



**Report of a Rapid Biodiversity Assessment at
Luokeng Nature Reserve, North Guangdong,
China, September 2002**

Kadoorie Farm and Botanic Garden
in collaboration with
Shaoguan Forestry Bureau
South China Normal University

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Report of a Rapid Biodiversity Assessment at Luokeng Nature Reserve, North Guangdong, China, September 2002

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Background

The present report details the findings of a visit to North 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.

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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

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Objectives

- The major aim of the survey was to collect up-to-date information on the recently discovered population of the Crocodile Lizard *Shinisaurus crocodilurus* of Luokeng Reserve (Li and Xiao, 2002).
- The second aim of this survey was collect up-to-date information on the overall flora and fauna of Luokeng Nature Reserve, and to use this to help determine conservation priorities within South China.

Methods

- On 16-20 September 2002 a team of biologists from Hong Kong (GA, BC, BH, ML, LKS, NSC), Guangzhou (LZC, XZ) and Guangxi (ZZF) .
- 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. Mammal records were made by ML and BC. Records of birds were made or verified by LKS, ML or GA, reptiles and amphibians by ML, BC, LZC or XZ, fish by BC, dragonflies and butterflies by ML or BH, and verified by KW for dragonflies and RK for butterflies.
- 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. (2003a, 2003b); The Plant Names Project (2003);
 - 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

- Luokeng Nature Reserve is located at the southwest of Qujiang County, Shaoguan Shi District, North Guangdong, at 24°31'N, 113°20'E. Administration of of the reserve is the responsibility of the Qujiang County Forestry Bureau. The size of the reserve is 204 km² (State Forestry Administration Wildlife Conservation Office, 2003).
- The topography of Luokeng Nature Reserve is mainly low mountains. Tiantang Ding (1,016 m) is the highest peak within the reserve and it shares the summit of Chuandi Ding (1,587 m) with Shimentai Nature Reserve in Yingde Shi, Qingyuan Shi District.
- Mean annual temperature of Qujiang County is 20.1 °C. Mean monthly temperature ranges from 9.6 °C in January to 28.9 °C in July; annual precipitation is about 1,640 mm. The streams and rivers of Luokeng Nature Reserve flow eastwards and are the major sources of

the Luokeng Reservoir. Outflow from the reservoir feeds directly into Bei Jiang, a major tributary of the Zhujiang basin (Liu *et al.*, 1997).

- Luokeng was designated as a provincial nature reserve in 1998 by the Guangdong Provincial Government (State Forestry Administration Wildlife Conservation Office, 2003). The reserve headquarters is at Luokeng and there were 15 reserve staff in 2002 (Director He, Luokeng Nature Reserve, pers. comm. September 2002).
- The reserve's major objective is to protect the rare animal and plant species, such as subtropical evergreen broadleaf forest and rare fauna and flora (State Forestry Administration Wildlife Conservation Office, 2003); one of the main targets should therefore be the population of the National Protected Class I Crocodile Lizard *Shinisaurus crocodilurus*, which before the recent discovery in the Luokeng area and Northeast Vietnam was thought to be restricted to central-east Guangxi (Kadoorie Farm & Botanic Garden, 2002).

Results

Vegetation

- The zonal vegetation of the Luokeng area should be subtropical evergreen broadleaf forest. The vegetation of the surveyed hillsides was a mosaic of secondary forest at various successional stages, tall shrubland and China fir plantation. Low-lying flat areas have largely been transformed to farmland.
- The present survey covered the following areas and vegetation types/formations:
 - Plantations of *Cunninghamia lanceolata* were commonly seen throughout the reserve.
 - Feng shui woods, i.e. isolated forest patches that were preserved for feng shui purposes, were found. These remnant forests were only about two hectares in size, but had canopies up to 30 m tall. Forest at Xindong was located on low-lying flatland close to the village, and was dominated by *Schima superba*, *Liquidambar formosana*, *Sloanea sinensis* and *Neolitsea chunii* in the canopy and *Osmanthus fragrans* in the understorey. Forest at Zhuanghuang, a fraction larger in size, was located on hillside further from the village and was dominated by *Castanopsis fabri*, *Schima superba*, *Liquidambar formosana* and *Castanopsis eyrei* in the canopy, and *Dichroa febrifuga* and *Ardisia quinquegona* in the understorey.
 - Secondary hillside forest of varied heights was the dominant vegetation type of the area. Disturbed tall shrubland and open forest, dominated by *Alniphyllum fortunei*, *Pinus massoniana*, *Schefflera heptaphylla*, *Eurya acuminatissima* and *Dicranopteris pedata*, dominated the landscape. On hillsides of Daba Keng, Dakongtan and Dazhuyuan, more mature forest could be found in more inaccessible ravines. Individual trees of *Castanopsis eyrei* that had escaped logging and reached 30 m tall could be found occasionally.
 - Extensive secondary forest was seen from a distance but it was not surveyed during this visit.
 - The low limestone hills in the vicinity of Luokeng Town were covered in dense tall shrubland about 1.5 to 4m tall. Dominant species included *Sapium rotundifolium*, *Chukrasia tabularis*, *Vitex canescens* and *Caesalpinia crista*. The stream flowing out of the limestone cave of Dayan was overgrown with submerged aquatic herbs (e.g. *Potamogeton malaiianus* and *Hydrilla verticillata*).
 - The flat area surrounding Luokeng town and Xindong Cun has been transformed to farmland, mainly rice paddy.

Flora

- The present survey recorded 348 vascular plant species, including 39 fern species in 21 families, four gymnosperms in four families, and 305 flowering plant species in 88 families. Considering the wide variety of habitat surveyed and the duration of the survey, this figure suggested the surveyed area had a moderately diverse flora.
- Among the flora recorded, several species are of conservation importance:

- *Cycas taiwaniana* is considered globally Endangered and is under Class I national Protection in China. A small population was seen. All species in the genus *Cycas* are threatened by collection for ornamental purposes in China. Individuals of this species were also seen in some households.
- *Bretschneidera sinensis* is globally Endangered and is Class I nationally Protected in China. Only a single sapling was seen. This species has a wide but scattered distribution in South China.
- *Ixonanthes chinensis* is globally Vulnerable and is Class II nationally Protected in China. It was found to be locally common. This species is widespread and common in tropical and southern subtropical evergreen forest in South China.
- *Artocarpus hypargyreus* is globally Vulnerable. A few saplings were seen. This species is widespread and common in tropical and southern subtropical evergreen forest in South China.
- Three species in the tree fern families (Cyathaceae) were found in the present survey. All three species have a widespread distribution in South China. *Alsophila spinulosa* and *Gymnosphaera podophylla* are often locally common in relatively well-preserved forest habitats, whereas *G. metteniana* have a more scattered distribution. Both *A. spinulosa* and *G. podophylla* were found to be locally common in some sites visited in the present survey, while only a single plant of *G. metteniana* was found. All tree fern species, especially *A. spinulosa*, are heavily exploited for medicinal purpose and production of planting material. All species in the tree fern families are under Class II national protection in China.
- *Cibotium barometz* is under Class II national protection in China. It was found to be locally common at two locations. The species is exploited for medicinal purpose but it is widespread in South China and commonly found in tall shrubland and forest margin.
- *Pittosporum fulvipilosum* is endemic to northern Guangdong. It was locally common in one of the shrubland areas.
- *Pteris austrosinica* is restricted to Guangxi and Guangdong. A single plant was seen.
- *Begonia leprosa* is restricted to Guangxi and Guangdong. It was locally common at certain limestone areas.
- *Blastus pauciflorus* is restricted to Guangdong and Jiangxi. It was locally common at two locations.
- Two new records for Guangdong were found in the present survey:
 - *Polystichum dielsii* has previously been recorded from Guangxi, Hunan, and Sichuan, Yunnan, and Guizhou. It was found to be locally common at certain sites.
 - *Scirpus filipes* has previously been recorded only in Fujian although it should be noted that Cyperaceae plants are often overlooked. It was locally common at a few sites.

Table 1. Vascular plants at Luokeng Nature Reserve, 17-19 September 2002. Species that 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
PTERIDOPHYTA	
Adiantaceae	<i>Adiantum capillus-veneris</i> L.
Aspidiaceae	<i>Ctenitis rhodolepis</i> (C.B. Clarke) Ching
	<i>Ctenitopsis glabra</i> Ching & Chu H. Wang
Aspleniaceae	<i>Asplenium falcatum</i> Lam.
Athyriaceae	<i>Diplazium subsinuatum</i> (Wall. ex Hook. & Grev.) Tagawa
	<i>Monomelangium pullingeri</i> (Baker) Tagawa
Blechnaceae	<i>Blechnum orientale</i> L.
	<i>Woodwardia japonica</i> (L.f.) Sm.
Bolbitidaceae	<i>Bolbitis subcordata</i> (Copel.) Ching
Cyatheaceae	<i>Alsophila spinulosa</i> (Wall. ex Hook.) R.M. Tryon
	<i>Gymnosphaera metteniana</i> (Hance) Tagawa
	<i>Gymnosphaera podophylla</i> (Hook.) Copel.
Dicksoniaceae	<i>Cibotium barometz</i> (L.) J. Sm.
Dryopteridaceae	<i>Polystichum dielsii</i> H. Christ

Family	Scientific name
Gleicheniaceae	<i>Polystichum eximium</i> (Mett. ex Kuhn) C. Chr. <i>Dicranopteris ampla</i> Ching & P.C. Chiu <i>Dicranopteris pedata</i> (Houtt.) Nakaike <i>Diplopterygium chinensis</i> (Rosenst.) DeVol
Lindsaeaceae	<i>Lindsaea heterophylla</i> Dryand. <i>Stenoloma chusanum</i> (L.) Ching
Lycopodiaceae	<i>Lycopodium casuarinoides</i> (Spring) Holub
Marattiaceae	<i>Angiopteris fokiensis</i> Hieron.
Nephrolepidaceae	<i>Nephrolepis auriculata</i> (L.) Trimea
Osmundaceae	<i>Osmunda japonica</i> Thunb. <i>Osmunda vachellii</i> Hook.
Peranemaceae	<i>Acrophorus stipellatus</i> (Wall.) Moore
Polypodiaceae	<i>Lemmaphyllum microphyllum</i> C. Presl <i>Lepidogrammits rostrata</i> (Bedd.) Ching <i>Polypodiodes chinensis</i> (H. Christ) S.G. Lu <i>Pyrrosia adnascens</i> (Sw.) Ching
Pteridaceae	<i>Histiopteris incisa</i> (Thunb.) J. Sm. <i>Pteris austrosinica</i> (Ching) Ching <i>Pteris dispar</i> Kunze <i>Pteris insignis</i> Mett. ex Kuhn
Pteridiaceae	<i>Pteridium aquilinum</i> (L.) Kuhn var. <i>latiusculum</i> (Desv.) Underw. ex A. Heller
Sinopteridaceae	<i>Cheilosoria chusana</i> (Hook.) Ching & K.H. Shing
Thelypteridaceae	<i>Dictyocline wilfordii</i> (Hook.) J. Sm. <i>Pronephrium lakhimpureense</i> (Rosenst.) Holttum <i>Pronephrium triphyllum</i> (Sw.) Holttum
GYMNOSPERMAE	
Cycadaceae	<i>Cycas taiwaniana</i> Carruth.
Gnetaceae	<i>Gnetum parvifolium</i> (Warb.) Chun
Pinaceae	<i>Pinus massoniana</i> Lamb.
Taxodiaceae	<i>Cunninghamia lanceolata</i> (Lamb.) Hook.
ANGIOSPERMAE	
Dicotyledonae	
Aceraceae	<i>Acer fabri</i> Hance <i>Acer tutcheri</i> Duthie
Actinidiaceae	<i>Actinidia eriantha</i> Benth. <i>Actinidia fulvicoma</i> Hance var. <i>lanata</i> (Hemsl.) C.F. Liang <i>Actinidia glaucophylla</i> F. Chun <i>Actinidia latifolia</i> (Gardner & Champ.) Merr.
Alangiaceae	<i>Alangium chinense</i> (Lour.) Harms.
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. <i>Toxicodendron sylvestre</i> (Siebold & Zucc.) Kuntze
Annonaceae	<i>Desmos chinensis</i> Lour. <i>Fissistigma glaucescens</i> (Hance) Merr. <i>Fissistigma oldhamii</i> (Hemsl.) Merr. <i>Fissistigma uonicum</i> (Dunn) Merr. <i>Uvaria boniana</i> Finet & Gagnep.
Apocynaceae	<i>Alyxia sinensis</i> Champ. ex Benth. <i>Alyxia odorata</i> Wall. ex G. Don <i>Melodinus suaveolens</i> Champ. ex Benth. <i>Strophanthus divaricatus</i> (Lour.) Hook. & Arn. <i>Trachelospermum jasminoides</i> (Lindl.) Lem.
Aquifoliaceae	<i>Ilex chapaensis</i> Merr. <i>Ilex dasyphylla</i> Merr. <i>Ilex ficoidea</i> Hemsl. <i>Ilex kwangtungensis</i> Merr. <i>Ilex lohfaucensis</i> Merr. <i>Ilex pubescens</i> Hook. & Arn. <i>Ilex viridis</i> Champ. ex Benth.
Araliaceae	<i>Heteropanax fragrans</i> (D. Don) Seem. <i>Schefflera heptaphylla</i> (L.) Frodin
Asclepiadaceae	<i>Cynanchum auriculatum</i> Royle ex Wight
Asteraceae	<i>Vernonia solanifolia</i> Benth.

Family	Scientific name
Begoniaceae	<i>Begonia crassirostris</i> Irmsch. <i>Begonia leprosa</i> Hance <i>Begonia palmata</i> D. Don
Berberidaceae	<i>Mahonia bealei</i> (Fortune) Carrière <i>Mahonia shenii</i> Chun
Boraginaceae	<i>Ehretia longiflora</i> Champ. ex Benth.
Bretschneideraceae	<i>Bretschneidera sinensis</i> Hemsl.
Caesalpinaceae	<i>Bauhinia championii</i> (Benth.) Benth. <i>Bauhinia glauca</i> (Wall. ex Benth.) Benth. <i>Caesalpinia crista</i> L. <i>Gymnocladus chinensis</i> Baill.
Campanulaceae	<i>Campanumoea javanica</i> Blume <i>Campanumoea lancifolia</i> (Roxb.) Merr. <i>Lobelia melliana</i> E. Wimm. <i>Pratia nummularia</i> (Lam.) A. Br. & Aschers.
Caprifoliaceae	<i>Viburnum fordiae</i> Hance <i>Viburnum sempervirens</i> Koch
Celastraceae	<i>Celastrus monospermus</i> Roxb.
Chloranthaceae	<i>Sarcandra glabra</i> (Thunb.) Nakai
Clethraceae	<i>Clethra bodinieri</i> H. Lév.
Clusiaceae	<i>Calophyllum membranaceum</i> Gardner & Champ. <i>Garcinia multiflora</i> Champ. ex Benth.
Combretaceae	<i>Combretum alfredii</i> Hance
Connaraceae	<i>Rourea minor</i> (Gaertn.) Leenh.
Daphniphyllaceae	<i>Daphniphyllum calycinum</i> Benth <i>Daphniphyllum oldhami</i> (Hemsl.) Rosenth.
Ebenaceae	<i>Diospyros morrisiana</i> Hance ex. Walpers
Elaeocarpaceae	<i>Elaeocarpus chinensis</i> (Gardner & Champ.) Hook. f. ex Benth. <i>Elaeocarpus japonicus</i> Siebold & Zucc. <i>Elaeocarpus sylvestris</i> (Lour.) Poir. <i>Sloanea sinensis</i> (Hance) Hemsl.
Ericaceae	<i>Craibiodendron kwangtungense</i> S. Y. Hu <i>Rhododendron kwangtungense</i> Merr. & Chun <i>Rhododendron moulmmainense</i> Hook. f. (<i>R. westlandii</i> Hemsl.)
Escalloniaceae	<i>Itea chinensis</i> Hook. & Arn
Euphorbiaceae	<i>Alchornea trewioides</i> (Benth.) Muell.-Arg. <i>Antidesma japonicum</i> Siebold & Zucc. <i>Croton lachnocarpus</i> Benth. <i>Croton tiglium</i> L. <i>Glochidion puberum</i> (L.) Hutch. <i>Glochidion triandrum</i> (Blanco) C.B. Rob <i>Macaranga adenantha</i> Gagnep. <i>Mallotus apelta</i> (Lour.) Müll. Arg. <i>Mallotus lianus</i> Croizat <i>Mallotus paniculatus</i> (Lam.) Müll. Arg. <i>Sapium discolor</i> (Champ. ex Benth.) Müll.-Arg. <i>Sapium rotundifolium</i> Hemsl. <i>Vernicia fordii</i> (Hemsl.) Airy Shaw <i>Vernicia montana</i> Lour.
Fagaceae	<i>Castanopsis carlesii</i> (Hemsl.) Hayata <i>Castanopsis eyrei</i> (Champ. ex Benth.) Tutcher <i>Castanopsis fabri</i> Hance <i>Castanopsis fargesii</i> Franch. <i>Castanopsis fissa</i> (Champ. ex Benth.) Rehder et E. H. Wilson <i>Castanopsis fordii</i> Hance <i>Castanopsis hystrix</i> Miq. <i>Castanopsis kawakamii</i> Hayata <i>Castanopsis lamontii</i> Hance <i>Cyclobalanopsis edithiae</i> (Skan) Schottky <i>Cyclobalanopsis hui</i> (Chun) Chun ex Y.C. Hsu & H. Wei Jen <i>Lithocarpus fenestratus</i> (Roxb.) Rehder <i>Lithocarpus glaber</i> (Thunb.) Nakai <i>Lithocarpus haipinii</i> Chun <i>Lithocarpus hancei</i> (Benth.) Rehder <i>Lithocarpus harlandii</i> (Hance ex Walp.) Rehder <i>Lithocarpus litseifolius</i> (Hance) Chun

Family	Scientific name
Flacourtiaceae	<i>Lithocarpus uvariifolius</i> (Hance) Rehder
	<i>Bennettiodendron leprosipes</i> (Clos) Merr.
	<i>Casearia balansae</i> Gagnep.
	<i>Idesia polycarpa</i> Maxim.
Gentianaceae	<i>Canscora andrographioides</i> Griffith ex C.B. Clarke
Gesneriaceae	<i>Rhynchosyche ellipticum</i> (Wal. ex D. Dietr.) A. DC.
Hamamelidaceae	<i>Altingia chinensis</i> (Champ. ex Benth.) Oliv. ex Hance
	<i>Corylopsis multiflora</i> Hance
	<i>Liquidambar formosana</i> Hance
Hernandiaceae	<i>Illigera rhodantha</i> Hance
Hydrangeaceae	<i>Dichroa febrifuga</i> Lour.
	<i>Hydrangea paniculata</i> Siebold
	<i>Pileostegia tomentella</i> Hand.-Mazz.
	<i>Mappianthes iodoides</i> Hand.-Mazz.
Icacinaceae	<i>Ixonanthes chinensis</i> Champ.
Ixonanthaceae	<i>Engelhardtia roxburghiana</i> Wall.
Juglandiaceae	<i>Paraphlomis javanica</i> (Blume) Prain
Lamiaceae	<i>Stauntonia chinensis</i> DC.
Lardizabalaceae	<i>Stauntonia obovata</i> Hemsl.
	<i>Beilschmiedia fordii</i> Dunn
Lauraceae	<i>Cinnamomum austrosinense</i> H.T. Chang
	<i>Cinnamomum porrectum</i> (Roxb.) Kosterm.
	<i>Cryptocarya chingii</i> W.C. Cheng
	<i>Lindera metcalifana</i> C.K. Allen
	<i>Litsea acutivena</i> Hayata
	<i>Litsea cubeba</i> (Lour.) Pers.
	<i>Litsea elongata</i> (Nees) Benth. & Hook. f.
	<i>Litsea elongata</i> (Nees) Benth. & Hook. f. var. <i>subverticillata</i> (Y.C. Yang) Yen C. Yang & P.H. Huang
	<i>Litsea greenmaniana</i> C.K. Allen
	<i>Machilus breviflora</i> (Benth.) Hemsl.
	<i>Machilus velutina</i> Champ. ex Benth.
	<i>Neolitsea cambodiana</i> Lecomte
	<i>Neolitsea chuii</i> Merr.
	<i>Sassafras tzumu</i> (Hemsl.) Hemsl.
	<i>Gelsemium elegans</i> (Gardner & Champ.) Benth.
<i>Strychnos cathayensis</i> Merr.	
Loganiaceae	<i>Taxillus chinensis</i> (DC.) Danser
Loranthaceae	<i>Manglietia moto</i> Dandy
Magnoliaceae	<i>Michelia maudiae</i> Dunn
	<i>Michelia chuii</i> Merr.
Melastomataceae	<i>Blastus cochinchinensis</i> Lour.
	<i>Blastus pauciflorus</i> (Benth.) Guillaumin
	<i>Melastoma affine</i> D. Don
	<i>Melastoma dodecandrum</i> Lour.
Meliaceae	<i>Chukrasia tabularis</i> A. Juss.
Menispermaceae	<i>Cyclea hypoglauca</i> (Schauer) Diels
	<i>Hypserpa nitida</i> Miers
Mimosaceae	<i>Acacia concinna</i> (Willd.) DC.
	<i>Acacia pennata</i> (L.) Willd.
	<i>Pithecellobium clypearia</i> (Jack) Benth.
	<i>Pithecellobium lucidium</i> Benth.
Moraceae	<i>Artocarpus hypargyreus</i> Hance ex Benth.
	<i>Artocarpus styracifolius</i> Pierre
	<i>Broussonetia kaempferi</i> Sieb.
	<i>Cudrania cochinchinensis</i> (Lour.) Kudo et Masam.
	<i>Ficus erecta</i> Thunb.
	<i>Ficus esquiroliana</i> H. Lévl.
	<i>Ficus hirta</i> Vahl
	<i>Ficus langkokensis</i> Drake
	<i>Ficus pandurata</i> Hance
	<i>Ficus pumila</i> L.
	<i>Ficus sarmentosa</i> Buch.-Ham. ex Sm. var. <i>henryi</i> (King ex Oliv.) Corner
	<i>Ficus variolosa</i> Lindl. ex Benth.
	<i>Morus wittiorum</i> Hand.-Mazz.
Myricaceae	<i>Myrica rubra</i> (Lour.) Sieb. & Zucc.
Myrsinaceae	<i>Ardisia chinensis</i> Benth.

Family	Scientific name
	<i>Ardisia gigantifolia</i> Stapf
	<i>Ardisia hanceana</i> Mez
	<i>Ardisia lindleyana</i> D. Dietr.
	<i>Ardisia maclurei</i> Merr.
	<i>Ardisia quinquegona</i> Blume
	<i>Embelia laeta</i> (L.) Mez
	<i>Embelia parviflora</i> Wall. ex A. DC.
	<i>Embelia ribes</i> Burm. f.
	<i>Embelia undulata</i> (Wall.) Mez
	<i>Embelia vestita</i> Roxb.
	<i>Maesa japonica</i> (Thunb.) Moritz et Zoll.
	<i>Maesa perlarius</i> (Lour.) Merr.
	<i>Mysine seguinii</i> H. Lév
Myrtaceae	<i>Baeckea frutescens</i> L.
	<i>Rhodomyrtus tomentosa</i> (Aiton) Hassk.
	<i>Syzygium austrosinense</i> (Merr. & L.M. Perry) Chang & Miao
	<i>Syzygium buxifolium</i> Hook. & Arn.
Olacaceae	<i>Schoepfia chinensis</i> Gardner & Champ.
	<i>Jasminum lanceolarium</i> Roxb.
	<i>Jasminum sinense</i> Hemsl.
Papilionaceae	<i>Osmanthus fragrans</i> (Thunb.) Lour.
	<i>Bowringia callicarpa</i> Champ. ex Benth.
	<i>Dalbergia hancei</i> Benth.
	<i>Millettia championii</i> Benth.
	<i>Millettia dielsiana</i> Harms
	<i>Millettia nitida</i> Benth.
	<i>Millettia pachycarpa</i> Benth.
	<i>Pueraria lobata</i> (Willd.) Ohwi
	<i>Spatholobus suberectus</i> Dunn
Piperaceae	<i>Piper boehmeriifolium</i> (Miq.) C. DC.
Pittosporaceae	<i>Pittosporum fulvipilosum</i> H.T. Chang & S.Z. Yan
Polygalaceae	<i>Polygala fallax</i> Hemsl.
Polygonaceae	<i>Polygonum chinense</i> L.
	<i>Polygonum multiflorum</i> Thunb. ex Murray
Proteaceae	<i>Helicia reticulata</i> W. T. Wang
Rhamnaceae	<i>Berchemia floribunda</i> (Wall.) Brongn.
	<i>Hovenia acerba</i> Lindl.
	<i>Rhamnus crenata</i> Siebold & Zucc.
	<i>Sageretia lucida</i> Merr.
	<i>Ventilago inaequilateralis</i> Merr. & Chun
	<i>Ventilago leiocarpa</i> Benth.
Rosaceae	<i>Eriobotrya fragrans</i> Champ. ex Benth.
	<i>Laurocerasus phaeosticta</i> (Hance) C. K. Schneid.
	<i>Laurocerasus spinulosa</i> (Siebold & Zucc.) C.K. Schneid.
	<i>Photinia prunifolia</i> (Hook. & Arn.) Lindl.
	<i>Pygeum topengii</i> Merr.
	<i>Pyrus calleryana</i> (L.) Lindl.
	<i>Rosa laevigata</i> Michx.
	<i>Rubus leucanthus</i> Hance
	<i>Rubus pirifolius</i> Sm.
	<i>Rubus reflexus</i> Ker
	<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 cochinchinensis</i> Lour.
	<i>Coptosapelta diffusa</i> (Champ. ex Benth.) Steenis
	<i>Gardenia jasminoides</i> J. Ellis
	<i>Hedyotis hedyotideia</i> (DC.) Merr.
	<i>Lasianthus micranthus</i> Hook. f.
	<i>Lasianthus trichophlebus</i> Hemsl.
	<i>Morinda umbellata</i> L.
	<i>Mussaenda esquirolii</i> H. Lév.
	<i>Mussaenda pubescens</i> W. T. Aiton
	<i>Pavetta hongkongensis</i> Brem.
	<i>Psychotria serpens</i> L.
	<i>Psychotria tutcheri</i> Dunn

Family	Scientific name	
Rutaceae	<i>Tarenna mollissima</i> (Hook. & Arn.) B.L. Rob.	
	<i>Uncaria rhynchophylloides</i> F.C. How	
	<i>Evodia lepta</i> (Spreng.) Merr.	
	<i>Evodia ruticarpa</i> (A. Juss.) Benth.	
	<i>Murraya paniculata</i> (L.) Jack	
	<i>Toddalia asiatica</i> (L.) Lam.	
	<i>Zanthoxylum armatum</i> DC.	
Sabiaceae	<i>Zanthoxylum myriacanthum</i> Wall. ex Hook. f.	
	<i>Meliosma fordii</i> Hemsl.	
	<i>Meliosma squamulata</i> Hance	
Santalaceae	<i>Sabia discolor</i> Dunn	
Santalaceae	<i>Dendrotrophe frutescens</i> (Champ. ex Benth.) Danser	
Sapotaceae	<i>Sinosideroxylon wightianum</i> (Hook. & Arn.) Aubrév.	
Sargentodoxaceae	<i>Sargentodoxa cuneata</i> (Oliv.) Rehder & E.H. Wilson	
Scrophulariaceae	<i>Adenosma glutinosum</i> (L.) Druce	
Sterculiaceae	<i>Reevesia thyrsoidea</i> Lindl.	
Styracaceae	<i>Alniphyllum fortunei</i> (Hemsl.) Makino	
	<i>Huodendron biaristatum</i> (W.W. Sm.) Rehder	
	<i>Meliiodendron xylocarpum</i> Hand.-Mazz.	
	<i>Styrax odoratissimus</i> Champ. ex Benth.	
	<i>Styrax suberifolius</i> Hook. & Arn.	
	<i>Styrax tonkinensis</i> (Pierre) Craib ex Hartwich	
	<i>Symplocos adenophylla</i> Wall. ex G. Don	
Symplocaceae	<i>Symplocos cochinchinensis</i> (Lour.) S. Moore	
	<i>Symplocos lancifolia</i> Siebold & Zucc.	
	<i>Adinandra bockiana</i> E. Pritz var. <i>acutifolia</i> (Hand.-Mazz.) Kobuski	
	<i>Adinandra glischroloma</i> Hand.-Mazz.	
Theaceae	<i>Eurya acuminatissima</i> Merr. & Chun	
	<i>Eurya macartneyi</i> Champ.	
	<i>Eurya nitida</i> Korthals	
	<i>Hartia villosa</i> (Merr.) Merr.	
	<i>Schima superba</i> Gardn. et Champ.	
	<i>Ternstroemia gymnanthera</i> (Wight & Arn.) Bedd.	
	<i>Trema cannabina</i> Lour. var. <i>dielsiana</i> (Hand.-Mazz.) C.J. Chan	
Ulmaceae	<i>Boehmeria nivea</i> (L.) Gaudich.	
Urticaceae	<i>Gonostegia hirta</i> (Hassk.) Miq.	
	<i>Oreocnide frutescens</i> (Thunb.) Miq.	
Verbenaceae	<i>Callicarpa integerrima</i> Champ.	
	<i>Callicarpa kochiana</i> Makino	
	<i>Callicarpa longipes</i> Dunn	
	<i>Callicarpa rubella</i> Lindl.	
	<i>Clerodendrum cyrtophyllum</i> Turcz.	
	<i>Clerodendrum fortunatum</i> L.	
	<i>Vitex canescens</i> Kurz	
Vitaceae	<i>Tetrastigma planicaule</i> (Hook. f.) Gagnep.	
Monocotyledonae		
Araceae	<i>Epipremnum pinnatum</i> (L.) Engl.	
	<i>Pothos chinensis</i> (Raf.) Merr.	
Areaceae	<i>Calamus rhabdocladus</i> Burret	
	<i>Daemonorops margaritae</i> (Hance) Becc.	
Commelinaceae	<i>Pollia secundiflora</i> (Blume) Bakh. f.	
Cyperaceae	<i>Carex brunnea</i> Thunb.	
	<i>Carex cruciata</i> Wahlenb.	
	<i>Carex cryptostachys</i> Brongn.	
	<i>Carex nemostachys</i> Steud.	
	<i>Carex scaposa</i> C.B. Clarke	
	<i>Eleocharis tetraquetra</i> Nees	
	<i>Gahnia javanica</i> Moritzi	
	<i>Gahnia tristis</i> Nees	
	<i>Scirpus filipes</i> C.B. Clarke	
	Hydrocharitaceae	<i>Hydrilla verticillata</i> (L. f.) Royle
		<i>Nechamandra alternifolia</i> (Roxb.) Thwaites
Juncaceae	<i>Juncus effusus</i> L.	
Liliaceae	<i>Dianella ensifolia</i> (L.) DC.	
	<i>Disporum cantoniense</i> (Lour.) Merr.	

Family	Scientific name
	<i>Smilax china</i> L.
	<i>Smilax hypoglauca</i> Benth.
	<i>Smilax lanceifolia</i> Roxb.
Musaceae	<i>Musa balbisiana</i> Colla
Poaceae	<i>Centotheca lappacea</i>
	<i>Lophatherum gracile</i> Brongn.
	<i>Miscanthus sinensis</i> Andersson
	<i>Thysanolaena maxima</i> (Roxb.) Kuntze
Potamogetonaceae	<i>Potamogeton malaianus</i> Miq.
Zingiberaceae	<i>Alpinia oblongifolia</i> Hayata
	<i>Alpinia stachyoides</i> Hance
	<i>Zingiber officinale</i> Roscoe

Mammals

- On the morning of 17 September, a dead Hoary Bamboo Rat *Rhizomys pruinosus* was found.
- In the late afternoon of 17 September, many bats were observed roosting; based on the size of the bats and the location of the roost, they were identified as Lesser Dawn Bat (*Eonycteris spelaea*), with a few Leschenault's Rousette fruit bats (*Rousettus leschenaulti*) also possibly present. Lesser Dawn Bat is a new record for Guangdong; in China it was known only from Yunnan and Guangxi (Zhang Y. *et al.*, 1997). Leschenault's Rousette has a wide distribution and has been recorded in Tibet, Yunnan, Guizhou, Jiangxi, Fujian, Guangxi, Guangdong, Hainan and Hong Kong (Zhang Y. *et al.*, 1997).
- Local officials reported that South China Tiger *Panthera tigris amoyensis* visits the reserve yearly, and the Asiatic Black Bear *Ursus thibetanus* still occurs in the reserve.
- Some of the other species previously recorded from the Shaoguan area, such as Chinese Pangolin *Manis pentadactyla*, Wolf *Canis lupus*, Asiatic Black Bear *Ursus thibetanus*, Large Indian Civet *Viverra zibetha*, Forest Musk Deer *Moschus berezovskii* (Zhang Y. *et al.*, 1997 and references therein), may have occurred at Luokeng, but more specific and up-to-date information is required.

Birds

- Sixty-three bird species were recorded at Luokeng (Table 2). Both abundance and richness were rather low during the present survey.
- The most frequently encountered species included Chestnut Bulbul *Hemixos castanonotus*, Scarlet Minivet *Pericrocotus flammeus* and Japanese White-eye *Zosterops japonicus*.
- A number of small-bodied owls were seen during the survey; an owl was flushed from a shrub in the afternoon of 17 September. Owls of similar size were seen on the morning and evening of 18 September. None were seen clearly; based on size, they may have been scops owl (*Otus*) or owlet (*Glaucidium*) species.

Table 2. Birds recorded at Luokeng Nature Reserve, 17-19 September 2002. Sequence follows Clements (2000).

Scientific name	English name
<i>Tachybaptus ruficollis</i>	Little Grebe
<i>Egretta garzetta</i>	Little Egret
<i>Ardeola bacchus</i>	Chinese Pond Heron
<i>Bubulcus ibis</i>	Cattle Egret
<i>Butorides striatus</i>	Little Heron
<i>Aviceda leuphotes</i>	Black Baza
<i>Buteo buteo</i>	Common Buzzard
<i>Spilornis cheela</i>	Crested Serpent Eagle
<i>Accipiter trivirgatus</i>	Crested Goshawk
<i>Falco peregrinus</i>	Peregrine Falcon

Scientific name	English name
<i>Centropus sinensis</i>	Greater Coucal
<i>Collocalia brevirostris</i>	Himalayan Swiftlet
<i>Apus affinis</i>	House Swift
<i>Harpactes erythrocephalus</i>	Red-headed Trogon
<i>Alcedo atthis</i>	Common Kingfisher
<i>Halcyon smyrnensis</i>	White-throated Kingfisher
<i>Merops viridis</i>	Blue-throated Bee-eater
<i>Merops philippinus</i>	Blue-tailed Bee-eater
<i>Eurystomus orientalis</i>	Dollarbird
<i>Megalaima virens</i>	Great Barbet
<i>Megalaima oorti</i>	Black-browed Barbet
<i>Blythipicus pyrrhotis</i>	Bay Woodpecker
<i>Hirundo daurica</i>	Red-rumped Swallow
<i>Motacilla alba</i>	White Wagtail
<i>Motacilla cinerea</i>	Grey Wagtail
<i>Pericrocotus flammeus</i>	Scarlet Minivet
<i>Pericrocotus solaris</i>	Grey-chinned Minivet
<i>Spizixos semitorques</i>	Collared Finchbill
<i>Pycnonotus jocosus</i>	Red-whiskered Bulbul
<i>Pycnonotus sinensis</i>	Light-vented Bulbul
<i>Pycnonotus aurigaster</i>	Sooty-headed Bulbul
<i>Hemixos castanonotus</i>	Chestnut Bulbul
<i>Hypsipetes mcclllandii</i>	Mountain Bulbul
<i>Copsychus saularis</i>	Oriental Magpie Robin
<i>Monticola solitarius</i>	Blue Rock Thrush
<i>Myophonus caeruleus</i>	Blue Whistling Thrush
<i>Rhyacornis fuliginosus</i>	Plumbeous Water Redstart
<i>Enicurus schistaceus</i>	Slaty-backed Forktail
<i>Muscicapa griseisticta</i>	Grey-streaked Flycatcher
<i>Cyornis hainanus</i>	Hainan Blue Flycatcher
<i>Prinia atrogularis</i>	Hill Prinia
<i>Phylloscopus tenellipes</i>	Pale-legged Leaf Warbler
<i>Orthotomus sutorius</i>	Common Tailorbird
<i>Stachyris ruficeps</i>	Rufous-capped Babbler
<i>Garrulax pectoralis</i>	Greater Necklaced Laughingthrush
<i>Garrulax sannio</i>	White-browed Laughingthrush
<i>Pnoepyga pusilla</i>	Pygmy Wren Babbler
<i>Leiothrix lutea</i>	Red-billed Leiothrix
<i>Alcippe morrisonia</i>	Grey-cheeked Fulvetta
<i>Yuhina zantholeuca</i>	White-bellied Yuhina
<i>Yuhina castaniceps</i>	Striated Yuhina
<i>Sitta</i> sp.	Nuthatch sp.

Scientific name	English name
<i>Parus major</i>	Great Tit
<i>Aethopyga christinae</i>	Fork-tailed Sunbird
<i>Dicaeum ignipectus</i>	Fire-breasted Flowerpecker
<i>Zosterops japonicus</i>	Japanese White-eye
<i>Lanius schach</i>	Long-tailed Shrike
<i>Oriolus chinensis</i>	Black-naped Oriole
<i>Dicrurus hottentottus</i>	Spangled Drongo
<i>Dicrurus macrocercus</i>	Black Drongo
<i>Urocissa erythrorhyncha</i>	Red-billed Blue Magpie
<i>Dendrocitta formosae</i>	Grey Treepie
<i>Lonchura striata</i>	White-rumped Munia

- Black Baza *Aviceda leuphotes*, Crested Serpent Eagle *Spilornis cheela*, Crested Goshawk *Accipiter trivirgatus*, Common Buzzard *Buteo buteo*, Peregrine Falcon *Falco peregrinus* and Greater Coucal *Centropus sinensis* are Class II nationally Protected in China. Identity of the small owls could not be confirmed, but all owls are Class II nationally Protected in China.
- Himalayan Swiftlet *Collocalia brevirostris* is a new record for Guangdong but within its known range, being previously recorded in Tibet, Sichuan, Guizhou, Guangxi, Yunnan and Hong Kong in China.
- The presence of forest-dependent birds (including the barbet, woodpecker, trogon, bulbuls and babblers) indicates some intact forest habitat in the vicinity.

Reptiles and Amphibians

- Sixteen species of amphibian and 14 species of reptile (eight lizards and six snakes) were recorded at Luokeng during the survey (Table 3). No amphibians and reptiles were found at Xiafengshan.
- The *Megophrys* toad and the *Scincella* skink cannot be positively identified as the former was only heard and the latter was seen briefly but not caught.

Table 3. Amphibians and reptiles recorded at Luokeng Nature Reserve, 17 -19 September 2002. Sequence follows Zhao E.-M. & Adler (1993).

Scientific name	Habitat	
AMPHIBIA		
<i>Megophrys</i> sp.	stream	✓
<i>Bufo melanostictus</i>	field/village	✓
<i>Amolops ricketti</i>	stream	✓
<i>Paa exilispinosa</i>	stream	✓, tadpoles
<i>Rana fujianensis</i>	seep	✓
<i>Rana guentheri</i>	seep	✓
<i>Rana latouchii</i>	pool	✓
<i>Rana limnocharis</i>	plantation	✓
	stream	✓
	paddy field	✓
	seep	✓
<i>Rana livida</i>	stream	✓
<i>Rana macrodactyla</i>	marsh	✓
<i>Rana schmackeri</i>	stream	✓
<i>Rana taipehensis</i>	catchwater	✓
<i>Rana versabilis</i>	forest	✓
<i>Microhyla heymonsi</i>	paddy field	✓, tadpoles
<i>Microhyla ornata</i>	paddy field	✓
<i>Microhyla pulchra</i>	seep	✓
		✓

Scientific name	Habitat	
REPTILIA		✓
<i>Acanthosaura lepidogaster</i>	forest	✓
<i>Calotes versicolor</i>	shrubland	✓
	forest edge	✓
<i>Eumeces elegans</i>	forest edge	✓
<i>Shinisaurus crocodilurus</i>	stream	✓
<i>Scincella</i> sp.	forest edge	✓
<i>Sphenomorphus incognitus</i>	stream	✓
<i>Sphenomorphus indicus</i>	forest	✓
<i>Tropidophorus sinicus</i>	stream	✓
<i>Cyclophiops major</i>	tea plantation	✓
<i>Lycodon ruhstrati</i>	shrubland	✓
<i>Sibynophis chinensis</i>	forest	✓
<i>Sinonatrix percarinata</i>	stream	✓
<i>Bungarus multicinctus</i>	field/village	✓
<i>Protothrops mucrosquamatus</i>	field/village	✓

- The species of particular conservation interest is Crocodile Lizard *Shinisaurus crocodilurus*. This species is Class I nationally Protected in China. It was once thought to be confined to central Guangxi (Zhao & Adler, 1993) but has recently been discovered from Luokeng (Li & Xiao, 2002) and North Vietnam (Le Khac Quyet, Fauna and Flora International, pers. comm., August 2002). The Guangxi population has declined drastically (Zhang & Zeng, 2002), making the Luokeng population particularly important.
- The presence of a number of stream specialists and several forest species indicates that Luokeng still has rather good forests left.

Fish

- A total of eleven freshwater fish species were recorded from Luokeng Reserve and the surrounding area (Table 4). More species, such as barbs *Acrossocheilus* sp. (possibly the recorded *A. parallens*) and *Onychostoma* sp. were observed, but adverse weather conditions made sampling impossible.
- Sampling (including observational records) was conducted in selected locations. Due to the rainy weather before and during the survey sampling effort was low.
- The most frequently encountered species was *Opsariichthys bidens*.
- Some species collected could not be identified and may be of scientific/conservation interest: *Discogobio* sp., *Pterocryptis* sp., and *Oryzias* sp.

Table 4. Freshwater fish recorded at Luokeng Nature Reserve and surroundings, North Guangdong, 16-20 September 2002. (“%” = observational record, “*” = nomenclature follows Pan, 1991). Sequence of families follows Nelson (1994).

Scientific name	
<i>Opsariichthys bidens</i>	✓
<i>Hemiculter leuciculus</i>	✓
<i>Hemibarbus medius</i>	✓
<i>Puntius semifasciolatus</i> *	✓
<i>Acrossocheilus parallens</i>	%
<i>Onychostoma</i> sp.	%
<i>Discogobio</i> sp.	✓
<i>Pterocryptis</i> sp.	✓
<i>Oryzias</i> sp.	✓
<i>Rhinogobius duospilus</i>	✓
<i>Macropodus opercularis</i>	✓

- The Luokeng area has abundant freshwater habitats but the adverse weather conditions during our visit made our fish survey very brief and inefficient. A properly equipped and

designed fish survey of the reserve and surrounding area would surely reveal many more species.

- It was interesting to find a number of fish species living in complete darkness in the subterranean stream of the Dayan limestone cave, including two species (*Discogobio* sp. and *Pterocryptis* sp.) which could not be identified. Although strictly hypogean species have yet to be found in Dayan more detailed survey exploring further inside the cave system may reveal species of interest.

Dragonflies

- Twenty-three species were recorded in Luokeng during the three-day survey (Table 5).
- The most frequently encountered species was *Pantala flavescens*.

Table 5. Dragonflies recorded at Luokeng Nature Reserve, 17 - 19 September 2002. Sequence of families follows Schorr *et al.* (2001a, 2001b).

Scientific name
<i>Archineura incarnata</i>
<i>Calopteryx melli</i>
<i>Matrona basilaris basilaris</i>
<i>Vestalis smaragdina velata</i>
<i>Indocypha katharina</i>
<i>Euphaea decorata</i>
<i>Coeliccia cyanomelas</i>
<i>Copera ciliata</i>
<i>Anax nigrofasciatus</i>
<i>Anax parthenope</i>
<i>Periaeschna flinti</i>
<i>Planaeschna suichangensis</i>
<i>Crocothemis servilia</i>
<i>Hydrobasileus croceus</i>
<i>Orthetrum glaucum</i>
<i>Orthetrum luzonicum</i>
<i>Orthetrum pruinosum neglectum</i>
<i>Orthetrum sabina</i>
<i>Palpopleura sexmaculata</i>
<i>Pantala flavescens</i>
<i>Sympetrum eroticum ardens</i>
<i>Tramea virginia</i>
<i>Trithemis aurora</i>

- The record of *Indocypha katharina* is new to Guangdong. This is a very restricted species and is previously known from only three sites, two in Guangxi and another in Sichuan (Wilson & Reels, 2003).

Butterflies

- Sixty-three species were recorded in Luokeng during the three-day survey (Table 6).
- *Damora sagana*, *Lethe lanaris* and *Symbrenthia hypselis* can only be provisionally identified and require expert confirmation. Two species, *Troides* sp. and *Heliophorus* sp., can only be identified to genus level as they were only observed from a distance.

Table 6. Butterflies recorded at Luokeng, 17 - 19 September 2002. Sequence of families follows Bascombe (1995).

Scientific name	Habitat
<i>Caltoris cahira</i>	forest/farmland
<i>Celaenorrhinus aurivittatus</i>	forest/farmland
<i>Notocrypta curvifascia</i>	riparian forest
<i>Parnara guttata</i>	plantation
	forest
	shrubland

Scientific name	Habitat
<i>Pelopidas mathias</i>	shrubland
<i>Tagiades menaka</i>	shrubland
<i>Graphium agamemnon</i>	shrubland
<i>Graphium doson</i>	shrubland
	village
<i>Graphium sarpedon</i>	plantation/shrubland
<i>Lamproptera aurius</i>	shrubland
	paddy field
<i>Papilio demoleus</i>	village
<i>Papilio helenus</i>	plantation
	forest
<i>Papilio memnon</i>	riparian forest
	shrubland
	village
	forest
<i>Papilio paris</i>	shrubland
<i>Papilio protenor</i>	paddy field
	shrubland
<i>Papilio xuthus</i>	village
<i>Troides sp.</i>	shrubland
<i>Eurema hecabe</i>	paddy field
	shrubland
<i>Leptosia nina</i>	forest
<i>Abisara echerius</i>	shrubland
<i>Abisara neophron</i>	shrubland
<i>Curetis acuta</i>	shrubland
<i>Heliophorus sp.</i>	village
<i>Jamides bochus</i>	shrubland
	riparian forest
<i>Nacaduba kurava</i>	plantation
<i>Pseudozizeeria maha</i>	forest
<i>Taraka hamada</i>	forest
	shrubland
	plantation
<i>Tongeia potanini</i>	forest
	shrubland
<i>Udara albocaerulea</i>	riparian forest
<i>Aemona amathusia</i>	forest edge
	forest
	riparian forest
<i>Ariadne ariadne</i>	shrubland
	paddy field
<i>Athyma nefte</i>	plantation/shrubland
<i>Athyma perius</i>	shrubland
<i>Athyma selanophora</i>	shrubland
<i>Bhagadatta austenia</i>	forest edge
<i>Charaxes marmax</i>	plantation
<i>Cyrestis thyodamus</i>	shrubland
<i>Damora sagana ?</i>	forest
<i>Danaus genutia</i>	shrubland
<i>Euploea midamus</i>	shrubland
	plantation/shrubland
<i>Hestina assimilis</i>	shrubland
<i>Hypolimnas bolina</i>	shrubland
<i>Ideopsis similis</i>	riparian forest
	forest
<i>Lethe confusa</i>	forest
<i>Lethe lanaris ?</i>	bamboo forest
<i>Lethe satyrina</i>	shrubland
<i>Melanitis leda</i>	paddy field
<i>Mycalesis mineus</i>	shrubland
<i>Mycalesis zonata</i>	riparian forest
	plantation
<i>Neorina patria</i>	forest edge
<i>Neptis clinia</i>	forest
<i>Neptis hylas</i>	shrubland

Scientific name	Habitat
<i>Pantoporia hordonia</i>	forest edge
<i>Parantica aglea</i>	shrubland paddy field forest
<i>Parasarpa dudu</i>	forest edge
<i>Parathyma sulphitia</i>	paddy field
<i>Polyura athamas</i>	paddy field forest edge
<i>Precis (Junonia) almana</i>	paddy field shrubland
<i>Symbrenthia hypselis</i> ?	shrubland
<i>Symbrenthia lilaea</i>	shrubland plantation
<i>Ypthima lisandra</i>	plantation
<i>Ypthima motschulskyi</i>	plantation forest
<i>Ypthima perfecta</i>	shrubland

- Several species are apparently new records for Guangdong: *Tagiades menaka*, *Tongeia potanini*, *Damora sagana*, *Lethe lanaris*, *Lethe satyrina*, *Symbrenthia hypselis* and *Ypthima perfecta*.

Summary of flora and fauna

- Since the major aim of the survey was to study the status of Crocodile Lizard at Luokeng, the present survey focused on the known distribution areas within the reserve. The results were further affected by the unfavourable weather conditions during the first part of the survey period.
- The primary forest cover of subtropical evergreen broadleaf forest had long been cleared and the surveyed hillsides consisted of a mosaic of forest at various successional stages, tall shrubland, China fir plantation and farmland. Older broadleaf forest blocks were found in more inaccessible ravines and in the various Feng shui woods. More extensive secondary forest could be found, but the present survey failed to study its biota due to time constraints.
- There is reportedly very good mature forest (with trees >1m dbh) between Luokeng and Shimentai Nature Reserves.
- Despite the degraded nature of the vegetation and the unfavourable weather during the survey, the present survey recorded a fairly rich flora from Luokeng with 348 vascular plant species recorded in three days. This rich flora partly reflected the diverse successional stages of the forest mosaic and variety of habitats visited. Among the flora recorded there are four globally restricted species and two new records for Guangdong.
- Two globally Endangered species, two Vulnerable species and four Class II nationally Protected fern species were found in the present survey.
- The large-bodied forest fauna of Luokeng appears to be impoverished following forest degradation; only a dead bamboo rat was seen. The bat fauna discovered may be of interest; more status research work on Lesser Dawn Bat in China was recommended by the IUCN Action Plan for Bat Conservation.
- A rather diverse bird fauna was present with 63 species recorded; at least seven (including the unidentified owl(s)) of the birds recorded in the present survey are nationally Protected. Himalayan Swiftlet *Collocalia brevirostris* is a new record for Guangdong.
- The herpetofauna was also quite diverse: 16 amphibians and 14 reptiles were recorded including the Endangered and globally restricted Crocodile Lizard *Shinisaurus crocodilurus*.
- Richness of the recorded fish fauna was unexceptional with eleven species, but heavy rains made sampling very ineffectual. The Luokeng area has abundant freshwater habitats and a properly equipped and designed fish survey of the reserve and surrounding area would surely reveal many more species.

- Twenty-three dragonfly and sixty-three butterfly species were recorded, including a number of new provincial records. *Indocypha katharina* is a very restricted species and was only known from Guangxi (two sites) and Sichuan (one site) (Wilson & Reels, 2003).
- Due to the bad weather and the specialised focus of this short survey, the terrestrial fauna was not adequately sampled. However, a number of forest-dependent birds, reptiles and amphibians were recorded. A reported mature forest area and the extensive secondary forest of another site are likely to have a more complete terrestrial biota than the areas surveyed, and the former is even reported to be a migration route for Tiger.
- The streams draining Luokeng Nature Reserve support some highly restricted stream-dependent species.
- MacKinnon *et al.* (1996) did not evaluate the biodiversity value of Luokeng Nature Reserve, due to its late inclusion into the national protected-area system. Although degradation is rather severe with little mature forest remains, the site was found to support some species of conservation concern, and it is here considered of high regional conservation importance within Guangdong. The secondary forest of Luokeng is at relatively low altitude. If protected well the conservation significance of the reserve may further increase following gradual colonisation by more forest-dependent species as the forests mature.

Threats and problems

- Almost all of the original forest has been cleared at Luokeng, and it is likely that much biodiversity has been lost. It has large areas of plantation and fire could be a risk to the regenerating vegetation.
- There are many hydropower stations in the Luokeng area (e.g. Daba Keng, Dakongtan, Dazhuyuan), and associated habitat degradation was evident. For example the riparian vegetation was disturbed with signs of siltation due to the related earthwork of the newly-built hydropower station at Xiaqi Keng stream in the Dazhuyuan area. Such work is clearly incompatible with the conservation objective for stream-dependent species. A review of the existing and planned hydropower stations is necessary for the reserve to safeguard the long-term survival of the population of such species.
- Illegal collecting of Crocodile Lizard apparently still occurred at the time of our visit and villagers reported there was a black market for Crocodile Lizard despite determined efforts to curb the trade by the reserve management authorities.
- Collection of stream fauna for commercial food trade was evident with the local market at Luokeng Town offered many wild-collected aquatic products (stream fishes, crustaceans and snails). It is not known whether these harvestings are sustainable. Some household sewage was discharged directly into the main river draining Luokeng Town, where it eventually feeds into the Luokeng Reservoir.
- Illegal collection of valuable plants was also a problem; dug up tree ferns *Alsophila spinulosa* were found on 19 September; apparently it is a popular traditional medicine in the region. It would appear that residents have a high incentive to exploit the forest resources, but may not be doing so sustainably.
- There were apparently some points of contention between Luokeng and the neighbouring Shimentai Nature Reserves, including the precise boundaries at the Chuandi Ding Mountain. These might need to be addressed for effective cooperation in patrolling and landscape/wildlife management, especially for wide-ranging wildlife such as mammals and birds.

Opportunities

- Besides the more inaccessible forest on steep ravines and in the mountains there were numerous small but mature lowland Feng shui woods behind villages, indicating that residents value these forests. For completeness the reserve boundaries might be extended to include these lowland ecotypes, but it is also important to ensure the forest stewardship is continued and encouraged. The environmental awareness of the villagers should also be

raised and incentives provided so that they will also protect the biota (e.g. aquatic animals and valuable plants) from over-exploitation.

- If the regenerating forests and their biota at Luokeng are carefully protected from fire, logging, hunting, grazing and other unsuitable activities, there is potential for the ecosystem and wildlife populations to recover in future decades.
- Logging of the extensive plantations in the reserve is no longer permitted. Since such monotypic habitat has very low ecological value, the conservation value of Luokeng could be improved by ecological enhancement of these plantations. Ecological enhancement of plantations can be achieved by thinning of timber trees to allow native tree saplings to grow and eventually replace the plantations with native broadleaf forest. Planting an assemblage of tree species native to the Luokeng region in the cleared area can facilitate this process of enhancement. To achieve this, there is probably a need to establish a tree nursery to produce seedlings. 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.
- The southwestern side of Luokeng Nature Reserve is connected with Shimentai Nature Reserve (Yingde Shi) and Dabu County-level Nature Reserve (Ruyuan County) in Shaoguan Shi District. Some form of administrative merge or exchange with these reserves in the two City Districts would enable better cooperation in patrolling and managing the forest and biodiversity on the Chuandi Ding range.

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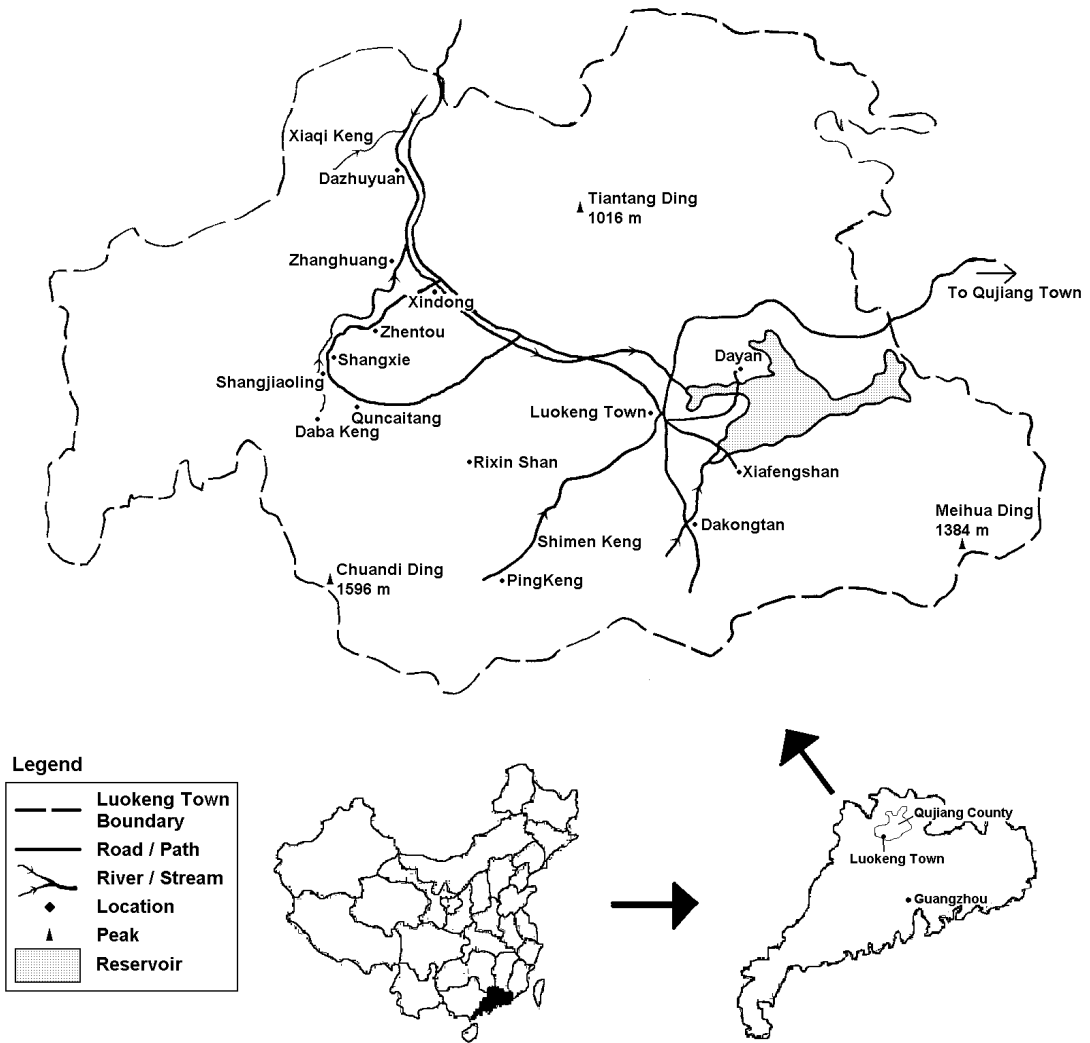


Figure 1. Map showing location of Luokeng Nature Reserve, North Guangdong, China.