Report of a Rapid Biodiversity Assessment at Dawangling Headwater Forest Nature Reserve, West Guangxi, China, August 1999

Kadoorie Farm and Botanic Garden
in collaboration with
Guangxi Zhuang Autonomous Region Forestry Department
South China Institute of Botany
South China Normal University
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Background

The present report details the findings of a visit to West 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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Contents

Translation of common Chinese geographical terms

Romanized Chinese (pinyin)	English meaning
Bei	North
Dao	island
Dong	East
Feng shui	the Chinese system of geomancy
Feng, Ding	peak
Gang	harbour
Hai	sea
He, Chuan, Jiang	river
Hu, Chi	lake
Keng, Gu, Gou	valley
Kou	outlet
Ling	range
Nan	South
Ping	flat
Shan	mountain
Shi	city
Tun	hamlet
Wan	bay
Xi	West
Xi, Yong	stream
Xian	county
Xiang, Cun	village

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Objectives

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

Methods

- On 4 to 6 August 1999 a team from Hong Kong (GS, JRF, ML, LKS, GTR), Guangzhou (LZC, CBH, WRJ, HXX), Xinyang (LHJ), Nanjing (CJS, WJS), and Beijing (ZGP) conducted a rapid biodiversity survey at Dawangling Nature Reserve.
- During fieldwork visual searching for plants, mammals, birds, reptiles, amphibians, fish, ants, butterflies and dragonflies was conducted. Frogs and birds were also identified by their calls. Plant records were made by field observation, with some specimens collected.
- Status of large and medium-sized mammals (excluding Insectivora, Chiroptera and Muridae) at Dawangling was inferred largely based on interviews with local people, with reference to colour pictures. For purposes of these interviews a list of South China mammals was compiled from various sources including Guangdong Forestry Department and South China Institute of Endangered Animals (1987), Corbet & Hill (1992) and Zhang Y. *et al.* (1997).
- Vascular plant records were made by CBH, and edited by NSC, except for orchids, for which records were made or verified by GS. Mammal records were made by LKS, ML or JRF. Records of birds were made or verified by LKS, reptiles and amphibians by ML or LZC, fish by BC and CXL, ants by JRF, dragonflies by KW and GTR, butterflies by GTR, molluscs by CDN.
- Nomenclature in the report is standardised based, unless otherwise stated, on the following references:
  - Flora (Pteridophyta, Gymnospermae and Angiospermae excluding Orchidaceae): Anon. (1959-2001); Anon. (1991); Anon. (1996-2001); Anon. (2002a, 2002b); The Plant Names Project (2002);
  - Orchids (Angiospermae: Orchidaceae): Chen (1999); Lang (1999); Tsi (1999);
  - Mammals (Mammalia): Wilson & Cole (2000);
  - Birds (Aves): Inskipp *et al*. (1996);
  - Reptiles and Amphibians (Reptilia and Amphibia): Zhao E.-M. & Adler (1993); Zhao E. *et al.* (2000);
  - Fish (Actinopterygii): Nelson (1994); Wu H.L. *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 (2002). Certain taxa, including orchids, reptiles, amphibians, fish and invertebrates, have yet to be properly assessed for global status. National conservation status of orchids 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

- Dawangling Headwater Forest Nature Reserve is in Baise City, Bose City District, West Guangxi, at 23°32'-23°51'N by 106°10'-106°30'E (MacKinnon *et al.*, 1996).
- The size of the nature reserve is about 819 km^2 (Mackinnon *et al.*, 1996; Zhang W., 1998).
- The reserve has a hilly landscape with an altitude range from 130 to 1,433m at the summit of Leida Shan. The geology is mainly sandy shale (Forestry Department of Guangxi Zhuang Autonomous Region, 1993).

- Dawangling is reported to have a northern tropical monsoon climate with mean monthly temperature range from 8.7°C in January to 24.2°C in July. Annual precipitation is 1,300-1,400mm, which mainly occurs in the wet season from May to September. Streams drain north towards the You Jiang, which flows east through Nanning to the Xi Jiang in Guangdong (Forestry Department of Guangxi Zhuang Autonomous Region, 1993).
- Dawangling was designated a provincial nature reserve to protect the headwater forest in 1982. It is classified as a Forest Ecosystem Nature Reserve (Zhang W., 1998) and managed by the local Forestry Bureau.

Results

Vegetation

- The original vegetation of Dawangling would have been northern tropical evergreen broadleaf forest. In the early 1990s the extent of natural forest was reported as 258 km^2, but much of it had been degraded to young secondary mixed forest and shrubland after agriculture and clear-felling. More well-preserved mature forest covered only about 7 km^2 (Forestry Department of Guangxi, 1993).
- The present survey found the forest at Dawangling was mainly young secondary coniferous and broadleaf forest and tall shrubland, dominated by *Pinus massoniana*, *Schima wallichii*, *Sapium discolor*, *Liquidambar formosana* and *Castanopsis fissa*. Above 1,200 m was older forest 10-15 m tall with more continuous cover, dominated by *Exbucklandia tonkinensis*, *Sassafras tzumu*, *Itoa orientalis*, *Castanopsis hystrix* and *Elaeocarpus glabripetalus*. Much of the hillside below 800 m was plantation of *Illicium verum* and *Vernicia* spp.

Flora

- The present survey recorded 211 vascular plants in 95 families, including 22 fern species in 17 families, three gymnosperm species in three families and 186 flowering plant species in 76 families. This is a relatively high number for a two-day survey, probably as a result of the diverse habitat types surveyed, ranging from farmland to secondary broadleaf forest. Twenty-three orchids were recorded (Table 2), all other species are shown in Table 1.
- Prior to the survey *Bulbophyllum hirundinis* had been recorded from only a single locality in Longzhou County in Guangxi.
- Among the flora recorded, there are a few species of conservation concern:
  - The orchids *Anoectochilus roxyburghii* and *Cymbidium goeringii* are Endangered in China due to over-collection, for medicinal and ornamental purposes respectively.
  - *Fagus longipetiolata* is considered to be globally Vulnerable. It was fairly common in the forest surveyed.
  - *Zenia insignis* is considered to be globally Near-threatened and is also under Class II National Protection in China.
  - *Brainea insignis*, *Cibotium barometz,* and *Alsophila spinulosa* are under Class II National Protection and are all under threat of collection for ornamental and medicinal purpose, although the first two species are widespread and common in South China.
  - The orchids *Anoectochilus elwesii*, *Dendrobium hercoglossum* and *D. henryi* are under threat of over-collection for medicinal uses. *Cymbidium* spp. are under threat for ornamental purposes.
  - *Alpinia guinanensis* is endemic to Guangxi.
  - *Trichosanthes reticulinervis* is endemic to Guangdong and Guangxi.
  - *Taxillus balansae* is restricted to SE Yunnan, SW Guangxi and N. Vietnam.
  - All the orchid species recorded are listed in CITES Appendix II.
- Apart from orchids (of which more than 50% of the terrestrial orchids found at Leida Shan are forest-dependent), relatively few forest specialists were found, and most species are typical of secondary forest and shrubland.

Table 1. Vascular plants of Dawangling Nature Reserve recorded in the present survey. Species which are nationally Protected (Class I or II) (State Forestry Administration & Ministry of Agriculture, 1999), globally Threatened or Lower Risk (Near-threatened) (IUCN, 2002) or globally restricted are indicated.

Family	Scientific name	Remarks
PTERIDOPHYTA		
Adiantaceae	*Adiantum caudatum* L.	
	Adiantum flabellulatum L.	
Angiopteridaceae	*Angiopteris* sp. (cf. *fokiensis*)	
Aspleniaceae	*Asplenium unilaterale* Lam.	
Athyriaceae	*Allantodia dilatata* (Blume) Ching	
Blechnaceae	*Blechnum orientale* L.	
	Brainea insignis (Hook.) J. Sm.	Protected II
	Woodwardia japonica (L.f.) Sm.	
Cyatheaceae	*Alsophila spinulosa* (Wall. ex Hook.) R.M.Tryon	Protected II
Dicksoniaceae	*Cibotium barometz* (L.) J. Sm.	Protected II
Gleicheniaceae	*Dicranopteris pedata* (Houtt.) Nakaike	
Huperziaceae	*Huperzia serrata* (Thunb.) Trevis.	
Lindsaeaceae	*Stenoloma chusanum* (L.) Ching	
Lygodiaceae	*Lygodium scandens* (L.) Sw.	
Nephrolepidaceae	*Nephrolepis auriculata* (L.) Trimea	
Osmundaceae	*Osmunda vachellii* Hook.	
Polypodiaceae	*Lepidogrammitis drymoglossoides* (Baker) Ching	
	Pyrrosis lingua (Thunb.) Farw	
Pteridiaceae	*Pteridium aquilinum* (L.) Kuhn var. *latiusculum* (Desv.) Underw. ex A. Heller	
Selaginellaceae	*Selaginella delicatula* (Desv. ex Poir.) Alston	
Thelypteridaceae	*Cyclosorus interruptus* (Willd.) H. Ito	
	Cyclosorus parasiticus (L.) Farw.	
GYMNOSPERMAE		
Gnetaceae	*Gnetum montanum* Markgr.	
Pinaceae	*Pinus massoniana* Lamb.	
Taxodiaceae	*Cunninghamia lanceolata* (Lamb.) Hook.	planted
ANGIOSPERMAE		
Dicotyledonae		
Aceraceae	*Acer cinnamomifolium* Hayata	
	Acer davidii Franch.	
Actinidiaceae	*Saurauia tristyla* DC.	
Alangiaceae	*Alangium chinense* (Lour.) Harms.	
Anacardiaceae	*Choerospondias axillaris* (Roxb.) B.L. Burtt & A.W. Hill	
	Rhus chinensis Mill.	
	Toxicodendron succedaneum (L.) Kuntze.	
Aquifoliaceae	*Ilex pubescens* Hook. & Arn.	
	Ilex triflora Blume	
Araliaceae	*Aralia armata* (Wall.) Seem.	
	Schefflera delavayi (Franch.) Harms	
	Schefflera octophylla (Lour.) Harms	
Asteraceae	*Ageratum conyzoides* L.	introduced from tropical America
	Conyza bonariensis (L.) Cronquist	introduced from tropical America
	Crassocephalum crepidioides (Benth.) S. Moore	introduced from Africa
	Elephantopus scaber L.	
	Senecio scandens Buch.-Ham.	
Berberidaceae	*Dysosma versipellis* (Hance) M. Cheng	
Betulaceae	*Betula luminifera* H.J.P. Winkl.	
Bignoniaceae	*Oroxylum indicum* (L.) Kurz	
	Radermachera sinica (Hance) Hemsl.	
Caesalpiniaceae	*Gleditsia fera* (Lour.) Merr.	
	Zenia insignis Chun	Lower Risk (nt); Protected II
Campanulaceae	*Pratia nummularia* (Lam.) A. Br. & Aschers.	
Capparaceae	*Capparis cantoniensis* Lour.	
Caprifoliaceae	*Viburnum fordiae* Hance	
Caryophyllaceae	*Drymaria cordata* (L.) Willd. ex Roem. & Schult.	
Celastraceae	*Celastrus stylosus* Wall.	

Family	Scientific name	Remarks
	Euonymus laxiflorus Champ. ex Benth.	
Chloranthaceae	*Sarcandra glabra* (Thunb.) Nakai	
Clusiaceae	*Hypericum monogynum* L.	
Cornaceae	*Bothrocaryum controversum* (Hemsl.) Pojark.	
Cucurbitaceae	*Trichosanthes reticulinervis* C.Y. Wu ex S.K. Chen	endemic to Guangdong and Guangxi
	Trichosanthes rubriflos Thorel ex Cayla	
Daphniphyllaceae	*Daphniphyllum oldhami* (Hemsl.) Rosenth.	
Ebenaceae	*Diospyros morrisiana* Hance ex. Walpers	
Elaeocarpaceae	*Elaeocarpus glabripetalus* Merr.	
Ericaceae	*Rhododendron simsii* Planch.	
Erythroxylaceae	*Erythroxylum sinense* Y. C. Wu	
Euphorbiaceae	*Breynia rostrata* Merr.	
	Macaranga adenantha Gagnep.	
	Sapium discolor (Champ. ex Benth.) Müll. Arg.	
	Sauropus garrettii Craib	
	Vernicia fordii (Hemsl.) Airy Shaw	
Fagaceae	*Castanea mollissima* Blume	cultivated
	Castanopsis fissa (Champ. ex Benth.) Rehder & E. H. Wilson	
	Castanopsis hystrix Miq.	
	Cyclobalanopsis neglecta Schottky	
	Fagus longipetiolata Seemen	Vulnerable
Flacourtiaceae	*Itoa orientalis* Hemsl.	
Hamamelidaceae	*Altingia chinensis* (Champ. ex Benth.) Oliv. ex Hance	
	Exbucklandia tonkinensis (Lecomte) Steenis	
	Liquidambar formosana Hance	
Hydrangeaceae	*Dichroa febrifuga* Lour.	
Illiciaceae	*Illicium verum* Hook. f.	mainly cultivated
Juglandaceae	*Engelhardtia roxburghiana* Wall.	
Lamiaceae	*Clinopodium chinense* (Benth.) Kuntze	
	Teucrium viscidum Blume	
Lauraceae	*Litsea cubeba* (Lour.) Pers.	
	Litsea monopetala (Roxb. ex Baker) Pers.	
	Neolitsea levinei Merr.	
	Sassafras tzumu (Hemsl.) Hemsl.	
Loganiaceae	*Gelsemium elegans* (Gardner & Champ.) Benth.	
Loranthaceae	*Macrosolen cochinchinensis* (Lour.) Tiegh.	
Magnoliaceae	*Magnolia paenetalauma* Dandy	
	Manglietia fordiana Oliv.	
	Michelia foveolata Merr. ex Dandy	
Melastomataceae	*Melastoma candidum* D. Don	
	Oxyspora paniculata (D. Don) DC.	
Menispermaceae	*Stephania hernandifolia* (Willd.) Walp.	
Mimosaceae	*Cylindrokelupha turgida* (Merr.) T.L. Wu	
Moraceae	*Ficus esquiroliana* H. Lév.	
	Ficus hirta Vahl	
	Ficus hispida L. f.	
	Ficus variegata Blume	
	Ficus virens Ait.	
Myricaceae	*Myrica rubra* (Lour.) Sieb. & Zucc.	
Myrsinaceae	*Ardisia gigantifolia* Stapf	
	Ardisia mamillata Hance	
	Maesa japonica (Thunb.) Moritzi & Zoll.	
Myrtaceae	*Rhodomyrtus tomentosa* (Aiton) Hassk.	
Oleaceae	*Jasminum lanceolarium* Roxb.	
Papilionaceae	*Dalbergia hancei* Benth.	
	Millettia pachycarpa Benth.	
	Mucuna birdwoodiana Tutch.	
	Ormosia microphylla Merr. & L. Chen	
	Podocarpium leptopus (A. Gray ex Benth.) Yen C. Yang & P.H. Huang	
	Pueraria lobata (Willd.) Ohwi	
Piperaceae	*Piper semiimmersum* C. DC.	
Polygalaceae	*Salomonia cantoniensis* Lour.	
Proteaceae	*Helicia reticulata* W. T. Wang	

Family	Scientific name	Remarks
Ranunculaceae	*Clematis meyeniana* Walp.	
Rosaceae	*Laurocerasus phaeosticta* (Hance) C. K. Schneid.	
	Rubus alceaefolius Poir.	
	Spiraea japonica L. f. var. *acuminata* Franch.	
Rubiaceae	*Chasalia curviflora* Thwaites	
	Coptosapelta diffusa (Champ. ex Benth.) Steenis	
	Hedyotis chrysotricha (Palib.) Merr.	
	Morinda officinalis K.C. How	
	Mussaenda esquirolii H. Lév.	
	Mussaenda pubescens W. T. Aiton	
	Taxillus balansae (Lecomte) Danser	endemic to SE Yunnan, SW Guangxi and N. Vietnam
	Wendlandia uvariifolia Hance	
Rutaceae	*Evodia lepta* (Spreng.) Merr.	
	Evodia trichotoma (Lour.) Pierre	
	Zanthoxylum ailanthoides Siebold & Zucc.	
Santalaceae	*Dendrotrophe frutescens* (Champ. ex Benth.) Danser	
Sapindaceae	*Mischocarpus sundaicus* Blume	
	Nephelium chryseum Blume	
Sapotaceae	*Eberhardtia aurata* (Pierre ex Dubard) Lecomte	
Scrophulariaceae	*Torenia fournieri* Linden ex E. Fourn.	
Staphyleaceae	*Turpinia affinis* Merr. & L.M. Perry	
Styracaceae	*Alniphyllum eberhardtii* Guill.	
	Alniphyllum fortunei (Hemsl.) Makino	
	Melliodendron xylocarpum Hand.-Mazz.	
	Rehderodendron kweichowense Hu	
	Styrax agrestis (Lour.) G. Don	
Theaceae	*Eurya loquaiana* Dunn	
	Schima wallichii (DC.) Choisy	
Thymelaeaceae	*Wikstroemia indica* (L.) C. A. Mey.	
Urticaceae	*Boehmeria nivea* (L.) Gaudich.	
	Laportea bulbifera (Siebold & Zucc.) Wedd.	
Verbenaceae	*Callicarpa dichotoma* (Lour.) K. Koch	
	Clerodendrum mandarinorum Diels	
	Clerodendrum serratum (L.) Moon	
Vitaceae	*Ampelopsis cantoniensis* (Hook. & Arn.) Planch.	
	Tetrastigma planicaule (Hook. f.) Gagnep.	
Monocotyledonae		
Amaryllidaceae	*Curculigo capitulata* (Lour.) Kuntze	
	Hymenocallis littoralis (Jacq.) Salisb.	
Araceae	*Alocasia macrorrhiza* (L.) Schott	
	Rhaphidophora decursiva (Roxb.) Schott	
Areaceae	*Caryota ochlandra* Hance	
Commelinaceae	*Amischotolype hispida* (Less. & A. Rich.) D.Y. Hong	
Cyperaceae	*Carex filicina* Nees	
	Hypolytrum nemorum (Vahl) Spreng.	
	Kyllinga brevifolia Rottb.	
	Rhynchospora rubra (Lour.) Makino	
Dioscoreaceae	*Dioscorea cirrhosa* Lour.	
Liliaceae	*Dianella ensifolia* (L.) DC.	
	Paris polyphylla Sm.	
	Peliosanthes macrostegia Hance	
Musaceae	*Musa balbisiana* Colla	
Orchidaceae	(see Table 2)	
Pandanaceae	*Pandanus austrosinensis* T. L. Wu	
Poaceae	*Brachiaria villosa* (Lam.) A. Camus	
	Lophatherum gracile Brongn.	
	Microstegium vagans (Nees ex Steud.) A. Camus	
	Miscanthus floridulus (Labill.) Warb. ex K. Schum & Lauterb.	
	Neyraudia arundinacea (L.) Henr.	
	Phragmites vallatoria (L.) Veldkamp	
	Sacciolepis indica (L.) Chase	
	Setaria palmifolia (J. Köenig) Stapf	
	Thysanolaena maxima (Roxb.) Kuntze	

Family	Scientific name	Remarks
Zingiberaceae	*Alpinia blepharocalyx* K. Schum. var. *glabrior* (Hand.-Mazz.) T.L. Wu	
	Alpinia guinanensis D. Fang & X.X. Chen	endemic to Guangxi
	Alpinia hainanensis K. Schum.	
	Alpinia kwangsiensis T.L. Wu & S.J. Chen	
	Alpinia oblongifolia Hayata	
	Alpinia pumila Hook. f.	
	Alpinia stachyoides Hance	
	Curcuma longa L.	cultivated
	Hedychium flavum Roxb.	
	Hedychium forrestii Diels	
	Zingiber striolatum Diels	

Table 2. Orchids recorded at Dawangling Nature Reserve from 5 to 6 August 1999.

Scientific name	Habitat	Remarks
Anoectochilus elwesii (Clarke ex Hook. f.) King & Pantl.	on forest floor and/or beside the stream with rich humus	terrestrial
Anoectochilus lanceolatus Lindl.	on rock surface with mosses and humus beside and in the middle of the stream	terrestrial
Anoectochilus roxyburghii (Wall.) Lindl.	on forest floor with rich humus	terrestrial, Endangered
Arundina graminifolia (D. Don.) Hochr.	on grassy slope	terrestrial
Bulbophyllum hirundinis (Gagnep.) Seidenf.	on rock and on tree trunk in forest	epiphytic, the 2nd locality in Guangxi, very rare in Guangxi
Bulbophyllum sp.	on tree trunk in forest	epiphytic
Cleisostoma paniculatum (Ker-Gawl.) Garay	on tree trunk in forest	epiphytic
Cymbidium aloifolium (L.) Sw.	on tree trunk	epiphytic
Cymbidium c.f. *dayanum* Rchb. f.	on tree trunk in forest	epiphytic
Cymbidium goeringii (Rchb. f.) Rchb. f.	on forest floor with rich humus	terrestrial, Endangered
Cymbidium c.f. *kanran*	on forest floor with rich humus	Terrestrial
Dendrobium henryi Schltr.	on rock with rich humus	epiphytic
Dendrobium hercoglossum Rchb. f.	on the base of tree trunk	epiphytic
Eria corneri Rchb. f.	on rock in forest beside the stream	epiphytic
Goodyera viridiflora (Blume) Blume	on rock with rich humus	terrestrial
Goodyera sp.1	on forest floor with rich humus	terrestrial
Goodyera sp.2	on forest floor with rich humus	terrestrial
Hetaeria cristata Blume	on forest floor with rich humus	terrestrial
Liparis bootanensis Griff.	on rock and on the base of tree trunk in forest	epiphytic
Liparis nervosa (Thunb. ex Murray) Lindl.	on forest floor with rich humus	terrestrial
Liparis viridiflora (Blume) Lindl.	on rock beside the stream	epiphytic
Liparis sp.	on rock in forest	epiphytic
Zeuxine sp.	on forest floor with rich humus	terrestrial

Mammals

- The status of mammals was inferred (Table 3) based on direct findings, on interviews with wardens and residents of Dawangling Nature Reserve, and on recorded distributions, including past records from Baise (Wei & Wu, 1985; Lu, 1987; Shen *et al.*, 1988; Liang, 1993; Wu M.C., 1993; Zhang Y. *et al* . 1997).
- Many scats of barking deer, probably *Muntiacus muntjak* judging from the size, were found.
- The scat of a small carnivore, probably Leopard Cat *Prionailurus bengalensis*, was found on 5 August.

Table 3. The inferred status of mammals at Dawangling Nature Reserve, based on interviewing staff of the Nature Reserve, and on past distribution records. "+" = rare, "++" = quite common, "+++" = abundant, "n" = not asked. Sequence follows Wilson & Cole (2000). Only species reported to occur by interviewees, or previously recorded from Baise City, are listed; for species listed previous records from Bose (a larger area encompassing Baise and other counties) are also given.

Scientific name	English name	Previous records	Abundance according to interviewees	Probable status
Tupaia belangeri	Northern Tree Shrew	(Baise)	+++	present
Macaca mulatta	Rhesus Monkey	(Bose)	+++	present

Scientific name	English name	Previous records	Abundance according to interviewees	Probable status
Vulpes vulpes	Red Fox	("Raise")	+	insecure
Nyctereutes procyonoides	Raccoon Dog	(Bose)	+	insecure
Prionailurus bengalensis (recorded as *Felis bengalensis*)	Leopard Cat	(Bose)	+	insecure
Panthera pardus	Leopard	-	+	insecure or extirpated
Panthera tigris	Tiger	(Baise)	?	extirpated
Martes flavigula	Yellow-throated Marten	(Bose)	++	insecure
Meles meles	Eurasian Badger	(Bose)	+	insecure
Melogale moschata	Chinese Ferret-badger	(Bose)	+++	present
Mustela kathiah	Yellow-bellied Weasel	(Bose)	+	insecure
Mustela sibirica	Siberian Weasel	(Bose)	+	insecure
Prionodon pardicolor	Spotted Linsang	-	+++	present
Viverricula indica	Small Indian Civet	-	+++	present
Sus scrofa	Wild Boar	-	+++	present
Moschus berezovskii	Chinese Forest Musk Deer	(Baise)	++	insecure
Cervus unicolor	Sambar	-	+	insecure
Muntiacus crinifrons	Black Muntjac	-	+	uncertain (see text)
Muntiacus muntjak	Indian Muntjac	(Bose)	+++	present
Muntiacus reevesii	Reeves's Muntjac	(Bose)	+++	present
Naemorhedus caudatus	Chinese Goral	-	+	insecure
Manis pentadactyla	Chinese Pangolin	(Bose)	+	insecure
Callosciurus erythraeus	Pallas's Squirrel	-	+++	present
Dremomys pernyi	Perny's Long-nosed Squirrel	-	+++	present
Dremomys pyrrhomerus	Red-hipped Squirrel	-	+++	present
Ratufa bicolor	Black Giant Squirrel	-	+++	present
Tamiops maritimus	Maritime Striped Squirrel	-	+++	present
Belomys pearsonii	Hairy-footed Flying Squirrel	-	+	insecure
Petaurista petaurista (or *P. philippensis*) (recorded as *P. yunanensis*)	Red Giant Flying Squirrel (or Indian Giant Flying Squirrel)	(Bose)	+++	present
Rhizomys sinensis	Chinese Bamboo Rat	(Bose)	+++?	present
Rhizomys pruinosus	Hoary Bamboo Rat	-	+++?	unknown
Hystrix brachyura	Malayan Porcupine	-	+	insecure
Lepus sinensis	Chinese Hare	(Bose)	+	insecure

- Of the species suspected to occur, some are of particular conservation concern:
  - Black Muntjac *Muntiacus crinifrons* is listed as globally Vulnerable by IUCN, and Class II Protected in China. The recorded range of this species is in East China (Zhang *et al.*, 1997), quite far from Guangxi, but there have been unconfirmed reports from Yunnan and Guangxi.
  - Chinese Goral *Naemorhedus caudatus* is globally Vulnerable, and Class II Protected in China.
  - Malayan Porcupine *Hystrix brachyura* is globally Vulnerable.
  - Chinese Pangolin *Manis pentadactyla*, Rhesus Monkey *Macaca mulatta* and Chinese Forest Musk Deer *Moschus berezovskii* are globally Near-threatened, and Class II Protected in China.
  - Hairy-footed Flying Squirrel *Belomys pearsoni* is globally Near-threatened.
  - Leopard *Panthera pardus* is Class I Protected in China.
  - Yellow-throated Marten *Martes flavigula*, Small Indian Civet *Viverricula indica*, Spotted Linsang *Prionodon pardicolor* and Sambar *Cervus unicolor* are Class II Protected in China.

Birds

- Fifty-nine species of birds were recorded in Dawangling Nature Reserve during this survey (Table 4).
- The record of Long-tailed Sibia *Heterophasia picaoides* is apparently the first from Guangxi. Blue-throated Barbet *Megalaima asiatica* was also recorded at Cenwanglaoshan Nature Reserve (Kadoorie Farm and Botanic Garden, 2003a) and Diding Nature Reserve (Kadoorie Farm and Botanic Garden, 2003b). Both species were previously only recorded from Yunnan within China.
- The most frequently encountered species included Mountain Bulbul *Hypsipetes mcclellandii*, Grey-cheeked Fulvetta *Alcippe morrisonia* and Chestnut Bulbul *Hemixos castanonotus*.

Table 4. Birds recorded at Dawangling Nature Reserve, 4-6 August 1999. Sequence follows Clements (2000). * Species identity uncertain following recent taxonomic study (P.J. Leader, Hong Kong, pers. comm., February 2003).

English name	**Scientific name**
Oriental Honey-buzzard	*Pernis ptilorhynchus*
Crested Serpent Eagle	*Spilornis cheela*
Crested Goshawk	*Accipiter trivirgatus*
Silver Pheasant	*Lophura nycthemera*
Barred Cuckoo Dove	*Macropygia unchall*
Emerald Dove	*Chalcophaps indica*
Chestnut-winged Cuckoo	*Clamator coromandus*
Common Kingfisher	*Alcedo atthis*
Great Barbet	*Megalaima virens*
Golden-throated Barbet	*Megalaima franklinii*
Black-browed Barbet	*Megalaima oorti*
Blue-throated Barbet	*Megalaima asiatica*
White Wagtail	*Motacilla alba*
Collared Finchbill	*Spizixos semitorques*
Red-whiskered Bulbul	*Pycnonotus jocosus*
Brown-breasted Bulbul	*Pycnonotus xanthorrhous*
Chestnut Bulbul	*Hemixos castanonotus*
Mountain Bulbul	*Hypsipetes mcclellandii*
Black Bulbul	*Hypsipetes leucocephalus*
Hill Prinia	*Prinia atrogularis*
Grey-breasted Prinia	*Prinia hodgsonii*
Slaty-bellied Tesia	*Tesia olivea*
Grey-bellied Tesia	*Tesia cyaniventer*
Mountain Tailorbird	*Orthotomus cuculatus*
Blyth's Leaf Warbler	*Phylloscopus reguloides*
Sulphur-breasted Warbler *	*Phylloscopus ricketti ?*
Blue-and-white Flycatcher	*Cyanoptila cyanomelana*
Hainan Blue Flycatcher	*Cyornis hainanus*
Grey-headed Canary Flycatcher	*Culicicapa ceylonensis*
Plumbeous Water Redstart	*Rhyacornis fuliginosus*
Slaty-backed Forktail	*Enicurus schistaceus*
Grey Bushchat	*Saxicola ferrea*
White-throated Fantail	*Rhipidura albicollis*
Hwamei	*Garrulax canorus*
White-browed Laughingthrush	*Garrulax sannio*
Streak-breasted Scimitar Babbler	*Pomatorhinus ruficollis*
Pygmy Wren Babbler	*Pnoepyga pusilla*
Rufous-capped Babbler	*Stachyris ruficeps*
Red-billed Leiothrix	*Leiothrix lutea*
White-browed Shrike Babbler	*Pteruthius flaviscapis*
Blue-winged Minla	*Minla cyanouroptera*
Dusky Fulvetta	*Alcippe brunnea*
Rusty-capped Fulvetta	*Alcippe dubia*
Grey-cheeked Fulvetta	*Alcippe morrisonia*
Long-tailed Sibia	*Heterophasia picaoides*
Striated Yuhina	*Yuhina castaniceps*
White-bellied Yuhina	*Yuhina zantholeuca*
Vinous-throated Parrotbill	*Paradoxornis webbianus*
Great Tit	*Parus major*
Velvet-fronted Nuthatch	*Sitta frontalis*
Mrs Gould's Sunbird	*Aethopyga gouldiae*
Fork-tailed Sunbird	*Aethopyga christinae*
Black-throated Sunbird	*Aethopyga saturata*
Plain Flowerpecker	*Dicaeum concolor*
Oriental White-eye	*Zosterops palpebrosus*
Long-tailed Shrike	*Lanius schach*
Bronzed Drongo	*Dicrurus aeneus*
Grey Treepie	*Dendrocitta formosae*
White-rumped Munia	*Lonchura striata*

- Some of the species recorded are of particular conservation significance:
  - Oriental Honey-buzzard *Pernis ptilorhynchus*, Crested Serpent Eagle *Spilornis cheela*, Crested Goshawk *Accipiter trivirgatus*, Silver Pheasant *Lophura nycthemera* and Barred Cuckoo Dove

Macropygia unchall are Class II Protected in China.

– The populations of Long-tailed Sibia *Heterophasia picaoides* are of interest in South China, as they are near the eastern limit of their range at Dawangling.

- The presence of forest-dependent species including barbets and babblers indicated that Dawangling has forest with moderately high integrity.

Reptiles and Amphibians

- Twelve species of amphibian, three species of lizard and three species of snake were recorded (Table 5).
- *Ovophis tonkinensis* is a new record for China.
- *Ophryophryne pachyproctus* is a new record for Guangxi.
- The most frequently encountered species near the paddy fields were the frogs *Microhyla butleri* and *Rana limnocharis*; most frequent in and near the forests was the skink *Sphenomorphus indicus.*

Table 5. Amphibians and Reptiles of Dawangling Nature Reserve. Sequence follows Zhao E.-M. & Adler (1993).

Species	Habitat	Records
AMPHIBIA		
Ophryophryne pachyproctus	forest edge	✓
Bufo melanostictus	village	✓
Paa boulengeri	forest stream	tadpoles
Rana guentheri	pond	✓
	grassland	✓
Rana limnocharis	pond	✓
	grassland	✓
	paddy field	✓
	forest edge	✓
	forest/paddy field	✓
	shrubland	✓
	puddle	✓, tadpoles
	open forest	✓
Chirixalus vittatus	pond	✓
	irrigation ditch among paddy fields	✓
Philautus odontotarsus	pond	✓
Polypedates megacephalus	paddy field	✓
	irrigation ditch among paddy fields	✓
Theloderma asperum	logged forest edge	tadpoles
	forest	tadpoles
	forest edge	tadpoles
Microhyla butleri	irrigation ditch among paddy fields	✓
	forest	
Microhyla heymonsi	forest edge/agriculture field	✓
Microhyla ornata	pond	✓
REPTILIA		
Acanthosaura lepidogaster	open forest/shrubland	✓
Sphenomorphus indicus	forest	✓
	forest edge/shrubland	
	open forest	
Tropidophorus guangxiensis	forest	✓
Amphiesma popei	paddy field	✓
Sibynophis collaris	open forest	✓
Ovophis tonkinensis	forest	✓

- The presence of several forest species and forest stream specialists, such as *Paa boulengeri, Theloderma asperum, Acanthosaura lepidogaster, Tropidophorus guangxiensis, Sibynophis collaris* and *Ovophis tonkinensis* indicated that the forests and the streams have quite high integrity.

Fish

- Four species of freshwater fish were reported from Dawangling Nature Reserve (Table 6); sampling effort was limited as villagers did not encourage fishing. Specimens of these records have not been examined by specialists. All records were made in the vicinity of Longhe Cun on 6 August.
- No species was particularly abundant during the survey.

Table 6. Freshwater fish reported from Dawangling, 4-6 August 1999. Sequence of families follows Nelson (1994).

Species
Pseudogastromyzon fangi
Beaufortia leveretti
Schistura fasciolata
Rhinogobius giurinus

- One species collected was tentatively identified as *Beaufortia leveretti*, which has not previously been recorded from Guangxi (Yue *et al.*, 2000). The present record should be considered doubtful until specimens can be examined.

Ants

- Seventy-six species were recorded (Table 7). Many cannot be reliably named, and some are thought to be new to science.
- The most frequently encountered species included *Prenolepis magnocula*, *Paratrechina* sp. 9, *Pachycondyla* sp. 2 and *Pachycondyla* sp. 1.

Table 7. Ant species recorded from Dawangling Nature Reserve, August 1999. * Forest associated.

Species	**Habitat**
new formicine genus sp. 1	closed broadleaf forest
Aenictus (*dentatus* group) sp. 4	open 5m broadleaf forest
Aenictus binghami *	open herbaceous verge of road
Camponotus (cf. *jianghuaensis*) sp. 15	broadleaf forest
Camponotus (cf. *mitis*) sp. 11	forest, shrubland
Camponotus (cf. *wasmanni*) sp. 35	open forest, shrubland
Camponotus rufoglaucus	open herbaceous vegetation
Camponotus sp. 28-group	closed 15m broadleaf forest
Cataulacus granulatus	closed 10m broadleaf forest
Cerapachys sulcinodis *	closed 20m broadleaf forest
Crematogaster (cf. *dohrni*) sp. 25	open forest, herbaceous
Crematogaster (cf. *dohrni*) sp. 8	open shrubland
Crematogaster (cf. *laboriosa*) sp. 3	open broadleaf forest
Crematogaster (cf. *travancorensis*) sp. 2	forest, shrubland
Crematogaster sp. 26	open 5m broadleaf forest
Dolichoderus (cf. *flatidorsus*) sp. 6	broadleaf forest
Dolichoderus sp. 9	open broadleaf forest
Gnamptogenys bicolor	open 20m broadleaf/road
Gnamptogenys sp. 5 *	broadleaf forest
Hypoponera (cf. *excoecata*) sp. 2 *	closed 15m broadleaf forest
Hypoponera sp. 3 *	closed 10m broadleaf forest
Iridomyrmex (*anceps* group) sp. 1	open grassland
Lepisiota rothneyi	open low broadleaf forest
Leptogenys (cf. *chinensis*) sp. 18 *	closed 20m broadleaf forest
Leptogenys (cf. *kraepelini*) sp. 7 *	closed 15m broadleaf forest
Leptogenys kitteli *	forest, open vegetation
Monomorium (cf. *bimaculatum*) sp. 9 *	closed broadleaf forest
Monomorium destructor	open 5m broadleaf forest
Monomorium pharaonis	inside building (also found in forest litter sample from 1,200m, but probably entered sample in building)
Monomorium sp. 4 *	open 25m broadleaf forest
Odontomachus (cf. *xizangensis*) sp. 4	open herbaceous/road
Odontomachus monticola *	broadleaf forest
Odontoponera (cf. *denticulata*) sp. 1	open vegetation
Oligomyrmex (cf. *hunanensis*) sp. 3	closed 15m broadleaf forest

Species	Habitat
Oligomyrmex sp. 9	closed 15m broadleaf forest
Pachycondyla (cf. *astuta*) sp. 14 *	broadleaf forest
Pachycondyla (cf. *luteipes*) sp. 2 *	broadleaf forest
Pachycondyla (cf. *nigrita*) sp. 17 *	broadleaf forest
Pachycondyla (cf. *sauteri*) sp. 7	closed broadleaf forest
Pachycondyla (*javana* group) sp. 1 *	broadleaf forest
Pachycondyla rufipes	open herbaceous
Paratrechina (cf. *bourbonica*) sp. 4	open 25m broadleaf
Paratrechina (cf. *opaca*) sp. 26 *	broadleaf forest
Paratrechina (nr. *indica*) sp. 9 *	closed broadleaf forest
Paratrechina sauteri	broadleaf forest
Paratrechina sp. 36 *	closed 20m broadleaf forest
Paratrechina sp. 40	closed 10m broadleaf forest
Pheidole (cf. *noda*) sp. 1	forest, open vegetation
Pheidole (cf. *yeensis*) sp. 40	open 20m streamside broadleaf forest
Pheidole (*rinae* group) sp. 9	closed broadleaf forest
Pheidole gatesi *	open corn/herbaceous
Pheidole smythiesi	closed 10m broadleaf forest
Pheidole sp. 11	broadleaf forest
Pheidole sp. 13 *	broadleaf forest
Pheidole sp. 29 *	open 10m broadleaf forest
Pheidole sp. 7 *	open vegetation
Polyrhachis (Myrma) sp. 25	open shrubland
Polyrhachis tyrannica	closed 15m broadleaf forest
Prenolepis (cf. *emmae*) sp. 1 *	closed 15m broadleaf forest
Prenolepis magnocula *	broadleaf forest
Prenolepis sp. 3 *	closed broadleaf forest
Prenolepis sp. 8	broadleaf forest
Pristomyrmex pungens	broadleaf forest
Pseudolasius sp. 1	broadleaf forest
Pyramica sauteri *	open 25m broadleaf forest
Rhoptromyrmex (cf. *wroughtonii*) sp. 1	forest, open vegetation
Strumigenys (cf. *lewisi*) sp. 5 *	closed 15m broadleaf forest
Strumigenys sp. 6 *	broadleaf forest
Tapinoma sp. 1	open vegetation
Technomyrmex albipes	broadleaf forest
Technomyrmex sp. 2 *	closed broadleaf forest
Tetramorium (cf. *shensiense*) sp. 6 *	closed 5m broadleaf forest
Tetramorium (cf. *tonganum*) sp. 12	broadleaf forest
Tetraponera allaborans	open 5m broadleaf/stones
Tetraponera attenuata	open shrubland
Vollenhovia (cf. *emeryi*) sp. 1 *	broadleaf forest

- *Crematogaster* sp. 26 and *Paratrechina* sp. 40 are known only from Dawangling.
- Excluding these unique species, 42% of species recorded were forest specialists. This is a moderate figure indicating a mixture of high- and low-integrity forest. The proportion was similar at Leida Shan (40%) and Longhuo (41%).

Dragonflies

- Fourteen species were recorded over the two-day period (Table 8). Abundance was rather low, at least in part due to a seasonal reduction in numbers towards late summer.
- *Idionyx* sp. is an undescribed species closely allied to *I. optata*.

Table 8. Dragonflies recorded at Dawangling. Sequence of genera follows Schorr *et al*. (2001a, 2001b).

Species	Notes
Rhinocypha fenestrella	
Euphaea decorata	
Anisopleura qingyuanensis	
Bayadera bidentata	
Ceriagrion fallax fallax	
Lamelligomphus sp.	awaiting identification
Idionyx (cf. *optata*) sp.	undescribed species
Sympetrum eroticum	

Orthetrum pruinosum
Orthetrum sabina
Orthetrum triangulare
Trithemis aurora
Trithemis festiva
Pantala flavescens

• *Idionyx* sp. is known only from Dawangling.

Butterflies

• Forty-five species of butterfly were encountered over the two-day period (Table 9).

Table 9. Butterflies at Leida Shan (5 August 1999) and Longhuo (6 August 1999). Sequence follows Bascombe (1995).

Species	**Habitat**
Parnara ganga	disturbed forest
Telicota sp.	disturbed forest
Graphium sarpedon	farmland/road
	river/forest
	farmland
Papilio nephelus	disturbed forest
	farmland/road
Papilio paris	forest
Papilio protenor	disturbed forest
	forest
Troides sp.	disturbed forest
Catopsilia pomona	farmland/road
Eurema brigitta	forest
Eurema laeta	farmland/road
Hebomoia glaucippe	river/forest
Pieris (Artogeia) canidia	farmland forest
Pieris (Talbotia) naganum	disturbed forest
Prioneris sp.	river/forest
Abisara fylla	disturbed forest
Acytolepis puspa	river/forest
Curetis dentata	disturbed forest
Remelana jangala	disturbed forest
Zemeros flegyas	disturbed forest
	forest
Argyreus hyperbius	farmland/road
Ariadne ariadne	farmland/road
	farmland
Athyma jina	forest
Cethosia biblis	farmland
Charaxes bernardus	disturbed forest
Cyrestis thyodamas	disturbed forest
Danaus genutia	disturbed forest
Euploea midamus	disturbed forest
Euploea mulciber	disturbed forest
	forest
Hypolimnas bolina	farmland/road
Kallima inachus	disturbed forest
Lethe (Neope) sp.	disturbed forest
	forest
Lethe confusa	forest
Limenitis (Parasarpa) dudu	disturbed forest
Melanitis leda	disturbed forest
	forest
Mycalesis sp.	disturbed forest
Neptis hylas	disturbed forest
	forest
Pantoporia hordonia	disturbed forest
Parantica aglea	disturbed forest
	farmland/road
Polygonia c-aureum	farmland/road

Species	Habitat
Precis (Junonia) iphita	disturbed forest
	farmland/road
Precis (Junonia) orithya	farmland/road
	farmland
Symbrenthia hypselis	disturbed forest
Symbrenthia lilaea	disturbed forest
Tirumala limniace	disturbed forest
Tirumala septentrionis	disturbed forest

- Of the species recorded only *Athyma jina* and *Kallima inachus* are good forest indicators.

Molluscs

- Twelve species of mollusc were found in Dawangling Nature Reserve and the surrounding area. *Hemiphaedusa* sp. could not be identified from the specimen obtained.
- Three new records for Guangxi were made: *Macrochlamys hunancola*, *Opeas gracilis* (also found at Cenwanglaoshan on the same trip) and *Trichochloritis hunanensis*.
- The most abundant species was *Microcystina sinica*, in the village area.

Table 10. Molluscs of Dawangling and the surrounding area.

Species	Habitat
Bradybaena similaris similaris	village
Camaena cicatricosa	forest
Cyclophorus exaltatus	forest
Cyclophorus punctatus	riparian grassland/shrubland
Hemiphaedusa sp.	forest
Kaliella pyramidata	riparian grassland/shrubland
	forest
Kaliella sculpta	riparian grassland/shrubland
Macrochlamys hunancola	forest
Macrochlamys spiriplana	riparian grassland/shrubland
	forest
Microcystina sinica	village
Opeas gracilis	riparian grassland/shrubland
Trichochloritis hunanensis	riparian grassland/shrubland
	forest

- The mollusc fauna at Dawangling was quite diverse and included several central China species.
- The majority of the mollucs recorded were forest species, indicating quite high integrity in the forest remnants.

Summary of flora and fauna

- The present survey found the forest at Dawangling was mainly young secondary coniferous and broadleaf forest and tall shrubland. At high altitude was older forest 10-15 m tall with more continuous cover. Much of the hillside below higher altitude was plantation of *Illicium verum* and *Vernicia* spp.
- The present survey recorded 211 vascular plants. In general relatively few forest specialists were found, and most species are typical of secondary forest and shrubland; an exception was the terrestrial orchid flora at Leida Shan, Tangbin Tun, of which over 50% were forest-dependent. Flora of conservation concern included the globally Vulnerable *Fagus longipetiolata*, the nationally Endangered orchids *Anoectochilus roxyburghii* and *Cymbidium goeringii*, and several nationally Protected and several globally restricted species.
- The mammal fauna has not been studied in recent years, but may include species of conservation concern, such as globally Vulnerable Chinese Goral and Malayan Porcupine, and a number of nationally Protected species. Mammal signs were not infrequent during the survey.
- Fifty-nine bird species were recorded, including several nationally Protected species, and some species characteristic of Indochina and the Himalayan region, near the edge of their range at Dawangling.

- Twelve amphibian and six reptile species were recorded. They included several forest species and forest stream specialists, indicating quite high habitat integrity. The fish fauna was under-sampled, in part because villagers at Shangya Cun were very determined to protect the stream from fishing.
- The ant fauna, with 76 recorded species, included species not previously recorded in South China. There was moderate proportion of forest specialists (42%), indicating moderate forest integrity. Rather few dragonflies were recorded, due to the time of year. They included one undescribed species of *Idionyx* sp. currently known only from Dawangling. Of 45 butterflies recorded, only *Athyma jina* and *Kallima inachus* are good forest indicators. Most of the twelve gastropod species recorded were forest species.
- MacKinnon *et al*. (1994) recommended re-evaluating Dawangling's nature reserve status, due to its badly damaged scrubby forest as judged from satellite photographs; they estimated the forest cover to be only about 34%. However the forest is now probably of higher relative importance in the west Guangxi area, due to ongoing forest loss during the 1990s. The present survey, though only visiting a small proportion of the reserve, confirms the site is still of high local biodiversity importance.

Threats and problems

- The existing forests are small and fragmented, with only small sections of mature forests left. Illegal logging by the local villagers continues to be a threat.
- Collection of plants for various purposes is a serious problem. The present survey found that the Protected fern *Brainea insignis* was collected in large quantities for sale as medicine. The nationally Endangered *Cymbidum goeringii* has been over-collected by orchid traders for ornamental purposes. Other medicinal plants such as *Dysosma versipellis*, *Paris polyphylla*, *Cibotium barometz*, *Alsophila spinulosa*, *Anoectochilus elwesii*, *A. roxyburghii*, *Dendrobium hercoglossum* and *D. henryi* are also at risk of collection.
- The reserve did not seem to have the capacity to enforce a hunting ban. However at the time of the visit this seemed unnecessary; the hunters interviewed said they no longer hunted in the reserve, and this was supported by plentiful signs of deer on the forested ridge.

Opportunities

- Much of the forest biota could survive if habitat loss and degradation were halted; logging and forest clearance would need to be stopped.
- The signs of mammal activity, and the protective attitude of villagers toward their stream fish, suggest that local residents have taken some steps to conserve their resources. The possibility of expanding such community-based schemes to protect trees and plant resources could be investigated.
- To enhance viability of the forest biota existing forest fragments could be linked through natural regeneration, supplemented by reforestation. Most secondary forest could recover gradually by natural succession. On heavily degraded hillsides and in old plantations with reduced productivity, regeneration might be facilitated by planting saplings of native tree species, chosen to represent the natural forest community in the area - seed for such planting should be collected locally. On the most degraded hillsides, sustainable agriculture and forestry could be developed to help villagers improve their livelihoods without depleting the forest resources.

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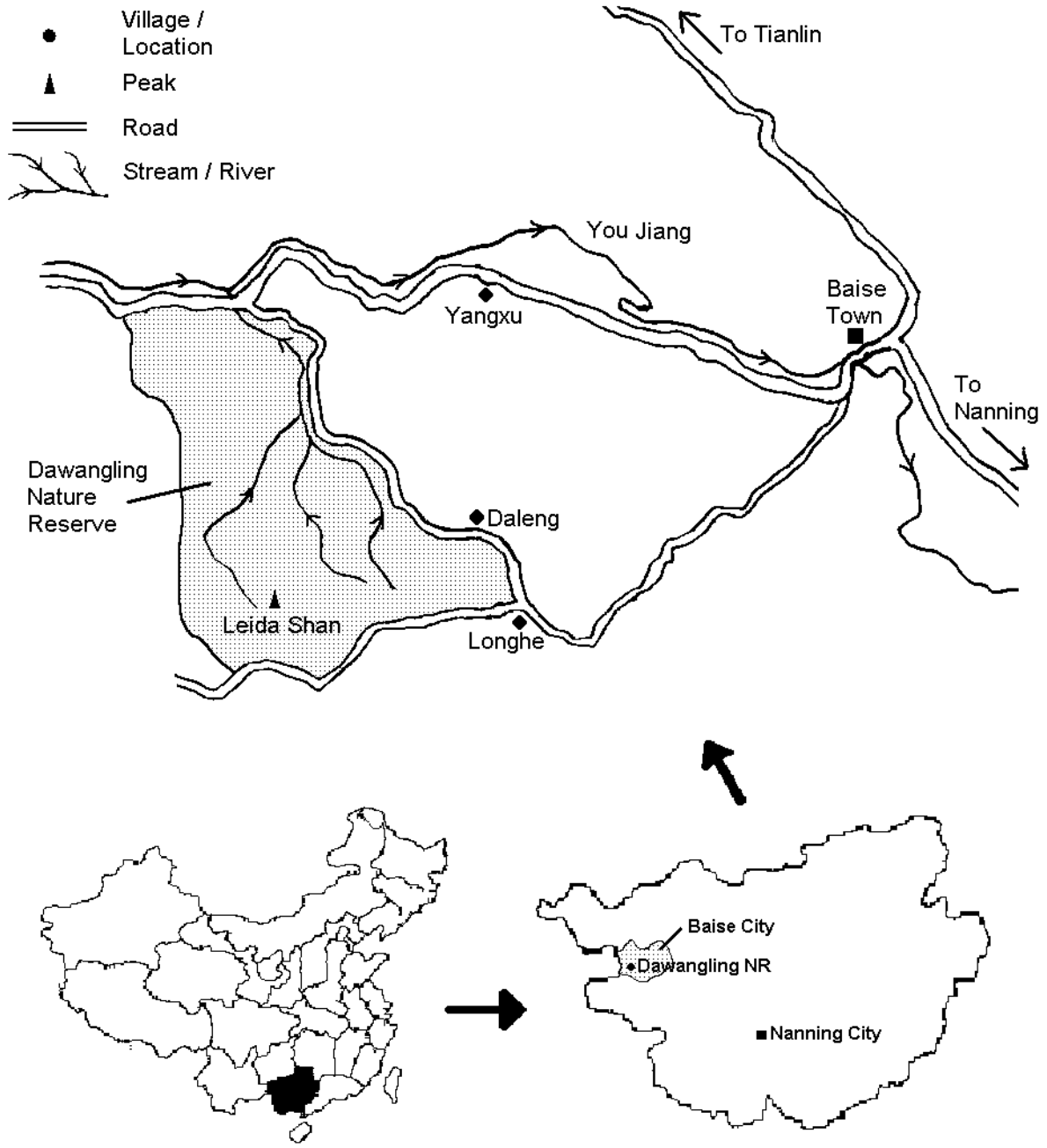

Figure 1. Map showing location of Dawangling Headwater Forest Nature Reserve, West Guangxi, China.