



**Report of a Rapid Biodiversity Assessment at  
Heishiding Nature Reserve, West Guangdong,  
China, July 2002**

**Kadoorie Farm and Botanic Garden  
in collaboration with  
Guangdong Provincial Forestry Department  
South China Normal University**

**March 2004**

**South China Forest Biodiversity Survey Report Series: No. 39  
(Online Simplified Version)**

# **Report of a Rapid Biodiversity Assessment at Heishiding Nature Reserve, West Guangdong, China, July 2002**

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## **Background**

The present report details the findings of a visit to West 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 (renamed the China Programme in 2003). 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.

## **Citation**

Kadoorie Farm and Botanic Garden, 2004. *Report of a Rapid Biodiversity Assessment at Heishiding Nature Reserve, West Guangdong, China, July 2002*. South China Forest Biodiversity Survey Report Series (Online Simplified Version): No. 39. KFBG, Hong Kong SAR, ii + 19 pp.

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March 2004

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### Translation of some 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, summit
Gang	harbour
Hai	sea
He, Chuan, Jiang	river
Hu, Chi	lake
Keng, Gu, Gou	valley, stream
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

# Report of a Rapid Biodiversity Assessment at Heishiding Nature Reserve, West Guangdong, China, July 2002

## Objectives

- The aims of the survey were to collect up-to-date information on the fauna and flora of Heishiding Nature Reserve, and to use this to help determine conservation priorities within South China.
- The present survey was the second visit by a team of biologists from KFBG, the earlier one on 22-25 April 1997 concentrating on birds, herpetofauna, butterflies and ants (Fellowes and Hau, 1997). This second survey sought to update and augment the information gained earlier, with additional attention to groups not previously covered such as flora, fish and dragonflies.

## Methods

- On 4 July 2002 a team of biologists from Hong Kong (ML, LKS, BC, NSC) and Guangzhou (LZC, XZ) travelled to Qixing Town of Fengkai County, after conducting a rapid biodiversity assessment at Dawuling Nature Reserve of Xinyi City (Kadoorie Farm and Botanic Garden, 2004).
- During fieldwork visual searching for plants, mammals, birds, reptiles, amphibians, fish, 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.
- Vascular plant records were made and edited by NSC, except for orchids, for which records were made by NSC. No direct mammal records were made. Records of birds were made or verified by LKS or ML, reptiles and amphibians by ML, BC, LZC or XZ, fish by BC, dragonflies and butterflies by ML, and dragonflies verified by KW.
- Nomenclature in the report is standardised based, unless otherwise stated, on the following references:
  - Flora (Pteridophyta, Gymnospermae and Angiospermae): Anon. (1959-2001); Anon. (1996-2001); Anon. (2002a, 2002b); The Plant Names Project (2002);
  - 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 *et al.* (1999);
  - 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 (2003). 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 Yu (1999) for plants.

## Location and management

- Heishiding Nature Reserve is located in Fengkai County, Zhaoqing City District, West Guangdong, bordering Guangxi. The coordinates have been given variously as 112° 00'E, 23° 30'N (MacKinnon *et al.*, 1996) and 111° 53'E, 23° 27'N. (Zhang J., 1997). The Tropic of Cancer runs through the Shimentang core area. The size of the reserve has been given as 32.3 km<sup>2</sup> (State Forestry Administration Wildlife Conservation Office, 2003) or 42 km<sup>2</sup> (Zhang J., 1997).

- The geology is mainly granite with some shale. The reserve has a moderately gentle landscape. Altitude in the reserve ranges from below 150 m to 927 m. The highest peak is Heishiding itself at 927 m (Anon., n.d.; Wang B. & Liu, 1987), streams from the reserve flow north into Qixing River, all eventually feeding into the Xi Jiang of the Zhujiang system.
- The region as a whole has a subtropical monsoon climate. Mean annual temperature at the nearby Qixing Town (200 m) is 19.6°C, mean monthly temperature ranges from 10.6°C in January to 28°C in summer; annual precipitation is about 1,800 mm and occurs mainly between April and September (Wang B. & Liu, 1987).
- The reserve was established in 1979 and upgraded to provincial level in 1996 (Zhang J., 1997). Its major objective is to protect the southern subtropical evergreen broadleaf forest and rare plants and animals (State Forestry Administration Wildlife Conservation Office, 2003). It is surrounded by the Qixing Forest Farm on the north side.
- Archaeological studies reveal evidence of human settlement from the Neolithic Age (Zhang J., 1997); as a result little primary forest remains in the nature reserve, but almost the whole reserve is currently covered in secondary broadleaf forest in various successional stages. The western portion of the reserve has a long history of human activities, thus suffered intense human disturbance over a long period with consequently degraded vegetation. The eastern portion of the reserve, i.e. Shimentang and its surrounding forest, has escaped intensive disturbance and the mature forest is believed to be almost 200 years old (Liu B. and Wang, 1987, 32). About 10 km<sup>2</sup> of the reserve was covered in relatively mature forest in 1997 (Zhang J., 1997). The main road along Qixing River bordering the northern limits of the reserve was constructed in 1965, and still serves as an important transport route between Guangdong and Guangxi.

## Results

### Vegetation

- The zonal vegetation of the Heishiding area should be southern subtropical evergreen broadleaf forest. The present survey found fairly extensive cover of natural forest with large trees in the surveyed area. The relatively high abundance of large *Pinus massoniana*, however, suggested that the forest is largely secondary.
- The present survey has covered the following areas and vegetation types/formations:
  - Extensive cover of lowland evergreen broadleaf forest dominated by *Castanopsis nigrescens*, *Cast. kawakamii*, *Cyclobalanopsis chungii*, *Ixonanthes chinensis*, *Cast. carlesii*, *Pinus massoniana*, *Cast. fabri*, *Altingia chinensis*, *Artocarpus styracifolius* and *Xanthophyllum hainanense* could be found in the experimental zone along the reserve main road behind the headquarters leading to the core area and along the stream from Shimentang to Heishi He. The forest is about 20-30m tall with trees up to 80cm dbh. The understorey is dominated by *Gymnosphaera podophylla* and *Cibotium barometz*.
  - Younger secondary broadleaf forest about 6-15m tall and dominated by *Schefflera heptaphylla*, *Pinus massoniana*, *Castanopsis nigrescens* and *Cyclobalanopsis chungii* was found around an abandoned farmland.
  - Lowland ravine forest dominated by *Ormosia pachycarpa* var. *tenuis*, *Castanopsis nigrescens*, *Alniphyllum fortunei* and *Xanthophyllum hainanense* was found. The forest is about 6-15m tall with trees up to 40 cm dbh.
  - Grassland, in places waterlogged, formed from abandoned farmland and dominated by *Imperata koenigii*, *Paspalum orbiculare*, *Sphaerocaryum malaccense*, *Juncus prismatocarpus*, *P. conjugatum* and *Cyperus haspans* could be found.

## Flora

- The present survey recorded 326 vascular plant species, including 26 fern species in 15 families, two gymnosperm species in two families, and 298 flowering plant species in 91 families (Table 1).
- Among the flora recorded, there are several species of conservation importance:
  - *Artocarpus hypargyreus* and *Ixonanthes chinensis* are both considered globally Vulnerable by IUCN (2003). Both species are common and widespread in South China. They were locally abundant and co-dominant in evergreen forest of the surveyed area.
  - *Madhuca pasquieri* is globally Vulnerable. Only a few saplings were found in the present survey.
  - *Sinia rhodoleuca* is under Class I National Protection in China. It is restricted to northwestern Guangdong and central and northern Guangxi. Thirteen plants were found. A few plants were also found at Shimentang.
  - *Castanopsis kawakamii* is considered to be Near Threatened. It is widespread in South China and was abundant at Heishiding.
  - *Gymnosphaera hancockii*, *G. metteniana*, and *G. podophylla* belong to the tree fern family which is under Class II National Protection in China. All of them are widespread and common in South China. *Gymnosphaera podophylla* was locally abundant in the surveyed area except for one of the grasslands, whereas *Gymnosphaera hancockii* and *G. metteniana* were locally common at Shimentang.
  - *Lithocarpus macilentus* is restricted to southern Guangdong and eastern Guangxi. Only a single tree was found.
  - *Ormosia pachycarpa* var. *tenuis* is restricted to southern Guangdong. It was locally abundant at parts of Heishiding.
- Earlier survey of Heishiding Nature Reserve in 1998 by Chen Binghui of South China Institute of Botany and Lawrence Chau of KFBG recorded *Bretschneidera sinensis* Hemsl. (globally Endangered), *Amentotaxus argotaenia* (Hance) Pilg. (globally Vulnerable), *Lysidice rhodostegia* Hance (provincially Protected), and *Camellia albogigas* Hu (endemic to Fengkai County) (Chen Binghui, South China Institute of Botany, *in litt.* 1999).

**Table 1.** Vascular plants of Heishiding Nature Reserve recorded in July 2002. Species which are nationally Protected (Class I or II) (Yu, 1999), globally Threatened or Lower Risk (Near-threatened) (IUCN, 2003) or globally restricted are indicated.

Family	Scientific name	Remarks
<b>PTERIDOPHYTA</b>		
Adiantaceae	<i>Adiantum flabellulatum</i> L.	
Athyriaceae	<i>Allantodia metteniana</i> (Miq.) Ching	
	<i>Diplazium donianum</i> (Mett.) Tardieu	
	<i>Diplazium subsinuatum</i> (Wall. ex Hook. & Grev.) Tagawa	
Blechnaceae	<i>Blechnum orientale</i> L.	
	<i>Chieniopteris harlandii</i> (Hook.) Ching	
	<i>Woodwardia japonica</i> (L.f.) Sm.	
Bolbitidaceae	<i>Bolbitis subcordata</i> (Copel.) Ching	
Cyatheaceae	<i>Gymnosphaera hancockii</i> (Copel.) Ching	Protected II
	<i>Gymnosphaera metteniana</i> (Hance) Tagawa	Protected II
	<i>Gymnosphaera podophylla</i> (Hook.) Copel.	Protected II
Dicksoniaceae	<i>Cibotium barometz</i> (L.) J. Sm.	Protected II
Gleicheniaceae	<i>Dicranopteris linearis</i> (Burm. f.) Underw.	
	<i>Dicranopteris pedata</i> (Houtt.) Nakaike	
	<i>Diplopterygium chinensis</i> (Rosenst.) DeVol	
	<i>Diplopterygium glaucum</i> (Thunb. ex Houtt.) Nakai	
Hymenophyllaceae	<i>Selenodesmium siamense</i> (H. Christ) Ching & Chu. H. Wang	
Lindsaeaceae	<i>Stenoloma chusanum</i> (L.) Ching	
Marattiaceae	<i>Angiopteris fokiensis</i> Hieron.	
Osmundaceae	<i>Osmunda vachellii</i> Hook.	
Plagiogyriaceae	<i>Plagiogyria dunnii</i> Copel.	
Polypodiaceae	<i>Colysis elliptica</i> (Thunb.) Ching var. <i>pothifolia</i> Ching	
Pteridaceae	<i>Pteris insignis</i> Mett. ex Kuhn	
Thelypteridaceae	<i>Pronephrium lakhimpureense</i> (Rosenst.) Holttum	

Family	Scientific name	Remarks
	<i>Pronephrium sampsoni</i> Ching ex Shing in J.F. Cheng & G.F. Chu <i>Pronephrium simplex</i> (Hook.) Holttum	
<b>GYMNOSPERMAE</b>		
Gnetaceae	<i>Gnetum luofuense</i> C. Y. Cheng	
Pinaceae	<i>Pinus massoniana</i> Lamb.	
<b>ANGIOSPERMAE</b>		
<b>Dicotyledonae</b>		
Actinidiaceae	<i>Actinidia callosa</i> Lindl. var. <i>discolor</i> C.F. Liang <i>Actinidia latifolia</i> (Gardner & Champ.) Merr.	
Alangiaceae	<i>Alangium chinense</i> (Lour.) Harms.	
Alismataceae	<i>Sagittaria trifolia</i> L.	
Anacardiaceae	<i>Choerospondias axillaris</i> (Roxb.) B.L. Burtt et. A.W. Hill <i>Rhus hypoleuca</i> Champ. ex Benth. <i>Toxicodendron succedaneum</i> (L.) Kuntze.	
Annonaceae	<i>Artabotrys hongkongensis</i> Hance <i>Fissistigma glaucescens</i> (Hance) Merr. <i>Fissistigma oldhamii</i> (Hemsl.) Merr. <i>Fissistigma uonicum</i> (Dunn) Merr. <i>Uvaria boniana</i> Finet & Gagnep. <i>Uvaria grandiflora</i> Roxb.	
Apiaceae	<i>Centella asiatica</i> (L.) Urb. <i>Eryngium foetidum</i> L.	
Apocynaceae	<i>Pottsia laxiflora</i> (Blume) Kuntze <i>Strophanthus divaricatus</i> (Lour.) Hook. & Arn.	
Aquifoliaceae	<i>Ilex dasyphylla</i> Merr. <i>Ilex ficoidea</i> Hemsl. <i>Ilex kwangtungensis</i> Merr. <i>Ilex memecylifolia</i> Champ. ex Benth. <i>Ilex pubescens</i> Hook. & Arn.	
Araliaceae	<i>Heteropanax fragrans</i> (D. Don) Seem. <i>Schefflera heptaphylla</i> (L.) Frodin	
Aristolochiaceae	<i>Aristolochia fangchi</i> Y.C. Wu ex L.D. Chow & S.M. Hwang	
Asclepiadaceae	<i>Hoya carnosia</i> (L.f.) R.Br. <i>Tylophora ovata</i> (Lindl.) Hook. ex Steud.	
Asteraceae	<i>Ageratum conyzoides</i> L.	introduced from tropical America
	<i>Artemisia indica</i> Willd. <i>Eclipta prostrata</i> (L.) L. <i>Elephantopus scaber</i> L. <i>Emilia sonchifolia</i> (L.) DC. <i>Vernonia solanifolia</i> Benth. <i>Wedelia chinensis</i> (Osbeck) Merr.	pantropical weed
Begoniaceae	<i>Begonia palmata</i> D. Don	
Boraginaceae	<i>Ehretia longiflora</i> Champ. ex Benth.	
Burseraceae	<i>Canarium album</i> (Lour.) Raeusch.	
Caesalpiniaceae	<i>Caesalpinia crista</i> L.	
Capparaceae	<i>Capparis membranifolia</i> Kurz	
Caprifoliaceae	<i>Viburnum sempervirens</i> Koch	
Celastraceae	<i>Microtropis obliquinervia</i> Merr. & Freeman	
Chloranthaceae	<i>Sarcandra glabra</i> (Thunb.) Nakai	
Clusiaceae	<i>Calophyllum membranaceum</i> Gardner & Champ. <i>Garcinia multiflora</i> Champ. ex Benth. <i>Hypericum japonicum</i> Thunb. ex Murray	
Connaraceae	<i>Rourea microphylla</i> (Hook. & Arn.) Planch. <i>Rourea minor</i> (Gaertn.) Leenh.	
Cornaceae	<i>Dendrobenthamia angustata</i> (Chun) W.P. Fang	
Daphniphyllaceae	<i>Daphniphyllum macropodum</i> Miq.	
Ebenaceae	<i>Diospyros eriantha</i> Champ. ex Benth. <i>Diospyros morrisiana</i> Hance ex. Walpers	
Elaeocarpaceae	<i>Elaeocarpus chinensis</i> (Gardner & Champ.) Hook. f. ex Benth. <i>Elaeocarpus decipiens</i> Hemsl. <i>Elaeocarpus duclouxii</i> Gagnep.	

Family	Scientific name	Remarks	
Ericaceae	<i>Elaeocarpus nitentifolius</i> Merr. & Chun		
	<i>Elaeocarpus sylvestris</i> (Lour.) Poir.		
	<i>Craibiodendron kwangtungense</i> S. Y. Hu		
	<i>Rhododendron championiae</i> Hook. f.		
	<i>Rhododendron simsii</i> Planch.		
Escalloniaceae	<i>Itea chinensis</i> Hook. & Arn		
Euphorbiaceae	<i>Antidesma japonicum</i> Siebold & Zucc.		
	<i>Breynia fruticosa</i> (L.) Hook. f.		
	<i>Bridelia insulana</i> Hance		
	<i>Croton lachnocarpus</i> Benth.		
	<i>Glochidion eriocarpum</i> Champ. ex Benth.		
	<i>Glochidion puberum</i> (L.) Hutch.		
	<i>Glochidion triandrum</i> (Blanco) C.B. Rob		
	<i>Macaranga sampsoni</i> Hance		
	<i>Mallotus japonicus</i> (Thunb.) Müll. Arg. var. <i>floccosus</i> (Müll. Arg.) S.M. Hwang		
	<i>Sapium discolor</i> (Champ. ex Benth.) Müll.-Arg.		
	<i>Vernicia montana</i> Lour.	planted	
	Fagaceae	<i>Castanopsis carlesii</i> (Hemsl.) Hayata	
		<i>Castanopsis carlesii</i> (Hemsl.) Hayata var. <i>spinulosa</i> W.C. Cheng & C.S. Chao	
		<i>Castanopsis eyrei</i> (Champ. ex Benth.) Tutcher	
<i>Castanopsis fabri</i> Hance			
<i>Castanopsis fissa</i> (Champ. ex Benth.) Rehder et E. H. Wilson			
<i>Castanopsis fordii</i> Hance			
<i>Castanopsis kawakamii</i> Hayata		Lower Risk	
<i>Castanopsis nigrescens</i> Chun & C.C. Huang			
<i>Cyclobalanopsis blakei</i> (Skan) Schottky			
<i>Cyclobalanopsis chungii</i> (F.P. Metcalf) Y.C. Hsu & H. Wei Jen			
<i>Cyclobalanopsis fleuryi</i> (Hickel & A. Camus) Chun ex Q. F. Zheng			
<i>Cyclobalanopsis hui</i> (Chun) Chun ex Y.C. Hsu & H. Wei Jen			
<i>Cyclobalanopsis myrsinifolia</i> (Blume) Oerst.			
<i>Lithocarpus calophyllus</i> Chun			
<i>Lithocarpus corneus</i> (Lour.) Rehder			
<i>Lithocarpus fenestratus</i> (Roxb.) Rehder			
<i>Lithocarpus glaber</i> (Thunb.) Nakai			
<i>Lithocarpus haipinii</i> Chun			
<i>Lithocarpus macilentus</i> Chun & C.C. Huang	Restricted to S. Guangdong & E. Guangxi		
Flacourtiaceae	<i>Lithocarpus uvariifolius</i> (Hance) Rehder		
	<i>Casearia balansae</i> Gagnep.		
Hamamelidaceae	<i>Homalium cochinchinense</i> (Lour.) Druce		
	<i>Altingia chinensis</i> (Champ. ex Benth.) Oliv. ex Hance		
	<i>Corylopsis multiflora</i> Hance		
	<i>Distylium racemosum</i> Siebold & Zucc.		
	<i>Exbucklandia tonkinensis</i> (Lecomte) Steenis		
	<i>Liquidambar formosana</i> Hance		
	<i>Loropetalum chinense</i> (R. Br.) Oliv.		
Hydrangeaceae	<i>Mytilaria laosensis</i> Lecomte		
	<i>Dichroa febrifuga</i> Lour.		
Icacinaceae	<i>Mappianthes iodoides</i> Hand.-Mazz.		
Ixonanthaceae	<i>Ixonanthes chinensis</i> Champ.	Vulnerable	
Juglandaceae	<i>Engelhardtia fenzelii</i> Merr.		
	<i>Engelhardtia roxburghiana</i> Wall.		
Lamiaceae	<i>Clinopodium chinense</i> (Benth.) Kuntze		
Lardizabalaceae	<i>Stauntonia chinensis</i> DC.		
Lauraceae	<i>Beilschmiedia tsangii</i> Merr.		
	<i>Beilschmiedia wangii</i> C.K. Allen		
	<i>Cinnamomum appelianum</i> Schewe		
	<i>Cinnamomum austrosinense</i> H.T. Chang		
	<i>Cinnamomum porrectum</i> (Roxb.) Kosterm.		
	<i>Cinnamomum validinerve</i> Hance		



Family	Scientific name	Remarks
	<i>Cryptocarya chinensis</i> (Hance) Hemsl.	
	<i>Cryptocarya chingii</i> W.C. Cheng	
	<i>Cryptocarya concinna</i> Hance	
	<i>Cryptocarya densiflora</i> Blume	
	<i>Lindera chunii</i> Merr.	
	<i>Lindera communis</i> Hemsl.	
	<i>Lindera metcalfiana</i> C.K. Allen	
	<i>Litsea elongata</i> (Nees) Benth. & Hook. f.	
	<i>Litsea greenmaniana</i> C.K. Allen	
	<i>Litsea rotundifolia</i> Hemsl. var. <i>oblongifolia</i> (Nees) C. K. Allen	
	<i>Machilus breviflora</i> (Benth.) Hemsl.	
	<i>Machilus pauhoi</i> Kanehira	
	<i>Machilus velutina</i> Champ. ex Benth.	
	<i>Neolitsea cambodiana</i> Lecomte	
	<i>Neolitsea chunii</i> Merr.	
	<i>Neolitsea phanerophlebia</i> Merr.	
Loganiaceae	<i>Gelsemium elegans</i> (Gardner & Champ.) Benth.	
	<i>Strychnos cathayensis</i> Merr.	
Lythraceae	<i>Rotala indica</i> (Willd.) Koehne	
	<i>Rotala rotundifolia</i> (Buch.-Ham. ex Roxb.) Koehne	
Magnoliaceae	<i>Manglietia moto</i> Dandy	
	<i>Michelia foveolata</i> Merr. ex Dandy	
	<i>Michelia macclurei</i> Dandy	
	<i>Michelia skinneriana</i> Dunn	
Malvaceae	<i>Urena lobata</i> L.	pantropical weed
Melastomataceae	<i>Blastus cochinchinensis</i> Lour.	
	<i>Melastoma dodecandrum</i> Lour.	
	<i>Melastoma normale</i> D. Don	
	<i>Memecylon ligustrifolium</i> Champ. ex Benth.	
	<i>Hypserpa nitida</i> Miers	
Mimosaceae	<i>Acacia concinna</i> (Willd.) DC.	
	<i>Acacia pennata</i> (L.) Willd.	
	<i>Adenanthera pavonina</i> L. var. <i>microsperma</i> (Teijsm. & Binnend.) I. C. Nielsen	
	<i>Albizia corniculata</i> (Lour.) Druce	
	<i>Pithecellobium clypearia</i> (Jack) Benth.	
	<i>Pithecellobium lucidium</i> Benth.	
	<i>Pithecellobium utili</i> Chun & F.C. How	
Moraceae	<i>Artocarpus hypargyreus</i> Hance ex Benth.	Vulnerable
	<i>Artocarpus styracifolius</i> Pierre	
	<i>Ficus hirta</i> Vahl	
	<i>Ficus langkokensis</i> Drake	
	<i>Ficus pyriformis</i> Hook. & Arn.	
	<i>Ficus variolosa</i> Lindl. ex Benth.	
Myrsinaceae	<i>Ardisia crenata</i> Sims	
	<i>Ardisia hanceana</i> Mez	
	<i>Ardisia lindleyana</i> D. Dietr.	
	<i>Ardisia mamillata</i> Hance	
	<i>Ardisia quinquegona</i> Blume	
	<i>Ardisia thyrsiflora</i> D. Don	
	<i>Embelia parviflora</i> Wall. ex A. DC.	
	<i>Embelia vestita</i> Roxb.	
	<i>Maesa japonica</i> (Thunb.) Moritz & Zoll.	
	<i>Myrsine stolonifera</i> (Koidz.) E. Walker	
	<i>Mysine seguinii</i> H. Lév	
Myrtaceae	<i>Baeckea frutescens</i> L.	
	<i>Rhodomyrtus tomentosa</i> (Aiton) Hassk.	
	<i>Syzygium rehderianum</i> Merr. & L.M. Perry	
Ochnaceae	<i>Sinia rhodoleuca</i> Diels	Protected I, Restricted to NW Guangdong & Guangxi
Olacaceae	<i>Schoepfia chinensis</i> Gardner & Champ.	
Oleaceae	<i>Chionanthus ramiflorus</i> Roxb.	
	<i>Jasminum lanceolarium</i> Roxb.	

Family	Scientific name	Remarks
Oxalidaceae	<i>Oxalis corymbosa</i> DC.	
Papilionaceae	<i>Bowringia callicarpa</i> Champ. ex Benth.	
	<i>Dalbergia hancei</i> Benth.	
	<i>Millettia nitida</i> Benth.	
	<i>Millettia pachyloba</i> Drake	
	<i>Ormosia fordiana</i> Oliv.	
	<i>Ormosia pachycarpa</i> Champ. ex Benth. var. <i>tenuis</i> Chun	endemic to Guangdong
	<i>Ormosia semicastrata</i> Hance	
Pentaphragaceae	<i>Pentaphragax euryoides</i> Gardner & Champ.	
Piperaceae	<i>Piper hongkongense</i> C. DC.	
Pittosporaceae	<i>Pittosporum glabratum</i> Lindl.	
Plantaginaceae	<i>Plantago major</i> L.	introduced
Polygalaceae	<i>Xanthophyllum hainanense</i> Hu	
Polygonaceae	<i>Polygonum chinense</i> L.	
Primulaceae	<i>Lysimachia fordiana</i> Oliv.	
	<i>Lysimachia paridiformis</i> Franch. var. <i>stenophylla</i> Franch.	
Proteaceae	<i>Helicia kwangtungensis</i> W.T. Wang	
	<i>Helicia longipetiolata</i> Merr. & Chun	
Rhamnaceae	<i>Hovenia acerba</i> Lindl.	
	<i>Sageretia lucida</i> Merr.	
	<i>Ventilago leiocarpa</i> Benth.	
Rhizophoraceae	<i>Carallia longipes</i> Chun ex W.C. Ko	
Rosaceae	<i>Eriobotrya fragrans</i> Champ. ex Benth.	
	<i>Eriobotrya japonica</i> (Thunb.) Lindl.	
	<i>Photinia prunifolia</i> (Hook. & Arn.) Lindl.	
	<i>Pyrus calleryana</i> (L.) Lindl.	
	<i>Rubus leucanthus</i> Hance	
	<i>Rubus reflexus</i> Ker var. <i>lanceolobus</i> F.P. Metcalf	
	<i>Rubus rosifolius</i> Sm.	
Rubiaceae	<i>Adina pilulifera</i> (Lam.) Franch. ex Drake	
	<i>Aidia canthioides</i> (Champ. ex Benth.) Masam.	
	<i>Aidia cochinchinensis</i> Lour.	
	<i>Alleizettella leucocarpa</i> (Champ. ex Benth.) Tirveng.	
	<i>Canthium dicoccum</i> (Gaertn.) Teysmann et Binnedijk	
	<i>Gardenia jasminoides</i> J. Ellis	
	<i>Hedyotis caudatifolia</i> Merr. & F.P. Metcalf	
	<i>Hedyotis hedyotideae</i> (DC.) Merr.	
	<i>Lasianthus fordii</i> Hance	
	<i>Lasianthus lancifolius</i> Hook. f.	
	<i>Psychotria tutcheri</i> Dunn	
	<i>Tarenna mollissima</i> (Hook. & Arn.) B.L. Rob.	
	<i>Uncaria hirsuta</i> Havil.	
	<i>Uncaria rynchophylla</i> (Miq.) Miq. ex Havil.	
	<i>Urophyllum chinense</i> Merr. & Chun	
Rutaceae	<i>Evodia leptae</i> (Spreng.) Merr.	
	<i>Toddalia asiatica</i> (L.) Lam.	
	<i>Zanthoxylum myriacanthum</i> Wall. ex Hook. f.	
	<i>Zanthoxylum scandens</i> Blume	
	<i>Meliosma fordii</i> Hemsl.	
	<i>Meliosma rigida</i> Siebold & Zucc.	
	<i>Meliosma squamulata</i> Hance	
	<i>Sabia limoniacea</i> Wall. ex Hook. f. & Thomson	
Santalaceae	<i>Dendrotrophe frutescens</i> (Champ. ex Benth.) Danser	
Sapotaceae	<i>Madhuca pasquieri</i> (Dubard) H.J. Lam	Protected II, Vulnerable
		<i>Sinosideroxylon wightianum</i> (Hook. & Arn.) Aubrév.
Schisandraceae	<i>Kadsura coccinea</i> (Lem.) A.C. Sm.	
Staphyleaceae	<i>Turpinia arguta</i> (Lindl.) Seem.	
Sterculiaceae	<i>Pterospermum heterophyllum</i> Hance	
	<i>Reevesia pubescens</i> Mast.	
	<i>Reevesia thyrsoides</i> Lindl.	
Styracaceae	<i>Alniphyllum fortunei</i> (Hemsl.) Makino	
	<i>Styrax suberifolius</i> Hook. & Arn.	
	<i>Styrax tonkinensis</i> (Pierre) Craib ex Hartwich	
Symplocaceae	<i>Symplocos adenophylla</i> Wall. ex G. Don	

Family	Scientific name	Remarks	
Theaceae	<i>Symplocos adenopus</i> Hance		
	<i>Symplocos congesta</i> Benth.		
	<i>Symplocos lancifolia</i> Siebold & Zucc.		
	<i>Symplocos sumuntia</i> Buch.-Ham. ex D. Don		
	<i>Symplocos wikstroemiifolia</i> Hayata		
	<i>Camellia salicifolia</i> Champ. ex Benth.		
	<i>Eurya distichophylla</i> Hemsl.		
	<i>Hartia villosa</i> (Merr.) Merr.		
	<i>Schima superba</i> Gardn. et Champ.		
	<i>Ternstroemia luteoflora</i> L.K. Ling		
Thymelaeaceae	<i>Tutcheria championii</i> Nakai		
	<i>Daphne championii</i> Benth.		
Ulmaceae	<i>Wikstroemia nutans</i> Champ. ex Benth.		
Urticaceae	<i>Trema tomentosa</i> (Roxb.) Hara		
Verbenaceae	<i>Gonostegia hirta</i> (Hassk.) Miq.		
	<i>Callicarpa formosana</i> Rolfe		
	<i>Callicarpa integerrima</i> Champ.		
	<i>Callicarpa loboapiculata</i> F.P. Metcalf		
	<i>Callicarpa longipes</i> Dunn		
	<i>Clerodendrum fortunatum</i> L.		
Vitaceae	<i>Vitex quinata</i> (Lour.) F.N. Williams		
	<i>Ampelopsis cantoniensis</i> (Hook. & Arn.) Planch.		
	<i>Tetrastigma hemsleyanum</i> Diels & Gilg		
<b>Monocotyledonae</b>			
Araceae	<i>Acorus tatarinowii</i> Schott		
	<i>Colocasia esculenta</i> (L.) Schott		
Areaceae	<i>Pothos chinensis</i> (Raf.) Merr.		
	<i>Calamus rhabdocladus</i> Burret		
Cyperaceae	<i>Carex cruciata</i> Wahlenb.		
	<i>Carex harlandii</i> Boott		
	<i>Carex nemostachys</i> Steud.		
	<i>Carex scaposa</i> C.B. Clarke		
	<i>Cyperus haspans</i> L.		
	<i>Gahnia javanica</i> Moritzi		
	<i>Gahnia tristis</i> Nees		
	<i>Hypolytrum nemorum</i> (Vahl) Spreng.		
	<i>Schoenoplectus juncooides</i> (Roxb.) Palla		
	<i>Scirpus ternatanus</i> Reinw. ex Miq.		
	<i>Scleria harlandii</i> Hance		
	Dioscoreaceae	<i>Dioscorea cirrhosa</i> Lour.	
	Hydrocharitaceae	<i>Vallisneria natans</i> (Lour.) H. Hara	
Juncaceae	<i>Juncus effusus</i> L.		
	<i>Juncus prismatocarpus</i> R. Br.		
Liliaceae	<i>Dianella ensifolia</i> (L.) DC.		
	<i>Smilax china</i> L.		
	<i>Smilax lanceifolia</i> Roxb.		
Orchidaceae	<i>Tropidia curculigoides</i> Lindl.		
Pandanaceae	<i>Pandanus austrosinensis</i> T. L. Wu		
Poaceae	<i>Imperata koenigii</i> (Retz.) P. Beauv.		
	<i>Lophatherum gracile</i> Brongn.		
	<i>Miscanthus sinensis</i> Andersson		
	<i>Paspalum conjugatum</i> Bergius		
	<i>Paspalum orbiculare</i> Forst.		
	<i>Pogonatherum crinitum</i> (Thunb.) Kunth		
	<i>Setaria palmifolia</i> (J. Koenig) Stapf		
	<i>Sphaerocaryum malaccense</i> (Trin.) Pilg.		
	<i>Sporobolus fertilis</i> (Steud.) Clayton		
	<i>Thysanolaena maxima</i> (Roxb.) Kuntze		
	Pontederiaceae	<i>Monochoria vaginalis</i> (Burm. f.) C. Presl	
	Zingiberaceae	<i>Alpinia oblongifolia</i> Hayata	
		<i>Alpinia stachyoides</i> Hance	

### **Mammals**

- During the present survey no mammal species or their signs were seen.
- In April 1997 reserve staff were interviewed regarding the mammalian fauna of Heishiding (Fellowes & Hau, 1997). Of the reported mammals Clouded Leopard *Neofelis* [as *Pardofelis*] *nebulosa*, Leopard *Panthera pardus*, Dhole *Cuon alpinus*, Oriental Small-clawed Otter *Amblonyx* [as *Aonyx*] *cinerea*, Large Indian Civet *Viverra zibetha*, and Chinese Pangolin *Manis pentadactyla* are of conservation concern.
- In the 1997 survey, a Wild Boar *Sus scrofa* was seen (LKS, KFBG, unpublished data) and tracks of deer and small carnivores were detected (Fellowes & Hau, 1997).
- A group of birdwatchers from Hong Kong visited the Heishiding area in January 1986 and reported seeing three species of squirrels, namely the giant squirrel *Ratufa* sp., *Callosciurus* sp. and striped squirrel *Tamiops* sp. (Viney, 1986).
- Some of the species reported, such as the big cats and the giant squirrel, are, if still present, unlikely to survive in the long term following further fragmentation and degradation of the already limited forest area. Nonetheless more specific and up-to-date information of the area's mammalian fauna is required.

### **Birds**

- Forty bird species were recorded at Heishiding (Table 2). Both abundance and richness were rather low during the present visit.
- The most frequently encountered species included Chestnut Bulbul *Hemixos castanonotus*, Mountain Bulbul *Hypsipetes mcclllandii* and Grey-cheeked Fulvetta *Alcippe morrisonia*.

**Table 2.** Birds recorded at Heishiding Nature Reserve, 4-8 July 2002. Sequence follows Clements (2000).

<b>Scientific name</b>	<b>English name</b>
<i>Spilornis cheela</i>	Crested Serpent Eagle
<i>Lophura nycthemera</i>	Silver Pheasant
<i>Macropygia unchall</i>	Barred Cuckoo Dove
<i>Clamator coromandus</i>	Chestnut-winged Cuckoo
<i>Centropus sinensis</i>	Greater Coucal
<i>Centropus bengalensis</i>	Lesser Coucal
<i>Otus spilocephalus</i>	Mountain Scops Owl
<i>Otus scops</i>	Oriental Scops Owl
<i>Megalaima oorti</i>	Black-browed Barbet
<i>Blythipicus pyrrhotis</i>	Bay Woodpecker
<i>Dendrocopos major</i>	Great Spotted Woodpecker
<i>Picus canus</i>	Grey-headed Woodpecker
<i>Megaceryle lugubris</i>	Crested Kingfisher
<i>Pericrocotus solaris</i>	Grey-chinned Minivet
<i>Pericrocotus flammeus</i>	Scarlet Minivet
<i>Chloropsis hardwickii</i>	Orange-bellied Leafbird
<i>Pycnonotus jocosus</i>	Red-whiskered Bulbul
<i>Hemixos castanonotus</i>	Chestnut Bulbul
<i>Hypsipetes mcclllandii</i>	Mountain Bulbul
<i>Enicurus schistaceus</i>	Slaty-backed Forktail
<i>Enicurus leschenaulti</i>	White-crowned Forktail
<i>Myophonus caeruleus</i>	Blue Whistling Thrush
<i>Cyornis hainanus</i>	Hainan Blue Flycatcher
<i>Pomatorhinus ruficollis</i>	Rufous-necked Scimitar Babbler
<i>Stachyris ruficeps</i>	Rufous-capped Babbler
<i>Garrulax chinensis</i>	Black-throated Laughingthrush
<i>Alcippe morrisonia</i>	Grey-cheeked Fulvetta
<i>Alcippe brunnea</i>	Dusky Fulvetta

Scientific name	English name
<i>Yuhina castaniceps</i>	Striated Yuhina
<i>Yuhina zantholeuca</i>	White-bellied Yuhina
<i>Prinia atrogularis</i>	Hill Prinia
<i>Orthotomus sutorius</i>	Common Tailorbird
<i>Parus major</i>	Great Tit
<i>Parus sibilator</i>	Yellow-cheeked Tit
<i>Zosterops japonicus</i>	Japanese White-eye
<i>Dicaeum ignipectus</i>	Flower-breasted Flowerpecker
<i>Dicaeum cruentatum</i>	Scarlet-backed Flowerpecker
<i>Aethopyga christinae</i>	Fork-tailed Sunbird
<i>Dendrocitta formosae</i>	Grey Treepie
<i>Lonchura striata</i>	White-rumped Munia

- The survey in April 1997 by the same ornithologist recorded a total of 66 bird species, including a number not found in the present survey: Japanese Sparrowhawk *Accipiter gularis* (Class II National Protected), Eurasian Sparrowhawk *Accipiter nisus* (Class II National Protected), Chinese Sparrowhawk *Accipiter soloensis* (Class II National Protected), Chinese Francolin *Francolinus pintadeanus*, Chinese Bamboo Partridge *Bambusicola thoracica*, Red-headed Trogon *Harpactes erythrocephalus* and Blue-throated Bee-eater *Merops viridis* (Fellowes & Hau, 1997).
- A soft double-hoot call, believed to be of the Brown Wood Owl *Strix leptogrammica*, was heard in the 1997 survey. The record could not be confirmed but the species has previously been reported from Heishiding (Fellowes & Hau, 1997).
- Crested Serpent Eagle *Spilornis cheela*, Silver Pheasant *Lophura nycthemera*, Barred Cuckoo Dove *Macropygia unchall*, Greater Coucal *Centropus sinensis*, Lesser Coucal *Centropus bengalensis*, Mountain Scops Owl *Otus spilocephalus* and Oriental Scops Owl *Otus scops* are Class II National Protected in China.
- The presence of forest-dependent birds (including a barbet, cuckoo dove, woodpeckers, bulbuls and babblers) indicates quite intact forest habitat in the vicinity.

### Reptiles and Amphibians

- Thirteen species of amphibian and fifteen species of reptile (ten lizards and five snakes) were recorded at Heishiding during the survey (Table 3).
- One frog species belonging to the *Odorrana* group could not be firmly identified because only females were found.
- The most frequently encountered species were *Microhyla heymonsi*, *Sphenomorphus incognitus* and *Sphenomorphus indicus*.
- A *Geoemyda spengleri* turtle kept by a reserve employee was said to have been picked up earlier close to the reserve.
- In addition to these, the following species were found in the earlier survey (Fellowes & Hau, 1997): *Rana limnocharis*, *Sacalia bealei* (misidentified as *S. quadriocellata*), *Eumeces chinensis* and *Achalinus rufescens*. The reserve museum also displayed specimens of *Python molurus*, *Calamaria septentrionalis*, *Elaphe taeniura* and *Ptyas mucosus* that were believed to have been caught locally (Fellowes & Hau, 1997).

**Table 3.** Amphibians and reptiles recorded at Heishiding Nature Reserve from 4 to 8 July 2002. Sequence follows Zhao E.-M. & Adler (1993).

Scientific name	Habitat	
<b>AMPHIBIA</b>		
<i>Megophrys kuatunensis</i>	stream	✓
	forest	✓
<i>Bufo melanostictus</i>	forest edge	✓
	village	✓
<i>Amolops ricketti</i>	stream	✓
<i>Paa spinosa</i>	stream	✓

Scientific name	Habitat	
<i>Rana fujianensis</i>	seep	✓
	roadside ditch	✓
<i>Rana guentheri</i>	marsh	✓
	pond	✓
<i>Rana livida</i>	stream	✓
<i>Rana (Odorrana) sp.</i>	forest edge	✓
<i>Philautus ocellatus</i>	forest	✓
<i>Polypedates megacephalus</i>	marsh	tadpoles
<i>Microhyla butleri</i>	pool	✓
<i>Microhyla heymonsi</i>	forest	✓
	roadside ditch	✓
	forest pool	tadpoles, eggs
	abandoned field	✓
		tadpoles
<i>Microhyla pulchra</i>	pool	✓
	marsh	tadpoles
<b>REPTILIA</b>		
<i>Hemiphyllodactylus sp.</i>	village	✓
<i>Acanthosaura lepidogaster</i>	village	✓
	forest	✓
<i>Calotes versicolor</i>	forest edge	✓
	shrubland	✓
<i>Ateuchosaurus chinensis</i>	ag. field/ plantation	✓
<i>Eumeces quadrilineatus</i>	village	✓
	forest edge	✓
<i>Scincella modesta</i>	forest	✓
	plantation	✓
<i>Scincella reevesii</i>	abandoned field	✓
	marsh	✓
<i>Sphenomorphus incognitus</i>	forest edge	✓
	stream	✓
	riparian forest	✓
<i>Sphenomorphus indicus</i>	forest edge	✓
	forest	✓
<i>Tropidophorus hainanus</i>	forest	✓
<i>Ahaetulla prasina</i>	riparian forest	✓
<i>Opisthotropis lateralis</i>	stream	✓
<i>Pareas margaritophorus</i>	forest edge	✓
<i>Sinonatrix percarinata</i>	stream	✓
<i>Hemibungarus maccllellandi</i>	forest edge	✓

- In addition a Buff-striped Keelback *Amphiesma stolatum* was seen on 8 July.
- A number of species recorded are of particular conservation interest:
  - The unidentified *Rana* frog belonging to the *Odorrana* group and the *Hemiphyllodactylus* gecko are of potential interest.
  - The records of *Opisthotropis lateralis* and *Tropidophorus hainanus* are the first for Guangdong Province.
  - *Geoemyda spengleri* is listed as Endangered in the IUCN Red List and Class II National Protected in China.
- Of other species reported previously:
  - *Sacalia bealei* is listed as Endangered in the IUCN Red List.
- A local worker of the tourism office in the nature reserve reported the wattle-necked soft-shelled turtle *Palea steindachneri* persists, though in low numbers as a result of hunting and pollution. It is a globally Endangered species and is Class II National Protected in China.
- The presence of many forest and forest stream species indicate that Heishiding still has high habitat quality.

### **Fish**

- A total of 18 freshwater fish species were recorded from Heishiding Nature Reserve and the surrounding area (Table 4). Twelve species were only found in a few locations.

- The most frequently encountered species were *Acrossocheilus parallens* and *Vanmanenia lineata*; the latter is highly restricted globally.
- The unidentified *Rhinogobius* sp. is similar to *R. yaoshanensis*, a species restricted to Guangxi. Further work may prove it to be a new record for Guangdong.

**Table 4.** Freshwater fish recorded at Heishiding Nature Reserve, Southwest Guangdong, 4-8 July 2002. Sequence of families follows Nelson (1994).

Scientific name	5 July	6 July	8 July
<i>Zacco platypus</i>			✓
<i>Opsariichthys bidens</i>			✓
<i>Hemibarbus medius</i>			✓
<i>Acrossocheilus parallens</i>	✓	✓	✓
<i>Acrossocheilus rendahli</i> *			✓
<i>Onychostoma gerlachi</i>			✓
<i>Oreonectes platycephalus</i>	✓		✓
<i>Micronemacheilus pulcher</i>			✓
<i>Liniparhomaloptera disparis disparis</i>		✓	✓
<i>Vanmanenia lineata</i>	✓	✓	✓
<i>Vanmanenia pingchowensis</i>			✓
<i>Pseudogastromyzon changtingensis tungpeiensis</i>		✓	✓
<i>Schistura incerta</i>			✓
<i>Glyptothorax fukiensis fukiensis</i>			✓
<i>Monopterus albus</i>		✓	
<i>Mastacembelus armatus</i>			✓
<i>Rhinogobius duospilus</i>			✓
<i>Rhinogobius</i> (cf. <i>yaoshanensis</i> ) sp.			✓

- Some species collected are of conservation concern: *Acrossocheilus rendahli* is only known from Bei Jiang of the Zhujiang drainage system. *Vanmanenia lineata* is restricted to Xi Jiang of the Zhujiang drainage system.
- The highlighted species are endemic to the Zhujiang drainage system.
- The Heishiding area had relatively high fish diversity and abundance, with a number of highly restricted species rarely seen in South China. While the streams within the reserve are probably too small and steep to support a diverse fish community, the larger Qixing River had a diverse fish fauna.
- The Qixing River had the majority of the species recorded; although it lies outside the reserve boundary, it should be considered as an important habitat for biodiversity conservation in the Heishiding area.

### Dragonflies

- Thirty-seven species were recorded during the five-day survey (Table 5).
- *Rhinocypha* sp. is a species new to science and is being described.
- *Vestalis miao* and *Bayadera bidentata* are apparently new records for Guangdong province. The former has also been recorded from Guangxi and Hainan while the latter is known from Guangxi, Hubei and Zhejiang (Wilson & Reels, 2003).

**Table 5.** Dragonflies at Heishiding Nature Reserve from 4 to 8 July 2002. Sequence of families follows Schorr *et al.* (2001a, 2001b).

Scientific name	Habitat
<i>Matrona basilaris basilaris</i>	riparian forest
<i>Neurobasis chinensis</i>	stream
<i>Vestalis miao</i>	stream
<i>Bayadera bidentata</i>	stream
<i>Rhinocypha</i> sp. ( <i>R. chaoi</i> sp.n. in prep.)	stream
<i>Rhinocypha perforata</i>	stream
<i>Euphaea decorata</i>	stream

Scientific name	Habitat
<i>Agriomorpha fusca</i>	forest forest seep riparian forest
<i>Coeliccia cyanomelas</i>	stream forest
<i>Copera ciliata</i>	forest pond
<i>Aciagrion tillyardi</i>	marsh/pool
<i>Ceriagrion azureum</i>	marsh
<i>Pseudagrion pruinosum fraseri</i>	stream
<i>Protosticta beaumonti</i>	forest
<i>Prodasineura autumnalis</i>	stream
<i>Planaeschna suichangensis</i>	forest
<i>Chlorogomphus papilio</i>	stream
<i>Heliogomphus scorpio</i>	stream
<i>Labrogomphus torvus</i>	stream
<i>Ophiogomphus sinicus</i>	stream
<i>Acisoma panorpoides</i>	marsh
<i>Crocothemis servilia</i>	village marsh pond
<i>Diplacodes trivalis</i>	abandoned field
<i>Hydrobasileus croceus</i>	forest edge
<i>Nanophya pygmea</i>	marsh
<i>Neurothemis fulia</i>	marsh pond
<i>Onychothemis testacea tonkinensis</i>	stream/riparian
<i>Orthetrum luzonicum</i>	marsh/pool
<i>Orthetrum pruinosum</i>	marsh/pool
<i>Orthetrum triangularae</i>	pool marsh/pool
<i>Palpopleura sexmaculata</i>	marsh/pool
<i>Pantala flavescens</i>	abandoned field
<i>Pseudothemis zonata</i>	pond
<i>Tetrathemis platyptera</i>	village
<i>Trithemis aurora</i>	pond stream
<i>Trithemis festiva</i>	stream
<i>Zygonyx asahinai</i>	stream

- The presence of a fair number of forest or forest stream species indicates that the forest and streams of the study area is of high integrity.

### Butterflies

- Forty-five species were recorded during the five-day survey (Table 6).

**Table 6.** Butterflies at Heishiding Nature Reserve from 4 to 8 July 2002. Sequence of families follows Bascombe (1995).

Scientific name	Habitat
<i>Aeromachus pygmaeus</i>	marsh abandoned field
<i>Hyarotis adrastus</i>	forest edge
<i>Iambrix salsala</i>	forest
<i>Mooreana trichoneura</i>	forest
<i>Parnara bada</i>	marsh
<i>Polytremis lubricans</i>	abandoned field
<i>Telicota augias</i>	forest edge
<i>Graphium sarpedon</i>	forest
<i>Papilio bianor</i>	forest abandoned field forest edge
<i>Papilio helenus</i>	forest
<i>Papilio memnon</i>	forest



Scientific name	Habitat
<i>Papilio paris</i>	village forest forest edge
<i>Papilio protenor</i>	forest
<i>Delias pasithoe</i>	shrubland
<i>Eurema hecabe</i>	stream forest edge
<i>Hebomoia glaucippe</i>	forest forest edge
<i>Leptosia nina</i>	forest
<i>Prioneris thestylis</i>	riparian forest
<i>Abisara echerius</i>	abandoned field
<i>Jamides alecto</i>	riparian forest
<i>Loxura atymnus</i>	forest edge
<i>Sinthusia chandrana</i>	riparian forest
<i>Zemeros flegyas</i>	forest
<i>Zizeeria maha</i>	forest edge abandoned field
<i>Argyreus hyperbius</i>	abandoned field
<i>Bhagadatta austenia</i>	forest
<i>Charaxes bernardus</i>	forest
<i>Euploea midamus</i>	forest abandoned field
<i>Euthalia hebe</i>	riparian forest
<i>Lexias dirtea</i>	forest edge
<i>Mandarinia regalis</i>	forest edge
<i>Melanitis leda</i>	forest edge forest
<i>Mycalesis minues</i>	abandoned field forest edge
<i>Mycalesis panthaka</i>	plantation
<i>Neptis clinia</i>	forest
<i>Neptis hylas</i>	abandoned field
<i>Orsotriaena medus</i>	forest edge
<i>Parantica melaneus</i>	forest edge
<i>Parasarpa dudu</i>	forest edge
<i>Parathyma sulphitia</i>	abandoned field
<i>Penthema adelma</i>	forest
<i>Precis (Junonia) almana</i>	forest edge
<i>Precis (Junonia) orithya</i>	abandoned field
<i>Ypthima lisandra</i>	forest edge
<i>Ypthima motschulskyi</i>	shrubland

- *Mooreana trichoneura*, *Telicota augias* and *Euthalia hebe* are apparently new records for Guangdong.
- Seventeen species (*Aeromachus pygmaeus*, *Hyarotis adrastus*, *Iambrix salsala*, *Mooreana trichoneura*, *Parnara bada*, *Polytrems lubricans*, *Telicota augias*, *Delias pasithoe*, *Prioneris thestylis*, *Jamides alecto*, *Sinthusia chandrana*, *Bhagadatta austenia*, *Charaxes bernardus*, *Euthalia hebe*, *Mycalesis minues*, *Parantica melaneus*, *Parasarpa dudu* and *Precis (Junonia) orithya*) are apparently new records for the reserve, not being listed by Liang *et al.* (1989) or Fellowes & Hau (1997). The combined total number of butterfly species for Heishiding is now 173.
- Of the species recorded, some (e.g. *Mooreana trichoneura*, *Lexias dirtea*, *Mandarinia regalis* and *Penthema adelma*) are typical of forest habitat.

#### Ants

- Ants were not surveyed in the current trip, but surveys in South China permit re-evaluation of species collected in 1997 (Fellowes & Hau, 1997). Thirty-five species were recorded.
- 40% of species found are forest-dependent, a figure typical of secondary forest of quite high integrity.

### Summary of flora and fauna

- The present survey covered major forest of Heishiding Nature Reserve. Well-structured, extensive cover of mature secondary evergreen forest was found. Lowland ravine forest was found in the experimental zone. Grassland, in places waterlogged, and formed from abandoned village and farmland, occupied the basin of Shimentang core area.
- The present survey recorded 326 vascular plant species, including three globally Threatened species (*Artocarpus hypargyreus*, *Ixonanthes chinensis* and *Madhuca pasquieri*), one Near Threatened species (*Castanopsis kawakamii*), and four nationally Protected species (*Sinia rhodoleuca*, *Gymnosphaera hancockii*, *G. metteniana*, and *G. podophylla*).
- In addition, the present survey also recorded two regionally restricted tree species (*Lithocarpus macilentus* and *Ormosia pachycarpa* var. *tenuis*).
- The large-bodied forest fauna of Heishiding appears to be impoverished following forest degradation, with no direct records in the present survey.
- A combined total of 80 bird species (66 in April 1997 and 40 in June 2002) have been recorded in total of nine days of survey by KFBG. Seven of the birds recorded in 2002 are nationally Protected.
- Thirteen amphibian and 15 reptile species were recorded, including new provincial records (e.g. *Opisthotropis lateralis*), undetermined species (*Hemiphyllocladylus* sp.), forest-dependent species (e.g. *Philautus ocellatus*) and globally Threatened species (e.g. *Geoemyda spengleri*).
- Eighteen fish species were recorded, including some species rarely found during KFBG's rapid surveys (e.g. *Acrossocheilus rendahli*) and unidentified species (*Rhinogobius* sp.). While the streams within the reserve are probably too small and steep to support a diverse fish community, the larger Qixing River on the reserve's northern boundary had a diverse fish fauna.
- Thirty-seven dragonfly and 45 butterfly species were recorded. One dragonfly has yet to be identified. Several dragonfly and butterfly species found are dependent on clean water and/or good quality forest.
- MacKinnon *et al.* (1996) suggested extending Heishiding Nature Reserve up to the peak of Qixingyan Ding at 1,274 m, on the northeast side of the reserve separated by a busy main road. This would have been a useful and positive step because, in the 1997 visit, there was still extensive secondary forest on the northern side of Qixing River, but the forest, belonging to the Qixing Forest Farm, has since been logged and only shrubs and recently established plantations were seen during the present survey.
- MacKinnon *et al.* (1996) considered Heishiding of local conservation significance; Fellowes & Hau (1997) considered it of regional (provincial) importance. Despite recent losses, Heishiding still supports mature natural forest and a number of species of conservation concern, and remains of high conservation importance within Guangdong. The well-established forest of Heishiding is at relatively low altitude. If protected well the conservation significance of reserve may further increase following further forest loss in other unprotected lowland areas across South China.

### Threats and problems

- At the time of the survey a reservoir and catchwater channel for a hydropower station were under construction, about 1 km east of the abandoned village of Shimentang core area. A considerable area of mature secondary forest in the buffer zone of Heishi He was cleared for the construction of maintenance road and catchwater channel.
- The biologically diverse Qixing River was being impounded for construction of another hydropower station. Riparian vegetation was being cleared and the hydrology of the river is certain to be severely affected. In addition the water quality of Qixing River has obviously deteriorated since the last visit in 1997, probably due to the operation of several small paper mills upstream. The combined impacts of changed hydrology and deteriorating water quality cast doubt on the future of stream-dependent biota along the Qixing River.

- As noted the extensive mature secondary forest in the Qixing Forest Farm, directly opposite the nature reserve in the north, has been logged since 1997. This has severely impacted the available forest habitat for wide-ranging animals in the Heishiding area.
- The busy main road along the northern edge of the reserve between Qixing Town and Heishi He was being paved at the time of our visit. The improved road system may bring traffic in greater volume and at higher speeds, with the potential for greater disturbance to animals in the area.
- Tourism was being promoted with a number of forest trails constructed in the well-forested experimental zone, and a stream had been dammed to make a swimming pool. It appears more tourist ‘attractions’ are planned in the small reserve; whether the potential environmental impacts of such construction have been assessed is not known.
- Since the 1997 visit, degradation of well-structured secondary forest has escalated both within and outside the reserve; the loss of a forested ‘buffer zone’ outside the core area makes the small core forest of Heishiding more susceptible to species loss and other human disturbances.

### **Opportunities**

- Extensive cover of mature secondary evergreen forest was found in Heishiding Nature Reserve. The forest is characterised by a closed canopy with large trees up to 80 cm dbh. Forest of this quality is uncommon in Guangdong, especially at this altitudinal range (300-800 m).
- The mountain ridges around the Shimentang core area are covered in relatively young secondary forest. These young forests and the associated biota, if carefully protected from fire, logging, hunting, grazing and other damaging factors, will mature and expand in future decades, and accumulate/attract more forest-dependent species if these are allowed to survive nearby.
- The survey team noticed that the area surrounding the reserve has largely been cleared and transformed to shrubland or plantation. Restoration of the natural vegetation will heavily depend on the forest in the nature reserve, which will serve as sources of seeds and dispersal agents. Heishiding is therefore of high conservation importance for the region.
- Given the high conservation importance of the forest at Heishiding, utilization of the resources in the reserve has to be carefully planned. Construction of facilities incompatible with forest conservation, such as large-scale tourist attractions and hydropower stations in the forest, must be avoided if this conservation value is to be maintained.
- At the moment tourism inside the reserve is geared towards “ecotours”. The forest in the experimental zone has good facilities (such as boarding, restaurants and nature trails with signposts) and appears to attract a fair number of visitors. The management authorities are keen to explore opportunities in ecotourism but the resources (e.g. biodiversity inventory and monitoring, educational design) to ensure the viability of such activities are apparently limited in Heishiding. The potential of developing the reserve into an outdoor environmental education centre should be fully explored by putting more emphasis into conservation education display and programmes. Guidelines for various aspects of ecotourism development are available, e.g. Ceballos-Lascuráin (1996) and China National Committee of the Man-and-the-Biosphere (1998).
- It was learned that the reserve management office has plans to reforest the cleared forest around the hydropower station being constructed near the Forestry Science Institute at Heishi He. It has also been suggested to extend Heishiding Nature Reserve to cover other forest in the northeast towards the high peak of Qixingyan Ding (MacKinnon *et al.*, 1996), which would now call for reforestation of the denuded hills belonging to Qixing Forest Farm. These measures would provide further support for biodiversity and the management office should pursue these goals as soon as possible. There is probably a need to establish a tree nursery to produce seedlings of tree species native to the Heishiding area. Advice could be sought from regional centres of expertise (such as South China Agricultural University,

The University of Hong Kong and KFBG) regarding reforestation techniques and in managing native tree nurseries.

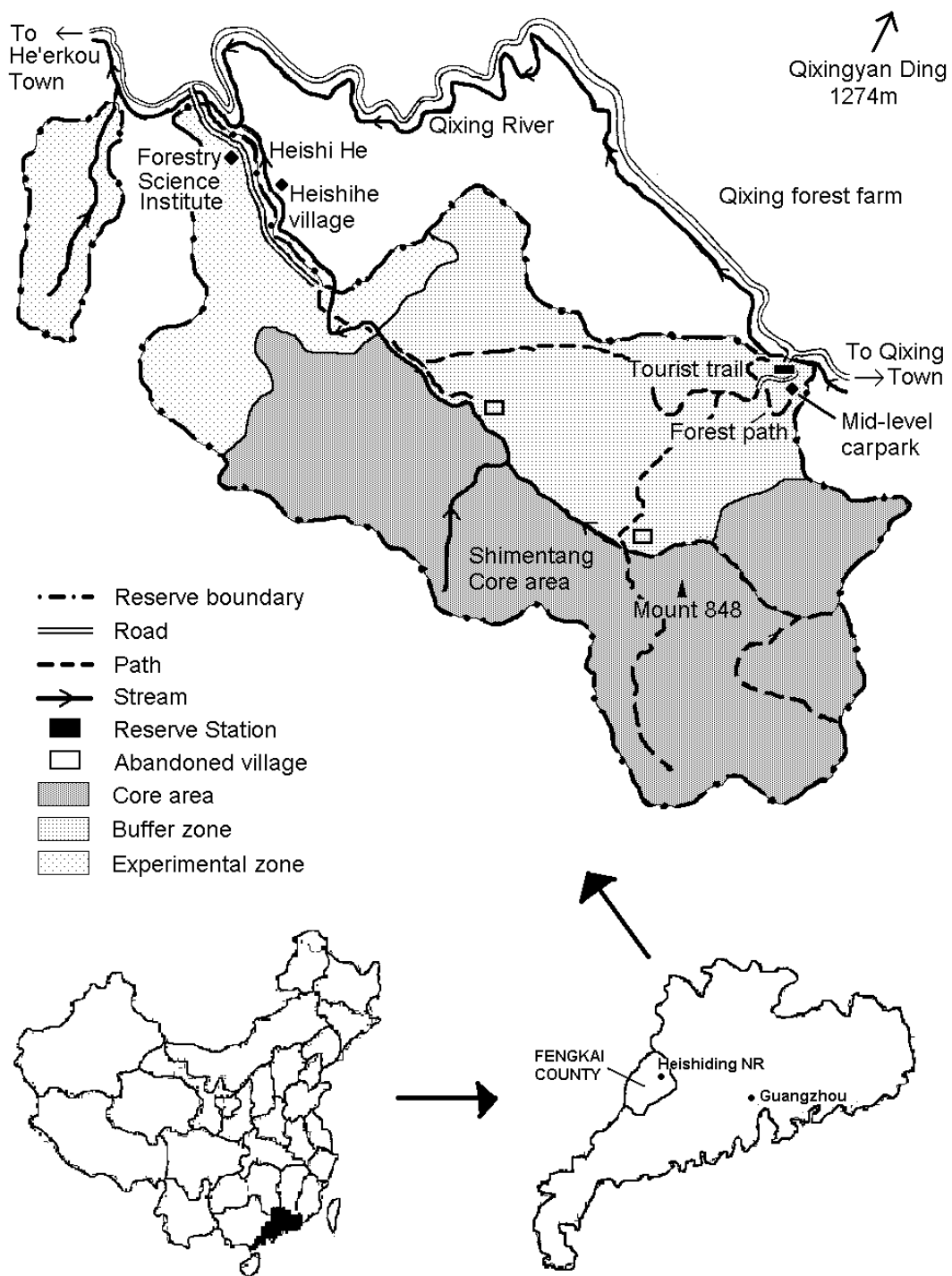
### Acknowledgements

The editors wish to thank the Guangdong Provincial Forestry Department for their cooperation and assistance, and all participants of the survey team, including field staff at Heishiding Nature Reserve. This work has been funded by KFBG.

### References

- Anon., n.d. *Introduction to Heishiding Nature Reserve*. Heishiding Nature Reserve Management Office.
- Anon., 1959-2001. *Flora Reipublicae Popularis Sinicae*. Tomus 2-80. Science Press, Beijing. (In Chinese.)
- Anon., 1996-2001. *Flora of China* Vol. 4, 15, 16, 17, 18, & 24. Science Press, Beijing, and Missouri Botanic Garden Press, St. Louis.
- Anon., 2002a. *Flora of China Checklist*. Published on the Internet: <http://mobot.mobot.org/W3T/Search/foc.html> [Accessed on 1 May 2003]
- Anon., 2002b. *Flora of China Manuscript*. Published on the Internet: <http://flora.huh.harvard.edu/china/> [Accessed on 1 May 2003]
- Bascombe, M.J. 1995. Check list of the butterflies of South China. *Memoirs of the Hong Kong Natural History Society* 20: 1-206.
- Ceballos-Lascuráin H., 1996. *Tourism, ecotourism, and protected areas: the state of nature-based tourism around the world and guidelines for its development*. IUCN – The World Conservation Union, Gland, Switzerland, 301 pp.
- China National Committee of the Man-and-the-Biosphere, 1998. *Nature Reserve and Ecotourism*. China Science and Technology Press, Beijing, 110 pp. (In Chinese.)
- Clements, J.F., 2000. *Birds of the World: A Checklist, Fifth Edition*. Ibis Publishing Company, California, 867pp.
- Fellowes, J.R., and Hau, C.-H., 1997. *A faunal survey of nine forest reserves in Tropical South China, with a review of conservation priorities in the region*. Kadoorie Farm and Botanic Garden, Hong Kong, 151 pp.
- 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, 2003. *2003 IUCN Redlist of Threatened Species*. Published on the Internet: <http://www.redlist.org/> [Accessed on 10 October, 2003]
- Kadoorie Farm and Botanic Garden, 2004. *Report of a Rapid Biodiversity Assessment at Dawuling Nature Reserve, Southwest Guangdong, China, June/July 2002*. South China Forest Biodiversity Survey Report Series: No. 38. KFBG, Hong Kong SAR, ii + 27 pp.
- Liang, G., Chen, Z., Wu, W., Huang, Z. and Gu, D., 1989. Insects of Heishiding – the nature conservation area, Guangdong, China. *Ecological Science* 1989 (1): 76-106.

- Liu, X. and Wang, B., 1987. The Vegetation Classification System and Main Kinds and Their Distribution in Hei Shi Ding Natural Reserve. *Ecologic Science* 1987 (1, 2): 19-34. (In Chinese with English abstract.)
- 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.
- Pan, J.-H. (ed.), 1991. *The Freshwater Fishes of Guangdong Province*. Guangdong Science and Technology Press, Guangzhou, 589 pp. (In Chinese.)
- 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 Wildlife Conservation Office, 2003. *China Nature Reserves*. State Forestry Administration, Beijing, 72 pp. (In Chinese.)
- The Plant Names Project, 2002. *International Plant Names Index*. Published on the Internet: <http://www.ipni.org/> [Accessed on 1 May, 2003].
- Viney, C., 1986. Observations on the birds of Hei Shi Ding Nature Reserve, Feng Kai County, Guangdong, P.R.C. *The Hong Kong Bird Report*: 101-103.
- Wang, B. and Liu, X., 1987. The Characteristics of the Vegetation in Hei Shi Ding Natural Reserve. *Ecologic Science* 1987 (1, 2): 1-18. (In Chinese with English abstract.)
- 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.
- Wilson, K.D.P. and Reels, G.T., 2003. Odonata of Guangxi Zhuang Autonomous Region, China, part 1: Zygoptera. *Odonatologica* 32(3): 237-279.
- 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.)
- Yu, Y.F., 1999. A milestone of wild plants protection in China - the list of wild plants protected by the nation (the first batch), *Plant Magazine* 5 : 3-11. (In Chinese.)
- Zhang, J. (ed.), 1997. *Nature Reserves of Guangdong Province*. Guangdong Tourism Publishing House, Guangzhou, 384 pp. (In Chinese.)
- 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 K. Adler, 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 Heishiding Nature Reserve, West Guangdong, China.