Report of a Rapid Biodiversity Assessment at Yangchun Baiyong Nature Reserve, Southwest Guangdong, 3 May 1998

Kadoorie Farm and Botanic Garden
in collaboration with
Guangdong Province Forestry Department
South China Institute of Botany
South China Agricultural University
South China Normal University
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Background

The present report details the findings of a trip to Southwest Guangdong 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 three years is on gathering up-to-date information on the distribution and status of fauna and flora.

Citation

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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

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Objectives

The aim of the survey was to provide up-to-date information on the biota of Yangchun Baiyong Nature Reserve, and to investigate reports of continued deforestation.

Methods

On 2 May, following a survey of Qixingkeng in Enping County (Kadoorie Farm and Botanic Garden, 2002a), the survey team (BH, JRF, ML, GTR, LKS, CBH, WRJ, LZC, LHJ and XMY) travelled from Jinshan to Yangchun County Town, and thence to Guigang, where torrential rain prevented travel to Baiyong Nature Reserve. This was instead visited on 3 May. On 4 May, at the suggestion of the Yangchun County Forestry Bureau, the team adjourned to Heweishan near the Xianjiadong River (Kadoorie Farm and Botanic Garden, 2002b).

During fieldwork visual searching for plants, mammals, birds, reptiles, amphibians, fish, ants, butterflies and dragonflies was conducted. Estimates of the status of large and medium-sized mammals (excluding Erinaceidae, Talpidae, Soricidae, Muridae and Chiroptera) at Baiyong were largely based on interviews with two reserve wardens, with reference to colour pictures. 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. (1997).

Plant records in the survey were made by CBH, XMY or WRJ, and edited by NSC, except in the case of orchids, which were verified by GS. Records of birds were made or verified by LKS, reptiles and amphibians by ML or LZC, fish by BC and CXL, ants by JRF, butterflies by GTR, dragonflies by GTR and KW of Hong Kong, and rove beetles by GDR, formerly of Hong Kong.

Nomenclature in the report is standardised based, unless otherwise stated, on the following references:

- Flora (Pteridophyta, Gymnospermae and Angiospermae excluding Orchidaceae): Anon. (1959-2000); Anon. (1996-2000); Anon. (2001); The Plant Names Project (2001);
- Orchids (Angiospermae: Orchidaceae): Chen (1999);
- Mammals (Mammalia): Wilson & Reeder (1993); Wilson & Cole (2000);
- Birds (Aves): Inskipp *et al*. (1996);
- Reptiles & Amphibians (Reptilia and Amphibia): Zhao E. *et al*. (2000);
- Fish (Actinopterygii): Nelson (1994); Wu *et al.* (1999);
- Ants (Insecta: Hymenoptera: Formicidae): named species according to Bolton (1995); unnamed species with reference numbers according to the collection currently held by KFBG.
- Dragonflies (Insecta: Odonata): Schorr *et al.* (2001a, 2001b);
- Butterflies (Insecta: Lepidoptera): Bascombe (1995);
- Rove Beetles (Insecta: Coleoptera: Staphylinidae): G. de Rougemont (unpublished).

Information on the global status of species is from IUCN publications, notably Hilton-Taylor (2000) and the Internet site (IUCN Species Survival Commission, 2001). National conservation status of orchids is based on Wang *et al.* (in press). Protection status in China is based on Hua & Yan (1993) for animals and State Forestry Administration & Ministry of Agriculture (1999) for

plants. Provincial protection status of plants is based on Guangdong Provincial Environmental Protection Bureau & South China Institute of Botany (1988). Certain taxa, including orchids, reptiles, amphibians, fish and invertebrates, have yet to be properly assessed for global status.

Location and management

Yangchun Baiyong Provincial Nature Reserve is in Yangchun County, southwest Guangdong, at 22° 24'N, 111° 38'E, bordering the Xinyi Municipality. It was established in 1990 mainly to protect southern subtropical primary forest, rare fauna and flora. It is listed as a Provincial-level Forest Ecosystem Nature Reserve (Zhang W., 1998), and is under the management of the Yangchun County Forestry Bureau. The size of the reserve has been variously given as 37 km^2 (MacKinnon *et al.*, 1996; Zhang J. & Lin, 1997) and 43 km^2 (Zhang W., 1998). The altitude range has been given as 200 to 1,042 m (MacKinnon *et al.*, 1996), or up to 877 m (Zhang J. & Lin, 1997). The rock composition is mainly granite and metamorphic rocks with crimson soil. Average annual temperature is 22°C, and average annual precipitation is 2,385 mm (Zhang J. & Lin, 1997).

Results

Vegetation

The zonal vegetation of Yangchun Baiyong Nature Reserve is southern subtropical monsoon evergreen broadleaf forest (Zhang J. & Lin., 1997). Although the original forest cover was destroyed long ago, secondary forest is well established. The existing vegetation can be broadly divided into the following types:

(1) Southern subtropical monsoon evergreen broadleaf forest (8 km^2). This is mainly on slopes at lower altitudes. The dominant species are Cryptocarya chinensis, Cinnamomum porrectum, Syzygium hancei, Sterculia lanceolata and Schefflera octophylla.
(2) Southern subtropical montane evergreen broadleaf forest (5 km^2). This is found on middle-altitude slopes. The dominant species are Schima superba, Machilus chinensis, Altingia chinensis, Castanopsis fissa and Engelhardtia roxburghiana.
(3) Southern subtropical evergreen coniferous forest (16 km^2) is dominated by Pinus massoniana and Cunninghamia lanceolata. This kind of vegetation has been planted artificially after clearance of the evergreen broadleaf forest.
(4) Mixed evergreen coniferous and broadleaf forest (0.55 km^2). This is distributed at higher altitudes. The dominant species are Pinus massoniana, Schima superba, Altingia chinensis and Castanopsis fissa. This vegetation type encompasses a succession from Pinus to secondary broadleaf forest.
(5) Hillside scrub-grassland (2 km^2). This is mainly in the highlands at the summits of Shuangguiding and Liangshanding. The dominant species are *Baeckea frutescens*, *Dicranopteris pedata*, *Miscanthus sinensis* and *Thysanolaena maxima*. It typically results from prolonged disturbance, such as fire or deforestation, causing open and impoverished vegetation.

Among the five major vegetation types, artificial coniferous forest is the most extensive, demonstrating that the reserve has been subject to extreme disturbance from human activities.

Flora

This survey recorded 126 plant species including ten fern species in eight families, three gymnosperm species in two families and 113 angiosperm species in 56 families (Table 1). The low number of species recorded reflects in part the low sampling effort, as only one day was spent in the reserve. It may also, however, reflect the degraded nature of the vegetation, as earlier

detailed botanical surveys recorded only 959 plant species in 180 families (Zhang J. & Lin, 1997) - a low figure compared to other nature reserves in Guangdong. The flora was dominated by tropical and subtropical families, such as Euphorbiaceae, Lauraceae, Rubiaceae, and Rutaceae.

Table 1. Vascular plant species recorded in Yangchun Baiyong Nature Reserve on 3 May 1998. Species which are under National Protection (Class I or II) (State Forestry Administration & Ministry of Agriculture, 1999) or Provincial Protection (Guangdong Provincial Environmental Protection Bureau & South China Institute of Botany, 1988), globally Threatened or Lower Risk (Near-threatened) (IUCN Species Survival Commission, 2001) or endemic are indicated.

Family	Scientific name	Notes
PTERIDOPHYTA		
Blechnaceae	*Blechnum orientale* L.	
Cyatheaceae	*Alsophila spinulosa* (Wall. ex Hook.) R.M.Tryon	Protected II
Davalliaceae	*Humata repens* (L.f.) Diels	
Dicksoniaceae	*Cibotium barometz* (L.) J. Sm.	Protected II
Gleicheniaceae	*Dicranopteris pedata* (Houtt.) Nakaike	
	Diplopterygium chinensis (Rosenst.) DeVol	
Lycopodiaceae	*Lycopodiastrum casuarinoides* (Spring) Holub	
	Palhinhaea cernua (L.) Franco et Vasc.	
Marattiaceae	*Angiopteris fokiensis* Hieron.	
Osmundaceae	*Osmunda vachellii* Hook.	
GYMNOSPERMAE		
Pinaceae	*Pinus fenzeliana* Hand.-Mazz.	Protected in Guangdong, Lower Risk (IUCN)
	Pinus massoniana Lamb.	
Taxodiaceae	*Cunninghamia lanceolata* (Lamb.) Hook.	planted
ANGIOSPERMAE		
Dicotyledonae		
Actinidiaceae	*Saurauia tristyla* DC.	
Aquifoliaceae	*Ilex formosana* Maxim.	
	Ilex pubescens Hook. et Arn.	
	Ilex rotunda Thunb.	
Araliaceae	*Schefflera octophylla* (Lour.) Harms	
Asteraceae	*Crassocephalum crepidioides* (Benth.) S. Moore	introduced from Africa
Caesalpiniaceae	*Bauhinia championii* (Benth.) Benth.	
	Bauhinia corymbosa Roxb. ex DC.	
Campanulaceae	*Pratia nummularia* (Lam.) A. Br. et Aschers.	
Caprifoliaceae	*Viburnum fordiae* Hance	
Celastraceae	*Euonymus laxiflorus* Champ. ex Benth.	
Chloranthaceae	*Sarcandra glabra* (Thunb.) Nakai	
Clusiaceae	*Cratoxylum cochinchinense* (Lour.) Blume	
	Hypericum japonicum Thunb. ex Murray	
Daphniphyllaceae	*Daphniphyllum macropodum* Miq.	
Elaeocarpaceae	*Elaeocarpus duclouxii* Gagnep.	
	Elaeocarpus varunua Buch.-Ham.	
	Sloanea sinensis (Hance) Hemsl.	
Escalloniaceae	*Polyosma cambodiana* Gagnep.	
Euphorbiaceae	*Aporosa dioica* (Roxb.) Müll. Arg.	
	Breynia fruticosa (L.) Hook. f.	
	Bridelia tomentosa Blume	
	Glochidion wrightii Benth.	
	Macaranga denticulata (Blume) Müll. Arg.	
	Mallotus apelta (Lour.) Müll. Arg.	
	Mallotus barbatus (Wall.) Müll. Arg.	
	Sapium discolor (Champ. ex Benth.) Müll.-Arg.	
	Vernicia montana Lour.	
Fagaceae	*Castanopsis fissa* (Champ. ex Benth.) Rehder et E. H. Wilson	
	Cyclobalanopsis hui (Chun) Chun ex Y.C. Hsu & H.W. Jen	

Family	Scientific name	Notes
Flacourtiaceae	*Casearia balansae* Gagnep.	
	Casearia glomerata Roxb.	
Hamamelidaceae	*Altingia chinensis* (Champ. ex Benth.) Oliv. ex Hance	
	Mytilaria laosensis Lecomte	
Hernandiaceae	*Illigera rhodantha* Hance	
Illiciaceae	*Illicium verum* Hook. f.	Cultivated
Juglandaceae	*Engelhardtia roxburghiana* Wall.	
Lamiaceae	*Isodon serra* (Maxim.) Kudô	
Lauraceae	*Cinnamomum porrectum* (Roxb.) Kosterm.	
	Lindera chunii Merr.	
	Lindera communis Hemsl.	
	Litsea cubeba (Lour.) Pers.	
	Litsea euosma W.W. Sm.	
	Machilus breviflora (Benth.) Hemsl.	
	Neolitsea kwangsiensis H. Liu	
Magnoliaceae	*Manglietia moto* Dandy	
	Michelia macclurei Dandy	
	Michelia odora (Chun) Nooteb. & B.L. Chen	Lower Risk (IUCN)
Malpighiaceae	*Hiptage benghalensis* (L.) Kurz	
Melastomataceae	*Medinilla septentrionalis* (W.W. Sm.) H.L. Li	
	Melastoma candidum D. Don	
	Melastoma sanguineum Sims	
Meliaceae	*Toona ciliata* M. Roem. var. *pubescens* (Franch.) Hand.-Mazz.	Protected II
Mimosaceae	*Albizia corniculata* (Lour.) Druce	
	Cylindrokelupha turgida (Merr.) T.L. Wu	
	Pithecellobium clypearia (Jack) Benth.	
Moraceae	*Ficus erecta* Thunb.	
	Ficus esquiroliana H. Lév.	
	Ficus fistulosa Reinw. ex Blume	
Myrsinaceae	*Ardisia crenata* Sims	
	Myrsine seguinii H. Lév	
Myrtaceae	*Cleistocalyx operculatus* (Roxb.) Merr. et L. M. Perry	
	Syzygium hancei Merr. et L. M. Perry	
Papilionaceae	*Dalbergia hancei* Benth.	
	Desmodium heterocarpon (L.) DC.	
	Millettia dielsiana Harms	
	Mucuna birdwoodiana Tutch.	
	Pueraria lobata (Willd.) Ohwi	
Pentaphylacaceae	*Pentaphylax euryoides* Gardner & Champ.	
Primulaceae	*Lysimachia fordiana* Oliv.	
Ranunculaceae	*Ranunculus cantoniensis* DC.	
Rhizophoraceae	*Carallia longipes* Chun ex W.C. Ko	
Rosaceae	*Rhaphiolepis indica* (L.) Lindl.	
	Rubus leucanthus Hance	
Rubiaceae	*Adina pilulifera* (Lam.) Franch. ex Drake	
	Canthium dicoccum (Gaertn.) Teysmann et Binnedijk	
	Diplospora dubia (Lindl.) Masam.	
	Morinda umbellata L.	
	Mussaenda pubescens W. T. Aiton	
	Psychotria asiatica L.	
	Wendlandia uvariifolia Hance	
Rutaceae	*Acronychia pedunculata* (L.) Miq.	
	Evodia glabrifolia (Champ. ex Benth.) C.C. Huang	
	Evodia lepta (Spreng.) Merr.	
	Toddalia asiatica (L.) Lam.	
	Zanthoxylum laetum Drake	
Sabiaceae	*Meliosma rigida* Siebold et Zucc.	
	Sabia swinhoei Hemsl.	
Sapindaceae	*Mischocarpus pentapetalus* (Roxb.) Radlk.	
Sapotaceae	*Sarcosperma laurinum* (Benth.) Hook. f.	

Family	Scientific name	Notes
Staphyleaceae	*Turpinia arguta* (Lindl.) Seem.	
Sterculiaceae	*Byttneria aspera* Colebr. ex Wall.	
	Reevesia thyrsoidea Lindl	
	Sterculia lanceolata Cav.	
Styracaceae	*Alniphyllum fortunei* (Hemsl.) Makino	
Theaceae	*Anneslea fragrans* Wall.	
	Camellia oleifera Abel	
Thymelaeaceae	*Wikstroemia nutans* Champ. ex Benth.	
Ulmaceae	*Gironniera subaequalis* Planch.	
	Trema orientalis (L.) Blume	
Urticaceae	*Boehmeria nivea* (L.) Gaudich.	
Monocotyledonae		
Amaryllidaceae	*Curculigo capitulata* (Lour.) Kuntze	
Liliaceae	*Dianella ensifolia* (L.) DC.	
	Heterosmilax japonica Kunth	
Marantaceae	*Phrynium placentarium* (Lour.) Merr.	
Musaceae	*Orchidantha chinensis* T.L.Wu	endemic to west Guangdong and south Guangxi
Orchidaceae	*Pholidota chinensis* Lindl.	epiphytic
Poaceae	*Lophatherum gracile* Brongn.	
	Miscanthus floridulus (Labill.) Warb. ex K. Schum et Lauterb.	
	Paspalum orbiculare Forst.	
	Thysanolaena maxima (Roxb.) Kuntze	
Taccaceae	*Schizocapsa plantaginea* Hance	
Zingiberaceae	*Alpinia oblongifolia* Hayata	

Among the species recorded in this survey, *Michelia odora* (*Tsoongiodendron odorum* Chun) and *Pinus fenzeliana* are listed as Lower Risk (Near-threatened) globally. *Pinus fenzeliana* is also under provincial protection in Guangdong. *Alsophila spinulosa*, *Cibotium barometz* and *Toona ciliata* var. *pubescens* are Class II protected nationally. *Orchidantha chinensis* is endemic to west Guangdong and south Guangxi. National conservation status of orchids is currently under review, but the single species recorded is listed under CITES Appendix II.

Mammals

No direct mammal sightings were made during the survey. The mammals reported to occur are listed in Table 2.

Table 2. The status of mammals (excluding Erinaceidae, Talpidae, Soricidae, Muridae and Chiroptera) at Yangchun Baiyong Nature Reserve, Guangdong. Based on interviews with two reserve wardens, Mr. Xie and Mr. Yan (+ = "rare", ++ = "common", +++ = "abundant"). Species names and sequence follow Wilson & Cole (2000), with synonyms commonly used by Chinese scientists in brackets.

Scientific name	English name	Mr. Xie	Mr. Yan	Probable status
Vulpes vulpes	Red Fox	-	+	insecure or extirpated
Prionailurus bengalensis (=Felis bengalensis)	Leopard Cat	+	+	insecure
Herpestes javanicus	Javan Mongoose	+	-	insecure or extirpated
Lutra lutra	Eurasian Otter	+	-	insecure or extirpated
Melogale moschata	Chinese Ferret-badger	+++	?	present
Mustela kathiah	Yellow-bellied Weasel	+	-	insecure or extirpated
Paguma larvata	Masked Palm Civet	++	+	insecure
Viverricula indica	Small Indian Civet	+	+	insecure
Sus scrofa	Wild Boar	+++	+++	present
Muntiacus muntjak	Indian Muntjac	+	-	insecure
Muntiacus reevesii	Reeves's Muntjac	+	++	uncertain
Manis pentadactyla	Chinese Pangolin	+	+++	insecure
Hystrix brachyura (=H. hodgsoni)	Malayan Porcupine	-	+++	insecure

Eurasian Otter *Lutra lutra* is Vulnerable globally and Class II protected in China. Malayan Porcupine *Hystrix brachyura* is globally Vulnerable. Chinese Pangolin *Manis pentadactyla* is considered globally Lower Risk (Near-threatened), and Class II protected in China. Small Indian Civet *Viverricula indica* is Class II protected in China. It appears from this indirect evidence that the mammal fauna of Baiyong is highly impoverished, with only the more adaptable species remaining.

Birds

Twenty-four species of birds were recorded (Table 3). The most frequently found species were Sulphur-breasted Warbler *Phylloscopus ricketti*, Chestnut Bulbul *Hemixos castanonotus*, Black Bulbul *Hypsipetes leucocephalus* and Hill Prinia *Prinia atrogularis*.

Table 3. Birds recorded at Baiyong, 3 May 1998. Sequence follows Clements (2000).

Scientific name	**English name**
Spilornis cheela	Crested Serpent Eagle
Accipiter trivirgatus	Crested Goshawk
Falco tinnunculus	Common Kestrel
Hierococcyx sparverioides	Large Hawk Cuckoo
Hierococcyx fugax	Hodgson's Hawk Cuckoo
Cuculus saturatus	Oriental Cuckoo
Centropus sinensis	Greater Coucal
Hirundo daurica	Red-rumped Swallow
Motacilla alba	White Wagtail
Motacilla cinerea	Grey Wagtail
Pericrocotus solaris	Grey-chinned Minivet
Pycnonotus jocosus	Red-whiskered Bulbul
Hemixos castanonotus	Chestnut Bulbul
Hypsipetes leucocephalus	Black Bulbul
Prinia atrogularis	Hill Prinia
Prinia flaviventris	Yellow-bellied Prinia
Cettia fortipes	Brownish-flanked Bush Warbler
Orthotomus cuculatus	Mountain Tailorbird
Orthotomus sutorius	Common Tailorbird
Phylloscopus fuscatus	Dusky Warbler
Phylloscopus ricketti	Sulphur-breasted Warbler
Cyornis hainana	Hainan Blue Flycatcher
Enicurus schistaceus	Slaty-backed Forktail
Saxicola torquata	Common Stonechat
Garrulax canorus	Hwamei
Pomatorhinus ruficollis	Streak-breasted Scimitar Babbler
Pnoepyga pusilla	Pygmy Wren Babbler
Stachyris ruficeps	Rufous-capped Babbler
Alcippe morrisonia	Grey-cheeked Fulvetta
Parus major	Great Tit
Aethopyga christinae	Fork-tailed Sunbird
Dicaeum ignipectus	Fire-breasted Flowerpecker
Lanius schach	Long-tailed Shrike
Garrulus glandarius	Eurasian Jay
Urocissa erythrorhyncha	Red-billed Blue Magpie
Corvus macrorhynchus	Large-billed Crow

Crested Serpent Eagle *Spilornis cheela*, Crested Goshawk *Accipiter trivirgatus* and Greater Coucal *Centropus sinensis* are Class II protected species in China. The presence of forest-dependent birds such as Hodgson's Hawk Cuckoo *Hierococcyx fugax*, Black Bulbul *Hypsipetes leucocephalus* and Grey-chinned Minivet *Pericrocotus solaris* suggested that the forest remnants still have value for bird conservation.

Reptiles and Amphibians

Sixteen species of amphibians, one species of terrapin (caught by a villager from a dammed stream pool), four species of lizard and three species of snake were found during this survey (Table 4). At Baiyong reserve, the most frequently encountered species were *Ophryophryne pachyproctus*, *Amolops* sp., and *Sphenomorphus incognitus*. At Guigang, the most common species were *Polypedates megacephalus* and *Microhyla ornata.*

Table 4. Amphibians and reptiles recorded at Baiyong, 3 May 1998. Sequence follows Zhao E.-M. & Adler (1993).

Species	**Habitat**	
AMPHIBIA		
Megophrys kuatunensis	stream	✓
Ophryophryne pachyproctus	stream	✓
	pool	✓
Bufo melanostictus	agricultural field	✓
	ditch	✓
	pool	tadpoles
Hyla simplex	ditch	✓
	paddy field	✓
Amolops sp.	stream	✓
Occidozyga lima	paddy field	✓
Occidozyga martensii	marsh	✓
	paddy field	✓
Rana guentheri	agricultural field	✓
	paddy field	✓
	pool	✓
Rana limnocharis	agricultural field	✓
	paddy field	✓
	pool	✓
Rana livida	catchwater	✓
	stream	✓
Rana rugulosa	paddy field	✓
Polypedates megacephalus	marsh	✓
	pool	✓
Polypedates megacephalus	agricultural field	✓
	paddy field	✓
Microhyla butleri	fir plantation	✓
	pool	✓
Microhyla heymonsi	pool	✓
	fir plantation	✓
Microhyla ornata	marsh	✓
	paddy field	✓
	pool	✓
Microhyla pulchra	paddy field	✓
	pool	✓
REPTILIA		
Platysternon megacephalum	stream pool	✓
Calotes microlepis	catchwater	✓
Calotes versicolor	agricultural field	✓
Sphenomorphus incognitus	fir plantation	✓
	stream	✓
Tropidophorus sinicus	fir plantation	✓
Calamaria septentrionalis	catchwater	✓
Sinonatrix aequifasciata	stream	✓
Trimeresurus albolabris	bamboo forest/paddy field	✓

Amolops sp. is a frog species, probably new to science, which was first found at Dawuling, southwest Guangdong in 1997 but misidentified as *A. torrentis* (Fellowes & Hau, 1997).

Ophryophryne pachyproctus was apparently known only from its type locality at Zhushihe, Yunnan (Yang, 1991; Zhao E.-M. & Adler, 1993) and the present record represents a considerable range extension for this rare frog. The record of *Calotes microlepis* was the first from Guangdong. This lizard has a restricted distribution in southern China, and is also found in Vietnam, Burma and India (Zhao E.-M. & Adler, 1993). *Megophrys kuatunensis* is a Chinese endemic and this is only the second record of the species from Guangdong. The skink, *Sphenomorphus incognitus*, a new record for Guangdong, was also recorded at Qixingkeng in Enping County (Kadoorie Farm and Botanic Garden, 2002a).

The presence of *Megophrys kuatunensis, Ophryophryne pachyproctus* and *Amolops* sp. indicates that the small hill streams and the riparian habitat within Baiyong Reserve have escaped severe disturbance. The occurrence of *Calotes microlepis* shows that the forest remnants left in the reserve still support uncommon forest species.

Fish

No streams inside the Baiyong Nature Reserve were surveyed. Six freshwater fish species were recorded in a stream at nearby Guigang (Table 5). The most abundant were the torrent loaches *Pseudogastromyzon fangi* and *Liniparhomaloptera disparis disparis* and the barb *Acrossocheilus parallens*. All species are widely distributed in Guangdong and none are of special conservation concern.

Table 5. Freshwater fish species at Guigang, near Baiyong. Sequence of genera follows Nelson (1994).

Species	**Habitat**
Nicholsicypris normalis	stream
Acrossocheilus parallens	stream
Schistura fasciolata	stream
Liniparhomaloptera disparis disparis	stream
Pseudogastromyzon fangi	stream
Pterocryptis gilberti	stream

Ants

Thirty-one ant species were recorded from Baiyong Nature Reserve (Table 6). The most frequently recorded species were *Pheidole smythiesi*, *Pheidole noda*, *Paratrechina* sp. 4, *Tapinoma* sp. 1, *Paratrechina* sp. 26 and *Pristomyrmex pungens*.

Table 6. Ant species encountered at Baiyong, 3 May 1998.

Species	**Habitat**
Camponotus (cf. *mitis*) sp. 11	secondary forest
Camponotus nicobarensis	forest, shrubland, urban
Camponotus (cf. *wasmanni*) sp. 35	secondary forest
Cataulacus granulatus	secondary forest
Crematogaster sp.	urban
Crematogaster (cf. *travancorensis*) sp. 2	secondary forest
Crematogaster (cf. *laboriosa*) sp. 3	secondary forest
Crematogaster (cf. *biroi*) sp. 4	low shrubland/ grassland
Diacamma (nr. *rugosum*) sp. 1	forest, shrubland
Leptogenys sp. 16	secondary forest
Leptogenys (cf. *lucidula*) sp. 10	secondary forest
Monomorium sp. 13	secondary forest
Odontomachus monticola	secondary forest
Odontomachus (cf. *silvestrii*) sp. 3	secondary forest
Pachycondyla (*javana* group) sp. 1	secondary forest
Pachycondyla (cf. *luteipes*) sp. 2	low shrubland/ grassland
Paratrechina (cf. *bourbonica*) sp. 4	forest, shrubland, grassland
Paratrechina longicornis	urban

Species	Habitat
Paratrechina (cf. *opaca*) sp. 26	forest, shrubland
Pheidole noda	forest, shrubland
Pheidole sp. 11	secondary forest
Pheidole smythiesi	forest, shrubland
Pheidole (*rinae* group) sp. 3	secondary forest
Polyrhachis dives	secondary forest
Polyrhachis (Campomyrma) sp. 20	secondary forest
Polyrhachis wolfi	secondary forest
Prenolepis (cf. *emmae*) sp. 1	shrubland, forest
Pristomyrmex pungens	forest, shrubland
Rhoptromyrmex wroughtonii	forest, shrubland
Tapinoma sp. 1	forest, shrubland, urban
Tetramorium sp. 22	secondary forest
Tetraponera attenuata	secondary forest
new formicine genus sp. 1	low shrubland/ grassland

Some of the species found, including *Monomorium* sp. 13, undescribed formicine genus sp. 1 and *Tetramorium* sp. 22, are possibly new to science. Others, including *Odontomachus* sp. 3 and *Leptogenys* sp. 10, are recorded from Guangdong for the first time.

Camponotus sp. 35, *Leptogenys* sp. 10 and *Odontomachus* sp. 3 are believed to survive only in or near primary forest, while *Odontomachus monticola*, *Paratrechina* sp. 26, *Polyrhachis* sp. 20, *P. wolfi* and *Prenolepis* sp. 1 are also confined to forest areas.

Dragonflies

Ten species of odonates were recorded on the day of the survey (Table 7), of which seven were encountered along a narrow catchwater running through disturbed forest. Several of these are good forest species, including a new species of *Rhipidolestes* (a new Guangdong endemic), *Agriomorpha fusca*, *Drepanosticta brownelli* and *Macromia* sp. The most abundant species was *Pantala flavescens*.

Table 7. Dragonflies recorded at Baiyong, 3 May 1998. Sequence of families follows Schorr *et al.* (2001a; 2001b).

Species	Habitat	Notes
Mnais mneme	disturbed forest 500m	
Mnais sp. A	disturbed forest 500m	pending identification
Agriomorpha fusca	disturbed forest 500m	
Rhipidolestes sp. nov.	disturbed forest 500m	Guangdong endemic
Coeliccia cyanomelas	disturbed forest 500m	
Drepanosticta brownelli	disturbed forest 500m	
Macromia sp.	disturbed forest 500m	pending identification
Pantala flavescens	ubiquitous	
Trithemis festiva	shrub 250m	
Zygonyx sp.	disturbed forest 250m	not collected

Butterflies

Only 13 species of butterfly were recorded, of which only *Ypthima chinensis* has not been recorded from Hong Kong. The common white *Artogeia canidia* was the most frequently recorded species. None of the species encountered are particularly indicative of pristine forest.

Table 8. Butterflies recorded at Baiyong, 3 May 1998. Sequence of families follows Bascombe (1995).

Species	Habitat
Lamproptera curius	disturbed forest
Papilio helenus	disturbed forest

Species	Habitat
Papilio memnon	disturbed forest
Troides helena	disturbed forest
Catopsilia pyranthe	disturbed forest
Eurema hecabe	disturbed forest
Pieris (Artogeia) canidia	disturbed forest
Nacaduba kurava	disturbed forest
Zemeros flegyas	disturbed forest
Cupha erymanthis	disturbed forest
Cyrestis thyodamas	disturbed forest
Mycalesis mineus	disturbed forest
Ypthima chinensis	disturbed forest

Rove Beetles

Three species of staphylinid beetle were recorded at Baiyong. At least one of these, *Erichsonius* sp., is new to science, and was subsequently found at Heweishan (Kadoorie Farm and Botanic Garden, 2002b). The other two, *Myrmecocephalus* sp. and *Phinopilus* sp., are probably also new to science.

Table 9. Rove beetles (Staphylinidae) recorded at Baiyong, 3 May 1998.

Species	Habitat	Notes
Erichsonius sp. nov.	secondary forest litter, 250m	new to science; different from the previous Guangdong species; also at Heweishan
Myrmecocephalus sp.	fragmented forest, 400m	probably new to science
Phinopilus sp. nov.	fragmented forest litter, 400m	probably new to science

Summary of flora and fauna

Baiyong Nature Reserve has a secondary vegetation cover which has been severely damaged by logging in recent years. The flora is typical of degraded landscapes and secondary forests in Guangdong, with relatively low plant diversity in the areas visited. Only two globally near-threatened species (*Michelia odora* and *Pinus fenzeliana*), three nationally protected species (*Alsophila spinulosa*, *Cibotium barometz* and *Toona ciliata* var. *pubescens*), and one regionally restricted species (*Orchidantha chinensis*) were found in the survey.

The fauna also shows signs of being somewhat depleted; most of the large forest mammals appear to have been lost. However, the small hill streams in the reserve still support several rare amphibian species and are of high conservation value. The patch of forest surveyed was small and disturbed, but nevertheless contained an undescribed species of damselfly, and several ants of conservation interest.

Only one day was spent surveying the reserve and the species list obtained in this study is far from complete. MacKinnon *et al.* (1996) gave Baiyong a rating of D (lowest priority) for its biodiversity importance, implying that it does not appear suitable for listing as a nature reserve. The results of this brief survey contradict this, and suggest that Baiyong is still of local significance as a sanctuary for forest biota.

Threats and problems

Before 1990 the Nature Reserve was a forest farm. Since the ownership rights and reserve boundaries were not clearly defined on its establishment, illegal felling has been widespread. As a result the broadleaf forest is now highly fragmented and restricted to ravines. In addition, the hydroelectric plants in the area have seriously affected the main stream within the reserve. During the visit the flow in the stream was drastically reduced and there were sections with no flow at all.

Thus it appears that development of the reserve has not succeeded in protecting habitats of biodiversity importance.

Opportunities and recommendations

There were still patches of native broadleaf forest left and they should be strictly protected. If Baiyong is to function as a nature reserve, the conservation objectives should be defined and understood by staff and residents. Particular attention should be paid to habitats most important to threatened species, such as those outlined in this report: in general these include mature forests, particularly those surrounding healthy streams. The nature reserve boundary should be clearly delineated to encompass the surviving natural forest, and logging of natural forest strictly prohibited. No further development of buildings, dams, roads etc. should be allowed without an independent environmental impact assessment. Zones should be revised; different zones should be policed based on the nature and degree of threats, and ecosystem integrity should be monitored.

Capacity building is needed for the Nature Reserve staff. A capacity building programme should be based on the specific needs and proposals for personnel recruitment, training and deployment; the necessary funding should be directed towards implementing conservation objectives. Various IUCN guidelines are available on subjects relevant to reserve management, such as ecotourism, reintroduction and control of alien invasive species. These would be useful aids to reserve staff.

Conflicts between people and nature should be minimised. The hydroelectric plants should take up less water, to ensure a continuous base flow in the main stream even during the dry season, allowing the re-establishment of the lotic community. Benefits of the reserve to the local community should be maximised, without compromising biodiversity conservation or the sustainability of resource use. Benefits should also be publicised: the economic contribution of natural forest to hydropower generation should be assessed and incorporated in decision-making on local resource use. It should also be featured in a comprehensive environmental education programme for residents and visitors.

In areas where the China Fir (*Cunninghamia lanceolata*) has been or will be harvested, reforestation using native tree species should be carried out, as recommended by MacKinnon *et al*. (1996). This would ultimately lead to economic benefits, including hydropower production, as well as environmental services. The re-established secondary forests will provide additional habitat for the rare forest species living at Baiyong and may attract some of the larger wildlife that has disappeared from the reserve.

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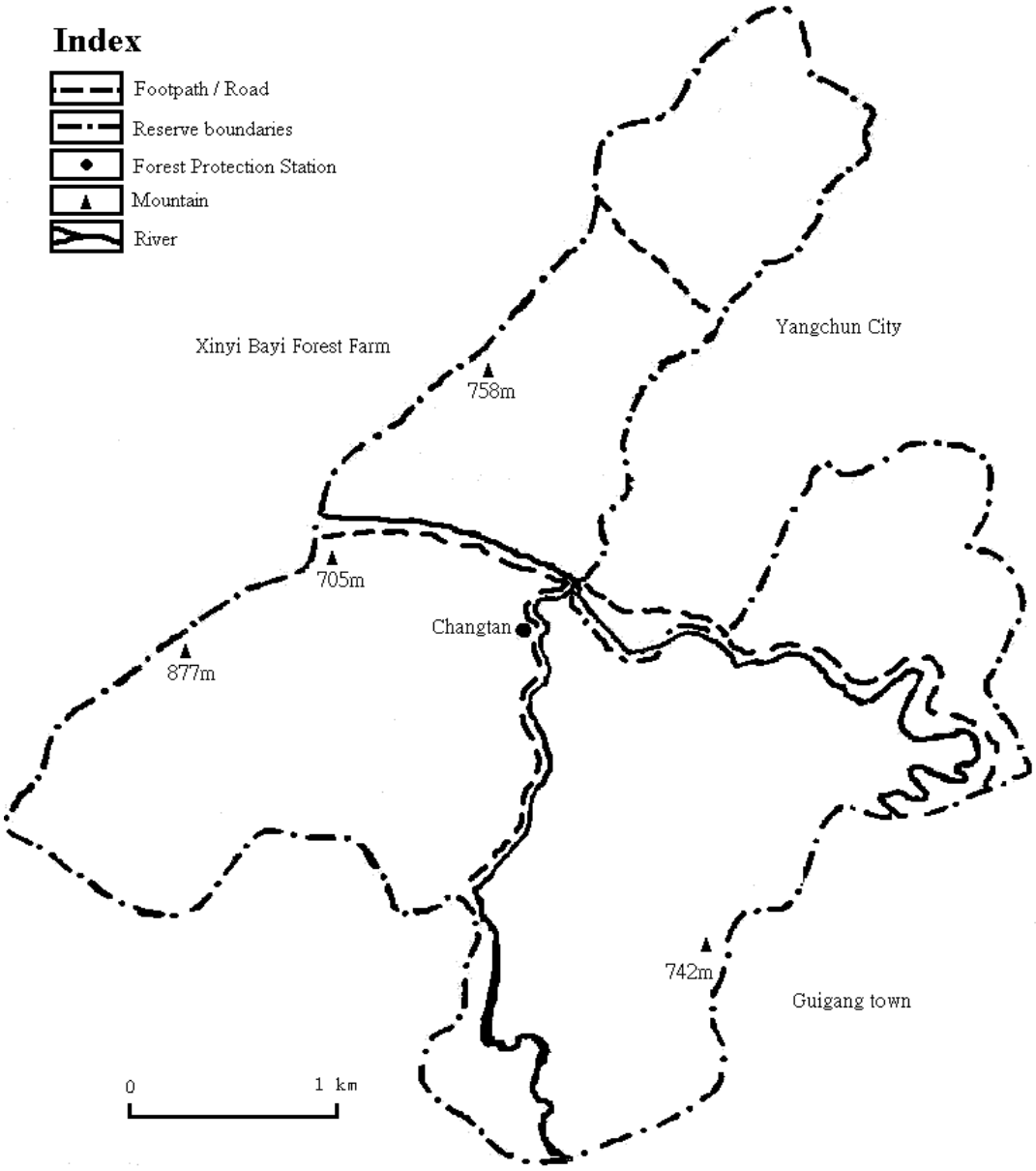

Figure 1 Yangchun Baiyong Nature Reserve, Southwest Guangdong.