



**Report of a Rapid Biodiversity Assessment at
Dawuling Nature Reserve, Southwest Guangdong,
China, June/July 2002**

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

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Report of a Rapid Biodiversity Assessment at Dawuling Nature Reserve, Southwest Guangdong, China, June/July 2002

Editors

Bosco P.L. Chan, Michael W.N. Lau, Ng Sai-Chit and John R. Fellowes

Contributors

Kadoorie Farm and Botanic Garden:	Bosco P.L. Chan	(BC)
	Michael W.N. Lau	(ML)
	Lee Kwok Shing	(LKS)
	Ng Sai-Chit	(NSC)
	John R. Fellowes	(JRF)
South China Normal University:	Li Zhenchang	(LZC)
	Xiao Zhi	(XZ)
	Chen Xianglin	(CXL)
Voluntary specialist:	Keith D.P. Wilson	(KW)

Background

The present report details the findings of a visit to Southwest Guangdong by members of Kadoorie Farm and Botanic Garden (KFBG) in Hong Kong and their colleagues, as part of KFBG's South China Biodiversity Conservation Programme (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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Contents

Objectives	1
Methods	1
Location and management	1
Results	2
<i>Vegetation</i>	2
<i>Flora</i>	3
<i>Mammals</i>	9
<i>Birds</i>	10
<i>Reptiles and Amphibians</i>	11
<i>Fish</i>	12
<i>Dragonflies</i>	13
<i>Butterflies</i>	13
<i>Ants</i>	14
Summary of flora and fauna	14
Threats and problems	15
Opportunities	16
Acknowledgements	16
References	16
Figure 1. Map.....	19

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 aims of the survey were to collect up-to-date information on the fauna and flora of Dawuling Nature Reserve, and to use this to help determine conservation priorities within South China.
- The present survey was the second visit by a team of biologists from KFBG, the earlier one on 25-28 April 1997 concentrating on birds, herpetofauna, butterflies and ants (Fellowes & Hau, 1997). This second survey sought to update and augment the information gained earlier, with additional attention to groups not previously covered such as flora, fish and dragonflies.

Methods

- On 28 June to 3 July 2002, a team of biologists from Hong Kong (BC, ML, LKS, NSC) and Guangzhou (LZC, XZ) conducted a rapid biodiversity survey at Dawuling National Nature Reserve.
- 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 or ML, reptiles and amphibians by ML, BC, LZC or XZ, fish by BC, dragonflies and butterflies by ML, and dragonflies verified by KW.
- Nomenclature in the report is standardised based, unless otherwise stated, on the following references:
 - Flora (Pteridophyta, Gymnospermae and Angiospermae): Anon. (1959-2001); Anon. (1996-2001); Anon. (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

- Dawuling Nature Reserve is located between Xinyi and Gaozhou Cities, Maoming City District, Southwest Guangdong, at 111° 8-15'E, 22° 14-17'N. Administration of the reserve is the responsibility of the Xinyi City Forestry Bureau. The size of the reserve is 34.4 km² (Zhang, J., 1997; State Forestry Administration Wildlife Conservation Office, 2003).
- The mountainous Dawuling Nature Reserve is part of the Yunwushan range; the altitudinal range is 800 to 1,704 m, with the highest being the summit of Datian Ding, the second-highest peak in Guangdong. Datian Ding has the headwaters of two large drainage systems -

the sea-going Jian Jiang flowing direct into the South China Sea near Qiongzhou Strait, and Huanghua Jiang, a tributary of Xi Jiang of the Zhujiang drainage (Anon., 1997).

- The region as a whole has a southern subtropical climate with a mean annual temperature of 17-18°C, on average 5°C cooler than the lowlands. Recorded maximum temperature was 28°C and minimum temperature was -5°C; annual precipitation is about 2,300-2,600 mm and occurs mainly between March and November in the forest area. Geology is mainly granite (Anon., 1997).
- The reserve was established in 1994 and upgraded to a provincial-level reserve in 1996, and the reserve management is seeking to upgrade Dawuling to a national nature reserve. Dawuling Nature Reserve had nine substations with a total of 59 staff in 1997, of which 14 were officers and 45 workers (Anon., 1997). The reserve headquarters is close to the Dawuling State Forest Farm, at an elevation of 1,030 m. It features a guesthouse with some entertainment facilities. The management authorities were building/refurbishing some of their substations at the time of our visit.
- The reserve has three core areas, namely Dongtang, Chang Keng and Datian Reservoir, and the best forest could be found in Chang Keng area (Anon., 1997; Xu Zhaorong, Deputy Director of Dawuling Nature Reserve, pers. comm. 29 June 2003).
- Due to major logging activity in the late 1950s, no primary forest remains in the reserve, but about half (16 km²) of the reserve is currently covered in secondary broadleaf forest, regenerated since the 1960s (Anon., 1997). The reserve's major objective is to protect the rare animal and plant species, such as tree ferns, *Cephalotaxus mannii*, *Apterosperma oblata*, Asiatic Golden Cat *Catopuma temmincki* and Chinese Pangolin *Manis pentadactyla* (State Forestry Administration Wildlife Conservation Office, 2003).

Results

Vegetation

- The zonal vegetation of Dawuling Nature Reserve should be south subtropical evergreen broadleaf forest. All primary forest cover, however, had been cleared (Anon., 1997, 6).
- The area is now covered mainly in highly fragmented young hillside secondary forest and plantations of *Cryptomeria fortunei*, *Pinus massoniana*, *Cunninghamia lanceolata* and *Phyllostachys heterocyclus* cv. *Pubescens*.
- The present survey covered the following areas and vegetation types:
 - At parts of Datian Ding, hillside secondary evergreen forest, with trees about 6-8 m tall and less than 30cm dbh, dominated by *Lithocarpus* sp. (cf. *L. elaeagnifolius*), *Castanopsis fabri*, *Machilus wangiana* and *Elaeocarpus japonicus*.
 - Hillside secondary evergreen forest dominated by *Castanopsis fabri*, *Castanopsis carlesii*, *Lithocarpus corneus*, *Neolitsea chunii*, *Machilus wangiana*, *M. thunbergii*, *M. pauhoi*, *Helicia longipetiolata*, *Elaeocarpus duclouxii* and *Alniphyllum fortunei* could be found at high altitudes at a few locations. Trees were about 6-15 m tall and up to 60 cm dbh.
 - Secondary ravine forest, with trees up to 6-10 m tall, dominated by *Macaranga adenantha*, *Machilus wangchiana*, *Neolitsea chunii*, *Helicia longipetiolata*, *Ficus esquiroliana*, and *F. langkokensis* could be found in some ravines.
 - Shrubland less than 1.5m tall dominated by *Dicranopteris splendida*, *Adinandra hainanensis*, *Rhodomyrtus tomentosa*, *Gahnia tristis* and *Ficus variolosa* could be found on mountain ridges and disturbed areas.
 - Montane tall shrubland about 1.5-2 m tall dominated by *Hartia tonkinensis*, *Enkianthus serrulatus*, *Rhododendron simiarum* and *R. moulmainsense* could be found at high altitudes.
 - Freshwater marsh formed from abandoned farmlands at high altitude was visited. It was dominated by short grass and herbs, including *Chrysopogon aciculatus*, *Juncus prismatocarpus*, *Kyllinga brevifolia*, *Sphaerocaryum malaccense*, *Plantago major* and *Commelina diffusa*.

Flora

- The present surveys recorded 360 vascular plant species, including 54 fern species in 26 families, four gymnosperm species in three families, and 302 angiosperm species in 96 families (Table 1). This is a relatively high figure given the reserve's high coverage of plantations and the fragmented nature of the natural forest. This reflects Dawuling's floral characteristics of high endemism apart from the diverse habitat types in the fragmented landscape.
- Among the flora recorded, there are several species of conservation importance:
 - *Cephalotaxus mannii* is considered globally Vulnerable and endangered in China (Anon., 1996-2001, Vol. 4). A single tree 15 m tall and 1.0 m dbh was found in the present survey.
 - *Alsophila spinulosa*, *Gymnosphaera gigantea*, *Gymnosphaera hancockii*, *G. metteniana*, and *G. podophylla* belong to the tree fern family of which all species are under National Class II Protection in China. They were relatively common at a few locations.
 - *Cibotium barometz* is under Class II National Protection in China. Although it is under threat of collection for medicinal purpose, it is both common and widespread in South China. It was found to be common at one location in the present survey.
 - *Toona ciliata* var. *pubescens* is under Class II National Protection in China. It is widespread in South China. It was found to be rare at one of the visited locations in the present survey.
 - *Fordiophyton cordifolium* is endemic to Guangdong. It was locally common along two locations.
 - *Tigridiopalma magnifica* is endemic to southern and western Guangdong. It was locally common at one of the visited locations.
 - *Camellia gauchowensis* is endemic to western Guangdong. At Dawuling it was locally common in human disturbed habitats such as at the margin of young secondary forest and plantation of *Illicium verum*.
 - *Eurya polyneura* is endemic to western Guangdong. It was locally common at one location and was also found at two other locations.
 - *Ardisia perreticulata* is restricted to Guangdong and Guangxi. It had a scattered distribution in Dawuling with only a few plants seen.
 - *Calamus macrorrhynchus* is restricted to Guangdong and Guangxi. It was locally common at one location.
- *Cyclosorus grosso-dentatus* and *Pseudocyclosorus guangxianensis* are both new records to Guangdong. The former was found around Datian Ding at high altitude. The latter was found at two other locations. Since both species were only recently described (Anon., 1996-2001, 331-2 of Vol. 4(1)), it is likely that they had been overlooked in the past and their regional distributions are not yet known.

Table 1. Vascular plants of Dawuling Nature Reserve recorded in June/July 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	Remarks
PTERIDOPHYTA		
Aspleniaceae	<i>Asplenium normale</i> D. Don	
	<i>Asplenium prolongatum</i> Hook.	
	<i>Asplenium wrightii</i> Eaton ex Hook.	
Athyriaceae	<i>Allantodia metteniana</i> (Miq.) Ching	
	<i>Athyriopsis japonica</i> (Thunb.) Ching	
	<i>Callipteris esculenta</i> (Retz.) J.Sm.	
Blechnaceae	<i>Blechnum orientale</i> L.	
	<i>Woodwardia japonica</i> (L.f.) Sm.	
Bolbitidaceae	<i>Egenolfia appendiculata</i> (Willd.) J.Sm.	
Cyatheaceae	<i>Alsophila spinulosa</i> (Wall. ex Hook.) R.M.Tryon	Protected II
	<i>Gymnosphaera gigantea</i> (Wall. ex Hook.) Ching	Protected II
	<i>Gymnosphaera hancockii</i> (Copel.) Ching	Protected II
	<i>Gymnosphaera metteniana</i> (Hance) Tagawa	Protected II
	<i>Gymnosphaera podophylla</i> (Hook.) Copel.	Protected II
Dennstaedtiaceae	<i>Dennstaedtia scabra</i> (Wall.) Moore var. <i>glabrescens</i>	

Family	Scientific name	Remarks
	(Ching) C. Chr.	
Dicksoniaceae	<i>Cibotium barometz</i> (L.) J. Sm.	Protected II
Drynariaceae	<i>Pseudodrynaria coronans</i> (Wall. ex Mett.) Ching	
Dryopteridaceae	<i>Arachniodes sphaerosora</i> (Ching) Ching <i>Cyrtomium balansae</i> (H. Christ) C. Chr.	
Gleicheniaceae	<i>Dicranopteris linearis</i> (Burm. f.) Underw. <i>Dicranopteris pedata</i> (Houtt.) Nakaike (<i>D. linearis</i> var. <i>dichotoma</i> Holtt.) <i>Dicranopteris splendida</i> (Hand.-Mazz.) Ching <i>Diplopterygium chinensis</i> (Rosenst.) DeVol <i>Diplopterygium glaucum</i> (Thunb. ex Houtt.) Nakai	
Hemionitidaceae	<i>Coniogramme japonica</i> (Thunb.) Diels	
Huperziaceae	<i>Huperzia serrata</i> (Thunb.) Trevis.	
Hymenophyllaceae	<i>Crepidomanes latealatum</i> (Bosch) Copel. <i>Mecodium badium</i> (Hook. & Grev.) Ching	
Lindsaeaceae	<i>Stenoloma chusanum</i> (L.) Ching	
Lycopodiaceae	<i>Diphasiastrum complanatum</i> (L.) Holub <i>Lycopodiastrum casuarinoides</i> (Spring) Holub <i>Lycopodium clavatum</i> L.	
Lygodiaceae	<i>Lygodium scandens</i> (L.) Sw.	
Marattiaceae	<i>Angiopteris fokiensis</i> Hieron.	
Monachosporaceae	<i>Monachosorum henryi</i> H. Christ	
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>Colysis elliptica</i> (Thunb.) Ching <i>Colysis elliptica</i> (Thunb.) Ching var. <i>pothifolia</i> Ching <i>Colysis hemionitidea</i> (Wall. ex Mett.) C. Presl <i>Lepidogrammits rostrata</i> (Bedd.) Ching <i>Microsorium buergerianum</i> (Miq.) Ching <i>Microsorium insigne</i> (Blume) Copel.	
Pteridaceae	<i>Histiopteris incisa</i> (Thunb.) J. Sm.	
Sinopteridaceae	<i>Cheilosoria tenuifolia</i> (Burm.f.) Trevis.	
Thelypteridaceae	<i>Cyclosorus grosso-dentatus</i> Ching ex Shing <i>Dictyocline wilfordii</i> (Hook.) J. Sm. <i>Macrothelypteris torresiana</i> (Gaudich.) Ching <i>Pronephrium lakhimpurensense</i> (Rosenst.) Holttum <i>Pseudocyclosorus guangxianensis</i> Ching ex Y.X. Ling	new record to Guangdong new record to Guangdong
Vittariaceae	<i>Pseudophegopteris pyrhorachis</i> (Kunze) Ching <i>Vittaria flexuosa</i> Fée	
GYMNOSPERMAE		
Cephalotaxaceae	<i>Cephalotaxus mannii</i> Hook. f.	Vulnerable, endangered in China
Pinaceae	<i>Pinus massoniana</i> Lamb.	
Taxodiaceae	<i>Cryptomeria japonica</i> (L.f.) D. Don <i>Cunninghamia lanceolata</i> (Lamb.) Hook.	planted
ANGIOSPERMAE		
Dicotyledonae		
Acanthaceae	<i>Strobilanthes divaricatus</i> (Nees) T. Anderson	
Aceraceae	<i>Acer davidii</i> Franch. <i>Acer tutcheri</i> Duthie	
Actinidiaceae	<i>Actinidia fulvicoma</i> Hance var. <i>lanata</i> (Hemsl.) C.F. Liang <i>Actinidia latifolia</i> (Gardner & Champ.) Merr. <i>Saurauia tristyla</i> DC.	
Alismataceae	<i>Sagittaria trifolia</i> L.	
Anacardiaceae	<i>Rhus hypoleuca</i> Champ. ex Benth. <i>Toxicodendron succedaneum</i> (L.) Kuntze.	
Annonaceae	<i>Artabotrys hongkongensis</i> Hance	
Apiaceae	<i>Centella asiatica</i> (L.) Urb. <i>Cryptotaenia japonica</i> Hassk.	

Family	Scientific name	Remarks
Aquifoliaceae	<i>Ilex ficoidea</i> Hemsl. <i>Ilex rotunda</i> Thunb. <i>Ilex tsoii</i> Merr. & Chun	
Araliaceae	<i>Dendropanax dentigerus</i> (Harms ex Diels) Merr. <i>Eleutherococcus trifoliatus</i> (L.) S.Y. Hu <i>Schefflera delavayi</i> (Franch.) Harms <i>Schefflera heptaphylla</i> (L.) Frodin	
Asclepiadaceae	<i>Graphistemma pictum</i> (Champ. ex Benth.) Benth. et Hook. f. ex Maxim.	
Asteraceae	<i>Aster ageratoides</i> Turcz. <i>Elephantopus tomentosus</i> L. <i>Inula cappa</i> (Buch.-Ham. ex D. Don) DC. <i>Ligularia japonica</i> (Thunb.) Less. <i>Senecio scandens</i> Buch.-Ham.	
Balsaminaceae	<i>Impatiens chinensis</i> L.	
Begoniaceae	<i>Begonia circumlobata</i> Hance <i>Begonia crassirostris</i> Irmsch. <i>Begonia palmata</i> D. Don	
Boraginaceae	<i>Ehretia longiflora</i> Champ. ex Benth.	
Caesalpiniaceae	<i>Bauhinia glauca</i> (Wall. ex Benth.) Benth. <i>Caesalpinia crista</i> L. <i>Caesalpinia vernalis</i> Champ. ex Benth.	
Campanulaceae	<i>Campanumoea javanica</i> Blume <i>Pratia nummularia</i> (Lam.) A. Br. et Aschers.	
Caprifoliaceae	<i>Sambucus chinensis</i> Lindl. <i>Viburnum fordiae</i> Hance <i>Viburnum odoratissimum</i> Ker Gawl.	
Caryophyllaceae	<i>Drymaria cordata</i> (L.) Willd. ex Roem. & Schult.	
Celastraceae	<i>Celastrus monospermus</i> Roxb.	
Chloranthaceae	<i>Sarcandra glabra</i> (Thunb.) Nakai	
Clusiaceae	<i>Garcinia multiflora</i> Champ. ex Benth. <i>Hypericum japonicum</i> Thunb. ex Murray	
Cornaceae	<i>Dendrobenthamia hongkongensis</i> (Hemsl.) Hutch.	
Ebenaceae	<i>Diospyros kaki</i> Thunb. <i>Diospyros morrisiana</i> Hance ex. Walpers	planted
Elaeocarpaceae	<i>Elaeocarpus decipiens</i> Hemsl. <i>Elaeocarpus duclouxii</i> Gagnep. <i>Elaeocarpus japonicus</i> Siebold & Zucc. <i>Elaeocarpus petiolatus</i> (Jack) Wall. ex Kurz <i>Elaeocarpus sylvestris</i> (Lour.) Poir.	
Ericaceae	<i>Enkianthus serrulatus</i> (E.H. Wilson) C.K. Schneid. <i>Rhododendron championiae</i> Hook. f. <i>Rhododendron moultainense</i> Hook. f. <i>Rhododendron simiarum</i> Hance <i>Rhododendron simsii</i> Planch.	
Erythroxylaceae	<i>Erythroxylum sinense</i> Y. C. Wu	
Escalloniaceae	<i>Itea chinensis</i> Hook. & Arn <i>Itea coriacea</i> Y.C. Wu	
Euphorbiaceae	<i>Bischofia javanica</i> Blume <i>Breynia fruticosa</i> (L.) Hook. f. <i>Glochidion eriocarpum</i> Champ. ex Benth. <i>Glochidion triandrum</i> (Blanco) C.B. Rob <i>Glochidion wrightii</i> Benth. <i>Macaranga adenantha</i> Gagnep. <i>Mallotus apelta</i> (Lour.) Müll. Arg. <i>Mallotus paniculatus</i> (Lam.) Müll. Arg. <i>Ricinus communis</i> L. <i>Sapium discolor</i> (Champ. ex Benth.) Müll.-Arg.	
Fagaceae	<i>Castanopsis carlesii</i> (Hemsl.) Hayata <i>Castanopsis fabri</i> Hance <i>Castanopsis fordii</i> Hance <i>Castanopsis hystrix</i> Miq. <i>Castanopsis lamontii</i> Hance <i>Cyclobalanopsis fleuryi</i> (Hickel & A. Camus) Chun ex Q. F. Zheng <i>Lithocarpus</i> sp. (cf. <i>L. elaeagnifolius</i> (Seem.) Chun)	

Family	Scientific name	Remarks
Gesneriaceae	<i>Lithocarpus comeus</i> (Lour.) Rehder	
	<i>Lysionotus pauciflorus</i> Maxim.	
	<i>Rhynchotechum formosanum</i> Hatus.	
Hamamelidaceae	<i>Liquidambar formosana</i> Hance	
	<i>Rhodoleia championii</i> Hook. f.	
Hydrangeaceae	<i>Dichroa febrifuga</i> Lour.	
	<i>Hydrangea kwangsiensis</i> Hu	
	<i>Pileostegia viburnoides</i> Hook. f. & Thomson	
	<i>Schizophragma integrifolium</i> Oliv.	
Ilaciniaceae	<i>Mappianthes iodoides</i> Hand.-Mazz.	
Illiciaceae	<i>Illicium verum</i> Hook. f.	mainly cultivated
Juglandiaceae	<i>Engelhardtia fenzelii</i> Merr.	
Lamiaceae	<i>Clinopodium chinense</i> (Benth.) Kuntze	
	<i>Gomphostemma chinense</i> Oliv.	
Lauraceae	<i>Paraphlomis javanica</i> (Blume) Prain	
	<i>Beilschmiedia wangii</i> C.K. Allen	
	<i>Cinnamomum austrosinense</i> H.T. Chang	
	<i>Cinnamomum cassia</i> (L.) Presl	planted
	<i>Cinnamomum porrectum</i> (Roxb.) Kosterm.	
	<i>Cryptocarya chinensis</i> (Hance) Hemsl.	
	<i>Lindera communis</i> Hemsl.	
	<i>Litsea cubeba</i> (Lour.) Pers.	
	<i>Litsea elongata</i> (Nees) Benth. & Hook. f.	
	<i>Litsea greenmaniana</i> C.K. Allen	
	<i>Litsea rotundifolia</i> Hemsl. var. <i>oblongifolia</i> (Nees) C. K. Allen	
	<i>Litsea verticillata</i> Hance	
	<i>Machilus decursinervis</i> Chun	
	<i>Machilus pauhoi</i> Kanehira	
	<i>Machilus robusta</i> W.W. Sm	
	<i>Machilus thunbergii</i> Siebold & Zucc.	
	<i>Machilus wangchiana</i> Chun	
<i>Neolitsea chunii</i> Merr.		
<i>Neolitsea levinei</i> Merr.		
Loganiaceae	<i>Gelsemium elegans</i> (Gardner & Champ.) Benth.	
Loranthaceae	<i>Taxillus chinensis</i> (DC.) Danser	
Lythraceae	<i>Rotala rotundifolia</i> (Buch.-Ham. ex Roxb.) Koehne	
Magnoliaceae	<i>Manglietia chingii</i> Dandy	
	<i>Michelia foveolata</i> Merr. ex Dandy	
	<i>Michelia maudiae</i> Dunn	
Melastomataceae	<i>Bredia sessilifolia</i> H.L. Li	
	<i>Fordiophyton cordifolium</i> C.Y. Wu ex C. Chen	restricted to Guangdong
	<i>Melastoma dodecandrum</i> Lour.	
	<i>Melastoma normale</i> D. Don	
	<i>Melastoma sanguineum</i> Sims	
	<i>Phyllagathis fordii</i> (Hance) C. Chen	
	<i>Tigridiopalma magnifica</i> C. Chen	restricted to W. & S. Guangdong
Meliaceae	<i>Aphanamixis grandifolia</i> Blume	
	<i>Toona ciliata</i> M. Roem. var. <i>pubescens</i> (Franch.) Hand.-Mazz.	Protected II
Mimosaceae	<i>Pithecellobium clypearia</i> (Jack) Benth.	
	<i>Pithecellobium lucidium</i> Benth.	
	<i>Pithecellobium utili</i> Chun & F.C. How	
Moraceae	<i>Cudrania cochinchinensis</i> (Lour.) Kudo et Masam.	
	<i>Ficus auriculata</i> Lour.	
	<i>Ficus erecta</i> Thunb.	
	<i>Ficus esquiroliana</i> H. Lévl.	
	<i>Ficus fistulosa</i> Reinw. ex Blume	
	<i>Ficus formosana</i> Maxim.	
	<i>Ficus hirta</i> Vahl	
	<i>Ficus langkokensis</i> Drake	
	<i>Ficus pandurata</i> Hance	
	<i>Ficus sarmentosa</i> Buch.-Ham. ex Sm. var. <i>henryi</i> (King ex	

Family	Scientific name	Remarks
	Oliv.) Corner	
Myricaceae	<i>Ficus variolosa</i> Lindl. ex Benth.	
Myrsinaceae	<i>Myrica rubra</i> (Lour.) Sieb. & Zucc.	
	<i>Ardisia amherstiana</i> A. DC.	
	<i>Ardisia perreticulata</i> C. Chen	restricted to Guangdong & Guangxi
	<i>Ardisia primulifolia</i> Gardner & Champ.	
	<i>Embelia vestita</i> Roxb.	
	<i>Maesa japonica</i> (Thunb.) Moritzi & Zoll.	
	<i>Mysine seguinii</i> H. Lév	
Myrtaceae	<i>Baeckea frutescens</i> L.	
	<i>Rhodomyrtus tomentosa</i> (Aiton) Hassk.	
	<i>Syzygium buxifolium</i> Hook. & Arn.	
Oleaceae	<i>Schoepfia chinensis</i> Gardner & Champ.	
Oleaceae	<i>Jasminum lanceolarium</i> Roxb.	
	<i>Ligustrum amamianum</i> Koidz.	
Onagraceae	<i>Ludwigia adscendens</i> (L.) H. Hara	
Oxalidaceae	<i>Oxalis corniculata</i> L.	
Papilionaceae	<i>Dalbergia hancei</i> Benth.	
	<i>Dalbergia millettii</i> Benth.	
	<i>Millettia speciosa</i> Champ. ex Benth.	
	<i>Mucuna birdwoodiana</i> Tutch.	
Pentaphragaceae	<i>Pentaphragax euryoides</i> Gardner & Champ.	
Piperaceae	<i>Piper hongkongense</i> C. DC.	
Pittosporaceae	<i>Pittosporum glabratum</i> Lindl.	
	<i>Pittosporum glabratum</i> Lindl. var. <i>neriifolium</i> Rehder & E.H. Wilson	
Plantaginaceae	<i>Plantago major</i> L.	introduced
Polygalaceae	<i>Polygala fallax</i> Hemsl.	
Polygonaceae	<i>Reynoutria japonica</i> Houtt.	
	<i>Rumex dentatus</i> L.	
Primulaceae	<i>Lysimachia nanpingensis</i> F.H. Chen & C.M. Hu	
Proteaceae	<i>Helicia longipetiolata</i> Merr. & Chun	
Rhamnaceae	<i>Hovenia acerba</i> Lindl.	
	<i>Rhamnus brachypoda</i> C. Y. Wu ex Y. L. Chen	
	<i>Rhamnus crenata</i> Siebold & Zucc.	
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>Rubus leucanthus</i> Hance	
	<i>Rubus malifolius</i> Focke	
	<i>Rubus parvifolius</i> L.	
	<i>Rubus reflexus</i> Ker	
	<i>Rubus reflexus</i> Ker var. <i>lanceolobus</i> F.P. Metcalf	
	<i>Rubus rosifolius</i> Sm.	
Rubiaceae	<i>Antirhea chinensis</i> (Champ. ex Benth.) F.B. Forbes & Hemsl.	
	<i>Coptosapelta diffusa</i> (Champ. ex Benth.) Steenis	
	<i>Gardenia jasminoides</i> J. Ellis	
	<i>Hedyotis hedyotideae</i> (DC.) Merr.	
	<i>Lasianthus fordii</i> Hance	
	<i>Lasianthus japonicus</i> Miq.	
	<i>Mussaenda pubescens</i> W. T. Aiton	
	<i>Paederia scandens</i> (Lour.) Merr.	
	<i>Psychotria asiatica</i> L.	
	<i>Uncaria rhynchophylla</i> (Miq.) Miq. ex Havil.	
Rutaceae	<i>Boenninghausenia albiflora</i> (Hook.) Rchb. ex Meisn.	
	<i>Evodia austrosinensis</i> Hand.-Mazz.	
	<i>Evodia leptae</i> (Spreng.) Merr.	
	<i>Skimmia reevesiana</i> (Fortune) Fortune	
	<i>Toddalia asiatica</i> (L.) Lam.	
	<i>Zanthoxylum avicennae</i> (Lam.) DC.	
	<i>Zanthoxylum nitidum</i> (Roxb.) DC.	

Family	Scientific name	Remarks
	<i>Zanthoxylum scandens</i> Blume	
Sabiaceae	<i>Meliosma squamulata</i> Hance	
	<i>Sabia limoniacea</i> Wall. ex Hook. f. & Thomson	
Santalaceae	<i>Dendrotrophe frutescens</i> (Champ. ex Benth.) Danser	
Sapotaceae	<i>Sarcosperma laurinum</i> (Benth.) Hook. f.	
Saururaceae	<i>Houttuynia cordata</i> Thunb.	
Schisandraceae	<i>Kadsura longipedunculata</i> Finet & Gagnep.	
Scrophulariaceae	<i>Bacopa monnieri</i> (L.) Pennell	
	<i>Lindernia crustacea</i> (L.) F. -Muell.	
	<i>Torenia concolor</i> Lindl.	
Solanaceae	<i>Solanum virginianum</i> L.	introduced
Staphyleaceae	<i>Turpinia cochinchinensis</i> (Lour.) Merr.	
	<i>Turpinia glaberrima</i> Merr.	
	<i>Turpinia montana</i> (Blume) Kurz	
Sterculiaceae	<i>Reevesia thyrsoides</i> Lindl.	
Styracaceae	<i>Alniphyllum fortunei</i> (Hemsl.) Makino	
	<i>Huodendron biaristatum</i> (W.W. Sm.) Rehder	
Symplocaceae	<i>Symplocos adenopus</i> Hance	
	<i>Symplocos cochinchinensis</i> (Lour.) S. Moore subsp.	
	<i>laurina</i> (Retz.) Noot.	
	<i>Symplocos lancifolia</i> Siebold & Zucc.	
	<i>Symplocos lucida</i> (Thunb.) Siebold & Zucc.	
	<i>Symplocos pseudobarberina</i> Gontsch.	
	<i>Symplocos sumuntia</i> Buch.-Ham. ex D. Don	
	<i>Symplocos wikstroemiifolia</i> Hayata	
Theaceae	<i>Adinandra bockiana</i> E. Pritz var. <i>acutifolia</i> (Hand.-Mazz.) Kobuski	
	<i>Adinandra glischroloma</i> Hand.-Mazz.	
	<i>Adinandra hainanensis</i> Hayata	
	<i>Camellia assimilis</i> Champ. ex Benth.	
	<i>Camellia gauchowensis</i> H.T. Chang	restricted to W. Guangdong
	<i>Cleyera japonica</i> Thunb.	
	<i>Cleyera pachyphylla</i> Chun ex H.T. Chang	
	<i>Eurya chinensis</i> R. Br.	
	<i>Eurya distichophylla</i> Hemsl.	
	<i>Eurya groffii</i> Merr.	
	<i>Eurya macartneyi</i> Champ.	
	<i>Eurya nitida</i> Korthals	
	<i>Eurya patenti-pila</i> Chun	
	<i>Eurya polyneura</i>	restricted to W. Guangdong
	<i>Eurya stenophylla</i> Merr.	
	<i>Hartia tonkinensis</i> Merr.	
	<i>Hartia villosa</i> (Merr.) Merr.	
	<i>Schima superba</i> Gardn. et Champ.	
	<i>Ternstroemia kwangtungensis</i> Merr.	
	<i>Ternstroemia luteoflora</i> L.K. Ling	
	<i>Tutcheria championii</i> Nakai	
Thymelaeaceae	<i>Daphne papyracea</i> Wall. ex Steud.	
Urticaceae	<i>Boehmeria nivea</i> (L.) Gaudich.	
	<i>Gonostegia hirta</i> (Hassk.) Miq.	
Verbenaceae	<i>Callicarpa brevipes</i> (Benth.) Hance	
	<i>Callicarpa loboapiculata</i> F.P. Metcalf	
	<i>Callicarpa longipes</i> Dunn	
	<i>Clerodendrum fortunatum</i> L.	
Viscaceae	<i>Korthalsella japonica</i> (Thunb.) Engl.	
Vitaceae	<i>Tetrastigma planicaule</i> (Hook. f.) Gagnep.	
Monocotyledonae		
Amaryllidaceae	<i>Curculigo capitulata</i> (Lour.) Kuntze	
Araceae	<i>Acorus tatarinowii</i> Schott	
	<i>Arisaema erubescens</i> (Wall.) Schott	
	<i>Colocasia esculenta</i> (L.) Schott	
	<i>Pothos chinensis</i> (Raf.) Merr.	
Areaceae	<i>Calamus macrorrhynchus</i> Burret	restricted to S. &

Family	Scientific name	Remarks
		W. Guangdong and Guangxi
Commelinaceae	<i>Caryota ochlandra</i> Hance <i>Trachycarpus fortunei</i> (Hook.) H. Wendl. <i>Amischotolype hispida</i> (Less. & A. Rich.) D.Y. Hong <i>Commelina diffusa</i> Burm. f. <i>Dictyospermum scaberrimum</i> (Blume) J.K. Morton <i>Floscopa scandens</i> Lour. <i>Murdannia nudiflora</i> (L.) Brenan <i>Rhopalephora scaberrima</i> (Blume) Faden	
Cyperaceae	<i>Carex harlandii</i> Boott <i>Carex perakensis</i> C.B. Clarke <i>Carex scaposa</i> C.B. Clarke <i>Carex tristachya</i> Thunb. <i>Eleocharis congesta</i> D. Don <i>Fimbristylis bisumbellata</i> (Forssk.) Bubani <i>Gahnia tristis</i> Nees <i>Kyllinga brevifolia</i> Rottb. <i>Lipocarpha microcephala</i> (R. Br.) Kunth <i>Pycneus flavidus</i> (Retz.) T. Koyama <i>Scirpus ternatanus</i> Reinw. ex Miq.	
Eriocaulaceae	<i>Eriocaulon nantoense</i> Hayata	
Juncaceae	<i>Juncus effusus</i> L. <i>Juncus prismatocarpus</i> R. Br.	
Liliaceae	<i>Campylandra wattii</i> C.B. Clarke <i>Dianella ensifolia</i> (L.) DC. <i>Hemerocallis citrina</i> Baroni <i>Ophiopogon chingii</i> F.T. Wang & Ts. Tang <i>Ophiopogon intermedius</i> D. Don <i>Ophiopogon</i> sp. (SCNG 3832) <i>Smilax china</i> L.	
Musaceae	<i>Musa balbisiana</i> Colla <i>Musa x paradisiaca</i>	planted
Pandanaceae	<i>Pandanus austrosinensis</i> T. L. Wu	
Poaceae	<i>Centotheca lappacea</i> <i>Chrysopogon aciculatus</i> (Retz.) Trin. <i>Lophatherum gracile</i> Brongn. <i>Miscanthus sinensis</i> Andersson <i>Phyllostachys heterocycla</i> (Carr.) Mitford cv. <i>Pubescens</i> <i>Sacciolepis indica</i> (L.) Chase <i>Sphaerocaryum malaccense</i> (Trin.) Pilg. <i>Thysanolaena maxima</i> (Roxb.) Kuntze	mainly cultivated
Pontederiaceae	<i>Monochoria vaginalis</i> (Burm. f.) C. Presl	
Zingiberaceae	<i>Alpinia hainanensis</i> K. Schum. <i>Alpinia japonica</i> (Thunb.) Miq. <i>Alpinia pumila</i> Hook. f.	

Mammals

- A rat of the genus *Niviventer* was disturbed from leaf litter by a small stream on 1 July.
- During the present survey no other mammal species or their signs were seen. The failure to see mammals widespread and common in other forests of Guangdong, such as squirrels, may partly due to the adverse weather conditions. Despite careful search around Datian Reservoir, where Asiatic Golden Cat tracks were seen in 1997 (Fellowes & Hau, 1997), no such tracks were detected in the second survey.
- In April 1997 reserve staff were interviewed regarding the mammal fauna of Dawuling (Fellowes & Hau, 1997). Of the reported mammals the Yellow-throated Marten *Martes flavigula*, Large Indian Civet *Viverra zibetha*, Asiatic Golden Cat *Catopuma temminckii*, Southern Serow *Naemorhedus sumatraensis* and Chinese Pangolin *Manis pentadactyla* are of conservation concern. Some of the species previously recorded from Xinyi area, such as the South China Tiger *Panthera tigris amoyensis* (Zhang Y. *et al.*, 1997 and references therein) may have occurred at Dawuling, but are unlikely to survive in the fragmented and

small forest; nonetheless more specific and up-to-date information of the area's mammalian fauna is required.

Birds

- Thirty-three bird species were recorded at Dawuling (Table 2). Both abundance and richness were rather low during the present survey.
- The most frequently encountered species included Chestnut Bulbul *Hemixos castanonotus*, Hill Prinia *Prinia atrogularis* and Lesser Shortwing *Brachypteryx leucophrys*.

Table 2. Birds recorded at Dawuling Nature Reserve, 29 June - 3 July 2002. Sequence follows Clements (2000).

Scientific name	English name
<i>Spilornis cheela</i>	Crested Serpent Eagle
<i>Accipiter virgatus</i>	Besra
<i>Cuculus poliocephalus</i>	Lesser Cuckoo
<i>Centropus sinensis</i>	Greater Coucal
<i>Megalaima virens</i>	Great Barbet
<i>Blythipicus pyrrhotis</i>	Bay Woodpecker
<i>Pycnonotus jocosus</i>	Crested Bulbul
<i>Pycnonotus xanthorrhous</i>	Brown-breasted Bulbul
<i>Hemixos castanonotus</i>	Chestnut Bulbul
<i>Chloropsis hardwickii</i>	Orange-bellied Leafbird
<i>Saxicola ferrea</i>	Grey Bushchat
<i>Brachypteryx leucophrys</i>	Lesser Shortwing
<i>Pomatorhinus erythrocnemis</i>	Spot-breasted Scimitar Babbler
<i>Pomatorhinus ruficollis</i>	Rufous-necked Scimitar Babbler
<i>Pnoepyga pusilla</i>	Pygmy Wren Babbler
<i>Garrulax pectoralis</i>	Greater-necklaced Laughingthrush
<i>Garrulax canorus</i>	Hwamei
<i>Leiothrix lutea</i>	Red-billed Leiothrix
<i>Alcippe morrisonia</i>	Grey-cheeked Fulvetta
<i>Prinia atrogularis</i>	Hill Prinia
<i>Orthotomus cuculatus</i>	Mountain Tailorbird
<i>Phylloscopus reguloides</i>	Blyth's Leaf Warbler
<i>Cettia fortipes</i>	Brownish-flanked Bush Warbler
<i>Bradypterus seebohmi</i>	Russet Bush Warbler
<i>Cyornis hainanus</i>	Hainan Blue Flycatcher
<i>Niltava macgrigoriae</i>	Small Niltava
<i>Parus major</i>	Great Tit
<i>Zosterops japonicus</i>	Japanese White-eye
<i>Dicaeum ignipectus</i>	Fire-breasted Flowerpecker
<i>Aethopyga christinae</i>	Fork-tailed Sunbird
<i>Urocissa erythrorhyncha</i>	Red-billed Blue Magpie
<i>Dendrocitta formosae</i>	Grey Treepie
<i>Corvus macrorhynchos</i>	Large-billed Crow

- A visit in April 1997 by the same ornithologist recorded 44 bird species; species not found in the present survey included Eurasian Hobby *Falco subbuteo* (Class II National Protected in China), Green-billed Malkoha *Phaenicophaeus tristis*, Red-billed Leiothrix *Leiothrix lutea*, Pygmy Wren-babbler *Pnoepyga pusilla*, and Eurasian Jay *Garrulus glandarius* (Fellowes & Hau, 1997).
- Crested Serpent Eagle *Spilornis cheela* and Greater Coucal *Centropus sinensis* are Class II National Protected in China.
- The presence of forest-dependent birds (including the barbet, woodpecker, bulbuls and babblers) indicates some intact forest habitat remains in the vicinity.

Reptiles and Amphibians

- Twenty species of amphibian (two newts and 18 anurans) and 11 species of reptile (five lizards and six snakes) were recorded at Dawuling during the survey (Table 3).
- The *Paramesotriton* newt, the *Hemiphyllodactylus* gecko and the *Opisthotropis* snake could not be positively identified and they are now being studied. The *Hyla* frog is provisionally assigned to *H. simplex*.
- The most frequently encountered species were *Tylototriton asperrimus*, *Occidozyga martensii* and *Philautus gracilipes*.
- In addition to these, the following species were found in the earlier survey (Fellowes & Hau, 1997): *Megophrys* sp., *Amolops* sp. (misidentified as *A. torrentis*), *Microhyla pulchra*, *Platyplacopus intermedius*, *Ahaetulla prasina*, *Amphiesma stolatum* and *Sinonatrix aequifasciata*.

Table 3. Amphibians and reptiles recorded at Dawuling Nature Reserve from 29 June to 3 July 2002. Sequence follows Zhao E.-M. & Adler (1993).

Scientific name	Habitat	Records
AMPHIBIA		
<i>Paramesotriton</i> sp.	stream	✓
	seep	✓
<i>Tylototriton asperrimus</i>	seep	✓ larvae
	stream	✓
	pool	✓
	stream side pool	larvae
<i>Leptolalax pelodytoides</i>	stream	tadpoles
<i>Bufo andrewsi</i>	plantation	✓
	forest	✓
	montane grassland	✓
<i>Bufo melanostictus</i>	plantation edge	✓
	shrubland	✓
<i>Hyla simplex</i> ?	grassland	✓
<i>Amolops ricketti</i>	stream	✓, tadpoles
	village	✓
<i>Occidozyga martensii</i>	marsh	✓, tadpoles
<i>Paa exilispinosa</i>	stream	tadpoles
	seep	✓
	ditch	✓
<i>Paa spinosa</i>	stream	✓
<i>Rana guentheri</i>	pool	✓
<i>Rana latouchii</i>	seep	tadpoles
	pool	✓
	stream	tadpoles
<i>Rana limnocharis</i>	marsh	tadpoles
	pool	✓
<i>Rana livida</i>	plantation	✓
	stream	✓
	forest	✓
	ditch	✓
<i>Rana versabilis</i>	plantation	✓
<i>Philautus gracilipes</i>	pool	✓ eggs, tadpoles
	ditch	✓, eggs
	stream side pool	eggs, tadpoles
	seep	✓, eggs
<i>Polypedates megacephalus</i>	marsh	tadpoles
	pool	tadpoles
<i>Microhyla butleri</i>	Pool	✓
<i>Microhyla heymonsi</i>	marsh	✓, tadpoles
	seep	✓, tadpoles
	pool	tadpoles
<i>Microhyla ornata</i>	pool	✓
	plantation	✓

Scientific name	Habitat	Records
REPTILIA		
<i>Hemiphyllodactylus</i> sp.	building	✓
<i>Acanthosaura lepidogaster</i>	forest	eggs
<i>Calotes versicolor</i>	village	✓
<i>Sphenomorphus indicus</i>	forest edge	✓
<i>Tropidophorus sinicus</i>	forest	✓
<i>Cyclophiops major</i>	plantation	✓
<i>Opisthotropis guangxiensis</i>	ditch	✓
	stream	✓
<i>Opisthotropis</i> sp.	stream	✓
<i>Rhabdophis subminiatus</i>	shrubland	✓
<i>Sibynophis chinensis</i>	plantation	✓
<i>Protobothrops</i>	village	✓
<i>mucrosquamatus</i>	forest	✓

- In addition a road-killed juvenile of *Ptyas korros* (Indochinese Rat Snake) was found on the road between Dacheng Town and the reserve on 29 June.
- A number of species recorded are of particular conservation interest:
 - The unidentified *Paramesotriton* sp. and *Opisthotropis* sp. are probably undescribed species and have never been reported from other sites.
 - The records of *Philautus gracilipes*, *Opisthotropis guangxiensis* and *Hemiphyllodactylus* sp. are new for Guangdong. *Opisthotropis guangxiensis* is known from one other site: Dayaoshan in Guangxi. *Philautus gracilipes* is restricted to a small number of sites in Yunnan and Guangxi (Zhao & Adler, 1993; Fellowes & Hau, 1997).
 - The salamander *Tylototriton asperrimus* is Class II National Protected in China.
- Of other species reported previously:
 - *Amolops* sp. is probably new to science and is also known from Baiyong Nature Reserve in Yangchun County, also in the Yunwushan range (Kadoorie Farm and Botanic Garden, 2002a).
- The presence of a number of stream specialists and several forest species indicates that Dawuling still had rather good forests left.

Fish

- Only five freshwater fish species were recorded from Dawuling Nature Reserve (Table 4); the adverse weather conditions made fish sampling during the survey period extremely difficult, which may be a major factor behind the unsatisfactory result.
- The most frequently encountered species were *Liniparhomaloptera obturostris* and *Vanmanenia xinyiensis*; both are described from specimens collected in Xinyi area and are highly restricted globally.
- All specimens of *Acrossocheilus* collected were fry and juveniles, and these specimens are provisionally assigned to *A. parallens*.

Table 4. Freshwater fish recorded at Dawuling Nature Reserve, 29 June to 3 July 2002. Sequence of families follows Nelson (1994).

Scientific name	29 June	30 June	2 July
<i>Acrossocheilus parallens?</i>	✓		
<i>Carassius auratus</i>	✓		
<i>Oreonectes platycephalus</i>	✓		✓
<i>Liniparhomaloptera obturostris</i>	✓	✓	✓
<i>Vanmanenia xinyiensis</i>	✓	✓	✓

- The wild goldfish *Carassius auratus* seen were all juveniles, found in a rocky stream. Local guide reported small-scale aquaculture has been attempted in the nearby farmland and this apparently breeding population may be descendant of the escapees.
- There are many freshwater habitats in the nature reserve, with streams of all sizes draining the valleys. However, fish diversity and abundance were quite low during the survey,

probably due to the torrential rain which made sampling difficult. Nonetheless the two balitorids *Liniparhomaloptera obturirostris* and *Vanmanenia xinyiensis* have highly restricted global ranges and are rarely seen elsewhere; both require good water quality.

Dragonflies

- Only 11 species were recorded in Dawuling during the five-day survey (Table 5). No dragonflies were recorded at Hengjiang Keng on 2 July 2002, probably due to the poor weather conditions.
- The most frequently encountered species was *Pantala flavescens*.

Table 5. Dragonflies recorded at Dawuling Nature Reserve from 29 June to 3 July 2002. Sequence of families follows Schorr *et al.* (2001a, 2001b).

Scientific name	Habitat
<i>Caliphaea consimilis</i>	stream
<i>Ceriagrion auranticum</i>	paddy field
<i>Coeliccia cyanomelas</i>	stream
	seep
<i>Crocothemis servilia</i>	marsh
<i>Neurothemis fulvia</i>	marsh
<i>Orthetrum glaucum</i>	stream side pool
	seep
<i>Orthetrum luzonicum</i>	marsh
<i>Orthetrum triangularae</i>	paddy field
<i>Palpopleura sexmaculata</i>	marsh
	paddy field/ditch
<i>Pantala flavescens</i>	paddy field
	plantation/field
<i>Trithemis aurora</i>	stream

- None of the species recorded are of particular conservation concern.

Butterflies

- Thirty-five species were recorded in Dawuling during the five-day survey (Table 6).

Table 6. Butterflies recorded at Dawuling from 29 June to 3 July 2002. Sequence of families follows Bascombe (1995).

Scientific name	Habitat
<i>Parnara ganga</i>	grassland
<i>Atrophaneura aidonea</i>	riparian forest
<i>Graphium sarpedon</i>	riparian forest
<i>Papilio bianor</i>	shrubland
	riparian forest
<i>Papilio helenus</i>	plantation/field
<i>Papilio memnon</i>	forest
<i>Papilio paris</i>	plantation/field
<i>Papilio protenor</i>	plantation/field
<i>Catopsilia pomona</i>	plantation/field
<i>Cepora nerissa</i>	shrubland
	plantation/field
<i>Eurema hecabe</i>	plantation/field
<i>Leptosia nina</i>	plantation
<i>Abisara echerius</i>	plantation
<i>Heliophorus phoenicoparyphus</i>	shrubland
<i>Jamides bochus</i>	riparian forest
<i>Nacaduba kurava</i>	riparian forest
<i>Zemeros flegyas</i>	plantation
<i>Zizeeria karsandra</i>	abandoned field

Scientific name	Habitat
<i>Childrena childreni</i>	plantation
<i>Cyrestis thyodamus</i>	forest
<i>Danaus genutia</i>	plantation/field
<i>Hypolimnna bolina</i>	plantation/field
<i>Lethe confusa</i>	forest
<i>Lethe europa</i>	plantation/shrub
<i>Mandarinia regalis</i>	bamboo
<i>Melanitis leda</i>	riparian forest
	forest
	paddy field
<i>Mycalesis perseus</i>	abandoned field
<i>Neptis soma</i>	forest edge
<i>Parantica sita</i>	forest
<i>Polygonia (Kaniska) canace</i>	plantation/shrub
<i>Precis (Junonia) almana</i>	plantation/field
<i>Stibochiona nicea</i>	riparian forest
<i>Symbrenthia lilaea</i>	riparian forest
<i>Ypthima baldus</i>	forest
<i>Ypthima lisandra</i>	plantation/shrub

- An additional 22 species were recorded by Fellowes & Hau (1997): *Acraea issoria*, *Argyreus hyperbius*, *Artogeia canidia*, *A. rapae*, *Celastrina argiolus*, *Dodona durga*, *Euploea core*, *E. midamus*, *Eurema blanda*, *Euthalia niepelti*, *Lethe confusa*, *Lethe verma*, *Limenitis sulphitia*, *Neptis clinia*, *N. hylas*, *N. miah*, *Notocrypta curvifascia*, *Pantoporia hordonia*, *Papilio polyctor*, *P. polytes*, *Polyura nepenthes*, *Talbotia naganum* and *Zizeeria maha*. A total of 57 butterfly species are now known from Dawuling.
- Of the species recorded, some (e.g. *Mandarinia regalis* and *Stibochiona nicea*) are typical of forest habitat.

Ants

- Ants were not surveyed in the current trip, but surveys in South China permit re-evaluation of species collected in 1997 (Fellowes & Hau, 1997). Thirty-two species were recorded. Two species, *Camponotus* (cf. *anningensis*) sp. 37 and *Proceratium* sp. 1, are known only from Dawuling.
- Excluding these (possibly new) species, 47% of species found are forest-dependent, a figure typical of secondary forest of quite high integrity.

Summary of flora and fauna

- The present survey covered only the northern and central parts of Dawuling Nature Reserve. The primary forest cover, of south subtropical evergreen broadleaf forest, had long been cleared and the surveyed areas were found mainly to be highly fragmented young secondary forest and plantations of timber species, especially *Cryptomeria fortunei*. Older broadleaf forest blocks around 40 years old were found in more inaccessible ravines,. According to local staff, there is more mature forest in a certain area, which the present survey team failed to reach due to time constraints.
- Despite the degraded nature of the vegetation and the unfavourable weather during the present survey, the survey revealed a fairly rich flora at Dawuling with 360 vascular plant species recorded in five days.
- One globally Vulnerable species (*Cephalotaxus mannii*) and five Class II nationally Protected fern species were found in the present survey.
- Among the flora recorded there were six globally restricted species and two new records for Guangdong. This is a comparatively high figure for such rapid surveys in Guangdong, and consolidates the impression (Kadoorie Farm and Botanic Garden, 2002a, b & c) that the Yunwushan range in southwest Guangdong retains a high level of endemism with a distinctive flora of high conservation importance, despite its degraded vegetation.

- The large-bodied forest fauna of Dawuling appears to be impoverished following forest degradation; only a single forest rat was seen in a total of nine days of surveys (present and the 1997 surveys) and the bird fauna also seems to be rather poor (33 species in the present survey plus an additional 20 in the 1997 survey). Two of the birds recorded in the present survey are nationally Protected. Tracks of Asiatic Golden Cat, seen in 1997, were not seen in 2002.
- The herpetofauna, however, is very diverse and quite distinctive: 20 amphibians and 11 reptiles were recorded including undescribed (e.g. a *Paramesotriton* newt) and globally restricted (e.g. *Opisthotropis Guangxiensis*) species.
- The recorded fish fauna was also poor with only five species, most likely due to the heavy rains which made sampling difficult. Nonetheless the two balitorids found are globally highly restricted and require good water quality; Dawuling appears to support a globally significant population of both species.
- Eleven dragonfly and 35 butterfly species were recorded. None of the species recorded are of particular conservation concern. Some of the forest butterfly species and the ant fauna were indicative of moderate ecological integrity.
- Due to the bad weather, the biota of Dawuling was probably under-recorded during the present survey.
- The streams draining Dawuling Nature Reserve support many highly restricted stream-dependent species, including a number of species of conservation concern (e.g. the *Paramesotriton* newt and torrent loach *Vanmanenia xinyiensis*).
- MacKinnon *et al.* (1996) did not evaluate the biodiversity value of Dawuling Nature Reserve, due to its late entry into the national protected-area system; Fellowes & Hau (1997) considered it of regional importance. Although degradation is rather severe with little mature forest remaining, the site was found to support a high number of restricted species and some species of conservation concern. Dawuling is a representative forest site in the generally degraded Yunwushan range with a high level of endemism, and it is here again considered of high regional conservation importance. Evidence of its conservation importance may further increase after more thorough surveys and when the identities of the undetermined species are resolved.

Threats and problems

- Almost all of the original forest has been cleared at Dawuling, 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.
- Tourism was evidently being promoted at Dawuling through the usual attractions such as karaoke, and ambitious plans to develop ecotourism were included in a feasibility study report (Anon., 1997). In 2002 there was no evidence that either nature conservation or environmental education were being promoted.
- Large-scale quarrying was severely degrading the beautiful rice-terrace landscape and the stream habitat from Dacheng Town up to the entrance of the nature reserve. It is a highly incongruous activity in the tranquil atmosphere of the area and may affect the viability of the reserve's intention to promote ecotourism.
- The release of confiscated wildlife by forestry departments has been undertaken in Dawuling Nature Reserve. During an interview in 1997 it was reported that 20 individuals of loris *Nycticebus* sp., a group of primates non-native to Guangdong, were released in the reserve. Officials responsible for placement of confiscated wildlife, which are often misidentified, should be cautious because the release of confiscated animals can lead to the introduction of disease to wild populations, conflicts with surviving wild populations, genetic contamination with non-native subspecies, and even local extinctions through competition and predation by non-native species. There is also a high chance of mortality for such released animals if the habitat is not suitable; for example in 1997 the skeleton of a

monitor lizard (*Varanus* sp.) was seen a few metres from the release site (Fellowes & Hau, 1997).

Opportunities

- Despite the degraded nature of the vegetation, the Dawuling region apparently has a rather rich and distinctive biota and more survey effort will likely reveal results with implications for conservation.
- If the regenerating forests at Dawuling are carefully protected from fire, logging, hunting, grazing and other unsuitable activities, there is potential for natural forest and its biota to mature and expand in future decades.
- Logging of the extensive plantations of *Cryptomeria fortunei* and other timber species in the reserve is no longer permitted. Since such monotypic habitat has low ecological value, the conservation value of Dawuling 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 Dawuling region in the cleared area can facilitate this process.
- A lot of the hillsides are also covered with degraded young forest and shrubland, and here forest regeneration could be accelerated by planting native trees. Priority might be given to linking up more mature forest patches to establish contiguous forests spanning the altitudinal range of the reserve. 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.
- IUCN guidelines on reintroduction and the control of alien invasive species give valuable guidance which should be followed as far as possible when placement of confiscated animals is considered.
- Dawuling has high peaks, cool summer temperatures, a picturesque high-altitude 'lake' (Datian Reservoir), magnificent views and a good road system within the reserve. This provides good potential to develop ecotourism and other passive recreational activities, and a good opportunity for promoting environmental awareness among the general public. The management authorities are keen to explore opportunities in ecotourism but the resources for such activities are apparently limited. Guidelines for various aspects of ecotourism development are available, e.g. Ceballos-Lascuráin (1996) and China National Committee of the Man-and-the-Biosphere (1998).
- On the other hand, given the distinctiveness of the flora and fauna of the region, Dawuling is of comparatively high conservation value in Guangdong and hence should give priority to nature conservation.

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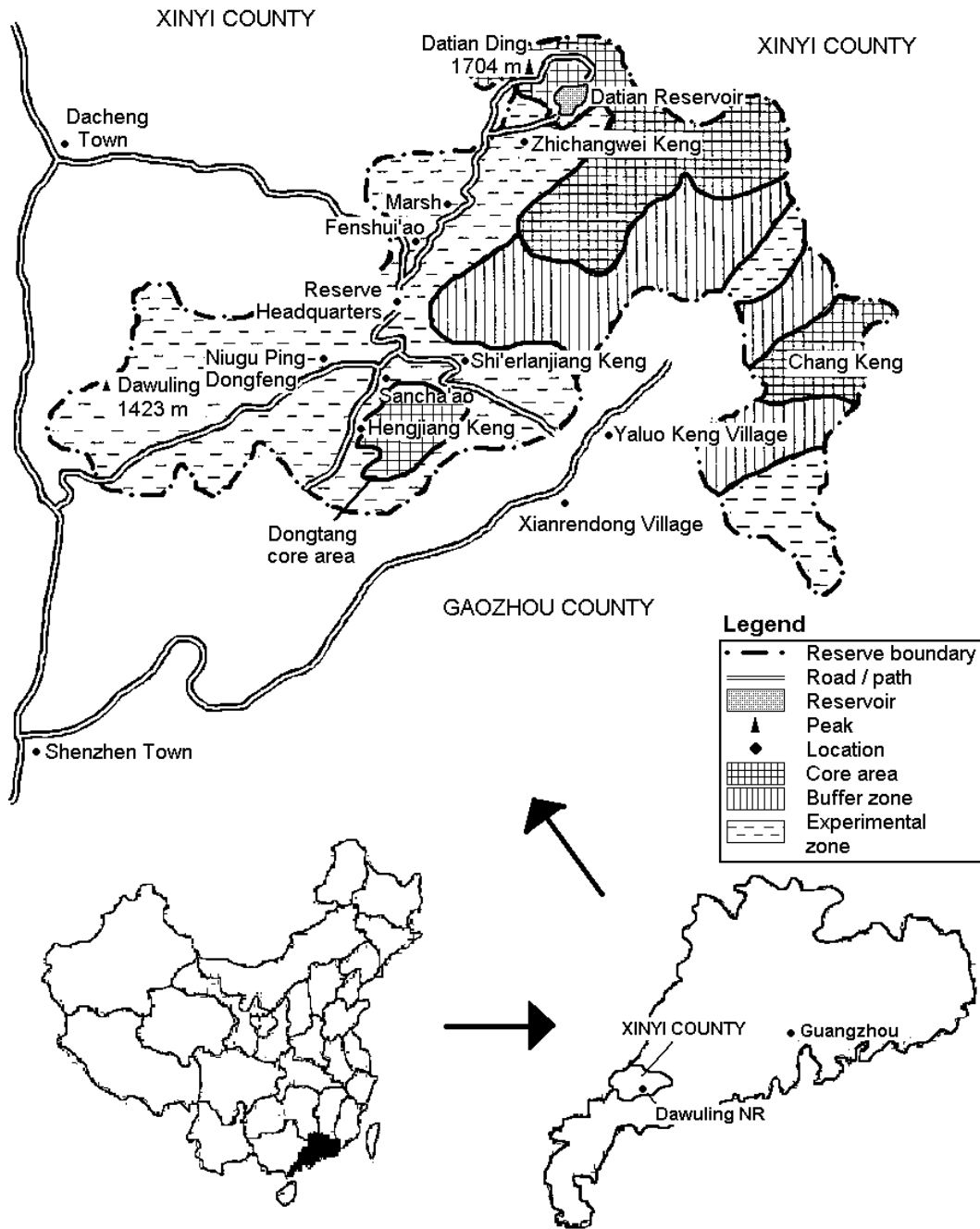


Figure 1. Map showing location of Dawuling Nature Reserve, Southwest Guangdong, China