



**Report of a Rapid Biodiversity Assessment at
Diaoluoshan National Forest Park, Southeast
Hainan, China, 23-28 May 1999**

Kadoorie Farm and Botanic Garden
in collaboration with
Hainan Provincial Forestry Department
South China Institute of Botany
Hainan Normal University
South China Normal University
Liuzhou Technical College
Xinyang Teachers' College

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Report of a Rapid Biodiversity Assessment at Diaoluoshan National Forest Park, Southeast Hainan, China, 23-28 May 1999

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Background

The present report details the findings of a visit to Southeast Hainan 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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Translation of common Chinese geographical terms

Chinese Romanization	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	valley
Kou	outlet
Ling	range
Nan	South
Shan	mountain
Shi	city
Tun	Hamlet
Wan	bay
Xi	West
Xi, yong	stream

Report of a Rapid Biodiversity Assessment at Diaoluoshan National Forest Park, Southeast Hainan, China, 23-28 May 1999

Objectives

- The aims of the survey were to collect up-to-date information on the fauna and flora of Diaoluoshan National Forest Park, including Baishuiling Nature Reserve, and to use this to help determine conservation priorities within South China. Emphasis was on groups that have not been extensively studied, including orchids, birds, amphibians, reptiles, fish, ants, dragonflies and butterflies.

Methods

- On 17 May a team from Haikou (FJP, YZD, XY), Hong Kong (GS, JRF, ML, LKS, GTR, KW), Guangzhou (XFW, WRJ, XZ), Liuzhou (CM) and Xinyang (LHJ) assembled in Haikou for a series of rapid biodiversity surveys in Southeast Hainan. Following brief visits to Jianling and Shangxi (Kadoorie Farm and Botanic Garden, 2002a), Qingpilin (Kadoorie Farm and Botanic Garden, in press) and Tongtieling and Xinglong Botanic Garden (Kadoorie Farm and Botanic Garden, 2002b), they surveyed the Diaoluoshan National Forest Park from 23-28 May.
- 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 Diaoluoshan 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 (excluding orchids) were made or verified by XFW and WRJ, and edited by NSC. Orchid records were made or verified by GS. Mammal records were made by LKS, KW or ML. Records of birds were made or verified by LKS, KW or ML, reptiles and amphibians by ML, fish by BC and CXL, ants by JRF, butterflies by GTR or ML, dragonflies by KW and GTR, and molluscs by CDN or XY.
- 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. (1996-2001); Anon. (2002a, 2002b); The Plant Names Project (2002);
 - Orchids (Angiospermae: Orchidaceae): Chen (1999); Lang (1999); Tsi (1999);
 - Mammals (Mammalia): D.E. 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);
 - 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). National conservation status of orchids is based on Wang *et al.* (in press). Certain taxa, including orchids, reptiles, amphibians, fish and invertebrates, have yet to be properly assessed for global status.

- Protected status in China is based on Hua & Yan (1993) for animals, and State Forestry Administration & Ministry of Agriculture (1999) for plants.

Location and management

- Diaoluoshan National Forest Park is in Lingshui, Wanning, Qiongzong and Baoting counties at 18°43'-18°58'N by 109°43'-110°03'E, Southeast Hainan. The park is 380 km² in size (Diaoluoshan Forestry Bureau, 1998).
- The region has a tropical monsoon climate with mean monthly temperature range from 15°C in January to 28°C in July. Annual precipitation is 1,800 to 2,000 mm, falling mainly between May and October (Diaoluoshan Forestry Bureau, 1998).
- The geology is mainly granite. The landscape is a mixture of steep and gentle hills, with some rocky outcrops (Diaoluoshan Forestry Bureau, 1998). The park has an altitudinal range from 50 to 1,499 m. The present survey included habitats from 180 to 1,130 m.
- The Forest Park was designated in 1994 to promote ecotourism as an alternative to logging native forest, which was banned in the same year (Diaoluoshan Forestry Bureau, 1998); it was subsequently upgraded to a National Forest Park in 1999. Diaoluoshan National Forest Park includes Baishuiling Nature Reserve (30 km² in size), which was established in 1984 to protect the tropical rainforest ecosystem and rare fauna (MacKinnon *et al.*, 1996). “Diaoluoshan Mountains” is classified as a Forest Ecosystem nature reserve (Zhang W., 1998), and is managed by the provincial Forestry Department.

Results

Vegetation

- The original vegetation of Diaoluoshan would have been tropical seasonal evergreen rainforest and hillside evergreen rainforest. Much of the original forest cover at lower elevations, however, had been cleared and transformed to secondary forest and shrubland. Some of the secondary forest reached about 20 m in height. Extensive forest, 20–40 m in height, could be found above 1,100 m. Judging from the size and structure of this forest, it may be primary.
- Dominant families in the forest vegetation included Lauraceae, Euphorbiaceae, Moraceae, Myrtaceae, Orchidaceae, Apocynaceae, Sterculiaceae, Areaceae, and Myrsinaceae.

Flora

- Earlier surveys of Diaoluoshan had recorded some 1,900 seed plant species in 171 families. This recorded flora was dominated by Lauraceae, Fagaceae, Moraceae, Rubiaceae, Papilionaceae, Poaceae, Cyperaceae and Orchidaceae (Ding *et al.*, 2002). The present survey recorded 331 vascular plant species, including 29 ferns in 20 families, two gymnosperms in two families, and 300 angiosperms in 77 families. These included 66 orchid species, shown in Table 2; all other species are shown in Table 1.
- *Bulbophyllum* (cf. *insulsum*) sp. is recorded from Hainan for the first time.
- Several plant species of conservation importance were found in the present survey:
 - *Vatica mangachapoi* is considered globally Endangered, and under Class II National Protection in China.
 - The orchids *Anoectochilus roxburghii* and *Cymbidium eburneum* are Endangered in China.
 - *Alseodaphne hainanense* is globally Vulnerable, and under Class II National Protection. It is endemic to Hainan and northern Vietnam.
 - *Liparis baotingensis* is known only from Diaoluoshan in Hainan and Malipo in Yunnan.

- *Gymnosphaera gigantea* and *Sphaeropteris hainanensis* are both under Class II National Protection. The latter is also endemic to Hainan.
- *Diospyros maclurei*, *Beilschmiedia longipetiolata*, *Cryptocarya impressinervia*, *Manglietia hainanensis*, *Ardisia densilepidotula*, *Saprosma hainanensis*, *Reevesia longipetiolata*, *Symplocos euryoides*, *Gordonia hainanensis*, *Microcos chungii* and the orchids *Ceratostylis hainanensis* and *Dendrobium changjiangense* are known only from Hainan. The present record of *Dendrobium changjiangense* is the first from Lingshui County.
- *Eria rosea* is known only from Hainan and Hong Kong.
- *Polyalthia lauii* and *Homalium hainanense* are known only from Hainan and Vietnam.
- *Aristolochia hainanensis* and *Rhododendron hainanense* are known only from Hainan and southern Guangxi.
- *Eria thao* is known only from Hainan, Shiwandashan in Guangxi (Kadoorie Farm and Botanic Garden, in preparation) and Vietnam.
- *Goniothalamus howii* is known only from Hainan and southern Yunnan.
- *Robiquetia spathulata* is restricted within China to Hainan.
- All recorded orchid species are listed in CITES Appendix II.
- Orchid diversity was very high, with a high percentage (76%) of epiphytic species. This high proportion is indicative of high-integrity tropical forest. Species of the genus *Liparis* were comparatively rich in the Diaoluoshan Resort area. The primitive orchids (*Apostasia odorata*, *Neuwiedia singaporeana* and *Tropidia curculigoides*) were also found in the survey.
- Exotic species and pantropical weeds were more common at lower elevations.

Table 1. Vascular plants of Diaoluoshan Nature Reserve recorded in the present survey. Not including orchids (see Table 2). Species which are Nationally Protected (Class I or II) (State Forestry Administration & Ministry of Agriculture, 1999), globally Threatened or at Lower Risk (Near-threatened) (IUCN, 2002) or globally restricted are indicated.

Family	Species	Remarks
PTERIDOPHYTA		
Antrophyaceae	<i>Antrophyum callifolium</i> Blume	
Aspleniaceae	<i>Asplenium loriceum</i> H. Christ	
	<i>Asplenium neolaserpitiifolium</i> Tardieu & Ching	
	<i>Neottopteris nidus</i> (L.) J. Sm.	epiphytic
Athyriaceae	<i>Diplazium donianum</i> (Mett.) Tardieu	
Blechnaceae	<i>Blechnum orientale</i> L.	
Bolbitidaceae	<i>Egenolfia appendiculata</i> (Willd.) J.Sm.	
Cyatheaceae	<i>Gymnosphaera gigantea</i> (Wall. ex Hook.) Ching	Protected II
	<i>Sphaeropteris hainanensis</i> (Ching) R.M. Tryon	Protected II, endemic to Hainan
Davalliaceae	<i>Davallia formosana</i> Hayata	
Drynariaceae	<i>Pseudodrynaria coronans</i> (Wall. ex Mett.) Ching	
Dryopteridaceae	<i>Arachniodes hainanensis</i> (Ching) Ching	
Gleicheniaceae	<i>Dicranopteris linearis</i> (Burm. f.) Underw.	
	<i>Diplopterigium blotiana</i> (C.Chr.) Nakai	
	<i>Palhinhaea cernua</i> (L.) Franco & Vasc.	
Lycopodiaceae	<i>Lygodium digitatum</i> C. Presl	
Nephrolepidaceae	<i>Nephrolepis biserrata</i> (Sw.) Schott	
Ophioglossaceae	<i>Ophioderma pendula</i> (L.) Presl	
Polypodiaceae	<i>Colysis digitata</i> (Baker) Ching	
	<i>Lepidogrammits rostrata</i> (Bedd.) Ching	
	<i>Microsorium punctatum</i> (L.) Copel.	
	<i>Pyrrhosia lingua</i> (Thunb.) Farw	
Psilotaceae	<i>Psilotum nudum</i> (L.) P. Beaur.	
Pteridaceae	<i>Pteris grevilleana</i> J. Agardh	
Selaginellaceae	<i>Selaginella picta</i> A. Br. ex Baker	
	<i>Selaginella scabrifolia</i> C.H.Wang	
Thelypteridaceae	<i>Cyclosorus heterocarpus</i> (Blume) Ching	
	<i>Pronephrium simplex</i> (Hook.) Holttum	
Vittariaceae	<i>Vittaria elongata</i> Sw.	

Family	Species	Remarks
GYMNOSPERMAE		
Gnetaceae	<i>Gnetum luofuense</i> C. Y. Cheng	
Podocarpaceae	<i>Podocarpus neriifolius</i> D. Don	
ANGIOSPERMAE		
Dicotyledonae		
Actinidiaceae	<i>Saurauia tristyla</i> DC.	
Amaranthaceae	<i>Celosia argentea</i> L. <i>Cyathula prostrata</i> (L.) Blume	
Anacardiaceae	<i>Toxicodendron succedaneum</i> (L.) Kuntze.	
Ancistrocladaceae	<i>Ancistrocladus tectorius</i> (Lour.) Merr.	
Annonaceae	<i>Alphonsea monogyna</i> Merr. & Chun <i>Desmos chinensis</i> Lour. <i>Fissistigma glaucescens</i> (Hance) Merr. <i>Goniothalamus howii</i> Merr. & Chun <i>Polyalthia lauii</i> Merr. <i>Polyalthia nemoralis</i> Aug. DC. <i>Popowia pisocarpa</i> (Blume) Endl. <i>Uvaria microcarpa</i> Champ. ex Benth.	endemic to Hainan & S. Yunnan endemic to Hainan & Vietnam
Apocynaceae	<i>Alyxia odorata</i> Wall. ex G. Don <i>Melodinus suaveolens</i> Champ. ex Benth. <i>Tabernaemontana bovina</i> Lour. <i>Tabernaemontana bufalina</i> Lour. <i>Wrightia pubescens</i> R. Br.	
Aquifoliaceae	<i>Ilex rotunda</i> Thunb. <i>Ilex triflora</i> Blume	
Araliaceae	<i>Schefflera octophylla</i> (Lour.) Harms	
Aristolochiaceae	<i>Aristolochia hainanensis</i> Merr.	endemic to Hainan & S. Guangxi
Asteraceae	<i>Crassocephalum crepidioides</i> (Benth.) S. Moore <i>Elephantopus scaber</i> L. <i>Elephantopus tomentosus</i> L. <i>Mikania cordata</i> (Burm. f.) B.L. Rob.	introduced from Africa
Begoniaceae	<i>Begonia howii</i> Merr. & Chun <i>Begonia palmata</i> D. Don	
Burseraceae	<i>Canarium pimela</i> Leenhouts	
Capparaceae	<i>Capparis cantoniensis</i> Lour. <i>Stixis suaveolens</i> (Roxb.) Pierre	
Caryophyllaceae	<i>Drymaria cordata</i> (L.) Willd. ex Roem. & Schult.	
Celastraceae	<i>Euonymus laxiflorus</i> Champ. ex Benth.	
Chloranthaceae	<i>Hedyosmum orientale</i> Merr. & Chun	
Clusiaceae	<i>Cratoxylum cochinchinense</i> (Lour.) Blume	
Clusiaceae	<i>Garcinia multiflora</i> Champ. ex Benth. <i>Garcinia oligantha</i> Merr.	
Convolvulaceae	<i>Argyreia capitiformis</i> (Poir.) Ooststr. <i>Hewittia malabarica</i> (L.) Suresh <i>Merremia umbellata</i> (L.) Hallier. f.	
Dilleniaceae	<i>Dillenia pentagyna</i> Roxb. <i>Dillenia turbinata</i> Finet & Gagnep. <i>Tetracera asiatica</i> (Lour.) Hoog.	
Dipterocarpaceae	<i>Vatica mangachapoi</i> Blanco.	Protected II, Endangered
Ebenaceae	<i>Diospyros eriantha</i> Champ. ex Benth. <i>Diospyros maclurei</i> Merr.	endemic to Hainan
Elaeocarpaceae	<i>Elaeocarpus sylvestris</i> (Lour.) Poir.	
Ericaceae	<i>Rhododendron hainanense</i> Merr.	endemic to Hainan & S. Guangxi
Escalloniaceae	<i>Itea macrophylla</i> Wall. ex Roxb.	
Euphorbiaceae	<i>Antidesma montanum</i> Blume <i>Aporosa dioica</i> (Roxb.) Müll. Arg. <i>Baccaurea ramiflora</i> Lour. <i>Bischofia javanica</i> Blume <i>Breynia fruticosa</i> (L.) Hook. f.	

Family	Species	Remarks
	<i>Bridelia tomentosa</i> Blume	
	<i>Claoxylon indicum</i> (Reinw. ex Bl.) Hassk.	
	<i>Croton laevigatus</i> Vahl	
	<i>Glochidion hirsutum</i> (Roxb.) Voigt	
	<i>Glochidion puberum</i> (L.) Hutch.	
	<i>Homonoia riparia</i> Lour.	
	<i>Macaranga denticulata</i> (Blume) Müll. Arg.	
	<i>Mallotus oblongifolius</i> (Miq.) Müll. Arg.	
Fagaceae	<i>Castanopsis fabri</i> Hance	
	<i>Cyclobalanopsis fleuryi</i> (Hickel & A. Camus) Chun ex Q. F. Zheng	
	<i>Cyclobalanopsis neglecta</i> Schottky	
Flacourtiaceae	<i>Homalium hainanense</i> Gagnep.	endemic to Hainan & Vietnam
	<i>Scolopia saeva</i> (Hance) Hance	
Gesneriaceae	<i>Aeschynanthus moningeriae</i> (Merr.) Chun	
Hernandiaceae	<i>Illigera rhodantha</i> Hance	
Icaciniaceae	<i>Gomphandra tetrandra</i> (Wall.) Sleum.	
	<i>Gonocaryum lobbianum</i> (Miers) Kurz	
Ixonanthaceae	<i>Ixonanthes chinensis</i> Champ.	Vulnerable
Juglandaceae	<i>Engelhardtia roxburghiana</i> Wall.	
Lamiaceae	<i>Anisomeles indica</i> (L.) Kuntze	
	<i>Gomphostemma chinense</i> Oliv.	
Lauraceae	<i>Alseodaphne hainanensis</i> Merr.	Protected II, Vulnerable, endemic to Hainan & N. Vietnam endemic to Hainan
	<i>Beilschmiedia longipetiolata</i> C.K. Allen	
	<i>Cinnamomum bejolghota</i> (Buch.-Ham.) Sweet	
	<i>Cinnamomum burmanni</i> (Nees & T. Nees) Blume	
	<i>Cinnamomum porrectum</i> (Roxb.) Kosterm.	
	<i>Cinnamomum tsoi</i> C.K. Allen	
	<i>Cryptocarya chinensis</i> (Hance) Hemsl.	
	<i>Cryptocarya densiflora</i> Blume	
	<i>Cryptocarya impressinervia</i> H.W. Li	endemic to Hainan
	<i>Litsea cubeba</i> (Lour.) Pers.	
	<i>Litsea elongata</i> (Nees) Benth. & Hook. f.	
	<i>Litsea rotundifolia</i> Hemsl. var. <i>oblongifolia</i> (Nees) C. K. Allen	
	<i>Litsea verticillata</i> Hance	
	<i>Machilus chinensis</i> (Champ. ex Benth.) Hemsl.	
	<i>Phoebe tavoyana</i> (Meisn.) Hook. f.	
Loganiaceae	<i>Strychnos angustiflora</i> Benth.	
Lythraceae	<i>Rotala densiflora</i> (Roth) Koehne	
Magnoliaceae	<i>Magnolia albosericea</i> Chun & C.H. Tsoong	
	<i>Manglietia hainanensis</i> Dandy	endemic to Hainan
Malpighiaceae	<i>Hiptage benghalensis</i> (L.) Kurz	
Malvaceae	<i>Sida cordifolia</i> L.	pantropical weed
	<i>Sida rhombifolia</i> L.	pantropical weed
Melastomataceae	<i>Blastus cochinchinensis</i> Lour.	
	<i>Melastoma candidum</i> D. Don	
	<i>Melastoma sanguineum</i> Sims	
Molluginaceae	<i>Mollugo pentaphylla</i> L.	
Moraceae	<i>Ficus formosana</i> Maxim.	
	<i>Ficus oligodon</i> Miq.	
	<i>Ficus pyriformis</i> Hook. & Arn.	
	<i>Ficus variegata</i> Blume var. <i>chlorocarpa</i> (Benth.) King	
	<i>Ficus variolosa</i> Lindl. ex Benth.	
	<i>Streblus indica</i> (Bureau) Corner	
Myrsinaceae	<i>Ardisia densilepidotula</i> Merr.	endemic to Hainan
	<i>Ardisia humilis</i> Vahl	
	<i>Ardisia obtusa</i> Mez	
	<i>Ardisia quinquegona</i> Blume	

Family	Species	Remarks
	<i>Embelia laeta</i> (L.) Mez	
	<i>Embelia ribes</i> Burm. f.	
	<i>Maesa japonica</i> (Thunb.) Moritzi & Zoll.	
	<i>Maesa perlarius</i> (Lour.) Merr.	
	<i>Mysine seguinii</i> H. Lév	
Myrtaceae	<i>Acmena acuminatissima</i> (Blume) Merr. & L. M. Perry	
	<i>Rhodomyrtus tomentosa</i> (Aiton) Hassk.	
	<i>Syzygium buxifolium</i> Hook. & Arn.	
Oleaceae	<i>Chionanthus ramiflorus</i> Roxb.	
	<i>Jasminum lanceolarium</i> Roxb.	
Papilionaceae	<i>Dalbergia hancei</i> Benth.	
	<i>Ormosia balansae</i> Drake	
	<i>Ormosia emarginata</i> (Hook. & Arn.) Benth.	
	<i>Ormosia pinnata</i> (Lour.) Merr.	
Pentaphylacaceae	<i>Pentaphylax euryoides</i> Gardner & Champ.	
Piperaceae	<i>Piper hongkongense</i> C. DC.	
	<i>Piper sarmentosum</i> Roxb.	
Polygalaceae	<i>Xanthophyllum hainanense</i> Hu	
Polygonaceae	<i>Polygonum barbatum</i> L.	
	<i>Polygonum chinense</i> L.	
Proteaceae	<i>Helicia formosana</i> Hemsl.	
	<i>Helicia longipetiolata</i> Merr. & Chun	
Rosaceae	<i>Laurocerasus phaeosticta</i> (Hance) C. K. Schneid.	
	<i>Rhaphiolepis indica</i> (L.) Lindl.	
Rubiaceae	<i>Adina pilulifera</i> (Lam.) Franch. ex Drake	
	<i>Aidia canthioides</i> (Champ. ex Benth.) Masam.	
	<i>Antirhea chinensis</i> (Champ. ex Benth.) F.B. Forbes & Hemsl.	
	<i>Catunaregam spinosa</i> (Thunb.) Tirveng.	
	<i>Lasianthus chinensis</i> (Champ. ex Benth.) Benth.	
	<i>Mussaenda erosa</i> Champ. ex Benth.	
	<i>Paederia scandens</i> (Lour.) Merr.	
	<i>Psychotria asiatica</i> L.	epiphytic
	<i>Psychotria serpens</i> L.	
	<i>Psychotria tutcheri</i> Dunn	
	<i>Saprosma hainanensis</i> Merr.	endemic to Hainan
	<i>Saprosma ternatum</i> Hook. f.	
	<i>Tarenna attenuata</i> (Voigt) Hutch.	
Rutaceae	<i>Evodia lepta</i> (Spreng.) Merr.	
	<i>Toddalia asiatica</i> (L.) Lam.	
	<i>Zanthoxylum avicennae</i> (Lam.) DC.	
	<i>Zanthoxylum nitidum</i> (Roxb.) DC.	
Sabiaceae	<i>Meliosma angustifolia</i> Merr.	
	<i>Meliosma rigida</i> Siebold & Zucc.	
	<i>Meliosma squamulata</i> Hance	
Sapindaceae	<i>Cardiospermum halicacabum</i> L.	
Sapotaceae	<i>Sarcosperma laurinum</i> (Benth.) Hook. f.	
Solanaceae	<i>Solanum virginianum</i> L.	introduced
Sterculiaceae	<i>Commersonia bartramia</i> (L.) Merr.	
	<i>Helicteres angustifolia</i> L.	
	<i>Helicteres hirsuta</i> Lour.	
	<i>Helicteres isora</i> L.	
	<i>Kleinhovia hospita</i> L.	
	<i>Melochia corchotifolia</i> L.	
	<i>Pterospermum heterophyllum</i> Hance	
	<i>Reevesia longipetiolata</i> Merr. & Chun	endemic to Hainan
	<i>Reevesia thyrsoides</i> Lindl	
	<i>Sterculia lanceolata</i> Cav.	
	<i>Waltheria indica</i> L.	
Symplocaceae	<i>Symplocos cochinchinensis</i> (Lour.) S. Moore	

Family	Species	Remarks
	<i>Symplocos euryoides</i> Hand.-Mazz.	endemic to Hainan
	<i>Symplocos glauca</i> (Thunb.) Koidz.	
	<i>Symplocos lancifolia</i> Siebold & Zucc.	
	<i>Symplocos poilanei</i> Guill.	
Theaceae	<i>Cleyera japonica</i> Thunb.	
	<i>Eurya ciliata</i> Merr.	
	<i>Symplocos euryoides</i> Kobuski	endemic to Hainan
	<i>Gordonia hainanensis</i> H.T. Chang	endemic to Hainan
	<i>Schima superba</i> Gardn. & Champ.	
	<i>Ternstroemia gymnanthera</i> (Wight & Arn.) Bedd.	
Tiliaceae	<i>Corchorus aestuans</i> L.	
	<i>Grewia eriocarpa</i> Juss.	
	<i>Microcos chungii</i> (Merr.) Chun	endemic to Hainan
	<i>Microcos paniculata</i> L.	
	<i>Triumfetta rhomboidea</i> Jacq.	
Ulmaceae	<i>Gironniera subaequalis</i> Planch.	
Verbenaceae	<i>Callicarpa candicans</i> (Burm. f.) Hochr.	
	<i>Callicarpa longifolia</i> Lam.	
	<i>Callicarpa nudiflora</i> Hook. & Arn.	
	<i>Clerodendrum cyrtophyllum</i> Turcz.	
Violaceae	<i>Viola yunnanensis</i> Becker & H.Boissieu	
Viscaceae	<i>Viscum articulatum</i> Burm. f.	
Vitaceae	<i>Ampelopsis cantoniensis</i> (Hook. & Arn.) Planch.	
	<i>Cissus repens</i> Lam.	
	<i>Leea indica</i> (Burm. f.) Merr.	
Monocotyledonae		
Amaryllidaceae	<i>Curculigo glabrescens</i> (Ridl.) Merr.	
Araceae	<i>Acorus gramineus</i> Sol.	
	<i>Pothos chinensis</i> (Raf.) Merr.	
	<i>Pothos repens</i> (Lour.) Druce	
	<i>Rhaphidophora hongkongensis</i> Schott	
Areaceae	<i>Arenga pinnata</i> (Wurmb) Merr.	
	<i>Calamus rhabdocladus</i> Burret	
	<i>Calamus tetradactylus</i> Hance	
	<i>Licuala fordiana</i> Becc.	
	<i>Licuala spinosa</i> Thunb.	
	<i>Pinanga discolor</i> Burret	
Commelinaceae	<i>Amischotolype hispida</i> (Less. & A. Rich.) D.Y. Hong	
	<i>Floscopa scandens</i> Lour.	
	<i>Murdannia nudiflora</i> (L.) Brenan	
Cyperaceae	<i>Carex baccans</i> Nees	
	<i>Carex cruciata</i> Wahlenb.	
	<i>Carex cryptostachys</i> Brongn.	
	<i>Cyperus haspans</i> L.	
	<i>Cyperus pilosus</i> Vahl	
	<i>Fuirena ciliaris</i> (L.) Roxb.	
	<i>Gahnia tristis</i> Nees	
Eriocaulaceae	<i>Eriocaulon sexangulare</i> L.	
Liliaceae	<i>Asparagus cochinchinensis</i> (Lour.) Merr.	
	<i>Aspidistra elatior</i> Blume	
	<i>Dianella ensifolia</i> (L.) DC.	
	<i>Heterosmilax japonica</i> Kunth var. <i>gaudichaudiana</i> (Kunth) F.T. Wang & Ts. Tang	
	<i>Smilax corbularia</i> Kunth	
Poaceae	<i>Apluda mutica</i> L.	
	<i>Cyrtococcum oxyphyllum</i> (Hochst. ex Steud.) Stapf	
	<i>Cyrtococcum patens</i> (L.) A. Camus	
	<i>Dactyloctenium aegyptium</i> (L.) P. Beauv.	exotic species
	<i>Imperata koenigii</i> (Retz.) P. Beauv.	

Family	Species	Remarks
	<i>Miscanthus floridulus</i> (Labill.) Warb. ex K. Schum & Lauterb.	
	<i>Miscanthus sinensis</i> Andersson	
	<i>Neyraudia arundinacea</i> (L.) Henr.	
	<i>Panicum incommutatum</i> Trin.	
	<i>Saccharum spontaneum</i> L.	
	<i>Schizachyrium brevifolium</i> (Sw.) Nees	
	<i>Thysanolaena maxima</i> (Roxb.) Kuntze	

Table 2. Orchids recorded in Diaoluoshan National Forest Park and neighbouring areas from 24 to 27 May 1999.

Species	Habitat	Remarks
<i>Agrostophyllum callosum</i> Rchb. f.	on tree trunk in forest beside stream	epiphytic
<i>Anoectochilus roxburghii</i> (Wall.) Lindl.	on rock and forest floor with rich humus	terrestrial; Endangered
<i>Apostasia odorata</i> Blume	on bamboo and broadleaf forest floor	terrestrial; primitive orchid
<i>Appendicula cornuta</i> Blume	on rock and tree trunk beside stream in forest	epiphytic
<i>Arachnis labrosa</i> (Lindl. et Paxt.) Rchb.f.	on tree trunk in forest	epiphytic
<i>Arundina graminifolia</i> (D. Don) Hochr.	on slope beside road	terrestrial
<i>Bulbophyllum affine</i> Lindl.	on tree trunk in forest	epiphytic
<i>Bulbophyllum ambrosia</i> (Hance) Schltr.	on tree trunk in forest and forest edge	epiphytic
<i>Bulbophyllum delitescens</i> Hance	on rock beside stream in forest	epiphytic
<i>Bulbophyllum</i> (cf. <i>insulsum</i>) sp.	on tree trunk in forest	epiphytic; newly recorded species for Hainan
<i>Bulbophyllum</i> (cf. <i>retusiusculum</i>) sp.	on rock and tree trunk in forest	epiphytic
<i>Bulbophyllum</i> sp.	on tree trunk in forest	epiphytic
<i>Calanthe triplicata</i> (Willemet) Ames	on forest floor with rich humus	terrestrial
<i>Calanthe</i> (cf. <i>clavata</i>) sp.	beside stream in forest	terrestrial
<i>Calanthe</i> sp.	on forest floor with rich humus	terrestrial
<i>Ceratostylis hainanensis</i> Z.H. Tsi	on tree trunk	epiphytic; endemic to Hainan
<i>Cephalantheropsis</i> sp.	on forest floor with rich humus	terrestrial
<i>Cleisostoma paniculatum</i> (Kar Gawl.) Garay	on tree trunk	epiphytic
<i>Cleisostoma parishii</i> (Hook.f.) Garay	on tree trunk in forest	epiphytic
<i>Cleisostoma rostratum</i> (Lindl.) Garay	on tree trunk in forest	epiphytic
<i>Cleisostoma simondii</i> (Gagnep.) Seidenf.	on tree trunk in forest	epiphytic
<i>Cleisostoma</i> sp.	on tree trunk beside path	epiphytic
<i>Coelogyne fimbriate</i> Lindl.	on tree trunk of forest edge	epiphytic
<i>Coelogyne</i> sp.	on tree trunk	epiphytic
<i>Cymbidium eburneum</i> Lindl.	on tree trunk in forest beside stream	epiphytic; Endangered
<i>Cymbidium floribundum</i> Lindl.	on tree trunk in forest	epiphytic
<i>Cymbidium</i> (cf. <i>dayanum</i>) sp.	on tree trunk in forest	epiphytic
<i>Cymbidium</i> sp.	on tree trunk	epiphytic
<i>Dendrobium acinaciforme</i> Roxb.	on tree trunk	epiphytic
<i>Dendrobium aduncum</i> Lindl.	on tree trunk in forest	epiphytic
<i>Dendrobium changjiangense</i> S.J. Cheng & C.Z. Tang	on rock and tree trunk (near base) in forest	epiphytic; endemic to Hainan; new record for Lingshui County
<i>Dendrobium densiflorum</i> Lindl.	on tree trunk in forest	epiphytic
<i>Dendrobium williamsonii</i> Day & Rchb. f.	on tree trunk in forest	epiphytic
<i>Dendrobium</i> (cf. <i>moniliforme</i>) sp.	on tree trunk	epiphytic
<i>Dendrobium</i> (cf. <i>nobile</i>) sp.	on tree branches in forest	epiphytic
<i>Dendrobium</i> sp.	on tree trunk in forest	epiphytic
<i>Diploprora championii</i> (Lindl.) Hook. f.	on tree trunk in forest	epiphytic

Species	Habitat	Remarks
<i>Eria pannea</i> Lindl.	on tree trunk in forest and edge of forest	epiphytic
<i>Eria rosea</i> Lindl.	on rock and tree trunk	epiphytic; restricted to Hainan & Hong Kong
<i>Eria thao</i> Gagnep.	on tree trunk in forest and edge of forest	epiphytic; restricted to Hainan, Shiwandashan in Guangxi & Vietnam
<i>Eria</i> (cf. <i>amica</i>) sp.	on tree trunk in forest beside stream	epiphytic
<i>Eria</i> (cf. <i>tomentosa</i> (K.D. Koen)) sp.	on rock at edge of forest	epiphytic
<i>Eria</i> sp.	on tree trunk in forest	epiphytic
<i>Flickingeria</i> (cf. <i>fimbriata</i> (Blume) Hawkes) sp.	on tree trunk in forest	epiphytic
<i>Flickingeria</i> sp.	on tree trunk in forest	epiphytic
<i>Geodorum dendsiflorum</i> (Lam.) Schltr.	on ground at forest edge	terrestrial
<i>Habenaria rhodocheila</i> Hance	on ground at forest edge, rich humus	terrestrial
<i>Liparis balansae</i> Gagnep.	on tree trunk in forest	epiphytic
<i>Liparis bautingensis</i> T. Tang & F.T. Wang	on rock and tree trunk in forest	epiphytic; known only from Diaoluoshan & Malipo in Yunnan
<i>Liparis bootanensis</i> Griff.	on rock and tree trunk in forest	epiphytic
<i>Liparis cespitosa</i> (Thou.) Lindl.	on tree trunk in forest	epiphytic
<i>Liparis luteola</i> Lindl.	on rock beside stream in forest	epiphytic
<i>Liparis stricklandiana</i> Rchb. f.	on tree trunk in forest	epiphytic
<i>Liparis viridiflora</i> (Blume) Lindl.	on tree trunk in forest	epiphytic
<i>Liparis</i> (cf. <i>bootanensis</i>) sp.	on tree trunk in forest	epiphytic
<i>Liparis</i> sp.	on tree trunk in forest	epiphytic
<i>Malaxis calophylla</i> (Rchb. f.) Kuntze.	on forest floor with rich humus	terrestrial
<i>Malaxis latifolia</i> Sm.	on forest floor	terrestrial
<i>Malaxis</i> sp.	on grassy slope beside road	terrestrial
<i>Nephalaphyllum cristatum</i> Rolfe	on tree trunk and forest floor with rich humus	terrestrial
<i>Neuwiedia singaporeana</i> (Baker) Rolfe	on forest floor with rich humus	terrestrial; primitive orchid
<i>Parapteroceras elobe</i> (Seidenf.) Averyanov.	on tree trunk beside path	epiphytic
<i>Peristylus</i> sp.	on grassy slope beside the path	terrestrial
<i>Pholidota chinensis</i> Lindl.	on rock and tree trunk	epiphytic
<i>Robiquetia spathulata</i> (Blume) J.J. Smith	on rock and branches of trees	epiphytic; restricted to Hainan within China
<i>Tropidia curculigoides</i> Lindl.	on forest floor with rich humus	terrestrial; primitive orchid

Mammals

- A squirrel, probably Red-hipped Squirrel *Dremomys pyrrhomerus*, was heard on 25 May.
- At Nanxi, many fruit skins were found below a fruiting tree, probably left by a palm civet (either *Paguma larvata* or *Paradoxurus hermaphroditus*).
- The status of mammals was inferred (Table 3) based on an interview with two officials of Baishuiling Nature Reserve, and on recorded distributions, including past records from Diaoluoshan (Guangdong Institute of Entomology and Zhongshan University, 1983; Zhang Y. *et al.*, 1997). Reports of species not previously recorded from Hainan are here considered doubtful. In some cases they are likely to reflect misidentification of related species (e.g. Assam Macaque *Macaca assamensis* in place of Rhesus Monkey *M. mulatta*; Reeves's Muntjac *Muntiacus reevesi* in place of Indian Muntjac *M. muntjak*).
- There are historic records of black gibbons from Diaoluoshan but the species was under intense hunting pressure from local people during the 1950s (Tang & Li, 1957). All the people asked during this survey said they had not heard gibbons for some years, indicating that this ape has

probably been extirpated from Diaoluoshan. Eastern Crested Gibbon *Nomascus* (cf. *nasutus*) sp. is Critically Endangered, and known only from Bawangling National Nature Reserve in western Hainan and a single site in Vietnam.

Table 3. The inferred status of mammals at Diaoluoshan National Forest Park, Hainan, based on interviewing two officials of the Nature Reserve and on previous distribution records (see text). “+” = rare, “++” = quite common, “+++” = abundant. Sequence follows D.E. Wilson & Cole (2000).

Scientific name	English name	Past records	Mr. Chao & Mr.Liu	Probable status
<i>Hylomys hainanensis</i>	Hainan Gymnure		++	present
<i>Mogera insularis</i>	Insular Mole	✓	(not asked)	present
<i>Tupaia belangeri</i>	Northern Tree Shrew	✓	+++	present
<i>Hipposideros armiger</i>	Great Roundleaf Bat	✓	(not asked)	present
<i>Pipistrellus ceylonicus</i>	Kelaart's Pipistrelle	✓	(not asked)	present
<i>Miniopterus australis</i>	Little Long-fingered Bat	✓	(not asked)	present
<i>Macaca assamensis</i>	Assam Macaque		+++	doubtful
<i>Macaca mulatta</i>	Rhesus Monkey		-	uncertain
<i>Nomascus</i> (cf. <i>nasutus</i>) sp. (recorded as <i>Hylobates concolor</i>)	Eastern Crested Gibbon	✓	+	extirpated
<i>Cuon alpinus</i>	Dhole		+++	doubtful
<i>Prionailurus bengalensis</i>	Leopard Cat		+++	present
<i>Neofelis nebulosa</i>	Clouded Leopard	✓	+++	present
<i>Herpestes urva</i>	Crab-eating Mongoose	✓	+++	present
<i>Amblonyx cinereus</i>	Oriental Small-clawed Otter	✓	-	insecure
<i>Lutra lutra</i>	Eurasian Otter		+++	uncertain
<i>Martes flavigula</i>	Yellow-throated Marten	✓	-	insecure
<i>Melogale moschata</i>	Chinese Ferret-badger	✓	-	present
<i>Mustela kathiah</i>	Yellow-bellied Weasel		+++	present
<i>Mustela sibirica</i>	Siberian Weasel		+	doubtful
<i>Ursus thibetanus</i>	Asiatic Black Bear	✓	++	insecure
<i>Paguma larvata</i>	Masked Palm Civet	✓	+++	present
<i>Paradoxurus hermaphroditus</i>	Asian Palm Civet	✓	-	insecure
<i>Viverra zibetha</i>	Large Indian Civet	✓	-	insecure
<i>Viverricula indica</i>	Small Indian Civet	✓	++	present
<i>Sus scrofa</i>	Wild Boar	✓	+++	present
<i>Cervus unicolor</i>	Sambar	✓	++	insecure
<i>Muntiacus muntjak</i>	Indian Muntjac	✓	++	present
<i>Muntiacus reevesii</i>	Reeves's Muntjac		+++	doubtful
<i>Manis pentadactyla</i>	Chinese Pangolin		+++	present
<i>Callosciurus erythraeus</i>	Pallas's Squirrel	✓	+++	present
<i>Dremomys pernyi</i>	Perny's Long-nosed Squirrel		+++	doubtful
<i>Dremomys pyrrhomerus</i>	Red-hipped Squirrel	✓	+++	present
<i>Ratufa bicolor</i>	Black Giant Squirrel		+++	present
<i>Tamiops maritimus</i>	Maritime Striped Squirrel		+++	present
<i>Belomys pearsonii</i>	Hairy-footed Flying Squirrel		+++	present
<i>Hylopetes alboniger</i>	Particolored Flying Squirrel		+++	present
<i>Hylopetes phayrei</i> (recorded as <i>Petinomys elictilis</i>)	Indochinese Flying Squirrel	✓	-	insecure or extirpated
<i>Petaurista phillipensis</i> (recorded as <i>P. hainana</i>)	Indian Giant Flying Squirrel	✓	+++	present
<i>Leopoldamys edwardsi</i> (recorded as <i>Rattus edwardsi</i>)	Edwards's Long-tailed Giant Rat	✓	(not asked)	present
<i>Mus musculus</i>	House Mouse	✓	(not asked)	present
<i>Niviventer fulvescens</i> (recorded as <i>Rattus fulvescens</i>)	Chestnut White-bellied Rat	✓	(not asked)	present

Scientific name	English name	Past records	Mr. Chao & Mr.Liu	Probable status
<i>Rattus tanezumi</i> (recorded as <i>R. flavipectus</i>)	Tanezumi Rat	✓	(not asked)	present
<i>Rattus turkestanicus</i> (recorded as <i>R. rattoides</i>)	Turkestan Rat	✓	(not asked)	present
<i>Hystrix brachyura</i>	Malayan Porcupine		+++	present
<i>Atherurus macrourus</i>	Asiatic Brush-tailed Porcupine	✓	+++	present

- Some of the species suspected to occur are of special conservation concern.
 - Hainan Gymnure *Hylomys hainanensis* is globally Endangered, and Class II Protected in China.
 - Clouded Leopard *Neofelis nebulosa* is globally Vulnerable, and Class I Protected in China.
 - Eurasian Otter *Lutra lutra* and Asiatic Black Bear are globally Vulnerable, and Class II Protected in China.
 - Rhesus Monkey *Macaca mulatta*, Oriental Small-clawed Otter *Amblonyx cinereus*, Large Indian Civet *Viverra zibetha*, Small Indian Civet *Viverricula indica*, Sambar *Cervus unicolor*, Chinese Pangolin *Manis pentadactyla* and Indian Giant Flying Squirrel *Petaurista philippensis* are Class II Protected in China.
 - Eurasian Otter, Small Indian Civet and Sambar are also Class II Protected nationally.
- The globally Vulnerable Hainan Hare *Lepus hainanus* was not reported or recorded from Diaoluoshan, but has been recorded from Lingshui County (Zhang Y. *et al.*, 1997).

Birds

- Seventy-seven species of birds were recorded in Diaoluoshan National Forest Park during this survey (Table 4).
- The most frequently encountered species included Black-browed Barbet *Megalaima oorti*, Grey-cheeked Fulvetta *Alcippe morrisonia*, Chestnut Bulbul *Hemixos castanonotus*, Mountain Bulbul *Hypsipetes mcclllandii*, Light-vented Bulbul *Pycnonotus sinensis*, Rufous-capped Babbler *Stachyris ruficeps*, Hainan Blue Flycatcher *Cyornis hainanus* and Dusky Fulvetta *Alcippe brunnea*.
- The call of an unidentified large owl was heard on 25 May.
- Other species previously recorded from Diaoluoshan include Malayan Night Heron *Gorsachius melanolophus*, Hainan Peacock Pheasant *Polyplectron katsumatae*, Mountain Imperial Pigeon *Ducula badia* and Ratchet-tailed Treepie *Temnurus temnurus* (Tang & Li, 1957). Their present occurrence could not be confirmed during the present survey.

Table 4. Birds recorded at Diaoluoshan National Forest Park, May 1999. Sequence follows Clements (2000).

Scientific name	English name
<i>Milvus migrans</i>	Black Kite
<i>Spilornis cheela</i>	Crested Serpent Eagle
<i>Accipiter trivirgatus</i>	Crested Goshawk
<i>Spizaetus nipalensis</i>	Mountain Hawk Eagle
<i>Arborophila ardens</i>	Hainan Partridge
<i>Lophura nycthemera</i>	Silver Pheasant
<i>Amaurornis phoenicurus</i>	White-breasted Waterhan
<i>Scolopax rusticola</i>	Eurasian Woodcock
<i>Streptopelia chinensis</i>	Spotted Dove
<i>Treron curvirostra</i>	Thick-billed Green Pigeon
<i>Treron sieboldii</i>	White-bellied Green Pigeon
<i>Ducula aenea</i>	Green Imperial Pigeon
<i>Clamator coromandus</i>	Chestnut-winged Cuckoo

Scientific name	English name
<i>Hierococcyx sparverioides</i>	Large Hawk Cuckoo
<i>Cuculus micropterus</i>	Indian Cuckoo
<i>Surniculius lugubris</i>	Drongo Cuckoo
<i>Phaenicophaeus tristis</i>	Green-billed Malkoha
<i>Centropus sinensis</i>	Greater Coucal
<i>Glaucidium brodiei</i>	Collared Owlet
<i>Caprimulgus indicus</i>	Grey Nightjar
<i>Hirundapus cochinchinensis</i>	Silver-backed Needletail
<i>Cypsiurus balasiensis</i>	Asian Palm Swift
<i>Apus affinis</i>	House Swift
<i>Harpactes erythrocephalus</i>	Red-headed Trogon
<i>Ceyx erithacus</i>	Oriental Dwarf Kingfisher
<i>Halcyon smyrnensis</i>	White-throated Kingfisher
<i>Nyctornis athertoni</i>	Blue-bearded Bee-eater
<i>Merops philippinus</i>	Blue-tailed Bee-eater
<i>Megalaima oorti</i>	Black-browed Barbet
<i>Dendrocopos canicapillus</i>	Grey-capped Pygmy Woodpecker
<i>Picus flavinucha</i>	Greater Yellownappe
<i>Blythipicus pyrrhotis</i>	Bay Woodpecker
<i>Hirundo rustica</i>	Barn Swallow
<i>Coracina melaschistos</i>	Black-winged Cuckooshrike
<i>Pericrocotus flammeus</i>	Scarlet Minivet
<i>Pericrocotus solaris</i>	Grey-chinned Minivet
<i>Pericrocotus brevirostris</i>	Short-billed Minivet
<i>Pycnonotus sinensis</i>	Light-vented Bulbul
<i>Alophoixus pallidus</i>	Puff-throated Bulbul
<i>Hemixos castanonotus</i>	Chestnut Bulbul
<i>Hypsipetes mcclllandii</i>	Mountain Bulbul
<i>Hypsipetes leucocephalus</i>	Black Bulbul
<i>Chloropsis hardwickii</i>	Orange-bellied Leafbird
<i>Prinia flaviventris</i>	Yellow-bellied Prinia
<i>Phylloscopus hainanus</i>	Hainan Leaf Warbler
<i>Abroscopus albogularis</i>	Rufous-faced Warbler
<i>Cyornis hainanus</i>	Hainan Blue Flycatcher
<i>Copsychus saularis</i>	Oriental Magpie Robin
<i>Copsychus malabaricus</i>	White-rumped Shama
<i>Myiomela leucura</i>	White-tailed Robin
<i>Enicurus leschenaulti</i>	White-crowned Forktail
<i>Rhipidura albicollis</i>	White-throated Fantail
<i>Hypothymis azurea</i>	Black-naped Monarch
<i>Garrulax pectoralis</i>	Greater Necklaced Laughingthrush
<i>Garrulax maesi</i>	Grey Laughingthrush
<i>Garrulax chinensis</i>	Black-throated Laughingthrush
<i>Pomatorhinus ruficollis</i>	Streak-breasted Scimitar Babbler
<i>Pomatorhinus hypoleucos</i>	Large Scimitar Babbler
<i>Stachyris ruficeps</i>	Rufous-capped Babbler
<i>Stachyris striolata</i>	Spot-necked Babbler
<i>Alcippe brunnea</i>	Dusky Fulvetta
<i>Alcippe morrisonia</i>	Grey-cheeked Fulvetta
<i>Yuhina zantholeuca</i>	White-bellied Yuhina
<i>Melanochlora sultanea</i>	Sultan Tit
<i>Sitta solangiae</i>	Yellow-billed Nuthatch
<i>Nectarinia jugularis</i>	Olive-backed Sunbird
<i>Aethopyga christinae</i>	Fork-tailed Sunbird
<i>Dicaeum concolor</i>	Plain Flowerpecker
<i>Dicaeum ignipectus</i>	Fire-breasted Flowerpecker
<i>Dicaeum cruentatum</i>	Scarlet-backed Flowerpecker
<i>Zosterops japonica</i>	Japanese White-eye
<i>Lanius schach</i>	Long-tailed Shrike
<i>Dicrurus aeneus</i>	Bronzed Drongo
<i>Dicrurus paradiseus</i>	Greater Racket-tailed Drongo

Scientific name	English name
<i>Corvus macrorhynchus</i>	Large-billed Crow
<i>Lonchura striata</i>	White-rumped Munia

- Some of the birds recorded are of particular conservation concern:
 - Hainan Partridge and Hainan Leaf Warbler are globally Vulnerable and endemic to Hainan. Hainan Partridge is a Class I Protected Species in China.
 - Black Kite, Crested Serpent Eagle, Mountain Hawk Eagle, Crested Goshawk, Silver Pheasant, Hainan Peacock Pheasant, Thick-billed Green Pigeon, White-bellied Green Pigeon, Green Imperial Pigeon, Greater Coucal and Collared Owlet are Class II Protected species in China.
- The presence of many forest-dependent species, including a number of pigeons, woodpeckers and babblers, indicated that the forests at Diaoluoshan are of high integrity.

Reptiles and Amphibians

- Twenty-eight species of amphibian, one species of terrapin, nine species of lizard and nine species of snake were recorded at Diaoluoshan (Table 5).
- The most frequently recorded species at middle elevations included *Rana spinulosa*, *Philautus ocellatus*, *Philautus odontotarsus*, *Polypedates mutus*, *Microhyla heymonsi*, *Microhyla pulchra* and *Sinonatrix percarinata*. Most frequent at lower altitudes were *Amolops torrentis*, *Bufo melanostictus*, *Microhyla pulchra* and *Calotes versicolor*.
- Several new records for Diaoluoshan were made: *Rana tiannanensis*, *Gehyra mutilata*, *Gekko similignum*, *Acanthosaura lepidogaster*, *Platyplacopus kuehnei*, *Tropidophorus hainanus*, *Amphiesma sauteri* and *Ptyas korros*.
- Some species could not be firmly identified:
 - A *Philautus* tree frog, that resembled *P. ocellatus* but has a very different tadpole, was recorded at Baishuiling. This is probably a new species and has previously been recorded from Bawangling, Jianfengling and Shangxi (Kadoorie Farm and Botanic Garden, 2001a, 2001b, 2002a).
 - The identity of a frog that resembles *Rana adenopleura* is still unclear because it has a different advertisement call from *R. adenopleura* in the mainland.
 - Several newly-metamorphosed green tree frogs were found but they were too small to be identified positively.
 - A small natricine snake found at Nanxi was tentatively identified as *Amphiesma craspedogaster*, which, if confirmed, would be a new record for Hainan.
 - An agamid lizard, probably *Calotes microlepis*, was observed in the canopy of a tall tree beside the access road to Diaoluoshan resort.

Table 5. Amphibians and reptiles of Diaoluoshan and neighbouring areas. Sequence follows Zhao E.-M. & Adler (1993).

Species	Habitat	
AMPHIBIA		
<i>Leptobrachium hainanensis</i>	forest stream	✓, tadpoles
<i>Bufo melanostictus</i>	village/parkland	✓
	roadside pool	tadpoles
	shrubland	✓
	logged forest	✓
	stream	✓
	river	✓
<i>Pelophryne scalpta</i>	forest	✓
	forest stream	✓
<i>Amolops hainanensis</i>	forest stream	✓

Species	Habitat	
<i>Amolops torrentis</i>	forest stream	✓
	stream in abandoned field	✓
	stream in plantation	✓
	forest	✓
	river	✓
<i>Occidozyga martensii</i>	seepage in forest	✓
<i>Rana</i> (cf. <i>adenopleura</i>) sp.	seepage in forest	✓
	forest pond	✓, tadpoles
<i>Rana fragilis</i>	forest stream	✓, tadpoles
<i>Rana guentheri</i>	seepage in logged forest	✓
	marsh	✓
	pool	✓
<i>Rana limnocharis</i>	village/parkland	✓
	shrubland	✓
	pool	✓
	abandoned field/shrubland	✓
	logged forest	✓
	forest stream	✓
<i>Rana livida</i>	forest stream	✓
<i>Rana hainanensis</i>	forest stream	✓
	forest	✓
	forest edge	✓
<i>Rana spinulosa</i>	forest stream	✓, tadpoles
	shrubland/plantation	✓
	forest	✓
	seepage in forest	tadpole
	forest pond	✓
<i>Rana taipehensis</i>	river	✓
	forest	✓
	forest	✓
<i>Rana tiannanensis</i>	forest	✓
<i>Buergeria oxycephala</i>	forest stream	tadpoles
	river	✓
	stream	✓
<i>Chirixalus doriae</i>	pool in cleared forest	✓
<i>Chirixalus vittatus</i>	forest pond	✓, eggs
<i>Philautus ocellatus</i>	forest/bamboo	✓
		tadpoles
<i>Philautus</i> (nr. <i>ocellatus</i>) sp.	forest stream	✓
	pool in cleared forest	✓
<i>Philautus odontotarsus</i>	village/parkland	✓
	pool in village	tadpoles
	pool at plantation edge	✓
	forest	✓
	seasonal pool in forest	✓
<i>Polypedates megacephalus</i>	village/parkland	✓, eggs
<i>Polypedates mutus</i>	pool at plantation edge	✓
	forest pond	✓, eggs, tadpoles
<i>Rhacophorus rhodopus</i>	pool in cleared forest	✓
	seasonal pool in forest	✓
	forest pond	✓
<i>Rhacophorus</i> sp.	forest pond	tadpoles
	forest	✓
<i>Microhyla heymonsi</i>	pool in village	tadpoles
	forest	✓
	forest pond	✓, tadpoles
	seepage in logged forest	tadpoles

Species	Habitat	
<i>Microhyla pulchra</i>	roadside pool	tadpoles
	plantation edge	✓
	forest edge	✓
	abandoned field	✓
	forest	✓
	pool in cleared forest	✓
	logged forest	✓
paddy field	✓	
REPTILIA		
<i>Platysternon megacephalum</i>	forest stream	✓
<i>Gehyra mutilata</i>	village	✓
<i>Gekko similignum</i>	village	✓
<i>Acanthosaura lepidogaster</i>	forest stream	✓
	forest	✓
	logged forest	✓
<i>Calotes versicolor</i>	river	✓
	shrubland	✓
	shrubland/logged forest	✓
	village	✓
	forest edge	✓
<i>Draco maculatus</i>	forest edge	✓
	forest	eggs
<i>Platyplacopus kuehnei</i>	forest pond	✓
	logged forest	✓
<i>Eumeces quadrilineatus</i>	logged forest	✓
<i>Mabuya multifasciata</i>	river	✓
	forest edge	✓
<i>Tropidophorus hainanus</i>	village	✓
	logged forest	✓
<i>Amphiesma</i> (cf. <i>craspedogaster</i>) sp.	forest	✓
	forest edge	✓
<i>Amphiesma sauteri</i>	forest edge	✓
<i>Dendrelaphis pictus</i>	forest edge	✓
	logged forest	✓
<i>Psammodynastes pulverulentus</i>	forest	✓
<i>Ptyas korros</i>	forest edge	✓
<i>Rhabdophis adleri</i>	forest	✓
	forest edge	✓
<i>Rhynchophis boulengeri</i>	forest edge	✓
<i>Sinonatrix percarinata</i>	forest stream	✓
	pool in cleared forest	✓
	forest pond	✓
<i>Trimeresurus stejnegeri</i>	forest	✓
	forest stream	✓

- Some species were of particular conservation concern:
 - *Leptobrachium hainanensis*, *Pelophryne scalpta*, *Amolops hainanensis*, *Amolops torrentis*, *Rana fragilis*, *Buergeria oxycephala*, *Gekko similignum* and *Rhabdophis adleri* are endemic to Hainan. *Pelophryne scalpta* appears to be restricted to more natural forests in Southeast Hainan.
- Many forest specialists were recorded, including *Leptobrachium hainanensis*, *Pelophryne scalpta*, *Polypedates mutus*, *Philautus ocellatus*, *Rhacophorus rhodopus*, *Acanthosaura lepidogaster*, *Draco maculatus*, *Tropidophorus hainanus*, *Rhabdophis adleri*, *Rhynchophis boulengeri* and *Trimeresurus stejnegeri*, indicating the very high ecological integrity of the reserve.
- Other species previously recorded from Diaoluoshan area include *Bufo galeatus*, *Rana rugulosa*, *Rana macrodactyla*, *Rana versabilis*, *Rana andersoni*, *Occidozyga lima*, *Microhyla butleri*,

Microhyla ornata (Liu *et al.*, 1973), *Pyxidea mouhotii* (as *Cyclemys mouhotii*), *Cuora trifasciata* (as *Cyclemys trifasciata*), *Cuora galbiniformis* (as *Cyclemys flavomarginata hainanensis*), *Mauremys mutica* (as *Clemmys mutica*), *Sacalia bealei* (as *Clemmys bealii bealii*), *Sacalia quadriocellata* (as *Clemmys bealii quadriocellata*), *Ptyas mucosus*, *Oligodon formosanus* (as *Holarchus formosanus*), *Oligodon cinereus* (as *Holarchus violaceus*), *Lycodon subcinctus*, *Cyclophiops multicinctus* (as *Opheodrys multicinctus*), *Elaphe porphyracea nigrofasciata*, *Amphiesmoides ornaticeps* (as *Natrix ornaticeps*), *Amphiesma stolatum* (as *Natrix stolata*), *Rhabdophis subminiata subminiata* (as *Natrix subminiata subminiata*), *Xenochrophis piscator* (as *Natrix piscator*), *Dinodon rosozonatum* (misidentified as *Dinodon flavozonatum*), *Enhydryis chinensis*, *Boiga kraepelini*, *Boiga multomaculata*, *Naja atra* (as *Naja naja atra*) and *Trimeresurus albolabris* (Li, 1958).

Fish

- Nine freshwater fish species were recorded from Diaoluoshan; an additional four species were reported to be present but specimens have not been examined by specialists (Table 6).
- The species most widely recorded included *Nicholsicypris normalis* and *Capoeta semifasciolata*.
- One species collected was tentatively identified as *Semilabeo notabilis*, which has not previously been recorded from Hainan Island (Yue *et al.* 2000). The present record should be considered doubtful until specimens can be examined.
- Local residents claimed that over 40 species of freshwater fish occur in the Diaoluoshan area; this would be an extremely important fish diversity hotspot if this claim was legitimate.

Table 6. Freshwater fish recorded from Diaoluoshan, 24-26 May 1999 (“✓” = present, “#” = unconfirmed report). Sequence of genera follows Nelson (1994).

Species	
<i>Opsariichthys bidens</i>	✓, #
<i>Nicholsicypris normalis</i>	✓, #
<i>Capoeta semifasciolata</i>	✓, #
<i>Acrossocheilus iridescens iridescens</i>	✓, #
<i>Onychostoma leptura</i>	✓, #
<i>Semilabeo notabilis?</i>	#
<i>Cobitis sinensis</i>	✓
<i>Misgurnus anguillicaudatus</i>	✓
<i>Vanmanenia hainanensis</i>	✓, #
<i>Schistura fasciolata</i>	✓, #
<i>Pterocryptis cochinchinensis</i>	✓
<i>Rhinogobius giurinus</i>	#
<i>Channa gachua</i>	#

- Some of the species recorded/reported were of particular conservation importance:
 - *Vanmanenia hainanensis* and *Acrossocheilus iridescens iridescens* are endemic to Hainan.
 - *Nicholsicypris normalis*, *Onychostoma leptura* and *Pterocryptis cochinchinensis* are restricted to the Indochina region.
- The stream by the Resort Area, Nanxi River and Diaoluo River all appeared to be in healthy condition during the present survey, supporting species typical of clean streams.

Ants

- Seventy-eight species were recorded at Diaoluoshan (Table 7). Many of these could not be reliably named, and some are thought to be new to science.
- The most frequently recorded in the (middle altitude) western parts, including Baishuiling and the resort area, were *Prenolepis* sp. 1, *Odontomachus monticola*, *Leptogenys kitteli* and *Pachycondyla* sp. 2. Most frequent in the (lower altitude) eastern parts were *Odontoponera* sp.

1, *Diacamma* sp. 1, *Anoplolepis gracilipes*, *Camponotus nicobarensis*, *Crematogaster* sp. 8 and *Camponotus rufoglaucus*.

Table 7. Ant species recorded at Diaoluoshan National Forest Park, May 1999. * Species with a strong forest association.

Species	Habitat
<i>Acropyga acutiventris</i> *	closed 25m broadleaf
<i>Aenictus</i> (<i>dentatus</i> group) sp. 4	closed 30m broadleaf
<i>Aenictus</i> (<i>laeviceps</i> group) sp. 2	closed broadleaf
<i>Anochetus</i> (cf. <i>yunnanensis</i>) sp. 4 *	20m broadleaf forest
<i>Anoplolepis gracilipes</i>	open vegetation
<i>Aphaenogaster</i> (cf. <i>beccarii</i>) sp. 1 *	closed 30m broadleaf/bamboo
<i>Aphaenogaster</i> (cf. <i>hunanensis</i>) sp. 3 *	open 25m broadleaf forest
<i>Camponotus</i> (cf. <i>fuscivillosus</i>) sp. 28	closed 20m broadleaf
<i>Camponotus</i> (nr. <i>humerus</i>) sp. 31	open 20m broadleaf forest
<i>Camponotus</i> (cf. <i>mitis</i>) sp. 11	closed broadleaf forest
<i>Camponotus nicobarensis</i>	open vegetation & low forest
<i>Camponotus rufoglaucus</i>	open vegetation, shrubland
<i>Camponotus</i> (<i>variegatus</i> group) sp. 4	open 30m broadleaf/ bamboo
<i>Camponotus</i> (nr. <i>vitreus praerufus</i>) sp. 32	open broadleaf forest
<i>Cataulacus granulatus</i>	open broadleaf forest
<i>Crematogaster</i> (cf. <i>biroi</i>) sp. 4	forest, shrubland
<i>Crematogaster</i> (cf. <i>dohrni</i>) sp. 8	low forest, open vegetation
<i>Crematogaster</i> (cf. <i>laboriosa</i>) sp. 3	open shrubland/herb
<i>Crematogaster</i> sp. 23	broadleaf forest, shrubland
<i>Diacamma</i> (nr. <i>rugosum</i>) sp. 1	forest, open vegetation
<i>Dolichoderus</i> (nr. <i>taprobanae</i>) sp. 4	20m broadleaf forest
<i>Gnamptogenys bicolor</i>	low forest, shrubland
<i>Gnamptogenys binghami</i> *	closed 30m broadleaf forest
<i>Hypoponera</i> sp. 3 *	closed 30m broadleaf forest
<i>Kartidris</i> (cf. <i>galos</i>) sp. 1 *	closed 25m broadleaf
<i>Lepisiota</i> (cf. <i>capensis</i>) sp. 3	open low broadleaf forest
<i>Lepisiota rothneyi</i>	broadleaf forest
<i>Leptogenys kitteli</i> *	broadleaf forest
<i>Leptogenys peuqueti</i>	forest, shrubland
<i>Leptogenys</i> (cf. <i>kraepelini</i>) sp. 7 *	open 25m broadleaf forest
<i>Monomorium</i> (cf. <i>impexum</i>) sp. 2 *	open tall broadleaf forest
<i>Myrmecina</i> (cf. <i>flava</i>) sp. 4 *	closed 20m broadleaf forest
<i>Odontomachus monticola</i> *	closed broadleaf forest
<i>Odontoponera</i> (cf. <i>denticulata</i>) sp. 1	forest, open vegetation
<i>Oecophylla smaragdina</i>	forest, shrubland
<i>Oligomyrmex</i> (cf. <i>wheeleri</i>) sp. 1	open low broadleaf forest
<i>Pachycondyla</i> (<i>javana</i> group) sp. 1 *	closed broadleaf forest
<i>Pachycondyla leeuwenhoekii</i> *	closed 15m broadleaf forest
<i>Pachycondyla</i> (cf. <i>luteipes</i>) sp. 2 *	broadleaf forest
<i>Pachycondyla</i> sp. 18	open 25m broadleaf/bamboo
<i>Paratrechina</i> (cf. <i>bourbonica</i>) sp. 4	forest, open vegetation
<i>Paratrechina sauteri</i>	tall broadleaf forest
<i>Paratrechina</i> (cf. <i>opaca</i>) sp. 26 *	closed broadleaf forest
<i>Paratrechina</i> (nr. <i>indica</i>) sp. 9 *	closed tall broadleaf forest
<i>Pheidole gatesi</i> *	open 25m broadleaf/bamboo
<i>Pheidole</i> (cf. <i>noda</i>) sp. 1	tall broadleaf forest
<i>Pheidole</i> (<i>rinae</i> group) sp. 9	closed tall broadleaf forest
<i>Pheidole</i> (cf. <i>smythiesi</i>) sp.	open 25m broadleaf
<i>Pheidole tsailuni</i> *	broadleaf forest
<i>Pheidole</i> sp. 11-B	broadleaf forest, open vegetation
<i>Pheidole</i> sp. 13-A *	tall broadleaf forest
<i>Pheidole</i> sp. 33	closed 30m broadleaf/bamboo
<i>Pheidole</i> sp. 49	(not recorded)
<i>Philidris</i> sp. 1 *	broadleaf forest

Species	Habitat
<i>Polyrhachis</i> (cf. <i>bicolor</i>) sp. 17 *	closed tall broadleaf forest
<i>Polyrhachis halidayi</i>	broadleaf forest
<i>Polyrhachis tyrannica</i>	broadleaf forest
<i>Polyrhachis vigilans</i> *	closed 20m broadleaf
<i>Polyrhachis wolfi</i> *	tall broadleaf forest
<i>Polyrhachis</i> sp. 28	open 20m broadleaf
<i>Ponera</i> (cf. <i>sinensis</i>) sp. 1 *	open 25m broadleaf
<i>Ponera</i> sp. 3 *	tall broadleaf forest
<i>Prenolepis</i> (cf. <i>emmae</i>) sp. 1 *	tall broadleaf forest
<i>Pyramica</i> (cf. <i>canina</i>) sp. *	open 25m broadleaf
<i>Strumigenys</i> sp. *	closed 30m broadleaf forest
<i>Tapinoma</i> sp. 1	open 20m broadleaf
<i>Technomyrmex albipes</i>	forest, open shrubland
<i>Technomyrmex</i> sp. 2 *	closed tall broadleaf
<i>Tetramorium bicarinatum</i>	lawn
<i>Tetramorium</i> (cf. <i>guangxiensis</i>) sp. 16 *	closed 30m broadleaf/ bamboo
<i>Tetramorium</i> (cf. <i>kraepelini</i>) sp. 4 *	closed tall broadleaf forest
<i>Tetramorium nipponense</i> *	tall broadleaf forest
<i>Tetramorium</i> (cf. <i>shensiense</i>) sp.	grassland
<i>Tetramorium</i> (cf. <i>walshi</i>) sp. 20 *	closed 25m broadleaf forest
<i>Tetraoponera attenuata</i>	open 20m broadleaf forest
<i>Tetraoponera binghami</i>	village
<i>Tetraoponera modesta</i>	closed 20m broadleaf forest
<i>Vollenhovia</i> sp. 5	open 20m broadleaf/ bamboo

- *Pachycondyla* sp. 18, *Pheidole* sp. 33, *Pheidole* sp. 49 and *Polyrhachis* sp. 28 are known only from Diaoluoshan.
- The percentage of forest-dependent species (not including new species) in the area near and above the resort was 62%, a rather high figure indicating high forest integrity. The percentage along the Baishuiling trail was 50%, indicating the mixture of good and disturbed forest. The figures for the lower parts, Nanxi and Dali, were 33% and 35% respectively, indicating relatively low integrity.
- The African exotic ant *Anoplolepis gracilipes* was widespread below certain altitude.

Dragonflies

- Thirty-five species were recorded from the Diaoluoshan area (Table 8). Five of these (*Vestalis miao*, *Drepanosticta elongata*, *Drepanosticta zhoui*, *Sinosticta hainanense* and *Chlorogomphus gracilis*) were previously undescribed (see K.D.P. Wilson & Reels, 2001). *Chlorogomphus icarus*, described as new by K.D.P. Wilson & Reels (2001), was subsequently found to be a synonym of *C. usudai*. Another new species, *Anisogomphus* sp., has yet to be described.
- The most frequently encountered in the middle-altitude western parts of the park included *Drepanosticta zhoui*, *Pseudolestes mirabilis* and *Euphaea ornata*. Most frequent at lower-altitude Nanxi were *Lamelligomphus hainanensis* and *Orientogomphus armatus*.

Table 8. Dragonfly species recorded from the Diaoluoshan area, 24-27 May 1999. Sequence of families follows Schorr *et al.* (2001a, 2001b).

Species	Notes
<i>Calopteryx melli</i>	
<i>Vestalis miao</i>	new species (Wilson & Reels, 2001)
<i>Rhinocypha f. fenestrella</i>	
<i>Aciagrion tillyardi</i>	
<i>Euphaea ornata</i>	
<i>Philosina alba</i>	new record for Hainan
<i>Pseudolestes mirabilis</i>	Hainan endemic
<i>Coelliccia scutellum hainanense</i>	Hainan endemic subspecies
<i>Drepanosticta elongata</i>	new species (Wilson & Reels, 2001)

Species	Notes
<i>Drepanosticta zhoui</i>	new species (Wilson & Reels, 2001)
<i>Sinosticta hainanense</i>	new species (Wilson & Reels, 2001)
<i>Periaeschna magdalena</i>	
<i>Polycanthagyna erythromelas</i>	
<i>Tetracanthagyna waterhousei</i>	
<i>Chlorogomphus usudai</i>	Hainan endemic
<i>Chlorogomphus gracilis</i>	new species (Wilson & Reels, 2001)
<i>Macromia calliope</i>	
<i>Macromia clio</i>	
<i>Macromia katae</i>	previously considered a Hong Kong endemic
<i>Macromia moorei malayana</i>	
<i>Macromidia rapida</i>	
<i>Anisogomphus</i> sp.	
<i>Gomphidia k. kruegeri</i>	
<i>Lamelligomphus hainanensis</i>	
<i>Leptogomphus celebratus</i>	Hainan endemic
<i>Nihonogomphus thomassoni</i>	Hainan endemic
<i>Orientogomphus armatus</i>	
<i>Paragomphus pardalinus</i>	
<i>Diplacodes trivialis</i>	
<i>Onychothemis testaceum tonkinensis</i>	
<i>Orthetrum chrysis</i>	
<i>Palpopleura s. sexmaculata</i>	
<i>Tetrathemis platyptera</i>	
<i>Trithemis aurora</i>	
<i>Trithemis festiva</i>	
<i>Zygonyx iris insignis</i>	

- Many of the dragonflies recorded were of conservation importance:
 - *Vanmanenia hainanensis* and *Acrossocheilus iridescens iridescens* are endemic to Hainan.
 - *Chlorogomphus gracilis* and *Anisogomphus* sp. are known only from Diaoluoshan.
 - *Vestalis miao* is known only from Diaoluoshan and Shangxi in Wanning County, Southeast Hainan (Kadoorie Farm and Botanic Garden, 2002a). It was named after the resident Miao people (K.D.P. Wilson & Reels, 2001).
 - An additional eight taxa (*Drepanosticta zhoui*, *Drepanosticta elongata*, *Sinosticta hainanense*, *Pseudolestes mirabilis*, *Coeliccia scutellum hainanense*, *Chlorogomphus usudai*, *Leptogomphus celebratus* and *Nihonogomphus thomassoni*) are endemic to Hainan.
 - *Philosina alba* is known only from Diaoluoshan and from Dinghushan Biosphere Reserve in western Guangdong (K.D.P. Wilson, 1999).
 - *Lamelligomphus hainanensis*, *Macromia katae*, and *Zygonyx iris insignis* are known only from Hainan and Hong Kong
 - *Calopteryx melli* and *Paragomphus pardalinus* are restricted to Hainan, Guangdong and Guangxi.
 - *Orientogomphus armatus* is known only from Hainan and Fujian.
 - *Macromia calliope* is known only from Hainan and northern Vietnam.
- Diaoluoshan contained high value forest and had an outstanding dragonfly fauna. The lower-altitude river at Nanxi was a very good site for gomphids and *Macromia* species.

Butterflies

- Eighty-one species were recorded over the four-day period (Table 9).
- The most abundant species in the middle-altitude parts of the park included *Papilio helenus*, *Papilio memnon*, *Appias nero*, *Eurema* sp., *Euploea midamus*, *Faunis eumeus* and *Ypthima baldus*. Most abundant at the lower-altitude parts were *P. memnon* and *Vindula erota*.
- *Euthalia thibetana* is apparently a new Hainan record, not recorded for Hainan by Chou (1994) or Bascombe (1995).

Table 9. Butterflies recorded at Diaoluoshan National Forest Park (24-27 May 1999). Sequence of families follows Bascombe (1995).

Species	Habitat	Notes
<i>Caltoris bromus</i>	forest	
<i>Halpe homolea</i>	forest	
<i>Hasora anura</i>	forest	
<i>Hasora chromus</i>	river	
<i>Mooreana trichoneura</i>	forest	
<i>Parnara guttata</i>	stream/ shrub	
<i>Atrophaneura aidonea</i>	forest	
<i>Graphium agamemnon</i>	forest	
<i>Graphium doson</i>	river	
	forest	
<i>Graphium sarpedon</i>	stream/shrub	
	forest	
	river	
<i>Graphium (Paranticopsis) macareus</i>	forest	
<i>Graphium (Pathysa) antiphates</i>	(not recorded)	
<i>Pachliopta aristolochiae</i>	stream/shrub	
<i>Papilio demoleus</i>	river	
<i>Papilio helenus</i>	stream/shrub	
	forest	
	river	
<i>Papilio memnon</i>	stream/shrub	
	forest	
	river	
<i>Papilio nephelus</i>	forest	
	river	
<i>Papilio polytes</i>	river	
<i>Papilio protenor</i>	forest	
	river	
<i>Papilio (Chilasa) clytia</i>	river	
<i>Troides aeacus</i>	forest	
	river	
<i>Troides helena</i>	stream/shrub	
	forest	
<i>Troides sp.</i>	forest	
	river	
<i>Appias nero</i>	stream/shrub	
	forest	
<i>Catopsilia psylla</i>	forest edge	
<i>Cepora nerissa</i>	village	
<i>Delias pasithoe</i>	forest	
<i>Eurema hecabe</i>	forest	
<i>Eurema sp.</i>	forest	
	stream/shrub	
	river	
<i>Hebomoia glaucippe</i>	river	
<i>Ixias pyrene</i>	stream/shrub	
	river	
	forest	
<i>Pieris (Artogeia) canidia</i>	forest edge	
<i>Prioneris thestylis</i>	stream/shrub	
	forest	
	river	
<i>Acytolepis puspa</i>	forest	
<i>Caleta elna</i>	forest	
<i>Chilades lajus</i>	forest	
<i>Jamides alecto</i>	forest	
<i>Lampides boeticus</i>	river	
<i>Paralaxita dora</i>	forest	

Species	Habitat	Notes
<i>Prosotas nora</i>	forest	
<i>Ticherra acte</i>	forest	
<i>Zemerus flegyas</i>	river	
<i>Zizeeria maha</i>	forest edge	
<i>Cethosia biblis</i>	stream/shrub	
<i>Cethosia cyane</i>	forest	
	river	
<i>Charaxes bernardus</i>	forest	
<i>Chersonesia risa</i>	forest	
<i>Cupha erymanthis</i>	stream/shrub	
	river	
<i>Cyrestis cocles</i>	forest	
	river	
<i>Cyrestis thyodamas</i>	forest	
<i>Euploea core</i>		
<i>Euploea midamus</i>	forest	
	stream/shrub	
	river	
<i>Euploea mulciber</i>	forest	
<i>Euthalia thibetana</i>	forest	new Hainan record
<i>Faunis eumeus</i>	forest	
<i>Hypolimnas bolina</i>	forest	
<i>Precis (Junonia) almana</i>	field	
<i>Precis (Junonia) atlites</i>	village	
<i>Precis (Junonia) iphita</i>	stream/shrub	
	forest	
	river	
<i>Precis (Junonia) lemonias</i>	forest	
	river	
	field	
<i>Precis (Junonia) orithya</i>	river	
<i>Lethe chandica</i>	forest	
<i>Lethe insana</i>	forest	
<i>Lethe verma</i>	forest	
<i>Lethe (Neope) sp.</i>	forest	
<i>Mandarinia regalis</i>	forest	
<i>Melanitis leda</i>	forest	
<i>Mycalesis francisca</i>	forest	
<i>Mycalesis sp.</i>	forest	
<i>Neptis guia</i>	forest	
<i>Neptis hylas</i>	forest edge	
<i>Neptis leucoporus</i>	forest	
<i>Ideopsis similais</i>	village	
<i>Parantica aglea</i>	forest	
<i>Parantica sita</i>	forest	
	river	
<i>Parantica sp.</i>	forest	
<i>Phalanta phalanta</i>	river	
<i>Polyura narcea</i>	forest	
<i>Polyura nepenthes</i>	stream/shrub	
<i>Ragadia crisilda</i>	forest	
<i>Stibochiona nicea</i>	forest	
<i>Stichopthalma sp.</i>	forest	
	stream/shrub	
<i>Tanaecia julii</i>	forest	
<i>Vindula erota</i>	river	
<i>Ypthima baldus</i>	forest	
<i>Ypthima motschulskyi</i>	forest	
<i>Ypthima sp.</i>	forest	

- *Neptis guia* and *N. leucoporus* have not previously been encountered on KFBG surveys, and must be considered rare in South China.
- Most species were encountered in the forest. They included numerous forest specialists such as *Appias nero*, *Chersonesia risa*, *Euthalia thibetana*, *Lethe chandica*, *Lethe insana*, *Mandarinia regalis*, *Stibochiona nicea*, *Paralaxita dora* and *Ticherra acte*.

Molluscs

- Eight species of land snail, two species of slug and two species of freshwater snail were recorded (Table 10).
- The most frequently encountered terrestrial species was *Microcystis schmackeriana* while the most common aquatic species was *Galba pervia*.

Table 10. Molluscs recorded at Diaoluoshan National Forest Park.

Species	Habitat
<i>Bradybaena similaris</i>	grassland
<i>Camaena xanthoderma polyzona</i>	forest stream
<i>Cyclophorus exltatus</i>	forest
<i>Deroceras agrestis</i>	forest
<i>Galba pervia</i>	ditch
<i>Lagochilus hungerfordianus</i>	forest
<i>Lagochilus pilosus</i>	forest
<i>Leptopoma polyzonata</i>	forest
<i>Microcystis schmackeriana</i>	forest
<i>Semisulcospira paludiformis</i>	forest stream
<i>Trochomorpha haenseli</i>	forest
<i>Vaginulus alte</i>	parkland

- Two of the species recorded are Hainan endemic: *Lagochilus pilosus* and *Leptopoma polyzonata*.
- The presence of many forest species (including *Lagochilus hungerfordianus*, *L. pilosus*, *Leptopoma polyzonata*, *Microcystis schmackeriana*, *Camaena xanthoderma* and *Deroceras agrestis*) indicates that the Diaoluoshan still has very good forests.

Summary of flora and fauna

- Diaoluoshan is probably unique on Hainan in that natural forest cover extends from low to quite high altitude. A high percentage cover of primary forest was found in the Forest Park. The forest in Nanxi Forest Farm (140-640 m), though largely secondary, is one of the most natural lowland forest areas in Hainan.
- The present survey recorded 331 vascular plant species, suggesting that the flora at Dialuoshan is quite rich; orchids were particularly rich. The recorded flora included four globally Threatened or nationally Protected species (*Vatica mangachapoi*, *Alseodaphne hainanense*, *Gymnosphaera gigantea* and *Sphaeropteris hainanensis*), two nationally Endangered species (*Anoectochilus roxburghii* and *Cymbidium eburneum*) and 21 Hainan endemic or globally restricted species.
- There is little up-to-date information on the mammal fauna of Diaoluoshan, but the habitat seems large enough to support viable populations of mammals, including Threatened species that have been recorded or reported to occur, such as Hainan Gymnure, Clouded Leopard and Asiatic Black Bear. The large populations of forest birds, including regionally rare species of pigeons and woodpeckers, and the Threatened Hainan Partridge and Hainan Leaf Warbler, indicate high ecological integrity.

- The rich herpetofauna included a number of species confined to natural forests of Hainan, such as the frogs *Leptobrachium hainanensis*, *Pelophryne scalpta* and *Philautus ocellatus*, and the snake *Rhabdophis adleri*.
- The terrestrial invertebrate fauna was also rich, with a high proportion of forest specialists among the ants, butterflies and molluscs. Four ant species have been found only from Diaoluoshan.
- The dragonfly fauna included several species new to science, and some which are known only from Southeast Hainan, as well as others restricted to coastal tropical South China. The assemblage of rare dragonflies recorded at Diaoluoshan is the most outstanding recorded in all KFBG's surveys to date (K.D.P. Wilson & Reels, 1999). While the present fish survey was inconclusive, the area is also likely to support a rich freshwater fish fauna.
- Baishuiling Nature Reserve was predicted to be of local biodiversity significance by MacKinnon *et al.* (1996). The findings of the present survey suggest the larger Diaoluoshan National Forest Park to be of national biodiversity importance.

Threats and problems

- The greatest threat to biodiversity is habitat damage, which was still occurring at the time of the survey. The natural forest near Dali was subject to high levels of selective logging, despite the national ban.
- A large area of forest near the resort had been recently cleared, for a deer farm. Reportedly the species to be farmed was Père David's Deer *Elaphurus davidianus*, which is not native to Hainan.
- There was a plan to build a hydroelectric plant near Nanxi. If implemented this is likely to cause serious damage to the low altitude forest present, and have significant impacts on the outstanding river biota.
- The attempted development of ecotourism has faced some difficulties. The resort area has a pleasant environment, but the high density of leeches is likely to dissuade many visitors. It is possible the high leech density is due to past and present occurrence of livestock, in which case the proposed deer-farming may exacerbate the problem. There were few if any environmental education resources for visitors.
- Over-collecting appears to have been a problem for some animals and plants. Orchids with high ornamental value (e.g. *Cymbidium eburneum*, *Cymbidium floribundum* and *Dendrobium densiflorum*) were apparently collected in huge quantities in the past and are still threatened by over-collection in Hainan. Reserve staff reported that terrestrial snails used to be common at Diaoluoshan, but had been depleted by over-collecting for duck feed in the past.
- Some orchids in this area were threatened and are still being threatened by over collection for ornamental purposes, such as *Cymbidium eburneum*, *Cymbidium floribundum* and *Dendrobium densiflorum* etc.

Opportunities

- Diaoluoshan probably has the largest expanse of natural forest on Hainan, stretching from low to quite high altitude, and the forest is of great importance to fauna and flora. Conservation resources should match its national biodiversity importance.
- With careful provision of alternative income sources to the residents, the ban on cutting native broadleaf trees in natural forests could be more effectively implemented. Residents could also benefit from education programmes, and from other financial benefits of forest conservation (e.g. ecotourism).

- The resort provides fairly good accommodation and a restaurant. An education programme could be established to draw attention of visitors to the rich and unique biodiversity of the area. Guidelines for ecotourism development are available (e.g. Ceballos-Lascuráin, 1996).
- In addition to tourism, the forest offers potential for other sustainable sources of income. It would be an important seed source for production of saplings, for reforesting the degraded landscape of Hainan, southern Guangxi and southern Guangdong. Sustainable collection of seeds and planting of saplings might provide a stable income for the local villagers and the Forest Park. Collection of young saplings from the forest, however, would need to be prevented, and further clearance or damage to existing forest should be strictly prohibited.

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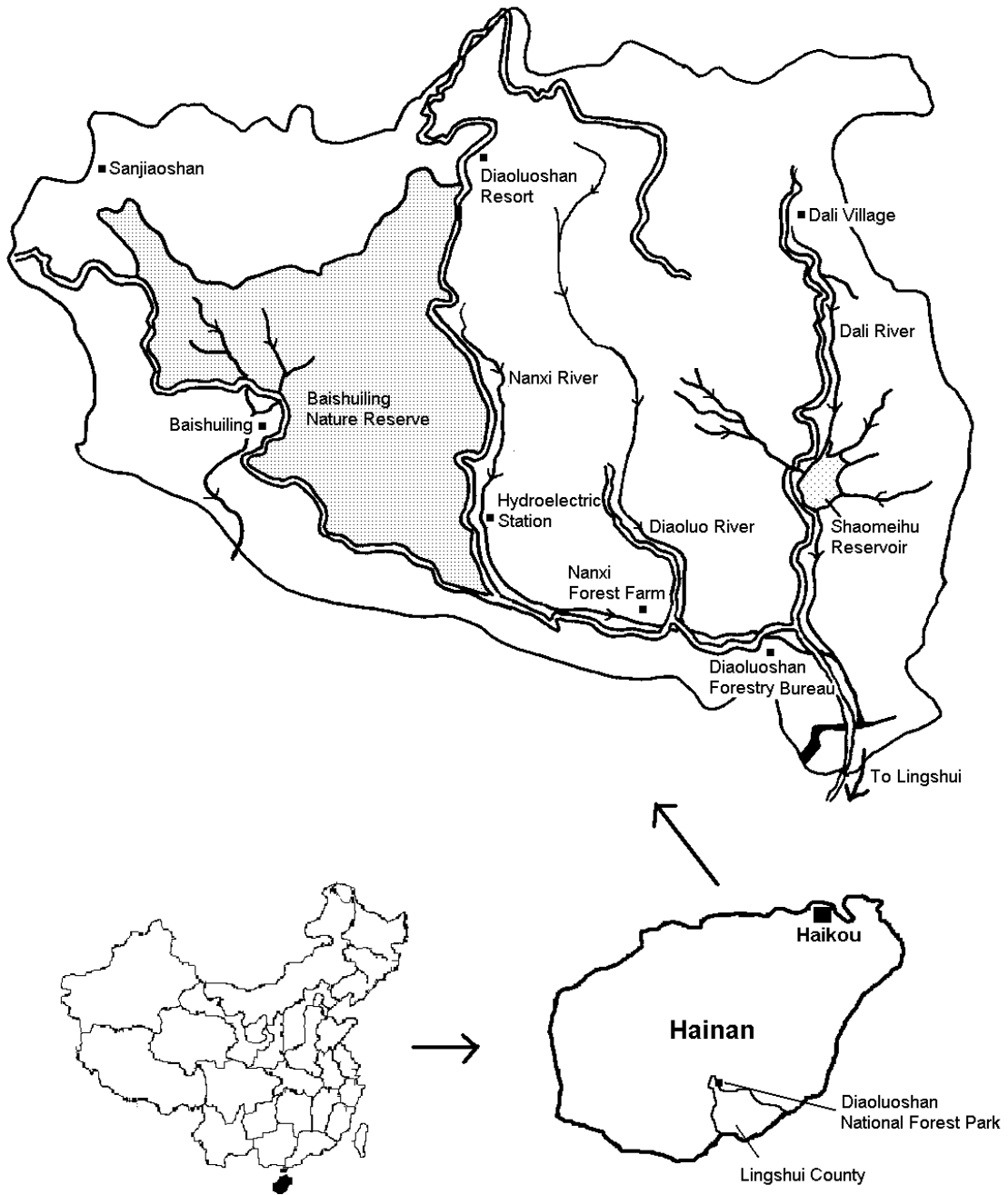


Figure 1. Map showing location of Diaoluoshan National Forest Park, Southeast Hainan, China