



**Report of a Rapid Biodiversity Assessment at  
Jiuwanshan Headwater Forest Nature Reserve,  
North Guangxi, China, 24 to 27 July 1998**

**Kadoorie Farm and Botanic Garden**  
in collaboration with  
**Guangxi Forestry Department**  
**Guangxi Institute of Botany**  
**Guangxi Normal University**  
**South China Normal University**  
**Xinyang Teachers' College**

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# Report of a Rapid Biodiversity Assessment at Jiuwanshan Headwater Forest Nature Reserve, North Guangxi, China, 24 to 27 July 1998

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## Background

The present report details the findings of a trip to the north of Guangxi Zhuang Autonomous Region 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 a Rapid Biodiversity Assessment at Jiuwanshan Headwater Forest Nature Reserve, North Guangxi, China, 24 to 27 July 1998

## Objectives

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

## Methods

From 17 to 23 July, a team from KFBG (BH, ML, JRF, LKS, GTR and GS), Guangxi Forestry Department (XZH), Guangxi Institute of Botany (WFN, WHQ, WYG), Guangxi Normal University (LLR), Xinyang Teachers' College (LHJ) and South China Normal University (LPK) surveyed Mulun Nature Reserve in Huangjiang County (Kadoorie Farm and Botanic Garden, 2002). On 24 July the team travelled from Huangjiang to Sanfang Town (~200m asl), in Rongshui County. Here they met the manager of the Jiuwanshan Forest Farm, which manages the Jiuwanshan Nature Reserve.

On 24 to 27 July, they conducted rapid biodiversity survey at Jiuwanshan Nature Reserve.

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 to identify them. The status of large and medium-sized mammals (excluding Insectivora, Chiroptera and Muridae) was assessed largely on the basis of interviews with Mr. Tang, an official of the Forest Farm, and two farmers with reference to colour photographs. For these purposes a list of South China mammals was compiled from various sources including Guangdong Forestry Department & South China Institute of Endangered Animals (1987), Corbet & Hill (1992) and Zhang Y. *et al.* (1997). Any other evidence such as mammal tracks, claw marks and scats, was also considered.

Plant records in the surveys were made or verified by WFN and edited by NSC, except in the case of orchids, which were made by GS. Mammal records were made by ML, JRF or BH. Records of birds were made or verified by LKS, reptiles and amphibians by ML, fish by BC, ants by JRF, butterflies by GTR and dragonflies by GTR and KW.

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. (1991); Anon. (1996-2000); Anon. (2001); The Plant Names Project (2001);
- Orchids (Angiospermae: Orchidaceae): Chen (1999); Lang (1999); Tsi (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); Yue *et al.* (2000);
- 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 (2001). Certain taxa, including orchids, reptiles, amphibians, fish and invertebrates, have yet to be properly assessed for global status. For orchids, conservation status in China is based on Wang *et al.* (in press). 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**

Jiuwanshan Headwater Forest Nature Reserve is in Rongshui, Luocheng and Huanjiang counties, North Guangxi, at 108°27'-108°59' E, 25°10'-25°25' N. The area has been listed as 1,204 km<sup>2</sup> (Li Z. & Qiu, 1993) and 964 km<sup>2</sup> (Forestry Department of Guangxi Zhuang Autonomous Region, 1993; MacKinnon *et al.*, 1996; Zhang W., 1998).

The region has a subtropical climate and is affected by monsoonal circulation year-round; mean annual temperature is 12-17.1°C and mean annual rainfall 1,600-2,100mm. The geology consists mainly of volcanic and igneous rock (Lu & Xie, 1993). The landscape, lying between the Yunnan-Guizhou Plateau and the Nanling range (Li L. & Qin, 1993), is mountainous, with an altitude range from 170 to 1,683m. The catchments drain south and east towards the Liujiang.

The reserve was designated a provincial Headwater Forest Nature Reserve in 1982. It is listed as a Provincial-level Forest Ecosystem Nature Reserve (Zhang W., 1998), and is under the management of the provincial Forestry Department. According to the officials of the Nature Reserve Management Office, in 1998 there were seven forestry police officers to patrol and curb illegal hunting and logging. The nature reserve did not have its own management station, but shared office space with the Jiuwanshan Forest Farm. The forest farm had a total of 100 staff, who both protected the forest and utilised forest resources. The nature reserve was not zoned, and the application of the term “core area” was not consistent. The forest plantations in the reserve were managed as timber forests while the natural forests were managed as headwater forests.

### **Vegetation**

The vegetation has been described by Long & Li L. (1993). The zonal vegetation of the region is subtropical broadleaf evergreen forest. At higher altitude, this vegetation gradually gives way to deciduous broadleaf forest and a mixture of montane dwarf forest and shrub/grass. The vegetation is dominated by Fagaceae, Lauraceae, Theaceae, Magnoliaceae, Rosaceae and Poaceae. Major dominant species include *Castanopsis fargesii*, *C. fabri*, *Fagus longipetiolata*, *Lithocarpus fenestrata*, *L. hancei*, *L. henryi*, *Schima argentea*, *S. superba*, *Machilus thunbergii*, *M. leptophylla*, *Manglietia chingii*, *Acer davidii*, *Carpinus pubescens*, *Betula luminifera*, *Brassaiopsis glomerulata* and *Rhododendron* spp. In some areas of mixed coniferous and broadleaf forest, *Fokienia hodginsii*, *Tsuga longibracteata* and *Pinus fenzeliana* are the dominant species.

A considerable proportion of the nature reserve, especially the lowland broadleaf evergreen forest, has been transformed to agricultural land, plantations of China Fir (*Cunninghamia lanceolata*), Pine (*Pinus massoniana*) or other tree crops, or secondary shrubland. In 1998 good forest could be found in the Shuanghekoushan area, but there was still some logging of native trees.

## Results

### Flora

Earlier surveys of the Jiuwanshan area from 1928 to 1990 recorded 2,715 species of native vascular plants in 215 families (Li L. & Qin, 1993). The present brief survey, comprising two and a half days in adverse weather, recorded 163 species. These included seven fern species in seven families, one gymnosperm, and 155 angiosperm species in 62 families. Orchids found are listed in Table 2; all other vascular plants are shown in Table 1.

This survey (Table 1) produced two records new for the Jiuwanshan area, namely *Machilus versicolora* and *Neolitsea confertifolia* (cf. Chapter VI in Li Z. & Qiu, 1993).

Among the species recorded in the survey, *Rhoiptelea chiliantha* is listed as Vulnerable globally, whereas *Michelia odora* (*Tsoongiodendron odorum* Chun) and *Phoebe bournei* are listed as Lower Risk (Near-threatened) globally. *Rhoiptelea chiliantha* and *P. bournei* are also under Class II protection nationally. *Rhoiptelea chiliantha* is restricted to South Guizhou, Southeast Yunnan, and Guangxi. In addition, *Alsophila spinulosa* and *Cibotium barometz* are also under Class II protection nationally. Several other species recorded are endemic to Guangxi or have a restricted distribution in South China. They include *Asarum sagittarioides* (endemic to Guangxi), *Fargesia cuspidata* (North Guangxi), *Zanthoxylum glomeratum* (North Guangxi and South Guizhou) and *Camellia polyodonta* (Guangxi and West Hunan).

**Table 1.** Vascular plant species recorded in Jiuwanshan Headwater Forest Nature Reserve on 25-27 July 1998. Not including Orchidaceae (see Table 2). Species which are under National Protection (Class I or II) (State Forestry Administration & Ministry of Agriculture, 1999), globally Threatened or Lower Risk (Near-threatened) (IUCN Species Survival Commission, 2001), or endemic are indicated.

Family	Species name	Remarks
<b>PTERIDOPHYTA</b>		
Blechnaceae	<i>Blechnum orientale</i> L.	
Cyatheaceae	<i>Alsophila spinulosa</i> (Wall. ex Hook.) R.M. Tryon	Protected II
Dicksoniaceae	<i>Cibotium barometz</i> (L.) J. Sm.	Protected II
Gleicheniaceae	<i>Diplazium chinensis</i> (Rosenst.) DeVol	
Marattiaceae	<i>Angiopteris fokiensis</i> Hieron.	
Osmundaceae	<i>Osmunda japonica</i> Thunb.	
Pteridiaceae	<i>Pteridium aquilinum</i> (L.) Kuhn var. <i>latiusculum</i> (Desv.) Underw. ex A. Heller	
<b>GYMNOSPERMAE</b>		
Gnetaceae	<i>Gnetum montanum</i> Markgr.	
<b>ANGIOSPERMAE</b>		
<b>Dicotyledonae</b>		
Aceraceae	<i>Acer fabri</i> Hance	
Actinidiaceae	<i>Actinidia callosa</i> Lindl. var. <i>henryi</i> Maxim. <i>Actinidia chinensis</i> Planch. <i>Actinidia eriantha</i> Benth.	
Anacardiaceae	<i>Toxicodendron vernicifluum</i> (Stokes) F.A. Barkley	
Annonaceae	<i>Fissistigma glaucescens</i> (Hance) Merr. <i>Fissistigma oldhamii</i> (Hemsl.) Merr.	
Aquifoliaceae	<i>Ilex chingiana</i> Hu & T. Tang <i>Ilex rotunda</i> Thunb.	
Araliaceae	<i>Brassaiaopsis glomerulata</i> (Blume) Regel <i>Dendropanax hainanensis</i> (Merr. & Chun) Merr. & Chun <i>Schefflera delavayi</i> (Franch.) Harms <i>Schefflera minutistellata</i> Merr. ex H.L. Li	
Aristolochiaceae	<i>Asarum caudigerum</i> Hance	

Family	Species name	Remarks
	<i>Asarum sagittarioides</i> C.F. Liang	endemic to Guangxi
Begoniaceae	<i>Begonia pedatifida</i> H. Lévl.	
Betulaceae	<i>Betula luminifera</i> H.J.P. Winkl.	
Boraginaceae	<i>Ehretia acuminata</i> (DC.) R. Br.	
Bretschneideraceae	<i>Bretschneidera sinensis</i> Hemsl.	
Capparaceae	<i>Capparis urophylla</i> F. Chun	
Caprifoliaceae	<i>Viburnum lutescens</i> Blume	
Celastraceae	<i>Celastrus orbiculatus</i> Thunb.	
Chloranthaceae	<i>Sarcandra glabra</i> (Thunb.) Nakai	
Clethraceae	<i>Clethra bodinieri</i> H. Lévl.	
Clusiaceae	<i>Garcinia multiflora</i> Champ. ex Benth. <i>Garcinia oblongifolia</i> Champ. ex Benth.	
Combretaceae	<i>Combretum alfredii</i> Hance	
Cucurbitaceae	<i>Gynostemma pentaphylla</i> (Thunb.) Makino	
Daphniphyllaceae	<i>Daphniphyllum longistylum</i> S.S. Chien	
Ebenaceae	<i>Diospyros morrisiana</i> Hance ex. Walpers	
Elaeocarpaceae	<i>Elaeocarpus duclouxii</i> Gagnep.	
Ericaceae	<i>Gaultheria leucocarpa</i> Blume var. <i>crenulata</i> (Kurz) T.Z. Hsu	
Euphorbiaceae	<i>Mallotus barbatus</i> (Wall.) Müll. Arg. <i>Mallotus paniculatus</i> (Lam.) Müll. Arg. <i>Mallotus philippinensis</i> (Lam.) Müll. Arg.	
Fagaceae	<i>Castanopsis carlesii</i> (Hemsl.) Hayata <i>Castanopsis eyrei</i> (Champ. ex Benth.) Tutcher <i>Castanopsis fissa</i> (Champ. ex Benth.) Rehder et E. H. Wilson <i>Castanopsis fordii</i> Hance <i>Castanopsis hystrix</i> Miq. <i>Castanopsis tibetana</i> Hance <i>Fagus longipetiolata</i> Seemen <i>Lithocarpus calophyllus</i> Chun <i>Lithocarpus corneus</i> (Lour.) Rehder <i>Lithocarpus litseifolius</i> (Hance) Chun	
Flacourtiaceae	<i>Idesia polycarpa</i> Maxim.	
Gesneriaceae	<i>Lysionotus pauciflorus</i> Maxim.	
Hamamelidaceae	<i>Altingia chinensis</i> (Champ. ex Benth.) Oliv. ex Hance <i>Corylopsis multiflora</i> Hance <i>Exbucklandia populnea</i> (R. Brown) R. W. Brown <i>Rhodoleia parvipetala</i> Tong	
Illiciaceae	<i>Illicium dunnianum</i> Tutcher	
Juglandaceae	<i>Engelhardtia roxburghiana</i> Wall.	
Lamiaceae	<i>Gomphostemma lucidum</i> Wall. ex Benth.	
Lardizabalaceae	<i>Stauntonia chinensis</i> DC.	
Lauraceae	<i>Actinodaphne cupularis</i> Gamble <i>Beilschmiedia tsangii</i> Merr. <i>Cinnamomum appelianum</i> Schewe <i>Cinnamomum austrosinense</i> H.T. Chang <i>Cinnamomum wilsonii</i> Gamble <i>Cryptocarya chinensis</i> (Hance) Hemsl. <i>Lindera communis</i> Hemsl. <i>Lindera kwangtungensis</i> (H. Liu) C.K. Allen <i>Litsea cubeba</i> (Lour.) Pers. <i>Litsea elongata</i> (Nees) Benth. et Hook. f. <i>Machilus decursinervis</i> Chun <i>Machilus ichangensis</i> Rehder & E.H. Wilson <i>Machilus leptophylla</i> Hand.-Mazz. <i>Machilus litseifolia</i> S. K. Lee <i>Machilus rehderi</i> C.K. Allen <i>Machilus velutina</i> Champ. ex Benth. <i>Machilus versicolora</i> S.K. Lee & F.N. Wei <i>Neolitsea chuui</i> Merr. <i>Neolitsea confertifolia</i> (Hemsl.) Merr. <i>Neolitsea levinei</i> Merr.	new record new record

Family	Species name	Remarks
	<i>Phoebe bournei</i> (Hemsl.) Y.C. Yang	Lower Risk (nt), Protected II
Magnoliaceae	<i>Sassafras tzumu</i> (Hemsl.) Hemsl. <i>Michelia maudiae</i> Dunn <i>Michelia platypetala</i> Hand.-Mazz <i>Michelia odora</i> (Chun) Nooteb. & B. L. Chen	
Melastomataceae	<i>Blastus cochinchinensis</i> Lour. <i>Fordiophyton fordii</i> (Oliv.) Krasser <i>Phyllagathis cavaleriei</i> (H. Lév. & Vaniot) Guillaumin	
Menispermaceae	<i>Stephania cephalantha</i> Hayata <i>Tinospora sagittata</i> (Oliv.) Gagnep.	
Mimosaceae	<i>Pithecellobium lucidium</i> Benth.	
Moraceae	<i>Artocarpus styracifolius</i> Pierre <i>Ficus tsiangii</i> Merr. ex Corner	
Myrsinaceae	<i>Embelia parviflora</i> Wall. ex A. DC.	
Myrtaceae	<i>Syzygium buxifolium</i> Hook. et Arn.	
Olacaceae	<i>Schoepfia jasminodora</i> Siebold & Zucc.	
Papilionaceae	<i>Dalbergia hancei</i> Benth.	
Pentaphragmataceae	<i>Pentaphragma euryoides</i> Gardner & Champ.	
Piperaceae	<i>Piper boehmeriifolium</i> (Miq.) C. DC. <i>Piper kadsura</i> (Choisy) Ohwi	
Pittosporaceae	<i>Pittosporum perryanum</i> Gowda	
Proteaceae	<i>Helicia cochinchinensis</i> Lour. <i>Helicia reticulata</i> W. T. Wang	
Rhoipteleaceae	<i>Rhoiptelea chiliantha</i> Diels & Hand.-Mazz.	Protected II, Vulnerable
Rosaceae	<i>Eriobotrya fragrans</i> Champ. ex Benth.	
Rubiaceae	<i>Lasianthus henryi</i> Hutch.	
Rutaceae	<i>Zanthoxylum glomeratum</i> C.C. Huang	endemic to N. Guangxi & S. Guizhou
Sargentodoxaceae	<i>Sargentodoxa cuneata</i> (Oliv.) Rehder & E.H. Wilson	
Schisandraceae	<i>Kadsura longipedunculata</i> Finet & Gagnep. <i>Schisandra henryi</i> C.B. Clarke	
Scrophulariaceae	<i>Paulownia kawakamii</i> Ito	
Sterculiaceae	<i>Reevesia pubescens</i> Mast.	
Styracaceae	<i>Alniphyllum fortunei</i> (Hemsl.) Makino <i>Huodendron biaristatum</i> (W.W. Sm.) Rehder <i>Styrax suberifolius</i> Hook. et Arn.	
Symplocaceae	<i>Symplocos anomala</i> Brand	
Theaceae	<i>Adinandra glischroloma</i> Hand.-Mazz. <i>Adinandra nitida</i> Merr. ex H.L. Li <i>Camellia caudata</i> Wall. <i>Camellia polyodonta</i> How ex Hu	endemic to Guangxi & W. Hunan
	<i>Camellia rhytidocarpa</i> H.T. Chang & S.Y. Liang <i>Cleyera japonica</i> Thunb. <i>Eurya acuminatissima</i> Merr. & Chun <i>Eurya tetragonoclada</i> Merr. & Chun <i>Hartia cordifolia</i> H.L. Li <i>Schima superba</i> Gardn. et Champ. <i>Ternstroemia gymnanthera</i> (Wight & Arn.) Bedd.	
Urticaceae	<i>Debregeasia squamata</i> King ex Hook. f. <i>Oreochide obovata</i> (C.H. Wright) Merr.	
Verbenaceae	<i>Clerodendrum mandarinorum</i> Diels <i>Vitex quinata</i> (Lour.) F.N. Williams	
<b>Monocotyledonae</b>		
Musaceae	<i>Musa balbisiana</i> Colla	
Poaceae	<i>Fargesia cuspidata</i> (Keng) Z.P. Wang & G.H. Ye	endemic to N. Guangxi



Surveys at Jiuwanshan from 1928 to 1990 had recorded 79 orchid species in 39 genera (Li Z. & Qiu, 1993). In the present rapid survey, 27 orchid species in 14 genera were found in the reserve (Table 2). Some species (*Anoectochilus* sp., *Calanthe* sp., *Cymbidium* spp. and *Dendrobium* sp.) could not be reliably assigned to a named species as they were not in flower; another terrestrial species, found at Laliushan could not be identified to genus, and is excluded here.

This survey (Table 2) produced a new record for China (*Mischobulbum* sp.) and five new records for the reserve (*Anoectochilus* sp., *Bulbophyllum levinei*, *B. reptans*, *Dendrobium nobile* and *Goodyera viridiflora*).

**Table 2.** Orchids recorded in Jiuwanshan Headwater Forest Nature Reserve, Guangxi, 25 to 27 July 1998. #Species newly recorded in the reserve. \* Species collected from the reserve and transplanted to the garden of Jiuwanshan Forest Farm Station.

Scientific Name	Habitat	Remarks
<i>Anoectochilus roxburghii</i> (Wall.) Lindl.	on forest floor	terrestrial; Endangered
# <i>Anoectochilus</i> sp.	on bamboo floor	terrestrial
<i>Arundina graminifolia</i> (D. Don.) Hockr.	on exposed grassy slope	terrestrial
# <i>Bulbophyllum levinei</i> Schltr.	on tree trunk	epiphytic
# <i>Bulbophyllum reptans</i> (Lindl.) Lindl.	on rock and tree trunk beside stream	epiphytic
<i>Calanthe masuca</i> (D. Don) Lindl.	on forest floor beside stream	terrestrial
<i>Calanthe triplicata</i> (Willemet) Ames	on forest floor beside stream	terrestrial
<i>Calanthe</i> sp.	on ground in disturbed grassy area	terrestrial
<i>Coelogyne fimbriata</i> Lindl.	on rock of bamboo floor	epiphytic
<i>Cymbidium ensifolium</i> (L.) Sw. *	on forest floor	terrestrial; Endangered
<i>Cymbidium kanran</i> Makino	on forest floor	terrestrial; Endangered
<i>Cymbidium lancifolium</i> Hook.	on bamboo floor and forest floor with humus	terrestrial
<i>Cymbidium sinense</i> (Andr.) Willd. *	on forest floor	terrestrial; Endangered
<i>Cymbidium</i> sp.1 (cf. <i>floribundum</i> )	on tree trunk	epiphytic
<i>Cymbidium</i> sp.2	on tree trunk	epiphytic
<i>Cymbidium</i> sp.3	on forest floor	terrestrial
<i>Dendrobium henryi</i> Schltr.	on tree trunk and rock in forest beside stream	epiphytic
# <i>Dendrobium nobile</i> Lindl.	on tree trunk in sparse & disturbed forest	epiphytic; Vulnerable
<i>Dendrobium</i> (cf. <i>williamsonii</i> ) sp.	on tree trunk	epiphytic
# <i>Goodyera viridiflora</i> (Blume) Blume	on low shrubland floor beside path	terrestrial
<i>Habenaria rhodocheila</i> Hance	on rock covered with rich humus	terrestrial
<i>Liparis nervosa</i> (Thunb. ex Murray) Lindl.	on forest floor	terrestrial
<i>Mischobulbum macranthum</i> (Hook. f.) Rolfe	beside stream	terrestrial
# <i>Mischobulbum</i> sp.	on forest floor	terrestrial; new to China
<i>Phaius flavus</i> (Blume) Lindl. *	on forest floor with rich humus	terrestrial
<i>Pholidota cantonensis</i> Rolfe	on tree trunk in sparse and disturbed forest	epiphytic; endemic to southern china (south of Yangtze)
<i>Pholidota chinensis</i> Lindl.	on rock and tree trunk in forest,	epiphytic

*Anoectochilus roxburghii*, *Cymbidium ensifolium*, *C. karan* and *C. sinense* are considered Endangered in China. *Dendrobium nobile* is Vulnerable. The status of the unidentified species is not known, but some may be of conservation concern. National protected status of orchids is still under review, but all recorded species are listed in CITES Appendix II.

Terrestrial orchids comprised 61% of species recorded in past surveys (including the saprophytes *Galeola lindleyana* and *Gastrodia elata*) and 64% of those in the present survey, and most of

them are forest-dependent species, suggesting quite good forest condition. Forest at the sites visited on 25 and 26 July had been damaged by logging and agriculture. Forest visited on 27 July, however, was less damaged, and forest-dependent terrestrial species (such as *Anoetochilus roxburghii* and *Calanthe masuca*) were still quite frequent in this area. The forest fern *Angiopteris fokiensis* was also common at this site.

### Mammals

A water shrew, believed to be Himalayan Water Shrew *Chimarrogale himalayica*, was seen foraging in a small stream at Jiuwanshan on the night of 27 July. A Harlequin Bat *Scotomanes ornatus*, was found resting on a low shrub on 25 July. No previous mammal survey is known to have been conducted at Jiuwanshan. Mammals reported to occur are shown in Table 3.

**Table 3.** The status of mammals (excluding Insectivora, Chiroptera and Muridae) at Jiuwanshan Headwater Forest Nature Reserve, Guangxi, based on interviewing two farmers and Mr. Tang, an official of the forest farm. Abundance: “-” = none, “+” = few, “++” = many, “+++” = very many. Nomenclature and sequence follows Wilson & Cole (2000).

Scientific name	English name	Farmers	Mr. Tang	Probable status
<i>Tupaia belangeri</i>	Northern Tree Shrew	+++	+++	present
<i>Macaca arctoides</i>	Stump-tailed Macaque	-	+++	insecure or extirpated
<i>Macaca assamensis</i>	Assam Macaque	-	+++	insecure or extirpated
<i>Macaca mulatta</i>	Rhesus Monkey	+++	+++	present
<i>Cuon alpinus</i>	Dhole	+	+++	insecure
<i>Catopuma temminckii</i>	Asiatic Golden Cat	-	+++	insecure
<i>Prionailurus bengalensis</i>	Leopard Cat	+++	+++	present
<i>Herpestes javanicus</i>	Javan Mongoose	+++	-	present
<i>Amblonyx cinereus</i>	Oriental Small-clawed Otter	-	+	insecure
<i>Lutra lutra</i>	Eurasian Otter	-	+++	insecure
<i>Melogale moschata</i>	Chinese Ferret-badger	+++	+++	present
<i>Martes flavigula</i>	Yellow-throated Marten	-	+++	present
<i>Mustela kathiah</i>	Yellow-bellied Weasel	+++	+++	present
<i>Mustela sibirica</i>	Siberian Weasel	-	+++	present
<i>Ursus thibetanus</i>	Asiatic Black Bear	-	+++	insecure or extirpated
<i>Paguma larvata</i>	Masked Palm Civet	+++	+++	present
<i>Paradoxurus hermaphroditus</i>	Asian Palm Civet	-	+	insecure
<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
<i>Hydropotes inermis</i>	Chinese Water Deer	+	-	insecure or extirpated
<i>Muntiacus muntjak</i>	Indian Muntjac	-	+++	insecure
<i>Muntiacus reevesii</i>	Reeves's Muntjac	-	+++	insecure
<i>Naemorhedus caudatus</i> ( <i>N. goral arnouxianus</i> )	Chinese Goral	-	+++	insecure
<i>Manis pentadactyla</i>	Chinese Pangolin	+++	+++	present
<i>Belomys pearsonii</i>	Hairy-footed Flying Squirrel	+	-	insecure
<i>Callosciurus erythraeus</i>	Pallas's Squirrel	+++	+++	present
<i>Dremomys pyrrhomerus</i>	Red-hipped Squirrel	-	+	insecure
<i>Ratufa bicolor</i>	Black Giant Squirrel	-	+	insecure
<i>Tamiops maritimus</i> (or <i>T. swinhoei</i> )	Maritime Striped Squirrel (or Swinhoe's Striped Squirrel)	+++	+++	present
<i>Hystrix brachyura</i>	Malayan Porcupine	+++	+++	present
<i>Lepus sinensis</i>	Chinese Hare	+++	+++	present

Of the species reported in this survey, Assam Macaque *Macaca assamensis* is globally Vulnerable and Class I protected in China, while Stump-tailed Macaque *Macaca arctoides*, Dhole *Cuon alpinus*, Asiatic Black Bear *Ursus thibetanus* and Chinese Goral *Naemorhedus caudatus* are globally Vulnerable and Class II protected. Rhesus Monkey *Macaca mulatta*, Asiatic Golden

Cat *Catopuma temminckii*, Oriental Small-clawed Otter *Amblonyx cinereus*, Chinese Forest Musk Deer *Moschus berezovskii*, Chinese Water Deer *Hydropotes inermis* and Chinese Pangolin *Manis pentadactyla* are globally Near-threatened and Class II protected; Yellow-throated Marten *Martes flavigula*, Eurasian Otter *Lutra lutra*, Small Indian Civet *Viverricula indica* and Sambar *Cervus unicorn* are also Class II protected.

### Birds

Twenty-three species of bird were recorded in Jiuwanshan Nature Reserve during this survey, of which 21 species are new records (Table 4). The most frequently encountered species were Chestnut Bulbul *Hemixos castanonotus* and Grey-cheeked Fulvetta *Alcippe morrisonia*.

**Table 4.** Birds recorded in Jiuwanshan Headwater Forest Nature Reserve, Guangxi, 24-27 July 1998. Sequence follows Clements (2000). # New record for the reserve (not recorded by Lu & Xie, 1993).

Scientific name	English name
<i>Spilornis cheela</i> #	Crested Serpent Eagle
<i>Spizaetus nipalensis</i> #	Mountain Hawk Eagle
<i>Megalaima virens</i> #	Great Barbet
<i>Megalaima oorti</i> #	Black-browed Barbet
<i>Celeus brachyurus</i> #	Rufous Woodpecker
<i>Pericrocotus roseus</i> #	Rosy Minivet
<i>Pericrocotus solaris</i> #	Grey-chinned Minivet
<i>Spizixos semitorques</i> #	Collared Finchbill
<i>Hemixos castanonotus</i> #	Chestnut Bulbul
<i>Hypsipetes mcclllandii</i> #	Mountain Bulbul
<i>Cinclus pallasii</i> #	Brown Dipper
<i>Rhyacornis fuliginosus</i> #	Plumbeous Water Redstart
<i>Enicurus scouleri</i> #	Little Forktail
<i>Enicurus schistaceus</i> #	Slaty-backed Forktail
<i>Enicurus leschenaulti</i> #	White-crowned Forktail
<i>Garrulax canorus</i>	Hwamei
<i>Alcippe morrisonia</i> #	Grey-cheeked Fulvetta
<i>Yuhina castaniceps</i> #	Striated Yuhina
<i>Yuhina zantholeuca</i> #	White-bellied Yuhina
<i>Parus major</i> #	Great Tit
<i>Urocissa erythrorhyncha</i>	Red-billed Blue Magpie
<i>Dendrocitta formosae</i> #	Grey Treepie
<i>Lonchura striata</i> #	White-rumped Munia

The presence of Mountain Hawk Eagle, Black-browed Barbet, Great Barbet, Rufous Woodpecker, Mountain Bulbul, Rosy Minivet and Grey-chinned Minivet indicate the presence of healthy natural forest at Jiuwanshan. The forest-fringed streams provide a variety of ideal habitats for forest stream birds such as Brown Dipper, Plumbeous Water Redstart and the three species of forktail.

The following species were not recorded during this survey, but reported by Lu & Xie (1993): Little Grebe *Tachybaptus ruficollis*, Little Egret *Egretta garzetta*, Black Kite *Milvus migrans*, Chinese Francolin *Francolinus pintadeanus*, Japanese Quail *Coturnix japonica*, Chinese Bamboo Partridge *Bambusicola thoracica*, Silver Pheasant *Lophura nycthemera*, Mrs Hume's Pheasant *Syrnaticus humiae*, Common Pheasant *Phasianus colchicus*, Golden Pheasant *Chrysolophus pictus*, Brown Crake *Amaurornis akool*, Oriental Turtle Dove *Streptopelia orientalis*, Spotted Dove *Streptopelia chinensis*, Common Cuckoo *Cuculus canorus*, Greater Coucal *Centropus chinensis*, Lesser Coucal *Centropus bengalensis*, Eurasian Eagle Owl *Bubo bubo*, Asian Barred Owllet *Glaucidium cuculoides*, Common Kingfisher *Alcedo atthis*, White-breasted Kingfisher *Halcyon smyrnensis*, Black-capped Kingfisher *Halcyon pileata*, Eurasian Hoopoe *Upupa epops*, Grey-capped Pygmy Woodpecker *Dendrocopos canicapillus*, Great Spotted Woodpecker

*Dendrocopos major*, Barn Swallow *Hirundo rustica*, Red-rumped Swallow *Hirundo daurica*, Yellow Wagtail *Motacilla flava*, White Wagtail *Motacilla alba*, Red-whiskered Bulbul *Pycnonotus jocosus*, Light-vented Bulbul *Pycnonotus sinensis*, Sooty-headed Bulbul *Pycnonotus aurigaster*, Black-naped Oriole *Oriolus chinensis*, Long-tailed Shrike *Lanius schach*, Black Drongo *Dicrurus macrocercus*, Ashy Drongo *Dicrurus leucophaeus*, Black-billed Magpie *Pica pica*, Large-billed Crow *Corvus macrorhynchus*, Crested Myna *Acridotheres cristatellus*, Russet Sparrow *Passer rutilans*, Eurasian Tree Sparrow *Passer montanus*, Grey-capped Greenfinch *Carduelis sinica*, Brambling *Fringilla montifringilla* and Yellow-breasted Bunting *Emberiza aureola*. These were indirect reports based on surveys of forestry/agricultural pests, medicinal animals, trade records and local subsistence uses, and should be treated with caution. Some are winter visitors or migrants, and unlikely to have been in the area during the present brief survey in July.

Mrs Hume's Pheasant is globally Vulnerable, and a Class I Protected species in China, and at the eastern edge of its range in North Guangxi. Black Kite, Crested Serpent Eagle, Mountain Hawk Eagle, Silver Pheasant, Golden Pheasant, Greater Coucal, Lesser Coucal, Eurasian Eagle Owl, Asian Barred Owl are Class II Protected species in China.

### **Reptiles and Amphibians**

Sixteen species of amphibians, one species of terrapin, two species of lizard and four species of snake were recorded during this rapid survey (Table 5). The most frequently encountered species was *Rana limnocharis*. *Megophrys* tadpoles were found at Jiuwanshan but the identity could not be worked out due to the lack of adult specimens.

**Table 5.** Amphibians and reptiles of Jiuwanshan Headwater Forest Nature Reserve and neighbouring area, 24-27 July 1998. Sequence follows Zhao E.-M. & Adler (1993).

<b>Species</b>	<b>Habitat</b>	<b>Records</b>
<b>AMPHIBIA</b>		
<i>Megophrys</i> sp.	stream	tadpoles
<i>Amolops ricketti</i>	stream	✓
<i>Paa shini</i>	stream	✓, tadpoles
<i>Paa spinosa</i> ?	stream	tadpoles
<i>Rana guentheri</i>	paddy field	✓
<i>Rana latouchii</i>	stream	tadpoles
<i>Rana limnocharis</i>	forest edge	✓
	plantation	✓
	paddy field	✓
<i>Rana livida</i>	stream	✓
	catchwater	✓
	forest	✓
<i>Rana rugulosa</i>	paddy field	✓
<i>Rana schmackeri</i>	forest	✓
<i>Rana taipehensis</i>	paddy field	✓
<i>Rana versabilis</i>	stream	✓
<i>Polypedates megacephalus</i>	village	✓
	plantation	✓
	paddy field	✓
<i>Microhyla butleri</i>	paddy field	✓
<i>Microhyla heymonsi</i>	pool	✓
	paddy field	tadpoles
<i>Microhyla ornata</i>	paddy field	✓

Species	Habitat	Records
<b>REPTILIA</b>		
<i>Geoemyda spengleri</i>	forest	✓
<i>Acanthosaura lepidogaster</i>	forest	✓
<i>Sphenomorphus incognitus</i>	stream	✓
<i>Cyclophiops major</i>	forest edge	✓
<i>Bungarus multicinctus</i>	paddy field	✓
<i>Trimeresurus mucrosquamatus</i>	shrubland	✓
<i>Trimeresurus stejnegeri</i>	forest edge	✓

In addition, the staff of the reserve said that *Andrias davidianus* (Giant Salamander), occurs in the streams at Jiuwanshan but due to over-collecting, it has become rare.

*Geoemyda spengleri* is a globally Endangered species, with a rather restricted distribution. *Andrias davidianus* is Data Deficient globally, and Class II Protected in China. *Paa shini* is also globally restricted. The presence of many stream amphibians (e.g. *Andrias davidianus*, *Amolops ricketti*, *Paa shini*, *Paa spinosa* and *Rana schmackeri*) indicates that the streams in Jiuwanshan are relatively intact ecologically. *Geoemyda spengleri*, *Acanthosaura lepidogaster* and *Trimeresurus stejnegeri* are found only in well-established forests.

### **Fish**

Only watercourses (including the paddy fields) at the edge of the reserve were surveyed and the results may not be representative of the reserve interior. Nevertheless, a total of 21 freshwater fish species were recorded from Jiuwanshan, including specimens of five species bought from local residents (Table 6). Eighteen species were not recorded by Lu & Xie (1993), and are possibly new records for the reserve. Combining these with the records of Lu & Xie (1993), Jiuwanshan has at least 27 species of freshwater fish. Some of the species await specialist verification. The most frequently encountered species was *Opsariichthys bidens*.

**Table 6.** Freshwater fish species recorded in the Jiuwanshan area, 24-27 July 1998. Sequence of genera follows Nelson (1994). # Nomenclature follows Yue *et al.* (2000).

Species	Observed	Purchased from villagers
<i>Zacco platypus</i>	✓	
<i>Opsariichthys bidens</i>	✓	
<i>Hemiculterella sauvagei</i>	✓	
<i>Capoeta semifasciolata</i>	✓	
<i>Acrossocheilus beijiangensis</i> #	✓	
<i>Acrossocheilus parallens</i>	✓	
<i>Hemibarbus umbrifer</i>	✓	
<i>Pseudorasbora parva</i>	✓	
<i>Cyprinus carpio</i> #		✓
<i>Micronemacheilus pulcher</i>	✓	
<i>Misgurnus anguillicaudatus</i>	✓	
<i>Leiocassis</i> (cf. <i>adiposalis</i> ) sp.		✓
<i>Mystus macropterus</i>		✓
<i>Glyptothorax fukiensis fukiensis</i>		✓
<i>Clarias fuscus</i>		✓
<i>Gambusia affinis</i>	✓	
<i>Monopterus albus</i>	✓	
<i>Mastacembelus armatus</i>		
<i>Rhinogobius</i> (cf. <i>brunneus</i> ) sp. 1		
<i>Rhinogobius</i> (cf. <i>duospilus</i> ) sp. 2		
<i>Macropodus opercularis</i>	✓	

*Hemiculterella sauvagei* was thought to be restricted to the upper Yangtze (Changjiang); this record thus represents a substantial range extension and is the first from Guangxi. *Hemibarbus*

*umbrifer* is endemic to the Zhujiang (Pearl River) catchment system. The catfish *Leiocassis* sp. and the gobies (*Rhinogobius* spp.) could not be confidently identified and may prove to be of scientific and conservation interest. The high richness of lotic fish species indicates that the streams and rivers are of high ecological integrity. However the invasive exotic species, *Gambusia affinis* (Mosquitofish) was also recorded in the paddy fields.

### Ants

Forty-six species were recorded from Jiuwanshan (Table 7). The most frequently encountered species were *Pachycondyla* sp. 17, *Pachycondyla* sp. 14, *Pheidole smythiesii*, *Prenolepis* sp. 1, *Polyrhachis tyrannica*, *Leptogenys kitteli*, *Odontomachus monticola*, *Rhoptromyrmex* sp. 1, *Lepisiota rothneyi* and *Pristomyrmex pungens*. Many species cannot be reliably named.

**Table 7.** Ants recorded at Jiuwanshan Headwater Forest Nature Reserve, 24-27 July 1998, with habitat.

Species	Habitat, altitude
<i>Acanthomyrmex</i> (cf. <i>crassispinus</i> ) sp. 1	closed broadleaf forest
<i>Anochetus</i> (cf. <i>yunnanensis</i> ) sp. 4	closed forest
<i>Aphaenogaster</i> (cf. <i>beccarii</i> ) sp. 1	closed forest
<i>Aphaenogaster</i> (cf. <i>hunanensis</i> ) sp. 3	forest
<i>Camponotus</i> (cf. <i>jianghuaensis</i> ) sp. 15	shrubland
<i>Camponotus</i> (cf. <i>mitis</i> ) sp. 11	open shrubland/ grassland
<i>Camponotus rufoglaucus</i>	low shrubland
<i>Crematogaster</i> (cf. <i>travancorensis</i> ) sp. 2	shrubland, open forest
<i>Crematogaster</i> (cf. <i>biroi</i> ) sp. 4	open shrubland/ grassland, forest
<i>Crematogaster</i> (cf. <i>laboriosa</i> ) sp. 3	forest
<i>Cryptopone</i> sp. 1	forest edge
<i>Dolichoderus</i> (cf. <i>flatidorsus</i> ) sp. 6	forest
<i>Dolichoderus</i> sp. 9	open forest
<i>Hypoponera</i> sp. 3	bamboo wood
<i>Lepisiota rothneyi</i>	shrubland
<i>Lepisiota</i> (cf. <i>capensis</i> ) sp. 3	open shrubland/grassland
<i>Leptogenys kitteli</i>	shrubland, forest
<i>Mayriella transfuga</i>	forest
<i>Odontomachus monticola</i>	forest
<i>Odontoponera</i> (cf. <i>denticulata</i> ) sp. 1	low shrubland
<i>Oligomyrmex</i> (cf. <i>hunanensis</i> ) sp. 3	bamboo wood, shrubland
<i>Pachycondyla</i> ( <i>javana</i> group) sp. 1	open fir plantation
<i>Pachycondyla</i> (cf. <i>astuta</i> ) sp. 14	forest, fields
<i>Pachycondyla leeuwenhoekii</i>	shrubland
<i>Pachycondyla</i> (cf. <i>nigrita</i> ) sp. 17	forest, shrubland, marsh
<i>Paratrechina</i> (cf. <i>bourbonica</i> ) sp. 4	open forest
<i>Paratrechina sauteri</i>	forest
<i>Paratrechina</i> (cf. <i>opaca</i> ) sp. 26	forest
<i>Paratrechina</i> (nr. <i>indica</i> ) sp. 9	forest
<i>Pheidole</i> (cf. <i>noda</i> ) sp. 1	shrubland
<i>Pheidole</i> sp. 11	forest edge
<i>Pheidole</i> sp. 13	open forest, shrubland
<i>Pheidole smythiesii</i>	forest, shrubland, grassland
<i>Pheidole</i> (cf. <i>tsailuni</i> ) sp. 7	closed forest
<i>Polyrhachis dives</i>	open shrubland/grassland
<i>Polyrhachis</i> ( <i>Campomyrma</i> ) sp. 20	shrubland
<i>Polyrhachis</i> (nr. <i>sculpturata</i> ) sp. 5	forest
<i>Polyrhachis tyrannica</i>	forest, shrubland
<i>Polyrhachis vigilans</i>	open forest
<i>Ponera</i> sp. 3	closed broadleaf forest
<i>Prenolepis</i> (cf. <i>emmae</i> ) sp. 1	forest, shrubland
<i>Prenolepis magnocula</i>	low shrubland
<i>Pristomyrmex pungens</i>	forest, shrubland
<i>Rhoptromyrmex</i> (cf. <i>wroughtonii</i> ) sp. 1	forest, shrubland
<i>Strumigenys</i> (cf. <i>lewisii</i> ) sp.	forest edge

Species	Habitat, altitude
<i>Technomyrmex</i> sp. 2	shrubland

*Ponera* sp. 3 and *Strumigenys* sp. may be confined to primary forest. Some 23 (50%) of the species recorded are forest-dependent. This rather high proportion reflects the high forest cover in the area visited.

### Dragonflies

Twenty-four dragonfly species were recorded from Jiuwanshan (Table 8). The most frequently encountered were *Bayadera melanopteryx*, *Matrona basilaris*, *Calicnemia miles*, *Indocnemis orang*, *Planaeschna suichangensis* and *Orthetrum albistylum*. Two species, *Macromia* sp. and *Macromidia/Idionyx* sp., are not yet identified and might be new to science.

**Table 8.** Dragonflies recorded at Jiuwanshan Headwater Forest Nature Reserve, 24-27 July 1998.

Species name	Notes
<i>Matrona basilaris</i>	
<i>Archineura incarnata</i>	
<i>Bayadera melanopteryx</i>	
<i>Calicnemia eximia</i>	
<i>Calicnemia miles</i>	
<i>Indocnemis orang</i>	
<i>Coeliccia cyanomelas</i>	
<i>Copera marginipes</i>	
<i>Drepanosticta brownelli</i>	new record for Guangxi, previously known only from Guangdong
<i>Gynacantha subinterrupta</i>	
<i>Planaeschna suichangensis</i>	
<i>Macromia</i> sp.	pending identification
<i>Macromidia/Idionyx</i> sp.	pending identification
<i>Leptogomphus perforatus</i>	
<i>Ophiogomphus sinicus</i>	
<i>Lamelligomphus camelus</i>	
<i>Sieboldius deflexus</i>	
<i>Orthetrum albistylum</i>	
<i>Orthetrum sabina</i>	
<i>Palpopleura sexmaculata</i>	
<i>Pantala flavescens</i>	
<i>Sympetrum eroticum</i>	
<i>Trithemis aurora</i>	
<i>Zygonyx asahinai</i>	

*Drepanosticta brownelli* has not previously been recorded outside of Guangdong, and is thought to be of conservation significance due to its narrow global range.

### Butterflies

Fifty-three species were recorded at Jiuwanshan over the period 25 to 27 July (Table 9). The most frequent were *Abisara fylloides*, *Heliophorus ila* and *Symbrenthia hypselis*. Thirteen species were apparently recorded from Guangxi for the first time.

**Table 9.** Butterflies at Jiuwanshan Headwater Forest Nature Reserve, 25-27 July 1998. Sequence of genera follows Bascombe (1995).

Species	Habitat	Notes
<i>Ampittia virgata</i>	forest, shrubland	
<i>Celaenorrhinus</i> sp.	forest/plantation	
<i>Gerosis phisara</i>	forest, shrubland, plantation	

Species	Habitat	Notes
<i>Mooreana trichoneura</i>	forest/shrubland	
<i>Potanthus</i> sp.	forest/plantation	
<i>Graphium chironides</i>	forest, plantation	
<i>Lamproptera meges</i>	forest	
<i>Meandrusa payeni</i>	forest, shrubland	new Guangxi record
<i>Papilio helenus</i>	forest, shrubland	
<i>Papilio memnon</i>	forest, shrubland	
<i>Papilio nephelus</i>	forest, shrubland	
<i>Papilio paris</i>	forest, shrubland	
<i>Papilio polytes</i>	forest, plantation	
<i>Papilio protenor</i>	forest, shrubland	
<i>Troides helena</i>	forest/shrubland	new Guangxi record
<i>Catopsilia pyranthe</i>	forest/plantation	
<i>Hebomoia glaucippe</i>	forest	
<i>Pieris (Talbotia) naganum</i>	forest/plantation	new Guangxi record
<i>Abisara burnii</i>	forest	new Guangxi record
<i>Abisara fylloides</i>	forest, shrubland, plantation	
<i>Deudorix rapaloides</i>	forest	new Guangxi record
<i>Heliophorus ila</i>	forest, shrubland, plantation	new Guangxi record
<i>Miletus boisduvali</i>	forest, plantation	
<i>Stiboges nymphidia</i>	forest	
<i>Taraka hamada</i>	forest, plantation	new Guangxi record
<i>Zemeros flegyas</i>	forest, plantation	
<i>Argynnis (Childrena) childreni</i>	forest, shrub	new Guangxi record
<i>Argynnis (Damora) sagana</i>	forest, plantation	
<i>Athyma asura</i>	forest, plantation	
<i>Athyma cama</i>	forest, shrubland, plantation	
<i>Athyma selenophora</i>	forest, plantation	
<i>Dichorragia nesimachus</i>	forest, plantation	new Guangxi record
<i>Euthalia anosia</i>	forest, plantation	new Guangxi record
<i>Euthalia hebe</i>	forest, plantation	new Guangxi record
<i>Euthalia niepelti</i>	forest, plantation	
<i>Hypolimnias bolina</i>	forest, shrub	
<i>Kallima inachus</i>	forest, plantation	
<i>Lethe confusa</i>	forest, shrubland, plantation	
<i>Lethe (Neope) muirheadii</i>	forest, shrubland	
<i>Limenitis (Bhagadatta) austenia</i>	forest	
<i>Melanitis leda</i>	forest, plantation	
<i>Melanitis phedima</i>	forest, shrubland	
<i>Mycalesis gotama</i>	forest, shrubland	
<i>Neptis namba</i>	forest, shrubland	new Guangxi record
<i>Neptis (Phaedyra) columella</i>	forest, plantation	
<i>Penthema adelma</i>	forest, shrubland, plantation	
<i>Polyura narcea</i>	forest, plantation	
<i>Polyura nepenthes</i>	forest, plantation	
<i>Polyura</i> sp.	forest, shrubland	
<i>Ragadia crisilda</i>	forest, plantation	new Guangxi record
<i>Stibochiona nicea</i>	forest, shrubland	
<i>Stichophthalma fruhstorferi</i>	forest	
<i>Symbrenthia hypselis</i>	forest, shrubland, plantation	

The butterflies included several notable forest species, such as *Meandrusa payeni*, *Pieris naganum*, *Limenitis austenia*, *Damora sagana*, *Dichorragia nesimachus*, the *Euthalia* spp., *Kallima inachus*, *Ragadia crisilda*, *Stibochiona nicea*, *Stichophthalma fruhstorferi*, *Abisara fylloides*, *Miletus boisduvali*, *Stiboges nymphidia* and *Mooreana trichoneura*. In fact, although the species count was relatively low, the butterfly fauna encountered was essentially a forest fauna, reflecting the high integrity of forest cover in the areas surveyed.



Besides the species recorded in this survey, the species *Allotinus drumila* was recorded at Jiuwanshan in 2001 by Wang Min (South China Agricultural University, pers. comm., November 2001).

### **Summary of flora and fauna**

The vegetation of Jiuwanshan consists of subtropical broadleaf evergreen forest, deciduous broadleaf forest and montane dwarf forest. A considerable proportion of the total reserve area, especially the lowland broadleaf evergreen forest, has been transformed to agricultural land, plantation or secondary shrubland. But good forest could still be found in the reserve interior.

The results of this survey are not necessarily representative of the whole reserve. However they indicate a healthy forest biota, which includes regionally uncommon species such as Mountain Hawk Eagle, Rufous Woodpecker, Rosy Minivet, *Paa shini* and *Geoemyda spengleri*. The reported mammal fauna is rich, and calls for further investigation. The streams and rivers support a diverse fauna including fish and dragonfly species with restricted distributions. A high proportion of the terrestrial insects and orchids encountered are forest-dependent species.

MacKinnon *et al.* (1996) considered Jiuwanshan of low biodiversity importance, as forest cover in the late 1980s was less than half. With subsequent deforestation regionally, and regeneration locally, the forest cover at Jiuwanshan must now be considered relatively good, and the present findings indicate a higher biodiversity importance than previously recognised.

### **Threats and problems**

Jiuwanshan has sustained forestry activity for some time. The remaining forest was fragmented and much of it degraded, but the rate of degradation has reportedly slowed in recent years following the change in national policy towards natural forest. Much of the logging had been at the edge of the reserve, but some took place further inside. The existing management structure made it difficult to resolve conflicts between economic development and forest conservation. The reserve was divided into four administrative zones managed by four different management stations, making coordinated and unified management difficult. More importantly, the local economy was dependent on exploiting forestry resources. Each management station was attached to a forest farm, which was still operating legally, and the management staff were also forest farm employees.

Besides the ongoing deforestation, wildlife such as plants and mushrooms were still being collected by villagers for medicine and food. Officials reported that wild orchids (particularly *Dendrobium* spp.) were collected for orchid traders in the early 1990s, and the demand, for medicinal and ornamental use, remains high.

### **Opportunities and recommendations**

Jiuwanshan still had a large area of relatively undisturbed forests in the core area, with high integrity of forest fauna and flora. There is thus a great prospect for recovery of natural forest. Clearly for the forest to fulfil its primary and economically predominant purposes, of headwater and biodiversity protection, forestry activity would need to come under very tight control, and natural forests completely safeguarded. Another priority, to avoid further degradation, is to prohibit collection of rare and threatened plants and animals.

Lowland forest recovery could be accelerated by planting native tree species in areas where planted commercial species have been harvested, and in abandoned cultivated fields. This could

be achieved through setting up small-scale local tree nurseries, with assistance from local research institutes and the forestry bureau.

Management authorities were considering a plan to divide the reserve into three zones. In the core zone existing fir plantations would be gradually phased out and native secondary forests encouraged. In the outer zone poorly established forests would be converted to plantation for forestry and agro-forestry. The third zone would be a forest park near the reserve headquarters, where tourism would be encouraged. Such non-exploitative uses of forest would be welcome, and educational facilities and staff should be provided to support it. But such a rezoning should be based foremost on the value of the land in water and biodiversity conservation. Only degraded areas with no forest cover should be considered for utilisation, and steep slopes should be allowed to redevelop natural vegetation (MacKinnon & Xie, 2001). To avoid environmental and economic problems, this zoning should be conducted with independent advice of ecologists from a respected institute.

Outside the forest, plants of high economic value could be cultivated and managed sustainably, to provide income to local villagers. But the main economic importance of Jiuwanshan, as a headwater forest, relies on the integrity of the natural forest, and this should be recognised in funding and in management.

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### **References**

- Anon., 1959-2000. *Flora Reipublicae Popularis Sinicae*. Tomus 2-80. Science Press, Beijing. (In Chinese.)
- Anon., 1991. *Flora of Guangxi*. Volume 1. Guangxi Science Technology Press, Nanning. (In Chinese.)
- Anon., 1996-2000. *Flora of China* Vol. 4, 15, 16, 17, 18, & 24. Science Press, Beijing, and Missouri Botanic Garden Press, St. Louis.
- Anon., 2001. *Flora of China Checklist*. Published on the Internet. <http://mobot.mobot.org/W3T/Search/foc.html> [accessed 1 September, 2001].
- Bascombe, M.J., 1995. Check list of the butterflies of South China. *Memoirs of the Hong Kong Natural History Society* 20: 1-206.
- Bolton, B., 1995. *A New General Catalogue of the Ants of the World*. Harvard University Press, Cambridge, Massachusetts, 504 pp.
- Chen, S. (ed.), 1999. Angiospermae Monocotyledoneae Orchidaceae (2). *Flora Reipublicae Popularis Sinicae*. Tomus 18. Science Press, Beijing, 463 pp. (In Chinese.)
- Clements, J.F., 2000. *Birds of the World: A Checklist, Fifth Edition*. Ibis Publishing Company, California, 867pp.
- Corbet, G.B. and Hill, J.E., 1992. *The Mammals of the Indomalayan Region: a Systematic Review*. Oxford University Press, New York, 488 pp.

- Forestry Department of Guangxi Zhuang Autonomous Region, 1993. *Guangxi Nature Reserves*. China Forestry Publishing House, Beijing, 187 pp.
- Guangdong Forestry Department and South China Institute of Endangered Animals, 1987. *Colour Guide of Wildlife in Guangdong Province*. Guangdong Science and Technology Press, Guangzhou, 139 pp. + 300 colour plates. (In Chinese.)
- Hua, W.L. and Yan, Q.W., 1993. *Protected Animals in China*. Shanghai Scientific and Technological Education Publishing House, Shanghai, 618 pp. (In Chinese with English abstract.)
- Inskipp, T., Lindsey, N. and Duckworth, W., 1996. *An Annotated Checklist of the Birds of the Oriental Region*. Oriental Bird Club, Sandy, Bedfordshire, U.K, 294 pp.
- IUCN Species Survival Commission, 2001. *2000 IUCN Redlist of Threatened Species*. Published on the Internet: <http://www.redlist.org/> [accessed 1 September, 2001].
- Kadoorie Farm and Botanic Garden, 2002. *Report of a Rapid Biodiversity Assessment at Mulun National Nature Reserve, North Guangxi, China, 18 to 23 July 1998*. South China Forest Biodiversity Survey Report Series: No. 13. KFBG, Hong Kong SAR, ii + 29 pp.
- Lang, K. (ed.), 1999. Angiospermae Monocotyledoneae Orchidaceae (1). *Flora Reipublicae Popularis Sinicae*. Tomus 17. Science Press, Beijing, 551 pp. (In Chinese.)
- Li, L. and Qin, H., 1993. Chapter II. Floristics of Seed Plants. Pp. 28-52. In: Li, Z. and Qiu, X. (eds.) *Reports on the plant resources of the Jiuwan Mountains, Guangxi, China*. China Forestry Publishing House, Beijing, 280 pp. (In Chinese.)
- Li, Z. and Qiu, X. (eds.), 1993. *Reports on the Plant Resources of the Jiuwan Mountains, Guangxi, China*. China Forestry Publishing House, Beijing, 280 pp. (In Chinese.)
- Long, G. and Li, L., 1993. Chapter III. Vegetation. Pp. 53-97. In: Li Z. and Qiu X. (eds.), *Reports on the Plant Resources of the Jiuwan Mountains, Guangxi, China*. China Forestry Publishing House, Beijing, 280 pp. (In Chinese.)
- Lu, M. and Xie, Z., 1993. Chapter I. Physical Environment. Pp. 1-27. In: Li Z. and Qiu X. (eds.), *Reports on the Plant Resources of the Jiuwan Mountains, Guangxi, China*. China Forestry Publishing House, Beijing, 280 pp. (In Chinese.)
- MacKinnon, J. & Xie, Y. (eds.), 2001. *Restoring China's Degraded Environment – the Role of Natural Vegetation*. Position paper of the Biodiversity Working Group of China Council for International Cooperation on Environment and Development, Beijing, 47 pp.
- MacKinnon, J., Meng, S., Cheung, C., Carey, G., Zhu, X. and Melville, D., 1996. *A Biodiversity Review of China*. World Wide Fund for Nature (WWF) International, WWF China Programme, Hong Kong, 529 pp.
- Nelson, J.S., 1994. *Fishes of the World, 3<sup>rd</sup> edition*. John Wiley & Sons, New York, 600 pp.
- Schorr, M., Lindeboom, M. and Paulson, D., 2001a. *List of Odonata of the World (Part 1, Zygoptera and Anisozygoptera)*. July 2001 version. Published on the Internet: <http://www.ups.edu/biology/museum/worldodonates.html>
- Schorr, M., Lindeboom, M. and Paulson, D., 2001b. *List of Odonata of the World (Part 2, Anisoptera)*. April 2001 version. Published on the Internet: <http://www.ups.edu/biology/museum/worldanisops.html>

- State Forestry Administration and Ministry of Agriculture, 1999. *State Protection List of Wild Plants*. (In Chinese.)
- The Plant Names Project, 2001. *International Plant Names Index*. Published on the Internet: <http://www.ipni.org/> [accessed 1 September, 2001].
- Tsi, Z. (ed.), 1999. Angiospermae Monocotyledoneae Orchidaceae (3). *Flora Reipublicae Popularis Sinicae*. Tomus 19. Science Press, Beijing, 485 pp. (In Chinese.)
- Wang, X.P. *et al.* (eds.), in press. *Plants of the Chinese Region – Status Survey and Conservation Action Plan. Appendix 1 Red Lists*. IUCN/SSC China Plant Specialist Group.
- Wilson, D.E. and Cole, F.R., 2000. *Common Names of Mammals of the World*. Smithsonian Institution Press, Washington and London, xiv + 204 pp.
- Wu, H.L., Shao, K.T. and Lai, C.F. (eds.), 1999. *Latin-Chinese Dictionary of Fishes' Names*. Sueichan Press, Taiwan, 1,028 pp. (In Chinese and English.)
- Yue, P. *et al.*, 2000. *Fauna Sinica – Osteichthyes Cypriniformes III*. Beijing: Science Press. (In Chinese with English abstract.)
- Zhang, W. (ed.), 1998. *China's Biodiversity: A Country Study*. China Environmental Science Press, Beijing, 476 pp.
- Zhang, Y. *et al.*, 1997. *Distribution of Mammalian Species in China*. CITES Management Authority of China. China Forestry Publishing House, Beijing, 280 pp. (In Chinese and English.)
- Zhao, E., Chang, H.W., Zhao, H. and Adler, K., 2000. Revised checklist of Chinese Amphibia & Reptilia. *Sichuan Journal of Zoology* 19(3): 196-207. (In Chinese.)
- Zhao, E.-M. and Adler, K., 1993. *Herpetology of China*. Society for the Study of Amphibians and Reptiles, Oxford, Ohio, U.S.A., 522 pp.

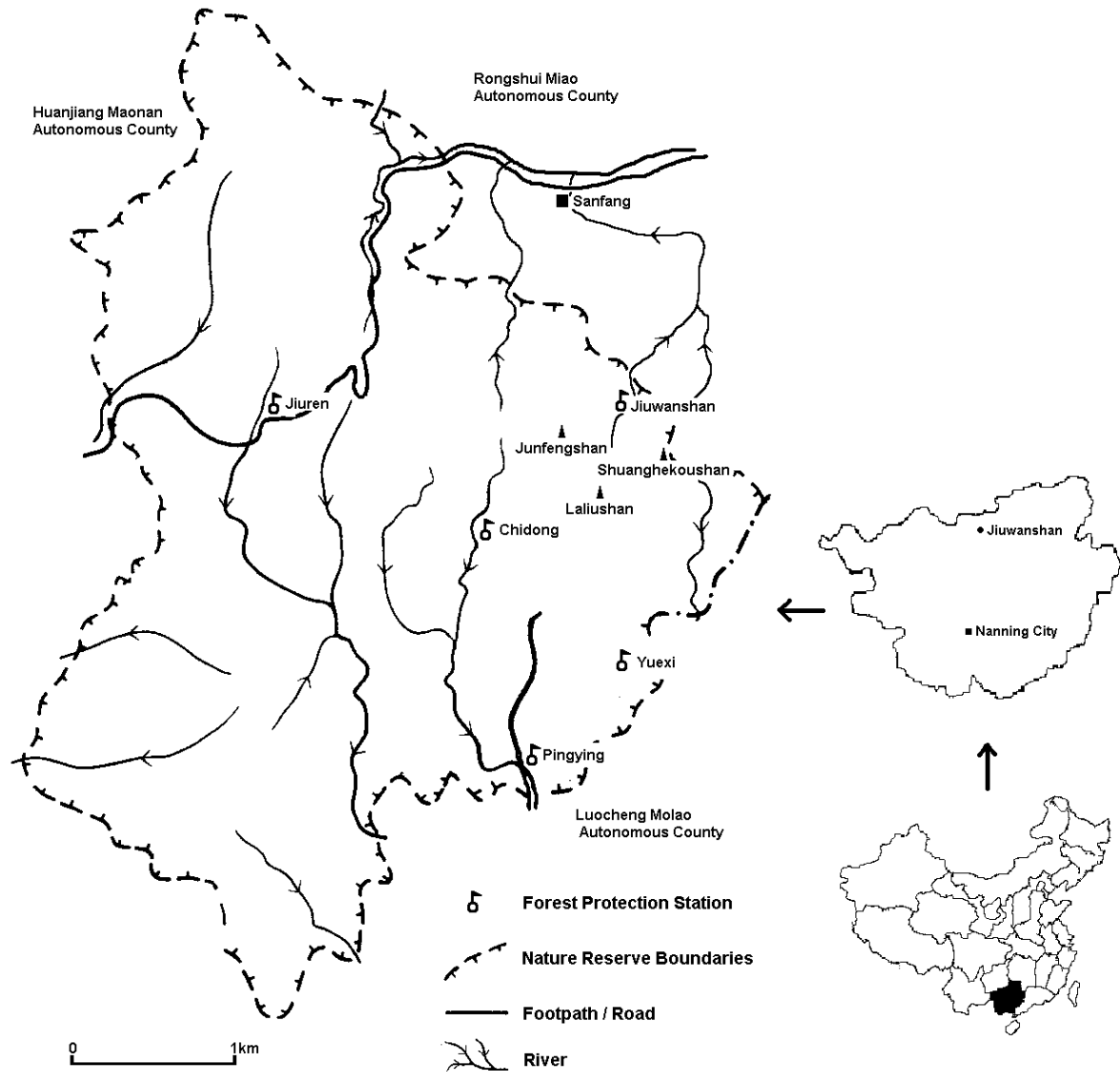


Figure 1. Map showing location of Jiuwanshan Headwater Forest Nature Reserve, North Guangxi, China.