu *et al.*, 1996). The total area is 451 km² (Forestry Department of Guangxi Zhuang Autonomous Region, 1993).
- The geology is mainly granite, with sandstone, shale, and slate occurring locally in some parts. Maoershan has a mountainous landscape with the major mountain range running from northeast to southwest. The highest peak is Maoershan which is, at 2,142 m, the highest peak in South China.
- The region has a subtropical monsoon climate. Mean monthly temperature is 18.6°C at Huajiang (280 m), 12.5°C at Jiuniukeng (1,200 m) and 7°C at Maoershan summit (2,142 m) (Liu *et al.*, 1996). Annual precipitation is over 2,100 mm, and occurs mainly from February to August. Its catchments drain to the south (Lijiang), north (Fuyishui), northeast (Xiangjiang) and west (Xunjiang).
- The reserve was established in 1976 to protect the mixed coniferous (*Tsuga*) and broadleaf forest ecosystem and the headwater forest (Forestry Department of Guangxi Zhuang Autonomous Region, 1993). It is listed as a Provincial-level Forest Ecosystem Nature Reserve (Zhang W. 1998), and managed by the provincial Forestry Department. Of the total area 84 km² is State-run.

Results

Vegetation

- The vegetation has been described by Forestry Department of Guangxi Zhuang Autonomous Region (1993). The following broad vegetation types were recognised at different altitudes during the present surveys.
 - The main zonal vegetation of the Maoershan region should be subtropical evergreen broadleaf forest. This vegetation could be found in lower altitude and was dominated by *Castanopsis fargesii*, *C. fabri*, *C. carlesii*, *C. eyrei*, *Schima superba* and *S. argentea* (Forestry Department of Guangxi Zhuang Autonomous Region, 1993). The present surveys, however, found that much of this lower altitude forest had been replaced by secondary shrubland, regenerating after deforestation, and by plantations of tree crops and timber such as *Cunninghamia lanceolata*, *Phyllostachys heterocyclus* cv. *Pubescens*, *P. edulis*, *Illicium verum* and *Camellia oleifera*. The present study only briefly surveyed mature forests at Longtangjiang and Caojiang.
 - In 1998 it was observed that at 1,000-1,300 m, deforestation had resulted in grassland and shrubland dominated by *Miscanthus floridulus* and *Rhododendron simsii*.
 - Good forest about 10-30 m tall could be found only where the subtropical mixed evergreen and deciduous broadleaf forest was dominated by *Castanopsis lamontii*, *Lithocarpus cleistocarpa*, *Fagus longipetiolata* and *F. lucida*.
 - In high altitude there were large areas of evergreen broadleaf forest and mixed coniferous and broadleaf forest, the dominant species being *Tsuga chinensis*, *Symplocos caudata*, *Osmanthus reticulatus* and *Rhododendron maoerense*.
 - Near the summit and mountain ridges was evergreen montane dwarf forest and tall shrubland about 2-10 m in height, dominated by *Symplocos* spp., *Cyclobalanopsis stewardiana*, *Litsea pedunculata*, *Ilex szechwanensis* and *Rhododendron yuefengense*.

Flora

- Maoershan has a moderately rich flora with 1,500 vascular plant species in 190 families recorded in earlier surveys (Li & Zhao, 2001). The flora is particularly rich in relict and endemic taxa, including a number of gymnosperms, such as *Tsuga* spp. and *Fokienia hodginsii*, representatives of primitive families, such as *Liriodendron chinense*, as well as Threatened species including *Bretschneidera sinensis* and *Rhoiptelea chiliantha* (Forestry Department of Guangxi Zhuang Autonomous Region, 1993).
- The present brief survey recorded 154 vascular plant species in 72 families, including four ferns, four gymnosperms and 146 angiosperm species in 65 families (Table 1). Important families in the flora included Fagaceae, Lauraceae, Theaceae, Araliaceae, Ericaceae, and Rosaceae.
- *Gentiana oligophylla* is a new record for Guangxi. It was previously recorded only in Central to West China.
- Among the recorded species, some are of particular conservation significance:
 - *Fagus longipetiolata* is globally Vulnerable.
 - *Zenia insignis* is at Lower Risk (near threatened) and under Class II National Protection.
 - *Rhododendron oligocarpum* is endemic to northeast Guangxi and east Guizhou.
 - National protected status of orchids is still under review, but *Pleione bulbocodioides* is listed on CITES Appendix II.

Table 1. Vascular plant species recorded in Maoershan Nature Reserve in 1998 and 2001. Species under National Protection (Class I or II) (State Forestry Administration & Ministry of Agriculture, 1999), globally Threatened or Lower Risk (IUCN Species Survival Commission, 2002) or highly restricted in range are indicated.

Family	Scientific name	Remarks
PTERIDOPHYTA		
Gleicheniaceae	<i>Diplazium chinensis</i> (Rosenst.) DeVol	
Marattiaceae	<i>Angiopteris fokiensis</i> Hieron.	
Plagiogyriaceae	<i>Plagiogyria distinctissima</i> Ching	
Selaginellaceae	<i>Selaginella doederleinii</i> Hieron	
GYMNOSPERMAE		
Cupressaceae	<i>Pinus massoniana</i> Lamb. <i>Tsuga chinensis</i> (Franch.) Pritz.	
Podocarpaceae	<i>Nageia nagi</i> (Thunb.) Kuntze	
Taxodiaceae	<i>Cunninghamia lanceolata</i> (Lamb.) Hook.	planted
ANGIOSPERMAE		
Dicotyledonae		
Aceraceae	<i>Acer flabellatum</i> Rehder	
Actinidiaceae	<i>Actinidia arguta</i> Planch. ex Miq. var. <i>purpurea</i> (Rehder) C.F. Liang <i>Actinidia latifolia</i> (Gardner et Champ.) Merr.	
Alangiaceae	<i>Alangium chinense</i> (Lour.) Harms.	
Anacardiaceae	<i>Choerospondias axillaris</i> (Roxb.) B.L. Burtt et. A.W. Hill <i>Toxicodendron succedaneum</i> (L.) Kuntze.	
Aquifoliaceae	<i>Ilex hylonoma</i> Hu & T. Tang <i>Ilex szechwanensis</i> Loes.	
Araliaceae	<i>Acanthopanax evodiifolius</i> Franch. <i>Acanthopanax evodiifolius</i> Franch. var. <i>gracilis</i> W.W. Sm. <i>Aralia armata</i> (Wall.) Seem. <i>Aralia cordata</i> Thunb. <i>Aralia echinocaulis</i> Hand.-Mazz. <i>Dendropanax dentigerus</i> (Harms ex Diels) Merr. <i>Schefflera delavayi</i> (Franch.) Harms <i>Schefflera octophylla</i> (Lour.) Harms	

Family	Scientific name	Remarks
Asclepiadaceae	<i>Cynanchum officinale</i> (Hemsl.) Tsiang & H.D. Zhang	
Caesalpiniaceae	<i>Bauhinia championii</i> (Benth.) Benth. <i>Zenia insignis</i> Chun	Lower Risk, Protected II
Caprifoliaceae	<i>Lonicera acuminata</i> Wall. <i>Lonicera japonica</i> Thunb. ex Murray <i>Viburnum sympodiale</i> Graebn.	
Celastraceae	<i>Euonymus hederaceus</i> Champ. ex Benth. <i>Euonymus myrianthus</i> Hemsl.	
Cornaceae	<i>Aucuba chinensis</i> Benth.	
Cucurbitaceae	<i>Dendrobenthamia angustata</i> (Chun) W.P. Fang <i>Gynostemma pentaphylla</i> (Thunb.) Makino <i>Siraitia grosvenorii</i> (Swingle) C. Jeffrey ex A.M. Lu & Zhi Y. Zhang <i>Trichosanthes cucumeroides</i> (Ser.) Maxim.	
Daphniphyllaceae	<i>Daphniphyllum macropodum</i> Miq. <i>Daphniphyllum oldhami</i> (Hemsl.) Rosenth.	
Elaeocarpaceae	<i>Elaeocarpus japonicus</i> Siebold & Zucc. <i>Sloanea sinensis</i> (Hance) Hemsl.	
Ericaceae	<i>Enkianthus chinensis</i> Franch. <i>Pieris formosa</i> (Wall.) D. Don <i>Rhododendron maoerense</i> D. Fang & Q.Z. Li <i>Rhododendron oligocarpum</i> W.P. Fang <i>Rhododendron pachyphyllum</i> W.P. Fang <i>Vaccinium sinicum</i> Sleumer	endemic to NE Guangxi & E Guizhou
Escalloniaceae	<i>Itea macrophylla</i> Wall. ex Roxb.	
Euphorbiaceae	<i>Mallotus apelta</i> (Lour.) Müll. Arg. <i>Mallotus lianus</i> Croizat <i>Sapium discolor</i> (Champ. ex Benth.) Müll.-Arg. <i>Sapium sebiferum</i> (L.) Roxb. <i>Vernicia fordii</i> (Hemsl.) Airy Shaw <i>Vernicia montana</i> Lour.	
Fagaceae	<i>Castanopsis carlesii</i> (Hemsl.) Hayata <i>Castanopsis eyrei</i> (Champ. ex Benth.) Tutcher <i>Castanopsis fabri</i> Hance <i>Castanopsis fissa</i> (Champ. ex Benth.) Rehder et E. H. Wilson <i>Castanopsis tibetana</i> Hance <i>Cyclobalanopsis stewardiana</i> (A. Camus) Y.C. Hsu & H.W. Jen <i>Fagus longipetiolata</i> Seemen <i>Fagus lucida</i> Rehder & E.H. Wilson <i>Lithocarpus cleistocarpus</i> (Seemen) Rehder & E.H. Wilson <i>Lithocarpus hancei</i> (Benth.) Rehder <i>Lithocarpus litseifolius</i> (Hance) Chun	Vulnerable
Gentianaceae	<i>Gentiana davidii</i> Franch. <i>Gentiana oligophylla</i> Harry Sm. ex C. Marquand <i>Latouchea fokiensis</i> Franch. <i>Swertia macrosperma</i> (C.B. Clarke) C.B. Clarke	new record for Guangxi
Gesnariaceae	<i>Chirita pinnatifida</i> (Hand.-Mazz.) B.L. Burt	
Hamamelidaceae	<i>Altingia chinensis</i> (Champ. ex Benth.) Oliv. ex Hance <i>Corylopsis multiflora</i> Hance <i>Liquidambar acalycina</i> H.T. Chang <i>Loropetalum chinense</i> (R. Br.) Oliv.	
Hydrangeaceae	<i>Dichroa febrifuga</i> Lour.	
Illiciaceae	<i>Illicium majus</i> Hook. f. & Thomson	
Lauraceae	<i>Cinnamomum austrosinense</i> H.T. Chang <i>Cryptocarya chingii</i> W.C. Cheng <i>Lindera fruticosa</i> Hemsl.	

Family	Scientific name	Remarks
	<i>Litsea cubeba</i> (Lour.) Pers.	
	<i>Litsea elongata</i> (Nees) Benth. & Hook. f.	
	<i>Litsea elongata</i> Benth. & Hook. f. var.	
	<i>subverticillata</i> (Y.C. Yang) Yen C. Yang & P.H. Huang	
	<i>Litsea pedunculata</i> (Diels) Y.C. Yang & P.H. Huang	
	<i>Machilus decursinervis</i> Chun	
	<i>Machilus leptophylla</i> Hand.-Mazz.	
	<i>Machilus litseifolia</i> S. K. Lee	
	<i>Neolitsea aurata</i> (Hayata) Koidz.	
	<i>Phoebe shearerii</i> (Hemsl.) Gamble	
Loganiaceae	<i>Buddleja lindleyana</i> Fortune	
Magnoliaceae	<i>Magnolia sieboldii</i> K. Koch	
	<i>Manglietia chingii</i> Dandy	
	<i>Michelia maudiae</i> Dunn	
Melastomataceae	<i>Fordiophyton fordii</i> (Oliv.) Krasser	
Meliaceae	<i>Toona sinensis</i> (Juss.) Roem.	
Menispermaceae	<i>Stephania cephalantha</i> Hayata	
Mimosaceae	<i>Albizia kalkora</i> (Roxb.) Prain	
Myricaceae	<i>Myrica rubra</i> (Lour.) Sieb. et Zucc.	
Myrtaceae	<i>Syzygium buxifolium</i> Hook. et Arn.	
Olacaceae	<i>Schoepfia jasminodora</i> Siebold & Zucc.	
Oleaceae	<i>Osmanthus reticulatus</i> P.S. Green	
Papaveraceae	<i>Macleaya cordata</i> (Willd.) R. Br.	
Papilionaceae	<i>Dalbergia hancei</i> Benth.	
Piperaceae	<i>Piper hancei</i> Maxim.	
Pittosporaceae	<i>Pittosporum glabratum</i> Lindl. var. <i>neriifolium</i> Rehder & E.H. Wilson	
Polygalaceae	<i>Polygala fallax</i> Hemsl.	
Polygonaceae	<i>Antenoron filiforme</i> (Thunb.) Roberty & Vautier	
	<i>Polygonum nepalense</i> Meisn.	
Ranunculaceae	<i>Clematis montana</i> Buch.-Ham. ex DC.	
Rosaceae	<i>Laurocerasus phaeosticta</i> (Hance) C. K. Schneid.	
	<i>Laurocerasus spinulosa</i> (Siebold & Zucc.) C.K. Schneid.	
	<i>Rosa multiflora</i> Thunb. var. <i>cathayensis</i> Rehder & E.H. Wilson	
	<i>Rubus xanthoneurus</i> Focke	
	<i>Sorbus caloneura</i> (Stapf) Rehder	
	<i>Sorbus hemsleyi</i> (C.K. Schneid.) Rehder	
	<i>Sorbus keissleri</i> (C.K. Schneid.) Rehder	
	<i>Sorbus wilsoniana</i> C.K. Schneid.	
	<i>Stranvaesia davidiana</i> var. <i>undulata</i> (Decne.) Rehder & E.H. Wilson	
Rubiaceae	<i>Aidia canthioides</i> (Champ. ex Benth.) Masam.	
	<i>Mussaenda esquirolii</i> H. Lév.	
	<i>Uncaria rynchophylla</i> (Miq.) Miq. ex Havil.	
Rutaceae	<i>Evodia glabrifolia</i> (Champ. ex Benth.) C.C. Huang	
	<i>Zanthoxylum ailanthoides</i> Siebold & Zucc.	
	<i>Zanthoxylum myriacanthum</i> Wall. ex Hook. f.	
Sabiaceae	<i>Meliosma glandulosa</i> Cufod.	
	<i>Meliosma squamulata</i> Hance	
Saxifragaceae	<i>Parnassia wightiana</i> Wall. ex Wight & Arn.	
Schisandraceae	<i>Schisandra henryi</i> C.B. Clarke	
Scrophulariaceae	<i>Paulownia kawakamii</i> Ito	
Simarubaceae	<i>Ailanthus altissima</i> (Mill.) Swingle	
Stachyuraceae	<i>Stachyurus chinensis</i> Franch.	
Staphyleaceae	<i>Euscaphis japonica</i> (Thunb.) Kanitz	

Family	Scientific name	Remarks
	<i>Turpinia arguta</i> (Lindl.) Seem.	
Styracaceae	<i>Alniphyllum fortunei</i> (Hemsl.) Makino	
Symplocaceae	<i>Symplocos botryantha</i> Franch.	
Theaceae	<i>Camellia pitardii</i> Cohen-Stuart	
	<i>Eurya brevistyla</i> Kobuski	
	<i>Schima superba</i> Gardn. et Champ.	
	<i>Ternstroemia gymnanthera</i> (Wight & Arn.) Bedd.	
Thymelaeaceae	<i>Wikstroemia monnula</i> Hance	
Ulmaceae	<i>Trema cannabina</i> Lour.	
Urticaceae	<i>Oreocnide frutescens</i> (Thunb.) Miq.	
Verbenaceae	<i>Clerodendrum cyrtophyllum</i> Turcz.	
	<i>Clerodendrum fortunatum</i> L.	
Monocotyledonae		
Araceae	<i>Amorphophallus dunnii</i> Tutcher	
Dioscoreaceae	<i>Dioscorea bulbifera</i> L.	
Liliaceae	<i>Allium wallichii</i> Kunth	
	<i>Ophiopogon intermedius</i> D. Don	
	<i>Smilax lebrunii</i> H. Lévl.	
Musaceae	<i>Musa balbisiana</i> Colla	
Orchidaceae	<i>Pleione bulbocodioides</i> (Franch.) Rolfe	semi-epiphyte, endemic to China
Poaceae	<i>Fargesia</i> sp.	
	<i>Phyllostachys heterocyclus</i> (Carr.) Mitford cv.	planted
	<i>Pubescens</i>	
Zingiberaceae	<i>Globba racemosa</i> Sm.	
	<i>Zingiber mioga</i> (Thunb.) Roscoe	

Mammals

- A number of direct mammal observations were made during the survey.
 - Two Red-hipped Squirrels *Dremomys pyrrhomerus* were seen at higher altitude.
 - Two Siberian Weasel *Mustela sibirica* were seen at different altitudes.
 - Several Maritime Striped Squirrels *Tamiops maritimus* were seen.
- Some indirect observations were also made:
 - Tracks of Wild Boar *Sus scrofa* were seen at higher altitude.
 - Scats and tracks of unidentified small mustelids (possibly *M. sibirica*) were seen at higher altitude.
- According to a local hunter, Tufted Deer *Elaphodus cephalophus* was still regularly trapped in the forest near Longtangjiang.
- The inferred status of larger mammals at Maershan, based partly on interviews with reserve staff, is shown in Table 2.

Table 2. The status of mammals (excluding Insectivora, Chiroptera and Muridae) at Maershan Nature Reserve, Guangxi, based on interviewing two reserve wardens and Mr. Yu, Senior Engineer of the Reserve (“+” = rare, “++” = common, “+++” = abundant). Sequence follows Wilson & Cole (2000).

Scientific name	English name	Reserve wardens	Mr. Yu	Probable local status
<i>Macaca arctoides</i>	Stump-tailed Macaque	+	-	insecure or extirpated
<i>Macaca mulatta</i>	Rhesus Monkey	-	+	insecure
<i>Macaca thibetana</i>	Père David’s Macaque	+	+	insecure
<i>Catopuma temminckii</i>	Asiatic Golden Cat	+	+	insecure
<i>Prionailurus bengalensis</i>	Leopard Cat	+	+	insecure
<i>Amblonyx cinereus</i>	Oriental Small-clawed Otter	+	-	insecure or extirpated
<i>Lutra lutra</i>	Eurasian Otter	-	+?	insecure or extirpated
<i>Arctonyx collaris</i>	Hog Badger	-	+	insecure or extirpated
<i>Melogale moschata</i>	Chinese Ferret-badger	-	+++	present
<i>Mustela kathiah</i>	Yellow-bellied Weasel	+++?	+	present

Scientific name	English name	Reserve wardens	Mr. Yu	Probable local status
<i>Mustela sibirica</i>	Siberian Weasel	+++?	+++	present
<i>Ursus thibetanus</i>	Asiatic Black Bear	+	+++	present
<i>Paguma larvata</i>	Masked Palm Civet	+++	+++	present
<i>Prionodon pardicolor</i>	Spotted Linsang	+	-	insecure
<i>Viverra zibetha</i>	Large Indian Civet	-	+	insecure or extirpated
<i>Viverricula indica</i>	Small Indian Civet	+	+++	present
<i>Sus scrofa</i>	Wild Boar	+++	+++	present
<i>Moschus berezovskii</i>	Chinese Forest Musk Deer	+	+	insecure
<i>Cervus unicolor</i>	Sambar	-	+	insecure or extirpated
<i>Elaphodus cephalophus</i>	Tufted Deer	+	+++	present
<i>Muntiacus reevesi</i>	Reeves's Muntjac	+	+	insecure
<i>Manis pentadactyla</i>	Chinese Pangolin	+	+	insecure
<i>Tamias maritimus</i> (or <i>T. swinhoei</i>)	Maritime Striped Squirrel (or Swinhoe's Striped Squirrel)	+++	+++	present
<i>Callosciurus erythraeus</i>	Pallas's Squirrel	?	?	uncertain
<i>Dremomys pyrrhomerus</i> (or <i>D. rufigenis</i>)	Red-hipped Squirrel (or Red-cheeked Squirrel)	-	+++	present
<i>Belomys pearsonii</i>	Hairy-footed Flying Squirrel	+++	-	present
<i>Petaurista philippensis</i> (or <i>P. petaurista</i>)	Indian Giant Flying Squirrel (or Red Giant Flying Squirrel)	-	++	present
<i>Rhizomys pruinosus</i>	Hoary Bamboo Rat	+++	+	present
<i>Rhizomys sinensis</i>	Chinese Bamboo Rat	+++	+++	present
<i>Hystrix brachyura</i>	Malayan Porcupine	+	+	insecure
<i>Lepus sinensis</i>	Chinese Hare	+++	+++	present

- Many of the species reported to occur at Maoershan are of conservation concern:
 - Stump-tailed Macaque *Macaca arctoides*, Eurasian Otter *Lutra lutra* and Asiatic Black Bear *Ursus thibetanus* are Vulnerable globally and Class II Protected in China.
 - Malayan Porcupine *Hystrix brachyura* is Vulnerable globally.
 - Rhesus Monkey *Macaca mulatta*, Père David's Macaque *Macaca thibetana*, Asiatic Golden Cat *Catopuma temminckii*, Oriental Small-clawed Otter *Amblonyx cinereus*, Chinese Forest Musk Deer *Moschus berezovskii* and Chinese Pangolin *Manis pentadactyla* are at Lower Risk (Near-threatened or Conservation-dependent) globally and Class II Protected in China.
 - Hairy-footed Flying Squirrel *Belomys pearsonii* is at Lower Risk (Near-threatened) globally.
 - Tufted Deer *Elaphodus cephalophus* is Data Deficient globally.
 - Spotted Linsang *Prionodon pardicolor*, Small Indian Civet *Viverricula indica* and Sambar *Cervus unicolor* are Class II Protected in China.
- Much of the habitat on Maoershan has been modified, and it is likely that many larger mammals have been lost despite the large area and altitude range. However many other species reportedly survive.

Birds

- Seventy-six species of birds were recorded in Maoershan Nature Reserve during this survey (Table 3).
- The most frequently encountered species at higher elevations were Red-billed Leiothrix *Leiothrix lutea*, Hwamei *Garrulax canorus*, Mountain Bulbul *Hypsipetes mccllellandii*, Red-tailed Minla *Minla ignotincta*, Pygmy Wren Babbler *Pnoepyga pusilla*, Streak-throated Fulvetta *Alcippe cinereiceps* and Blue-winged Minla *Minla cyanouroptera*. Most frequent at lower elevations were Chestnut Bulbul *Hemixos castanonotus*, Black-browed Barbet *Megalaima oorti*, Chinese Bamboo Partridge *Bambusicola thoracica*, Collared Finchbill *Spizixos semitorques*, Plumbeous Water Redstart *Rhyacornis fuliginosus* and Crested Serpent Eagle *Spilornis cheela*.
- The records of four species are new for Guangxi: Red-winged Laughingthrush *Garrulax*

formosus, Ratchet-tailed Treepie *Temnurus temnurus*, Racket-tailed Treepie *Crypsirina temia* and Yellow-browed Tit *Sylviparus modestus*. The records of the two treepies represent large extensions of the known range; within China, Ratchet-tailed Treepie was recorded only from Hainan while Racket-tailed Treepie was recorded only in the southern Yunnan lowlands (MacKinnon *et al.*, 2000).

- A wild-caught Tawny Fish Owl *Ketupa flavipes* was being held in the guesthouse at Huajiang on 23 August 1998. Since it was in good health and had not been in close proximity to other birds, it was released later.

Table 3. Birds recorded in Maoershan Nature Reserve, 21-24 August 1998, with number of individuals in each encounter. Sequence follows Clements (2000).

English name	Scientific name
Black Baza	<i>Aviceda leuphotes</i>
Crested Serpent Eagle	<i>Spilornis cheela</i>
Crested Goshawk	<i>Accipiter trivirgatus</i>
Chinese Bamboo Partridge	<i>Bambusicola thoracica</i>
Hodgson's Hawk Cuckoo	<i>Hierococcyx fugax</i>
Indian Cuckoo	<i>Cuculus micropterus</i>
Oriental Cuckoo	<i>Cuculus saturatus</i>
House Swift	<i>Apus affinis</i>
Common Kingfisher	<i>Alcedo atthis</i>
Dollarbird	<i>Eurystomus orientalis</i>
Great Barbet	<i>Megalaima virens</i>
Black-browed Barbet	<i>Megalaima oorti</i>
Bay Woodpecker	<i>Blythipicus pyrrhotis</i>
Barn Swallow	<i>Hirundo rustica</i>
Red-rumped Swallow	<i>Hirundo daurica</i>
Plain Martin	<i>Riparia paludicola</i>
Asian House Martin	<i>Delichon dasypus</i>
White Wagtail	<i>Motacilla alba</i>
Grey Wagtail	<i>Motacilla cinerea</i>
Grey-chinned Minivet	<i>Pericrocotus solaris</i>
Collared Finchbill	<i>Spizixos semitorques</i>
Light-vented Bulbul	<i>Pycnonotus sinensis</i>
Puff-throated Bulbul	<i>Alophoixus pallidus</i>
Chestnut Bulbul	<i>Hemixos castanonotus</i>
Mountain Bulbul	<i>Hypsipetes mccllellandii</i>
Brown Dipper	<i>Cinclus pallasii</i>
Blue Whistling Thrush	<i>Myophonus caeruleus</i>
Grey-winged Blackbird	<i>Turdus boulboul</i>
Yellow-bellied Prinia	<i>Prinia flaviventris</i>
Plain Prinia	<i>Prinia inornata</i>
Brownish-flanked Bush Warbler	<i>Cettia fortipes</i>
Yellowish-bellied Bush Warbler	<i>Cettia acanthizoides</i>
Mountain Tailorbird	<i>Orthotomus cuculatus</i>
Golden-spectacled Warbler	<i>Seicercus burkii</i>
Chestnut-crowned Warbler	<i>Seicercus castaniceps</i>
Rufous-faced Warbler	<i>Abroscopus albogularis</i>
Blyth's Leaf Warbler	<i>Phylloscopus reguloides</i>
Sulphur-breasted Warbler	<i>Phylloscopus ricketii</i>
Rufous-gorgeted Flycatcher	<i>Ficedula strophiate</i>
Hainan Blue Flycatcher	<i>Cyornis hainanus</i>
Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>
Plumbeous Water Redstart	<i>Rhyacornis fuliginosus</i>
Little Forktail	<i>Enicurus scouleri</i>
Slaty-backed Forktail	<i>Enicurus schistaceus</i>
Masked Laughingthrush	<i>Garrulax perspicillatus</i>
Black-throated Laughingthrush	<i>Garrulax chinensis</i>
Rusty Laughingthrush	<i>Garrulax poecilorhynchus</i>

English name	Scientific name
Hwamei	<i>Garrulax canorus</i>
Red-winged Laughingthrush	<i>Garrulax formosus</i>
Red-tailed Laughingthrush	<i>Garrulax milnei</i>
Streak-breasted Scimitar Babbler	<i>Pomatorhinus ruficollis</i>
Pygmy Wren Babbler	<i>Pnoepyga pusilla</i>
Rufous-capped Babbler	<i>Stachyris ruficeps</i>
Red-billed Leiothrix	<i>Leiothrix lutea</i>
White-browed Shrike Babbler	<i>Pteruthius flaviscapis</i>
Blue-winged Minla	<i>Minla cyanouroptera</i>
Red-tailed Minla	<i>Minla ignotincta</i>
Golden-breasted Fulvetta	<i>Alcippe chrysotis</i>
Streak-throated Fulvetta	<i>Alcippe cinereiceps</i>
Dusky Fulvetta	<i>Alcippe brunnea</i>
Grey-cheeked Fulvetta	<i>Alcippe morrisonia</i>
White-bellied Yuhina	<i>Yuhina zantholeuca</i>
Golden Parrotbill	<i>Paradoxornis verreauxi</i>
Green-backed Tit	<i>Parus monticolus</i>
Yellow-cheeked Tit	<i>Parus spilonotus</i>
Yellow-browed Tit	<i>Sylviparus modestus</i>
Mrs Gould's Sunbird	<i>Aethopyga gouldiae</i>
Fork-tailed Sunbird	<i>Aethopyga christinae</i>
Japanese White-eye	<i>Zosterops japonicus</i>
Silver Oriole	<i>Oriolus mellianus</i>
Spangled Drongo	<i>Dicrurus hottentottus</i>
Red-billed Blue Magpie	<i>Urocissa erythrorhyncha</i>
Grey Treepie	<i>Dendrocitta formosae</i>
Ratchet-tailed Treepie	<i>Temnurus temnurus</i>
Racket-tailed Treepie	<i>Crypsirina temia</i>
White-rumped Munia	<i>Lonchura striata</i>

- Several species are of conservation concern.
 - Silver Oriole *Oriolus mellianus* is Vulnerable globally, and has a restricted breeding range from southern Sichuan to northern Guangdong.
 - Crested Serpent Eagle, Crested Goshawk *Accipiter trivirgatus*, Black Baza *Aviceda leuphotes* and Tawny Fish Owl are Class II Protected species in China.
- The montane forest near Bajiaotian was especially important because a large number of forest bird species were recorded only here and not at other survey sites in South China. Unusual species included Grey-winged Blackbird *Turdus bouboul*, Red-winged Laughingthrush *Garrulax formosus*, Red-tailed Laughingthrush *Garrulax milnei*, Silver Oriole, Golden Parrotbill *Paradoxornis verreauxi*, Golden-breasted Fulvetta *Alcippe chrysotis*, Rufous-gorgeted Flycatcher *Ficedula strophiate* and Yellow-browed Tit.
- The high richness of forest birds indicated that this montane forest has high integrity.
- Forests at lower altitudes were not comprehensively sampled, but a large number of forest birds were recorded. The reserve as a whole offers a wide range of bird habitats.

Reptiles and Amphibians

- Eighteen species of amphibian (one newt and 17 anurans) and four species of reptile (two lizards and two snakes) were recorded from Maoershan (Table 4).
- The most frequently encountered species was *Rana schmackeri*.
- Juvenile frogs probably belonging to *Rana versabilis* were present.
- *Vibrissaphora yaoshanensis*, *Bufo cryptotympanicus*, *Rana adenopleura*, *Rana japonica*, *Rana latouchii*, *Microhyla heymonsi*, *Eumeces elegans*, *Sphenomorphus indicus*, *Rhabdophis subminiatus* and *Sibynophis chinensis* are new records for the reserve.

Table 4. Amphibians and reptiles of Maoershan Nature Reserve, 21-24 August 1998. Sequence follows Zhao E.-M. & Adler (1993).

Species	Habitat	Records
AMPHIBIA		
<i>Pachytriton labiatus</i>	stream	✓
<i>Brachytarsophrys carinensis</i>	stream	✓
<i>Megophrys minor</i>	stream	✓
<i>Vibrissaphora yaoshanensis</i>	stream	tadpoles
<i>Bufo cryptotympanicus</i>	forest	✓
	stream	✓
<i>Amolops ricketti</i>	stream	✓
<i>Paa boulengeri</i>	stream	✓
<i>Paa spinosa</i>	stream	✓, tadpoles
<i>Rana adenopleura</i>	stream	✓
	ditch	✓
	paddy field	✓
<i>Rana guentheri</i>	ditch	✓
<i>Rana japonica</i>	forest	✓
<i>Rana limnocharis</i>	bamboo plantation	✓
	pool	tadpoles
	ditch	✓
	paddy field	✓
<i>Rana latouchii</i>	pool	✓
<i>Rana livida</i>	stream	✓
<i>Rana schmackeri</i>	stream	✓, tadpoles
	forest edge	✓
<i>Rana versabilis</i> ?	forest	✓
<i>Microhyla heymonsi</i>	bamboo plantation	✓
	ditch	tadpoles
	stream	tadpoles
	pool	tadpoles
<i>Microhyla ornata</i>	paddy field	✓
	pool	tadpoles
	bamboo planatation	✓
REPTILIA		
<i>Eumeces elegans</i>	river	✓
	forest edge	✓
<i>Sphenomorphus indicus-</i>	forest edge	✓
	forest	✓
<i>Rhabdophis subminiatus</i>	forest edge	✓
<i>Sibynophis chinensis</i>	forest edge	✓

- In addition to these species, the following have previously been recorded from Maoershan: *Pachytriton brevipes*, *Bufo gargarizans*, *Bufo andrewsi*, *Bufo melanostictus*, *Hyla chinensis*, *Hyla simplex*, *Rana nigromaculata*, *Rana margaratae*, *Polypedates dennysi*, *Polypedates megacephalus*, *Polypedates mutus*, *Calotes versicolor* and *Eumeces chinensis* (Guangxi Zoological Society, 1988).
- *Bufo cryptotympanicus* is endemic to South China and has a very restricted range.
- The presence of *Pachytriton labiatus*, *Brachytarsophrys carinensis*, *Megophrys minor*, *V. yaoshanensis*, *B. cryptotympanicus*, *Paa boulengeri*, *Paa spinosa*, *Rana japonica*, *Rana livida*, and *Rana schmackeri* indicated that the forests and streams at Maoershan had high integrity.

Fish

- A total of 28 species of freshwater fish were recorded at Maoershan (Table 5). Some species await specialist verification.
- The most frequently encountered species were *Zacco platypus*, *Acrossocheilus parallens*, *Discogobio* (cf. *bismargaritus*) sp., species in the genus *Schistura* and *Pseudogastromyzon fangi*.

- *Discogobio* (cf. *bismargaritus*) sp. appears to be a new record for Guangxi (Yue *et al.* 2000).

Table 5. Freshwater fish recorded at Maoershan Nature Reserve, 22-24 August 1998. Sequence follows Nelson (1994). “**” = nomenclature follows Pan (1991); “***” = nomenclature follows Chen *et al.* (1998).

Species	Habitat
<i>Zacco platypus</i>	stream
<i>Microphysogobio tafangensis</i>	stream
<i>Pseudogobio guilinensis</i> **	stream
<i>Rhodeus ocellatus</i> **	stream
<i>Acrossocheilus parallens</i>	stream
<i>Acrossocheilus hemispinus</i> *	stream
<i>Onychostoma barbata</i>	stream
<i>Discogobio</i> (cf. <i>bismargaritus</i>) sp.	stream
<i>Misgurnus anguillicaudatus</i>	stream
<i>Parabotia lijiangensis</i>	stream
<i>Schistura fasciolata</i>	stream
<i>Schistura incerta</i>	stream
<i>Vanmanenia pingchowensis</i>	stream
<i>Protomyzon sinensis</i>	stream
<i>Pseudogastromyzon fangi</i>	stream
<i>Pelteobagrus fulvidraco</i>	stream
<i>Mystus guttatus</i>	stream
<i>Pterocryptis</i> sp. 1	stream
<i>Pterocryptis gilberti</i>	stream
<i>Silurus asotus</i>	stream
<i>Glyptothorax fukiensis fukiensis</i>	stream
<i>Mastacembelus armatus</i>	stream
<i>Siniperca scherzeri</i>	stream
<i>Siniperca undulatus</i>	stream
<i>Coreoperca whiteheadi</i>	stream
<i>Rhinogobius duospilus</i>	stream
<i>Rhinogobius</i> (cf. <i>brunneus</i>) sp. 1	stream
<i>Rhinogobius</i> sp. 2	stream

- Some of the species are of particular conservation significance:
 - *Parabotia lijiangensis* is endemic to the Lijiang drainage and thus has a highly restricted global range.
 - *Pseudogobio guilinensis* and *Protomyzon sinensis* are endemic to the Xijiang (West River) drainage.
- *Discogobio* (cf. *bismargaritus*) sp. and the stream gobies *Rhinogobius* spp. could not be identified to specific level and may prove to be of conservation significance.
- The presence of three species of the predatory mandarin fish in the genera *Coreoperca* and *Siniperca* at Huajiang indicates a healthy ecosystem with abundant fish. The site had high species richness with a diverse fish community.

Ants

- Fifty-one ant species were recorded from Maoershan (Table 6). Nineteen of these were near the summit at Bajiaotian. Many species require specialist verification.
- The most frequent species at high altitude were *Prenolepis* sp. 7 and *Myrmecaria* sp. Most frequent at lower elevations were *Crematogaster* sp. 3, *Prenolepis* sp. 1, *Pristomyrmex pungens*, *Pachycondyla* sp. 17, *Paratrechina* sp. 9 and *Pachycondyla* sp. 14.

Table 6. Ants recorded at Maershan Nature Reserve, 21-24 August 1998. * Species with a strong forest association. # Exotic species.

Species	Habitat
? <i>Anillomyrma</i> sp.	closed montane forest
<i>Aenictus</i> sp.	open forest
<i>Aphaenogaster</i> (cf. <i>hunanensis</i>) sp. 3 *	open forest
<i>Camponotus</i> (cf. <i>breviscapus</i>) sp. 28	broadleaf forest
<i>Cataulacus granulatus</i>	bamboo
<i>Crematogaster</i> (cf. <i>laboriosa</i>) sp. 3	open forest/ shrubland
<i>Dolichoderus</i> (cf. <i>flatidorsus</i>) sp. 6	open bamboo/ shrubland
<i>Hypoponera</i> (cf. <i>excoecata</i>) sp. 2 *	closed montane forest
<i>Hypoponera</i> sp. 3 *	closed broadleaf forest
<i>Hypoponera</i> sp. 5 *	(missing data)
<i>Lasius</i> sp. 1 *	open shrubland
<i>Leptogenys</i> sp. 17	closed broadleaf forest
<i>Monomorium destructor</i> #	low shrubland
<i>Myrmecina</i> sp. 2 *	closed montane forest
<i>Myrmecina</i> sp. 3 *	closed montane forest
<i>Myrmecaria</i> sp.	forest/ shrubland
<i>Odontomachus monticola</i> *	open 20m forest
<i>Oligomyrmex</i> sp. A	closed montane forest
<i>Oligomyrmex</i> sp. 6 *	broadleaf forest
<i>Oligomyrmex</i> sp. 7 *	closed broadleaf forest
<i>Pachycondyla</i> (<i>javana</i> group) sp. 1 *	broadleaf & bamboo
<i>Pachycondyla</i> (cf. <i>astuta</i>) sp. 14 *	broadleaf & bamboo
<i>Pachycondyla</i> (cf. <i>luteipes</i>) sp. 2 *	open forest
<i>Pachycondyla</i> (cf. <i>nigrita</i>) sp. 17 *	forest, shrubland & farmland
<i>Paratrechina</i> (cf. <i>bourbonica</i>) sp. 4 #?	bamboo/ farmland
<i>Paratrechina</i> sp. 30	open broadleaf & bamboo
<i>Paratrechina</i> (cf. <i>opaca</i>) sp. 26 *	open broadleaf/ shrubland
<i>Paratrechina</i> (nr. <i>indica</i>) sp. 9 *	closed forest
<i>Pheidole</i> (cf. <i>noda</i>) sp. 1	open fir & bamboo
<i>Pheidole</i> (cf. <i>simoni</i>) sp. 7	open forest/ grassland
<i>Pheidole</i> sp. 9-C	closed montane forest
<i>Pheidole</i> (<i>hortensis</i> group) 9-D	open broadleaf & bamboo
<i>Pheidologeton</i> sp. A	open bamboo/ shrubland
<i>Pheidologeton</i> (cf. <i>melasolenus</i>) sp. 8 *	closed broadleaf forest
<i>Polyrhachis lamellidens</i> *	(missing data)
<i>Polyrhachis tyrannica</i>	agricultural
<i>Polyrhachis vigilans</i> *	open bamboo & broadleaf
<i>Polyrhachis wolffi</i> *	open forest/ shrubland
<i>Polyrhachis</i> (<i>Myrma</i>) sp. 23	(missing data)
<i>Ponera</i> (cf. <i>sinensis</i>) sp. 1 *	closed montane forest
<i>Ponera</i> sp. 3 *	forest/ shrubland
<i>Prenolepis</i> sp. 8 * (= <i>Paratrechina opisothalmia</i>)	open bamboo/ shrubland
<i>Prenolepis</i> (cf. <i>emmae</i>) sp. 1 *	forest & moist rocks
<i>Prenolepis</i> (cf. <i>angularis</i>) sp. 7 *	montane forest
<i>Pristomyrmex pungens</i>	open bamboo/ broadleaf
<i>Pseudolasius</i> sp.	forest/ shrubland
<i>Pyramica canina</i> ? *	closed montane forest
<i>Strumigenys lewisi</i> ? *	closed montane forest
<i>Tapinoma</i> sp. 1?	open bamboo & broadleaf
<i>Technomyrmex</i> sp. 2 *	forest, moist rocks
<i>Tetramorium</i> sp. 2	closed broadleaf
<i>Tetramorium</i> sp. 25 *	(missing data)

- *Hypoponera* sp. 5, *Oligomyrmex* sp. 7, *Ponera* sp. 3, *Prenolepis* sp. 7, *Strumigenys lewisi* and *Tetramorium* sp. 25 are apparently dependent on primary forest.
- Of the species recorded, some 27 (53%) are forest-dependent. At least 12 (63%) of the species recorded at high altitude (Bajiaotian) are forest-dependent, while the corresponding proportions

were 52% at each of Longtangjiang and Caojiang. Only one to two exotic species were recorded, at lower elevations.

- The following species have been described as new, from specimens collected at Maoershan (Zhou, 2001). They appear to be known only from Maoershan. It has not yet been possible to compare them with those listed above, or with other described species held in overseas collections.
 - *Prenolepis angularis* Zhou (collected on 10.vii.94);
 - *Camponotus breviscapus* Zhou (collected on 10.vii.94).

Dragonflies

- Thirty-one dragonfly species were recorded during the survey (Table 7).
- Most frequently encountered were *Copera ciliata*, *Idionyx carinata*, and *Orthetrum triangulare*.
- Several specimens could not be assigned to described species, and await further study.
- Some of these records represent extensions of the known range:
 - The *Oligoaeschna* is an important record; very few *Oligoaeschna* specimens have been obtained from China and none from continental China. The female of *O. petalura* from Hainan is undescribed; *O. pyanan* is known from Hainan.
 - *Boyeria sinensis* has not previously been recorded from Guangxi.

Table 7. Dragonflies recorded at Maoershan Nature Reserve, 21-24 August 1998. Sequence of genera follows Schorr *et al.* (2001a, b).

Species	Remarks
<i>Archineura incarnata</i>	
<i>Matrona basilaris</i>	
<i>Neurobasis chinensis</i>	
<i>Vestalis smaragdina veluta</i>	
<i>Ceriagrion f. fallax</i>	
<i>Anisopleura qingyuanensis</i>	
<i>Bayadera melanopteryx</i>	
<i>Euphaea decorata</i>	
<i>Coeliccia cyanomelas</i>	
<i>Copera ciliata</i>	
<i>Indocnemis orang</i>	
<i>Aeschna petalura</i>	
<i>Anax nigrofasciatus</i>	
<i>Boyeria sinensis</i>	new Guangxi record
<i>Oligoaeschna</i> sp.	new record for mainland China
<i>Periaeschna</i> sp.	
<i>Planaeschna suichangensis</i>	
<i>Anotogaster</i> sp.	
<i>Idionyx carinata</i>	
<i>Somatochlora dido</i>	
<i>Lamelligomphus tutulus</i>	
<i>Leptogomphus perforatus</i>	
<i>Merogomphus paviei</i>	
<i>Orthetrum melanium</i>	
<i>Orthetrum pruinosum</i>	
<i>Orthetrum triangulare</i>	
<i>Pantala flavescens</i>	
<i>Sympetrum eroticum</i>	
<i>Sympetrum darwinianum</i>	
<i>Tramea virginia</i>	
<i>Trithemis aurora</i>	

- Several species recorded, including *Bayadera melanopteryx*, *Indocnemis orang*, *Planaeschna suichangensis*, *Idionyx carinata* and *Somatochlora dido*, are indicators of high stream integrity.

Butterflies

- Seventy species of butterfly were recorded at Maoershan over the period 22-24 August (Table 8). Relatively few of these (14) were near the summit at Bajiaotian.
- Frequent at both high and low altitudes were *Halpe homolea* and *Papilio nephelus*, *Argyrius hyperbius* and *Melanitis leda*. Besides these, the most frequent species included *Eurema hecabe*, *Lethe jalaurlida?*, *Parantica melanea* and *Vanessa indica* at high altitude, and *Telicota colon*, *Graphium chironides*, *Graphium sarpedon*, *Curetis dentata*, *Athyma selenophora*, *Dichorragia nesimachus* and *Precis iphita* at lower elevations.
- Some species (e.g. *Lethe* (cf. *jalaurlida*) sp.) require specialist verification, while others (*Eurema* sp., *Flos* sp.) could not be reliably assigned to a named species.
- Three apparently new provincial records were made on 23 August: *Sasakia charonda*, *Abraximorpha davidii* and *Capila pieridoides*.

Table 8. Butterflies recorded at Maoershan, 22-24 August 1998. Sequence of families follows Bascombe (1995).

Species	Habitat	Notes
<i>Abraximorpha davidii</i>	farmland/shrub/river	new Guangxi record
<i>Capila pieridoides</i>	farmland/shrub/river	new Guangxi record
<i>Choaspes benjaminii</i>	upland forest/shrub	
<i>Erionota torus</i>	farmland/shrub/river	
<i>Halpe homolea</i>	upland forest/shrub farmland/shrub/river forest/shrub/river	
<i>Hasora anura</i>	upland forest/shrub	
<i>Notocrypta curvifascia</i>	farmland/shrub/river forest/shrub/river	
<i>Parnara guttatus</i>	upland forest/shrub	
<i>Tagiades litigiosus</i>	farmland/shrub/river forest/shrub/river	
<i>Telicota colon</i>	farmland/shrub/river forest/shrub/river	
<i>Graphium chironides</i>	farmland/shrub/river forest/shrub/river	
<i>Graphium cloanthus</i>	forest/shrub/river	
<i>Graphium sarpedon</i>	farmland/shrub/river forest/shrub/river	
<i>Papilio bianor</i>	farmland/shrub/river forest/shrub/river	
<i>Papilio helenus</i>	farmland/shrub/river	
<i>Papilio memnon</i>	farmland/shrub/river forest/shrub/river	
<i>Papilio nephelus</i>	upland forest/shrub farmland/shrub/river forest/shrub/river	
<i>Papilio paris</i>	farmland/shrub/river forest/shrub/river	
<i>Papilio protenor</i>	farmland/shrub/river	
<i>Papilio xuthus</i>	farmland/shrub/river	
<i>Catopsilia pyranthe</i>	forest/shrub/river	
<i>Dercas lycorias</i>	farmland/shrub/river forest/shrub/river	
<i>Eurema hecabe</i>	upland forest/shrub farmland/shrub/river	
<i>Eurema</i> sp.	forest/shrub/river	
<i>Hebomoia glaucippe</i>	forest/shrub/river	
<i>Pieris (Talbotia) naganum</i>	farmland/shrub/river	
<i>Abisara echerius</i>	forest/shrub/river	
<i>Acytolepis puspaa</i>	upland forest/shrub	
<i>Curetis dentata</i>	farmland/shrub/river	

Species	Habitat	Notes
<i>Flos</i> sp.	forest/shrub/river	
<i>Heliophorus ila</i>	farmland/shrub/river	
<i>Jamides bochus</i>	farmland/shrub/river	
	forest/shrub/river	
<i>Zemerus flegyas</i>	farmland/shrub/river	
	forest/shrub/river	
<i>Acraea issoria</i>	forest/shrub/river	
<i>Argyreus hyperbius</i>	upland forest/shrub	
	farmland/shrub/river	
<i>Athyma cama</i>	forest/shrub/river	
<i>Athyma jina</i>	forest/shrub/river	
<i>Athyma nefte</i>	farmland/shrub/river	
<i>Athyma ranga</i>	farmland/shrub/river	
	forest/shrub/river	
<i>Athyma selenophora</i>	farmland/shrub/river	
	forest/shrub/river	
<i>Cethosia biblis</i>	farmland/shrub/river	
<i>Charaxes bernardus</i>	farmland/shrub/river	
	forest/shrub/river	
<i>Cyrestis thyodamas</i>	forest/shrub/river	
<i>Danaus genutia</i>	forest/shrub/river	
<i>Dichorragia nesimachus</i>	farmland/shrub/river	
	forest/shrub/river	
<i>Euthalia nara</i>	farmland/shrub/river	
<i>Euthalia niepelti</i>	farmland/shrub/river	
	forest/shrub/river	
<i>Hestina assimilis</i>	farmland/shrub/river	
	forest/shrub/river	
<i>Ideopsis similis</i>	farmland/shrub/river	
<i>Precis (Junonia) iphita</i>	farmland/shrub/river	
	forest/shrub/river	
<i>Precis (Junonia) orithya</i>	forest/shrub/river	
<i>Kallima inachus</i>	forest/shrub/river	
<i>Lethe chandica</i>	farmland/shrub/river	
	forest/shrub/river	
<i>Lethe jalaurida</i> ?	upland forest/shrub	new Guangxi record ?
<i>Lethe lanaris</i>	farmland/shrub/river	
<i>Lethe</i> sp.	upland forest/shrub	
<i>Limenitis (Bhagadatta) austenia</i>	forest/shrub/river	
<i>Limenitis (Parathyma) sulphitia</i>	farmland/shrub/river	
<i>Melanitis leda</i>	upland forest/shrub	
	farmland/shrub/river	
<i>Neptis clinia</i>	farmland/shrub/river	
	forest/shrub/river	
<i>Neptis miah</i>	farmland/shrub/river	
	forest/shrub/river	
<i>Parantica melanea</i>	upland forest/shrub	
<i>Parantica sita</i>	upland forest/shrub	
<i>Penthema adelma</i>	farmland/shrub/river	
	forest/shrub/river	
<i>Sasakia charonda</i>	farmland/shrub/river	new Guangxi record
<i>Stibochiona nicea</i>	farmland/shrub/river	
	forest/shrub/river	
<i>Stichophthalma howqua</i>	farmland/shrub/river	
	forest/shrub/river	
<i>Symbrenthia lilaea</i>	farmland/shrub/river	
	forest/shrub/river	
<i>Vanessa indica</i>	upland forest/shrub	

Species	Habitat	Notes
<i>Ypthima baldus</i>	farmland/shrub/river	

- The butterfly fauna was quite different in the montane and lowland areas.
 - Most of the species recorded in the upland area were common and widespread species. A possible notable exception is the questionable record of *Lethe jalaurida*, for which the closest previous records are northwest Yunnan and Sichuan (Bascombe, 1995).
 - The lowland sites had a fauna characteristic of mixed habitats. A notable (but unexplained) phenomenon was the high abundance of two skippers, *Halpe homolea* and *Telicota colon*.

Summary of flora and fauna

- The zonal vegetation of Maoershan should be subtropical broadleaf evergreen forest, but much of the natural forest on slopes below 1,000 m has been cleared for tree crop plantations. Relatively well-preserved forest could be found only above 1,300 m.
- The present survey recorded rather few plant species of conservation concern, but they included one globally Vulnerable species (*Fagus longipetiolata*), one Near-threatened and Class II Protected species (*Zenia insignis*), and one new record for Guangxi (*Gentiana oligophylla*). With the exception of *Z. insignis*, the species of interest were in montane forest.
- The montane forest near the summit of Maoershan had an exceptionally rich and distinctive avifauna including Grey-winged Blackbird, Crimson-winged Laughingthrush, Red-tailed Laughingthrush, Silver Oriole, Golden Parrotbill, Golden-breasted Fulvetta, Rufous-gorgeted Flycatcher and Yellow-browed Tit. A good population of *Bufo cryptotympanicus*, which is confined to very few localities in Guangdong and Guangxi, also existed in the montane forest. Due to the high altitude other animal groups were relatively species-poor.
- The lowland forests at Maoershan were not surveyed adequately to give a representative summary, but contained a large number of forest birds and a rich stream fauna.

Threats and problems

- Although Maoershan is considered one of the better-managed nature reserve for conserving forest biota, much of the forest at lower altitude has been transformed to secondary shrubland and plantation for tree crops. Relatively good forests are now restricted to higher altitude above 1,300 m or as isolated fragments at lower altitude. In 1998 deforestation was still reportedly occurring at Maoershan, especially where roads were being built to facilitate logging. This is likely to have caused great economic losses in watershed protection (MacKinnon *et al.*, 2001).
- Because of its proximity to Guilin City, Maoershan is a rather popular tourist destination. In recent years, construction of roads, guesthouses and reservoirs to meet the increasing demands for tourists and villagers have also caused considerable damage to some natural forests at Bajiaotian. Litter left by tourists has become a serious problem in the vicinity of the summit and Bajiaotian.
- Medicinal plants (e.g. *Pleione bulbocodioides*) were still being exploited extensively in the natural forest of Maoershan.
- Illegal fishing (through poisoning with lime) was reported at Longtangjiang, Caojiang and Wuguijiang. These activities are detrimental to stream wildlife and those dependent on stream habitats (such as Tawny Fish Owl). Hunting threatens mammals, birds, snakes and other larger animals.

Opportunities and recommendations

- The economic importance of Maoershan as a watershed, supplying agricultural and urban areas

in four river systems, is immense, and has been partially lost. For reasons of economic development and biodiversity conservation, clearing of natural forest for agriculture should be stopped completely.

- Patrolling and enforcement of wildlife protection legislation should be improved, especially in areas of biodiversity importance, including the montane forest and the streams mentioned in this report. Liming of streams in the reserve should be strictly banned.
- To identify other habitats of special importance there is a need for more extensive surveys in the Maoershan area.
- A lot of the hillsides at lower elevations are now covered with low shrubland, and here forest regeneration could be accelerated by planting native trees. Priority should be given to linking up forest patches to establish contiguous forests spanning the altitudinal range of Maoershan. To achieve this, many native tree seedlings will be required and there is probably a need to establish a nursery to produce them. Expert advice could be sought from the regional research institutes (such as Guangxi Institute of Botany, South China Agricultural University, The University of Hong Kong and KFBG) regarding reforestation techniques and in managing native tree nurseries. Where plantations are no longer economically viable, or are in areas of great conservation importance, they should also be replanted with native tree species to restore the habitat for wildlife.
- The upper part of the reserve is visited by a large number of tourists because it is the highest peak in South China and has spectacular scenery. Some facilities for tourists, such as simple accommodation, access road, nature trails, are already in place. Ecotourism, to promote awareness of nature without compromising the ecological value of this unique habitat, should be more carefully pursued, with the help of available guidelines (e.g. Ceballos-Lascuráin, 1996). Simple visitors' facilities (such as educational posters and leaflets, and litterbins) should be provided.
- Capacity building should be provided for the reserve staff, to help them fulfill their conservation functions and to help control the damaging impacts of tourism and other pressures.

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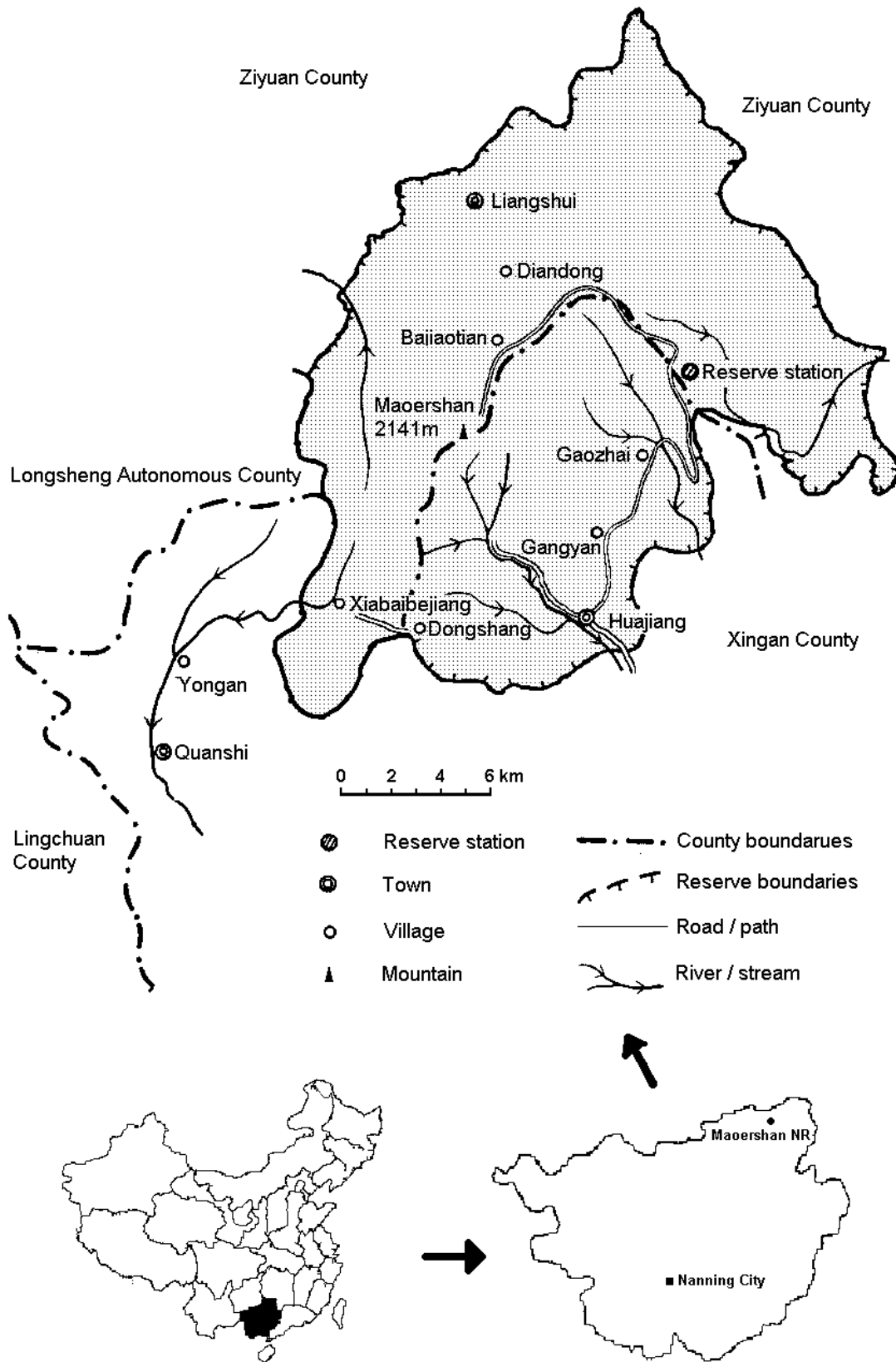


Figure 1. Map showing location of Maershan Nature Reserve, Northeast Guangxi, China.