林業特刊第十二號

亞洲濕地與水鳥保育國際會議與考察報告

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亞洲濕地與水鳥保育
國際會議與考察報告

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報告書名稱	亞洲濕地與水鳥保育國際會議與考察報告				
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服務機關名稱	臺大動物系	師大生物系	興大植物系	輔仁生物系	
年齡	四十五	四十	四十三	四十五	
職級	教授	教授	教授	副教授	
出國類別	參加會議及考察				
出國期間	自七十六年二月十九日至三月七日（公費十天，自費七天）				
到達國家及地點	馬來西亞（吉隆坡、馬六甲）、新加坡				
報告時間	七十六年三月				
所需公費數額					
內容提要	一、參加亞洲濕地與水鳥保育會議 二、新加坡水庫濕地考察 三、馬來西亞濕地考察 (1)剛帕河岸之白千層沼澤森林 (2)林吉河口之紅樹林 (3)色龍果河岸之紅樹林 (4)色伯泰水稻田農業區與熱帶沼澤森林 四、其他地區考察 (1)可拿色龍果山區自然景觀區 (2)法斯德高山森林景觀區 (3)馬來西亞國家公園				
本機關審核意見					
本院研考會處理意見					
備註					

摘　要

一、由 IWRB、Interwader 與馬來西亞野生動物和國家公園部主辦之亞洲濕地與水鳥保育會議於 1987 年 2 月 22 － 28 日在馬來半島馬六甲召開，與會國家計有 22 個代表 103 人。我國代表在行政院農業委員會部份補助下，計有 4 位代表參加。

二、我國代表團此次已將關渡、竹圍、挖子尾、夢幻湖、蘭陽溪口、大肚溪口、東石、小鬼湖、鴛鴦湖、南仁湖、龍鑾潭、五股及蘆洲等十二處濕地之資料加以編纂，併入即將由 IUCN 出版之亞洲濕地調查報告內，以供國際間對我國濕地現況之瞭解。

三、我國代表團於大會中亦報告前列十二個濕地之生態資源，並介紹農委會、營建署等單位多年來列入保護之濕地情況。國際有關單位對我國濕地之努力，已有所認識。

四、在濕地之經營管理討論會中，我國代表提出關渡自然公園之規劃報告，各國代表甚表讚許，並期望我國能破除萬難，早日完成。

五、大會結論，濕地爲各國重要之生態體系，爲沿海岸漁業生產之母，各國均應加强濕地之研究與保育，並加强國際間資訊之交流與合作。

六、鑑於濕地保育之重要，建議政府加强濕地清查與保育工作，並編印有關濕地保育之各種摺頁與刊物等。

前　言

亞洲濕地與水鳥保育會議（Conference on Wetland and Waterfowl Conservation）於1987年2月23－28日，在馬來西亞馬六甲召開。此次會議由國際水鳥研究中心（IWRB, the International Waterfowl Research Bureau）與國際涉禽組織（Interwader）兩個單位共同舉辦，並由馬來半島野生動物與國家公園部（The Department of Wildlife and National Parks, Peninsular Malaysia）協辦，計有來自22個國家的103位代表參加。在行政院農委會自然文化景觀審議暨技術小組之鼓勵，及農委會之補助下，我國計有四位代表參加。代表名單分別是林曜松（台大動物系，兼領隊）、呂光洋（師大生物系）、陳明義（興大植物系）、陳擎霞（輔大生物系）。大陸亦派三名代表參加此次大會。

此次會議之主要目的爲：

1. 討論亞洲濕地調查（Asian Wetland Inventory, AWI）計劃之進展。
2. 報導與交換東南亞水鳥之資訊。
3. 報告IWRB與Interwader之活動。
4. 討論濕地與水鳥保育之國際間或區域間之合作。
5. 研討濕地經營之原則與執行。
6. 推動東南亞濕地保育資訊與經驗之交流。

國際濕地與水鳥保育組織

一、IWRB

IWRB（International Waterfowl Research Bureau 國際水禽研究中心之相關活動亦爲本次大會之一討論項目。IWRB爲一國際性之非官方機構，最先宗旨是在推動並結合不同國家間有關遷移性水鳥之研究工作。但水鳥之研究工作終將涉及水鳥棲息之濕地，故IWRB最近正考慮改名爲"International Wetland Waterfowal Research Bureau"，以更符合實際。由於歐洲地區最需要協調工作，因此IWRB最早之活動是在歐州，但現已拓展至全球各地區。迄今，IWRB已發展出14個研究群（Research Groups），各有召集人分別推展各種重要水鳥與濕地之研究。

IWRB之經費來自會員國之經費、機構之樂捐，WWF 研究計劃之補助，以及其他契約性之工作。IWRB在1986年之預算爲150,000英磅，其中約66%是由會員國所提供。目前IWRB已有38個會員國，惟參與IWRB之亞洲國家尚少，IWRB特別呼請更多的亞洲國家參加，成爲會員國。

IWRB多年來一直爲濕地工作而努力。1960年代曾多次召開歐洲濕地與水鳥會議。歐洲濕地報告也不斷地修訂，中南美洲與加勒比海地區之濕地調查報告亦已出版。並在阿根廷設立區域性機構，以加强及改善該地區已列入之濕地的調查與保育工作。

由於IWRB與ICBP、IUCN及WWF之携手緊密合作之下，本次大會因而得以舉行。並將各國際單位及亞洲國家聚集一堂，共同討論，IWRB期望在此次大會後能在亞洲地區設立分支機構，也許可能

會與 Interwader 合作共同設立。

IWRB之未來工作將特別加强開發中國家濕地經營者之訓練工作，1986 年已曾在非洲突尼西亞舉辦過一系列的訓練。本次大會後，IWRB 與Interwader 亦舉辦訓練班，主要內容爲測量、製圖、植物調查、水鳥鑑定、水鳥計數、侯鳥繫放等基本課程。我國代表對這些基本課程已有所深刻認識，因而未參加。而改由主辦單位邀請參加會議後之考察團。

二國際涉禽組織（ Interwader ）

此次大會特別介紹國際涉禽之運作情形。國際涉禽創辦於 1983年，旨在調查與認定東亞太平洋地區與遷移性及棲息性水鳥有關之濕地，並對全地區之政府或非政府機構提供有關之技術上的協助。迄今，國際涉禽已在 6 個國家完成40項野外調查計劃，未來將更廣泛參與全亞洲地區之濕地活動，其中包括調查、測量、資料庫之建立；以及教育、訓練與保育等工作之推展，期能對亞洲地區濕地之保育與經營作更大的參與及貢獻。

會議內容

一亞洲濕地調查（Asian Wetland Inventory, AWI）計劃

鑑於亞洲濕地資源與水禽保育之重要性，1985年11月由國際WWF補助，並由IWRB、IUCN與ICBP支持一項為期兩年之亞洲濕地調查（AWI）計劃。此項計劃由英國Dr. Derek Scott担任國際召集人，負責協調亞洲地區24個國家與地區之濕地資源調查工作，各個國家各推出國家召集人負責當地之調查與協調事宜。

Dr. Scott於1986年4月親自前來台灣與我國之專家學者共商我國之濕地資源調查事宜，並親自拜訪農委會與營建署等單位，亦曾赴關渡與大肚溪口參觀對我國之濕地環境、水禽數量、保育狀況與調量人力等作一初步瞭解，並對我國濕地保育工作推動深具信心。經Dr. Scott邀請我國有關學者專家共商，建議組織中華民國濕地調查小組，成員計有林曜松、呂光洋、陳明義與陳肇霞四位，並推林曜松兼任召集人，負責協調台灣地區濕地資訊之收集與國家濕地報告之撰寫。在農委會、營建署及觀光局之協助下，我等於1987年2月完成台灣濕地調查報告附錄二，並於此次大會中提出報告。在亞洲地區中，我國之報告算是較完整的一份，而為國際召集人Dr. Scott所接受，並請尼泊爾代表以我國之報告範本。全亞洲之濕地調查報告擬於1987年年底編纂完畢，並於1988年初出版。此報告將是亞洲地區濕地及其保育最新資訊，亦為亞洲濕地保育經營之重要參考資料。

二濕地評估與水鳥研究

亞洲各國家濕地調查與水鳥研究情形亦是本次大會討論的主題之一。所提出之濕地報告大部份是近年來在國際涉禽技術協助下，各亞

洲國家保育與研究機構在調查海岸濕地之進展情形。所討論之濕地研究，包括水鳥與棲息地之空中與船上之調查，紅樹林植群研究與相關動物評估。

至於水鳥研究，主要是由東亞六個國家在這方面提出工作報告，並就水鳥之禁獵與經營策略作廣汎討論。會中日本代表特別提出擬在北海道設立天鵝博物館（ Swan Museum ）之構想，俾能爲亞洲生物學者提供一個研究水鳥之場所，該項計劃深爲參與代表所激賞。

由於亞洲水鳥及與其棲息濕地面臨莫大威脅，加以研究經費又短缺，因此大會特別强調未來宜將研究與應用相互配合，希望能藉著完整的科學性資料，支持經營與保育策略之推動。

三亞洲地區之濕地經營

亞洲地區濕地資源已被過度破壞，未來將面臨更大的威脅。亞洲之紅樹林有數百萬公頃，惜已大量被砍伐與破壞；以馬來西亞爲例，大面積的紅樹林已被砍伐除改爲魚塭。事實上，比起天然漁蝦產量之損失，魚塭之生產量確實得不償失。蝦類算是馬來西亞之一項主要出口品，幼蝦期必得依賴紅樹林才能生存，而90％之近海岸漁產之主要食物亦來自紅樹林。

紅樹林與漁產間之關係迄未有確切之資料加以認定，這方面之研究極待加强。紅樹林是複雜的生態系，在非洲與南美洲正在進行多項紅樹林生態系之研究計劃。所得資料或許對亞洲國家有所參考價值。由於缺乏國際間的連繫與交流，因而許多現存資料未能結合起來而加以應用，因此濕地資料之國際交流期望透過多種管道來推動。

有關台灣地區關渡自然公園之規劃與經營（ 附錄三 ），我國代表亦在大會中提出報告，包括自然環境、水鳥狀況、規劃構想與未來遠景等。此項計劃除日本外，在亞洲地區算是一項創舉，深受與會國家之讚賞。此自然公園之實現將受國際間所讚佩。

馬來西亞濕地參觀

一、Gapam河岸之Ayer Panas 白千層沼澤森林

白千層（Melalenca cajeputi ）零星分佈於馬來半島海岸地區，其中有數塊白千層林已被指定爲濕地保護區。Ayer Panas白千層沼澤森林卽是其中之一。

Ayer Panas白千層林位於馬六甲南方五公里處，生長於Gapam河岸之排水不良之生育地。白千層可適應此類積水窪地，且生長良好，形成高達50公尺之純林。此樹種耐火，火燒後地被植物雖被燒毀，白千層樹木却無損。再加上白千層能自然大量播種，而形成純林。

由此可見，白千層雖非優良之餌鳥植物，唯可在積水低地發育良好，未來關渡自然公園外圍之綠帶植物，可設計將此類植種列入考慮。

二、Linggi 河口之紅樹林

Linggi 河位於馬六甲北方六十公里，爲馬六甲州之北界。Linggi河出海口兩岸紅樹林密佈，爲馬來半島之代表性紅樹林群落。植群有Rhizophora、Acanthus、Clerodendrum、Excoecaria、Thespesia、Scaevola、Ipomoea、Zoysia、Acrostichum、Xylocarpus、Bruguiera、Sonneratia、Avicennia、Lumnizera等屬。林木間不時穿插些水椰（Nypa froticus ）。

紅樹林生態區孕育了豐富的動物相，沼地招潮蟹與彈塗魚甚多，水鳥亦衆。紅樹林樹梢上偶見銀葉猴（Silvered leaf monkey ）跳躍其間。

紅樹林非但提供了魚蝦螃蟹之食物與庇護所，亦提供鄰近漁村（

（俗稱Kampong ）漁民生計所需，在河中隨時可以看到漁民捕魚。除外，亦有部份漁民在天然水道中，利用箱網從事於鱒及經濟魚類的養殖。

他們在河口從事漁撈收穫良多外，漁民並可割水椰之大葉片出售，以作爲屋頂之覆蓋物，同時水椰之種仁幼嫩時可食用如椰仁。

在Linggi River紅樹林中，遊船最易看到的鳥類爲綠簑鷺、白頭海鷹、白胸翠鳥及翠鳥等，其他種類則因遊船迅速，鳥種鑑定不易。

Linggi 河口之紅樹林雖局部被砍伐過。但皆保留母樹以利天然下種更新，俾可維持保續生產之狀態，同時馬來西亞政府當局禁止砍伐緊臨河岸之紅樹林，以防止河水冲刷及淤砂之現象。

三、Selangor 河岸之紅樹林

Tanjong Karang河口之軟濕地，算是紅樹林，該地有廣大的泥質灘地，很多涉禽到此來過冬，當天在灘地上短暫停留中，看到的鳥類計有綠簑鷺、青足鷸、金斑鴴、大杓鷸、翠鳥、翻石鷸、東方鴴，以及無法鑑定的鷗及燕鷗等。

在泥質灘地上隨時可以看到漢民撿拾血蚶等，彈塗魚與水鳥之天堂。紅樹林雖因兩岸築堤而被部份破壞，但林帶仍維持50到100 公尺之寬度。目前雖有鄰近漁民砍伐小桿材，但因房屋建築業不景氣，支柱用之小桿材之銷路受限，因而砍伐之情況不算嚴重。同時紅樹天然下種容易，小面積砍伐後之天然更新不成問題。

Selangor 河出海口之紅樹林分佈尤廣，但林地已部份被改爲住屋用地及可可椰子栽培等用途。河岸之漁村（ Kampong ）算是馬來西亞特色之一。

四、Sebinchan 水稻田農業區與熱帶沼澤森林

在西海岸Sebinchan一帶，大面積的沼澤林（ Swamp forest）被砍除，改爲水田，每年種植兩期稻作。當地水鳥良多，由於此時期正值馬來西亞農民種植水稻之季節，不少水稻田就吸引不少水鳥來覓食，從車上看到的鳥類計有不同種的鷗及燕鷗、鷹斑鷸、磯鷸、燕鴴、白胸翠鳥、黑頭翠鳥、翠鳥、栗小鷺、老鷹等，數量都不算少。

其或與下列因素有關：

1. 稻作經營粗放，農藥用量少，灌溉水質肥沃。因而該濕地生態系之昆蟲、魚蝦、蜊蚪等爲鳥類豐富之食物來源，是以能支持大量的水鳥。
2. 大片稻田濕地中，有馬來農舍散置其間，農舍旁之小森林正可爲部份鳥類提供棲佇之需。同時馬來人甚爲愛護鳥類，行進其間從未曾見有網鳥或獵鳥者。

在Sobinchon之熱帶沼澤林有部份被完全保留未被破壞，林木茂密林下滿被蕨類等植物，行進其間除步道外，可謂寸步難行是不可多得之熱帶原始沼澤林，此區已列爲保護區，供學者專家研究。

建議事項

一、鑑於大會結論肯定紅樹林與沼澤地對沿漁業生產之重要性，建議政府對於台灣地區未指定之紅樹林、沼澤地，應儘速依法指定保護，並在沿海岸適當地先增植紅樹或草澤區。

二、鑑於濕地保育之重要，建議國內加強濕地調查與保育工作。

三、建議政府編印有關濕地保育之各種摺頁、書籍與刊物等。

四、IWRB為國際間重要之濕地與水鳥保育組織，已有三十八個國家參與。目前正在亞洲地區召募新會員，而IWRB對我國甚為友好。為加強我國濕地之保育與國際間之資訊與實質交流，建議政府或政府資助民間團體參加IWRB組織，以加速我國濕地保育工作之推動及提我國保育工作之國際形象。

五、建議政府透過各種管道以與亞洲國家或其他地區合作有關濕地生態之保育工作。

六、建議政府積極推動關渡自然公園之興建，以成為我國第一個濕地與自然保育之教育中心。

其他地區考察心得

一、Kuala Selangor Hill 自然景觀區

Kuala Selangor Hill 自然景觀區爲一遊樂區，面積不大，僅一公頃左右在一小山頂上，高約200公尺。區內合歡、鳳凰及紫檀樹甚多，株株百年以上，林木高聳，加上人工刻意栽植的觀賞樹叢、綠意盎然。林中紅色瓦屋點綴其間，使此區非但具有觀賞遊樂的價值，並具有要塞及燈塔的效果。從山頂上可望見 Selangor 河口紅樹林和臨近海岸沼澤森林，形成一大片樹海，是一視覺甚佳之地點。

此自然景觀區內最大特色是百年合歡樹上棲息有一群約30餘隻銀葉猴 silvered leaf monkey (Presbytis cristata) 。猴群跳躍其間並不畏人，甚至能從遊客手上取食。此種人與動物自然相處之景象，頗令人羨慕。

二、Fraser Hill 高山森林景觀區

Fraser Hill 爲馬來西亞中部高山森林景覽區，約一千三百公尺高，是馬來西亞之避暑勝地。

此地主要栽植些柏科及南洋杉科之植種，以保留部份馬來西亞高山原始森林。區內作整體規劃，除建築些高級別墅及旅舍外，並建有小型動物園，種類雖少，但品質甚高。園內林木茂密，遠望過去還以爲是植物園。此種動物與質物混爲一體之觀點地馬來西亞甚爲普遍，園中有水池、拱橋、小島、竹林等各項人爲設施四週都以草坪綠化，效果甚佳值得吾人借鏡，此地區經常有外國遊客到此處觀賞鳥類。

三、Kuala Tembeling 地區之國家公園

Kuala Tembeling 之國家公園爲馬來西亞唯一之國家公園，佔

地約4300 平方公里。爲全世界少有之熱帶雨林區，設立之目的旨在保護區內之生物及景觀資源。此公園之特色是完全利用水路與外界連絡，船行3小時讓遊客沿途欣賞高大之原始熱帶雨林。行進支流回航之小船，故意不用馬達完全靠水流及槳來控制航行，使遊客能完全領受到原始森林的特色，鳥叫、蟲鳴、水聲，及重重垂掛之纏藤。一個國家公園能設計如此，非但得天獨厚，也是其能善加利用其資源的緣故，園中植被動物之繁富更是不可勝舉，區內至少有200種以上之鳥類，140餘種哺乳動物，公園內非常强調野生動物之觀賞活動，如賞鳥步道、賞鳥小屋、夜間觀察大型哺乳類動物之樹屋等，同時公園內自然環境維持良好，除國民重視自然資源外，重罰亦有關，例如在國家公園內折一花木，即罰款約台幣8千元或判刑六個月，此處亦值借鏡。

致　　謝

承行政院農委會資助，我國代表才得以參加此次會議與考察，特此致謝。又承營建署、林業試驗所、觀光局等有關機構與學者專家提供珍貴資料，台灣濕地報告才得以完成，謹此致謝。

IWRB及AWI之邀請以及 Interwader 與馬來西亞野生動物與國家公園部之安排接待，在此也一併致謝。報告之編印承台大動物生態研究室吳海音、蘇逸峯、呂佩義、謝寶森、李玲玲等之協助，謹致謝意。

附錄一　會議議程

CONFERENCE ON
WETLAND AND WATERFOWL CONSERVATION IN ASIA
(INVENTORY AND MANAGEMENT)
MALACCA, FEBRUARY 22 – 28, 1987

PROGRAME OF ACTIVITIES

22 Feb 1987 Sunday　Arrival

23 Feb 1987 Monday　Round table, general acquaintance
Introductions and Opening

Duncan Parish
International Coordinator
Interwader East Asia/Pacific
Shorebird Study Programme

Professor G V T Matthews
Director International Waterfowl
Research Bureau

Encik Mohd b Momin Khan
Director General
Dept Wildlife and National Parks, Peninsulr Malaysia

Opening by the Honourable YB Datuk Amar Stephen K T Yong, PNBS Minister of Science, Technology and the Environment, Malaysia

Reception and lunch

Derek Scott: Asian Wetland Inventory

National overviews by represnetatives

Pakistan	Abdul Latif Rao
Nepal	Rajendra Lal Shrestha
India	S A Hussain
Sri Lanka	S W Kotagama
Bangladsh	Abdul Wahab Akonda
Thailand	Jira Jintanugool

Malaysia	Mohd Khan
Singapore	
Indonesia	Marcel Silvius
Philippines	
Mainland China	Meng Xianlin
Hong Kong	David S Melville
Rep. of China	Kuang-Yang Lue（吕光洋）
Japan	Koichiro Sonobe
Rep. of Korea	Pyong-Oh Won

Information about Bhutan, Burma, Laos, Cambodia, Vietnam, Brunei, Papua New Guinea, Mongolia and DPR of Korea by International Coordinator and participants.

TUESDAY

INTERWADER – An Overview.
Duncan Parish.

Wetland Surveys and Evaluation

Wetland Surveys of South East Sumatra Marcel Silvius, INTERWADER.

Evalution of Coastal Wetland in Brunei Bay
Mohd Jaya bin Jaji Sahat, Brunei Museum.

Mangroves in the Apar Delta, East Kalimantan
Sukristijono Sukardjo.

Importance of Intertidal Wetlands in Sarawak for Conservation of Migratory Shorebirds.
John Howes, INTERWADER.

Survey of Coastal Wetlands in Luzon
Simplicia Alonzo – Pasicolan, FORI, Philippines.

Evalution of Mangroves Along the West Coast of Peninsular Malaysia
Shamsudin Ibrahim.

The Wetland and Waterfowl Wealth of Pakistan
Ashiq Ahmad.

Wetland Development and Land Use Planning

Wetland Development in Indonesia
Marcel Silvius, INTERWADER.

International Cooperative Management of Brunei Bay
Julian Caldecott.

Waterbird Studies in Asia

Aspects of the Demography and Reproduction of the Night Heron
Louis Ratnam.

Large Waterbirds in Thailand
Bubphar Amget.

Evalution of Shorebird Hunting in the Villages Around Pattani Bay, Pattani, Thailand
Nukul Rattanadakol.

The Breeding Birds of Chenglushan Island, China
Cheng Zhao Qing.

Herons and Kota Belud Bird Sanctuary, Sabah
Richard Lansdown.

The Use of Pattani Bay by Migratory Shorebirds
Surapol Ardseurgnern.

Waders in Bangladesh
S.M.A. Rashid.

Swan Museum
Shigeru Matsui.

Wintering Waterfowl in Deep Bay, Hong Kong
David Melville.

25 Feb 1987 Wednesday IWRB
Presentation of activities Research groups
Midwinter counts Asia
General overview: Joost Van der Ven
Short presentation by national coordinators
Abdul Latif Rao, S A Hussain, David S Melville and others.

Excursion to Malacca and surroundings

26 Feb 1987 Thursday

Protection of Wetlands

Global Developments under the Ramsar Convention
D. Navid.

Management of Wetlands

Wetlands of India: Economic and Scientific Importance
C. K. Varshney.

Management Considerations for Bird Sanctuaries
P. Gole.

Guidelines for the Protection and Management of Mangrove and Estuarine Wetland in Indonesia
Sukristijono Sukardjo.

27 Feb 1987 Friday

Protection and Management of Wetlands

EDWIN – Project
Marcel Marchand.

Bonn Convention – Introduction
W. Verheugt.

Migratory Bird – Agreements
Tim Richmond.

Conservation of Wetlands in Indonesia
Syafii Manan.

The Development of GUANDU Nature Park in Rep. of China
Yao-Sung Lin.（林曜松）

Wetlands in India, an overview
S. A. Hussain.

28 Feb 1987 Saturday

Summary Asian Wetland Inventory
Derek Scott

Summary Waterbird Studies
Duncan Parish

General Conclusions and Closing –
G V T Matthews

TABLED REPORTS

A Preliminary List of Important Wetlands of Nepal
Rajendra Lal Shrestha
H. S. Nepali "Kazi".

Present Status of Wetland Distribution
and its Preservation in Nepal
Rajendra Lal Shrestha
H. S. Nepali "Kazi".

Wetland Conservation in Papua New Guinea
Gaikovina R. Kula.

Wetland Types in Sanjian Plain, North China
Jin Longrong.

附錄二　中華民國台灣地區濕地報告

Wetlands of Taiwan, Republic of China

Abstract

Taiwan (Part of R.O.C.) is a relatively small island with the high population density. Wetlands, including tidal flats, swamps and marshs, distribute mainly on the west coast and few small ponds in remote mountain areas. Just after the end of World War 11, more than 80,000 ha. of wetlands were recorded. However, 11,000 ha. of tidal flats have been reclaimed and another 15,000 ha. are planning to be reclaimed.

Among these wetlands, mangrove swamps locate on Tungshi, Tainan, Chuwei and Watzuwei areas, while salt marshs are mainly found near Guandu area and the mouth of Lanyangchi. Freshwater marshs and swamps distribute on Wuku and Luchou area, Lungnantan of Kenting National Park, Duck pond of Yangmingshan National Park, Yuenyang lake and Payu lake.

Areas close to mangrove swamps and slat marshs provide the major sea foods for this island, such as oyster, crabs, shrimps and bivalves. The other invertebrate fauna in these wetlands are poorly understood. Surveys for fauna and flora are being undertaken. Taiwan lies on the flyway for migration of Asian waders between Japan and the Philippines, and is thus important for migrants. Waders have been investigated on Guandu, Watzuwei, Lanyangchi and the mouth of Tatu River. Results indicated that more than 100 species of birds were recorded from each area. Among these, sandpippers, egrets and ducks occupy the highest proportions. Rare and endangered species of plants, such as *Sparganium fallax* is found only in Yuenyang lake, *Isoetes taiwanensis* in Duck pond of Yangmingshan National Park and *Kandelia candel* from Guandu area.

Mudflats and mangrove swamps on the west coast are facing the heavy pressure from the aquaculture business. Two mangrove species, *Bruguiera gymnorrhiza* and *Ceriops tagal* were wiped out due to these human activities. One law concerning the protection of coastal and wetlands is being drafted by Council of Agriculture (R.O.C.).

Wetlands of Taiwan, Republic of China

(1) Area 36,179 km^2.

(2) Population 19,500,000 (1986)

(3) Introductory Note

Taiwan is situated between 119 81' to 122 6' East longitude and 21 45' to 25 38' North latitude, and is in the Pacific Ocean off the southeastern coast of the Chinese mainland. It is an oblong-shaped island, Taiwan is approximately 394 km long from end to end and 144 km wide at the broadest points and has an area of 36179 square kilometers. It lies on the flyway for migration of Asian bird between the Philippines and Japan, and is thus important for migrants from Japan, Mainland China and areas further north. The Tropic of Cancer lies at a little south of Central Taiwan.

The Central Mountain Range and several minor ranges, comprising 62 peaks higher than 10,000 ft, runs from north to south on Taiwan. Yushan, over 13,000 ft, is the highest peak in Northeast Asia. The eastern mountains fall sharply towards the sea, leaving little or no plain. Mountains in the western part of the island fall less steeply and there is a plain 50 km at its widest, with some flat areas interspersed with small hills. Much of the land below 100 m is cultivated.

Its wide range of altitude and its location on the Tropic of Cancer, allows Taiwan to support four major plant communities: tropical, subtropical, temperate and alpine. Both the flora and fauna of the island are extremely rich, boasting around 4,000 species of vascular plants, 430 species of birds, 62 species of mammals, 76 species of reptiles, 30 species of amphibian, 130 species of freshwater fish and 400 species of butterfly.

Taiwan is a relatively small island and has one of the highest population densities in the world. Two-thirds of the island is covered by mountains which forces most of the population to live in the narrow, and now congested plains on the western portion of the island. Because of the high population density and the lack of a suitable land base, there has been a great environmental stress on the developable land.

(4) Summary of Wetland Situation

In the past, there was a long strip of tidal flat (about 80,000 ha) along the west coast of Taiwan. However, eleven thousand hectares of tidal flat are reclaimed and another fifteen thousand hectares of tidal flat are planned to be reclaimed. These tidal flats are very important for oyster and clam culture.

The mangroves are mainly found at a few patches along the west coast of Taiwan (Fig. 1). They occur in a zone of intense human activity and are subject to reclamation and accidental modification of their habitats. For example, human activity has already caused the extinction of two species of mangrove, Bruguiera gymnorrhiza and Ceriops tagal. Another two species, Rhizophora mucronata and Lumnitzera racemosa, are considered to be endangered. Along much of the western edge of Taiwan, tidal flat and mangrove lands have been gradually converted for use as fish ponds, industrial parks, houses, power plants, harbors, etc.

(5) Wetland Legislation

Both the Ministry of the Interior and the Council of Agriculture are responsible for wetland protection in Taiwan. Under the National Park Law, enacted on 13 June 1972, the Ministry of the Interior set up a National Planning Commission which is authorized to designate, alter or abolish areas set aside national parks and give approval on management plans. Establishment of national parks must be finally approved by the Executive Yuan. Within Kenting National Park and Yangmingshan National Park, three wetland sanctuaries (Nanjen Lake, Lungnantan and Duck Pond) have been protected since 1984.

The Department of Interior is also in charge of the Taiwan Coastal Area nature reserves, which are designated with programs for protection. The coastal nature reserves are further divided, according to levels and types of use, into "General Conservation"and "Natural Preservation" zones. The Natural Preservation zones will be designated either as Ecological Preservation Areas or Natural Preservation Areas in accordance with the Cultural Assets Preservation Act, administered by the Council of Agriculture. In 1983, seven coastal nature reserves were designated under a protection plan.

In 1984, the Council of Agriculture became directly responsible for endangered species and nature reserves under the Cultural Assets Preservation Act. This statute authorizes the Council of Agriculture to provide research funds, declare the endangered species and designate nature reserves. In 1986, under the Cultural Assets Preservation Act, the Council of Agriculture established eight nature reserves, three of them are wetland type ecosystem.

A draft law governing the protection of coastal areas and wetlands has been prepared by Dr. T. T. Kuo of National Taiwan University (College of Law). It contains 10 chapters with 91 articles. In the draft, subjects mentioned include, definitions of terms related to the protection of coastal zones and wetlands, procedures for defining the boundary and determining the area of a protected area, aims for protection, law enforcements, water quality and erosion control, limits for land reclamination, budgets for management, etc. The draft will be sent to the Excutive Yuan for evaluation and review.

(6) Wetland Area Administration

The Conservation and Planning Administration of the Ministry of the Interior is responsible for both the administration of National Parks, and the planning and implementation of the National Nature Conservation Strategy and the "Taiwan Coastal Area Natural Environmental Protection Plan". The latter aims to maintain the coastal environmental quality, to protect landscapes and biological resources and to manage marine reserves.

The Conservation Division of the Council of Agriculture is responsible for both research and the designation of endangered species and nature reserves.

(7) Organizatons involving with wetlands

1. Council of Agriculture, Executive Yuan

   a. To designate Ecological Preservation Areas or Nature Preservation Areas.
   b. To provide research funds.

2. Construction and Planning Adminstration (the Ministry of Interior)

   a. To designate Coastal Protection Areas.
   b. To designate the National Parks.
   c. To provide research funds.

3. Taiwan Forestry Bureau, Taiwan Provincial Government

   In charge of some wetland managements.

4. Taipei Wild Bird Society

   a. To survey waterbirds in many wetland areas of Taiwan.
   b. To operate the banding program of migratory birds.

5. Taichung Bird Club

   Partly in charge of Bird Sanctuary Planning of Tatu estuary.

6. Kaohsiung Bird Society

   To survey waterbirds near Kaohsiung area.

7. Taiwan Forestry Research Institute

   To conduct research on the succession of mangrove of Guandu.

8. National Taiwan University

   Dr. Lin, Yao-Sung is in charge of Bird Sanctuary Planning

of Guandu.

9. National Taiwan Normal University

Dr. Lue, Kuang-Yang has been doing research on mangroves and marsh ecosystem.

Dr. Wang, Ying has been doing research on the Nan-Jan lake (freshwater marsh ecosystem).

10. National Chung-Hsiung University

Dr. Chen, Ming-Yih is working on mangroves and estuaries.

11. Tunghai University

Associate Professor Chen, P. H., in cooperation with National Museum and Taichung Bird Club, is planning the bird sanctuary of Tatu estuary.

12. National Sun Yat-Sen University

Dr. Chang, Kun-Hsiung, Dean of College of Science, is working in the marine resources research.

13. Fu Jen University

Associate Professor Chen, Ching-Hsia is working on aquatic plants.

14. National Museum of Natural Science

Yen, Chung-Wei is planning the bird sanctuary of Tatu estuaries.

15. Society for Wildlife and Nature (SWAN)

Campaign for waterbirds and wetland protection.

16. Animal Protection Association

Campaign for waterfowl and wetland protection.

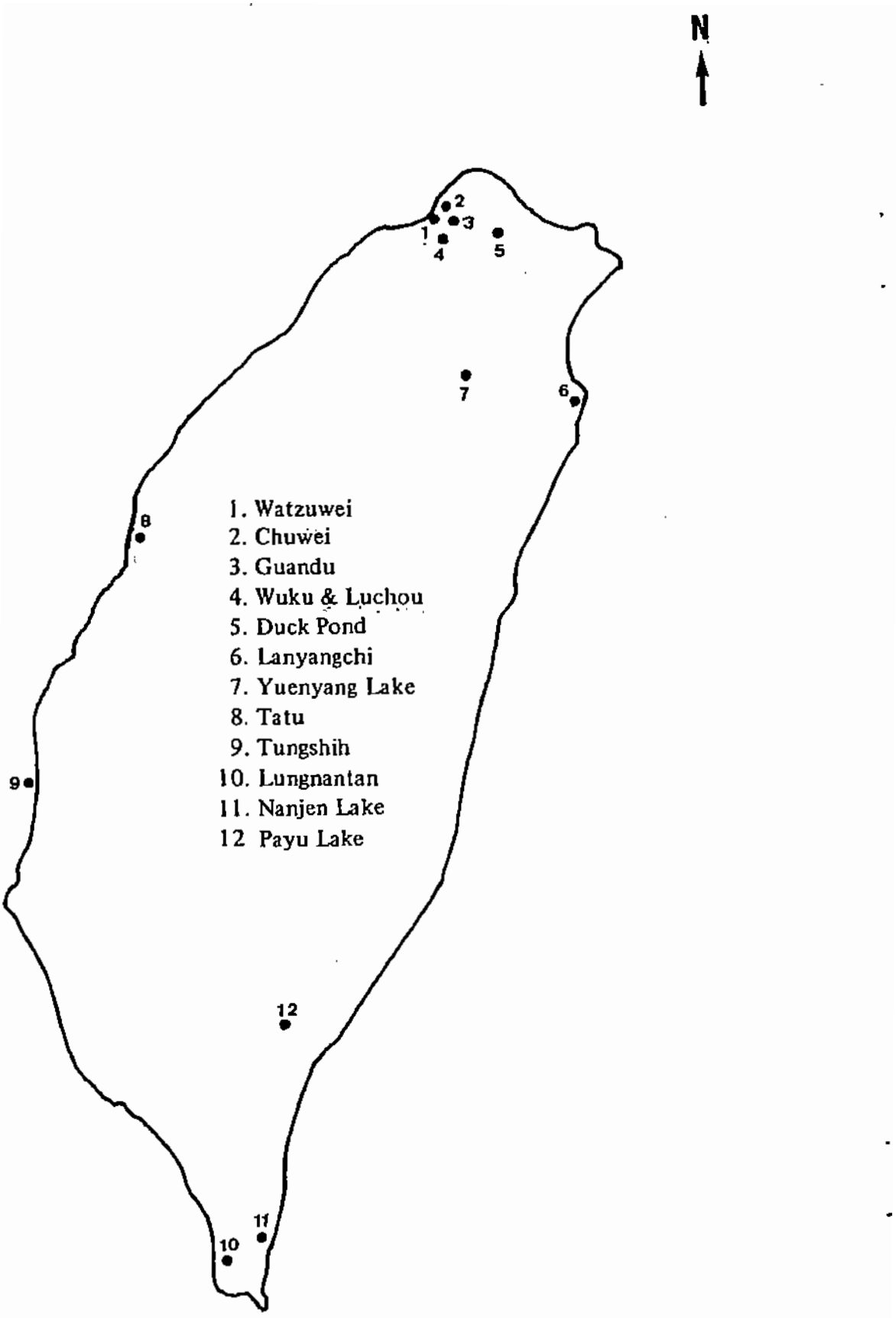

Fig. 1 Wetlands in Taiwan (R.O.C.)

List of Wetlands in Taiwan

Guandu WETLAND DATA SHEET

1. Country: Republic of China
2. Date:
3. Ref:

4. Name and address of compiler:

5. Name of wetland:
Guandu Marsh.

6. Geographical coordinates:
25° 11' N, 121° 27' E.

7. Location:
Guandu Marsh is located at the northwestern corner of Taipei city, and is situated at the confluence of the Tanhsui and Keelung rivers.

8. Area:
55 hectares.

9. Altitude:
3m

10. Biogeographical province:

11. Wetland type:
2, 7, 19.

12. Description of site:

(a) water regime:
Tanshui River.

(b) water depth:
0-3 m.

(c) salinity/acidity:
salinity: 30‰(high tide) - 0‰(low tide).

(d) fluctuations/permanence:
Two tides daily.

(e) tidal variations:
2 m.

(f) climatic conditions:
Annual rainfall is about 2000mm.
Yearly average temperature: 22°C.
Monthly average temperature: 15°C - 29°C.
Yearly average humidity: 80%

13. Principal vegetation:
    (a) aquatic vegetation:
        Phragmits communis, Cyperus malaccensis, Kandelia candel. (Table 2)

    (b) plant communities in adjacent areas:
        Agricultural land for rice.

14. Land tenure:
    (a) of site:
        Private.

    (b) of surrounding areas:
        Private.

15. Conservation measures taken:
    (a) protected areas:
        Designated as a nature preservation area in 1986.

    (b) other measures:
        Bird protection area.

16. Conservation measures proposed:
    (a) existing proposals:
        Nature preservation area.

    (b) new proposals:
        Nature park for bird watching and protection, recreation, and education.

17. Current land use:
    (a) at the wetland:
        Protected.

    (b) in surrounding areas:
        Agriculture for rice and vegetables.

18. Possible changes in land use and proposed development projects:
    (a) at the wetland:
        50 ha of agricultural land nearby will be changed into a nature park.

    (b) in the water catchment area:
        None.

19. Disturbances and threats:
    Water pollution, boating interference.

20. Conservation values:
    (a) economic and social values:
        Public recreation and education, bird watching, and scientific research. (Fig. 2)

    (b) wildlife:
        -- fish:
           Tilapia sp.

-- waterfowl:
204 species of birds including 45% of the bird species of Taiwan have been recorded. (Table 1)

-- other fauna:
There are 14 species of crabs, and 6 species of clams. See attached list. (Table 3,4)

(c) special floral values

21. Research and facilities:

22. References:
(a) Chou, Liang-siang, 1985. Bird resources at Guandu, Taiwan. In The Third East-Asian Bird Protection Conference, pp.228-239.
(b) Lin, Y. S., I. Wang, K. Y. Lue and L. S. Chou, 1984. Investigation on the ecology of wild birds in Taipei city. Taipei City Special Research Report No. 119-65 pp.

23. Outline map of site:
Fig. 1,2

24. Criteria for inclusion:
It is a unique marsh land, attracting nearly 200 species of birds, and it is an ideal place for bird watchers and nature lovers.
2b,2c.

Table 1. Avian fauna of Guandu

Chinese name	Scientific name	Chinese name	Scientific name
冠鸊鷉	*Podiceps cristatus*	紅冠水鷄	*Gallinula chloropus*
小鸊鷉	*Podiceps ruficollis*	緋秧鷄	*Porzana fusca*
蒼　鷺	*Ardea cinerea*	水　雉	*Hydrophasianus chirurgus*
紫　鷺	*Ardea purpurea*	彩　鷸	*Rostratula benghalensis*
黃頭鷺（牛背鷺）	*Bubulcus ibis*	東方環頸鴴	*Charadrius alexandrinus*
大白鷺	*Egretta alba*	黑胸鴴	*Charadrius dominicus*
唐白鷺	*Egretta eulophotes*	小環頸鴴	*Charadrius dubius*
小白鷺	*Egretta garzetta*	鐵嘴鴴	*Charadrius leschenaultii*
中白鷺	*Egretta intermedia*	蒙古鐵嘴鴴	*Charadrius mongolus*
黑　鷺	*Egretta sacra*	斑　鴴	*Pluvialis squatarola*
栗小鷺	*Ixobrychus cinnamomeus*	跳　鴴	*Vanellus chinereus*
黃小鷺	*Ixobrychus sinensis*	小辮鴴	*Vanellus vanellus*
夜　鷺	*Nycticorax nycticorax*	磯　鷸	*Tringa hypoleucos*
琵　鷺	*Platalea leucorodia*	翻石鷸	*Arenaria interpres*
黑頭白鷺	*Threskiornis melanocephalus*	尖尾鷸	*Calidris acuminata*
尖尾鴨	*Anas acuta*	濱　鷸	*Calidris alpina*
小水鴨	*Anas crecca*	漂　鷸	*Calidris canutus*
野鴨（綠頭鴨）	*Anas platyrhynchos*	滸　鷸	*Calidris ferruginea*
花嘴鴨	*Anas poecilorhyncha*	斑　鷸	*Calidris ruficollis*
白眉鴨	*Anas quelquedula*	雲雀鷸	*Calidris minutilla*
赤膀鴨	*Anas strepera*	丹氏穉鷸	*Calidris temminckii*
鳧鵲鴨（金眼鳧）	*Bucephala clangula*	姥　鷸	*Calidris tenuirostris*
鵟	*Buteo buteo*	田　鷸	*Capella gallinago*
澤　鵟	*Circus aeruginosus*	黃足鷸	*Tringa brevipes*
灰澤鵟	*Circus cyaneus*	美洲黃足鷸	*Tringa incana*
老　鷹	*Milvus migrans*	寬嘴鷸	*Limicola falcinellus*
鶚（魚鷹）	*Pandion haliaetus*	黑尾鷸	*Limosa limosa*
紅　隼	*Falco tinnunculus*	大杓鷸	*Numenius arquata*
竹　鷄	*Bambusicola thoracica*	黬　鷸	*Numenius madagascariensis*
白腹秧鷄	*Amaurornis phoenicurus*	中杓鷸	*Numenius phaeopus*

Table 1. (Continued)

Chinese name	Scientific name	Chinese name	Scientific name
流蘇鷸	*Philomachus pugnax*	赤腰燕	*Hirundo daurica*
鶴　鷸	*Tringa erythropus*	棕沙燕	*Riparia paludicola*
鷹斑鷸	*Tringa glareola*	大捲尾（烏秋）	*Dicrurus macrocercus*
諾曼氏青足鷸	*Tringa guttifer*	粉紅鸚嘴	*Paradoxornis webbiana*
青足鷸	*Tringa nebularia*	白頭翁	*Pycnonotus sinensis*
白腰草鷸	*Tringa ochropus*	野　鴝	*Erithacus calliope*
小青足鷸	*Tringa stagnatilis*	藍喉鴝	*Erithacus svecicus*
赤足鷸	*Tringa totanus*	黑喉鴝	*Saxicola torquata*
反嘴鷸	*Xenus cinereus*	赤腹鶇	*Turdus chrysolaus*
高蹺鴴	*Himantopus himantopus*	斑點鶇	*Turdus naumanni*
紅領瓣足鷸	*Phalaropus lobatus*	白眉鶇	*Turdus obscurus*
灰瓣足鷸	*Phalaropus falicarius*	白腹鶇	*Turdus pallidus*
燕　鴴	*Glareola pratincola*	大葦鶯	*Acrocephalus arundinaceus*
黑腹燕鷗	*Chlidonias hybrida*	短翅樹鶯	*Cettia diphone*
白翅黑燕鷗	*Chlidonias leucoptera*	短尾鶯	*Cettia squameiceps*
鷗嘴燕鷗	*Gelochelidon nilotica*	錦　鴝	*Cisticola juncidis*
黑脊鷗	*Larus argentatus*	（小鶲）極北柳鶯	*Phylloscopus borealis*
紅嘴鷗	*Larus ridibundus*	灰頭鷦鶯	*Prinia flaviventris*
黑嘴鷗	*Larus saundersi*	褐頭鷦鶯	*Prinia subflava*
小燕鷗	*Sterna albifrons*	赤喉鷚	*Anthus cervinus*
燕　鷗	*Sterna hirundo*	白背鷚	*Anthus gustavi*
珠頸斑鳩	*Streptopelia chinensis*	大花鷚	*Anthus novaeseelandiae*
金背鳩	*Streptopelia orientalis*	褐色鷚（小水鷚）	*Anthus spinoletta*
紅　鳩	*Streptopelia tranquebarica*	白鶺鴒	*Motacilla alba*
番　鵑	*Centropus bengalensis*	灰鶺鴒	*Motacilla cinerea*
小雨燕	*Apus affinis*	黃鶺鴒	*Motacilla flava*
白腰雨燕	*Apus pacificus*	紅尾伯勞	*Lanius cristatus*
翡翠（魚狗）	*Alcedo atthis*	棕背伯勞	*Lanius schach*
伯勞（小雲雀）	*Alauda gulgula*	八　哥	*Acridotheres cristatellus*
家　燕	*Hirundo rustica*	灰椋鳥	*Sturnus cineraceus*

Table 1. (Continued)

Chinese name	Scientific name	Chinese name	Scientific name
小椋烏	*Sturnus philippensis*	小　鵐	*Emberiza pusilla*
噪林鳥	*Sturnus sinensis*	黑臉鵐	*Emberiza spodocephala*
綠繡眼	*Zosterops japonica*	野　鵐	*Emberiza sulphurata*
黑頭文鳥	*Lonchura malacca*	小桑鳲	*Eophona migratoria*
斑文鳥	*Lonchura punctulata*	花　雀	*Fringilla montifringilla*
麻　雀	*Passer montanus*	冠　鵐	*Melophus lathami*
赤　鵐	*Emberiza fucata*		

Table 2. The floral list of Guandu Nature Park

Chinese name	Scientific name
巴拉草	*Brachiaria mutica (Forssk.) Stapf*
蒺藜草	*Cenchrus echinatus Linn*
狗牙根	*Cynodon dactylon (L.) Pers*
升馬唐	*Digitaria ciliaris (Retz.) Koel*
短穎馬唐	*Digitaria setigera Roem & Schult*
牛筋草	*Eleusine indica (L.) Gaertn*
白　茅	*Imperata cylindrica (L.) P. Beauv. var. major (Nees) C. E. Hubbard*
李氏禾	*Lerrsia hexandra Sw.*
五節芒	*Miscanthus floridulus (Labill.) Warb.*
稻	*Oryza sativa Linn*
二耳草	*Paspalum conjugatum Berg.*
雙穗雀稗	*Paspalum distichum Linn*
舖地黍	*Panicum repens L.*
吳氏雀稗	*Paspalum urvillei Steud*
蘆　葦	*Phragmites communis (Linn.) Trin*
鼠尾粟	*Sporobolus fertilis (Steud.) W. D. Clayton*
藿香薊	*Ageratum conyzoides L.*
昭和草	*Crassocephalum rabens (Juss. ex Jacq.) S. Moore.*
鱧　腸	*Eclipta prostrata L.*
紫背草	*Emilia sonchifolia (L.) DC*
野塘蒿	*Erigeron bonariensis L.*
台灣澤蘭	*Eupatorium formosanum Hayata*
刀傷草	*Ixeris laevigata (Blume) S. B. ex Max. var. oldhami (Max.) Kita.*
萵　苣	*Lactuca sativa L.*
豨　簽	*Siegesbeckia orientalis L.*
一枝香	*Vermonia cinerea (L.) Less*
雞兒腸	*Kalimeris indica (L.) Schultz-Bip.*
箬馬蘭	*Aster subulatus Michaux*
鬼　針	*Bidens bipinnata L.*
咸豐草	*Bidens pilosa L. var. minor (Blume) Sherff*
王爺葵	*Tithonia diversifolia (Hemsl) Gray*
雙花蟛蜞菊	*Wedelia biflora (L.) DC.*
蟛蜞菊	*Wedelia prostrata (Hook & Arn.) Hemsl.*

Table 2. (Continued)

Chinese name	Scientific name
苦林盤	*Clerodendrum inerme (L.) Gaertn.*
車桑子	*Dodonaea viscosa (L.) Jacq.*
紫莖牛膝	*Achyranthes aspera L. var. rubro-fusca Hook. f.*
節節花	*Alternanthera nodiflora R. Br.*
蓮子草	*Alternanthera sessilis (L.) R. Br. ex Roem. & Schultes*
刺　莧	*Amaranthus spmosus L.*
野莧菜	*Amaranthus viridis L.*
槭葉牽牛	*Ipomoea cairica (L.) Sweet*
甘　藷	*Ipomoea batatas (L.) Lam.*
多柱扁莎	*Pycreus polystachyos (Rottb.) P. Beauvois*
茳芏鹹草	*Cyperus malaccensis Lam.*
香附子	*Cyperus rotundus L.*
沙田草	*Cyperus comperssus Linn*
水毛花	*Schoenoplectus mucronatus (L.) Palla subsp. robustus Koyama*
短葉水蜈蚣	*Kyllinga brevifolia Rottb.*
碎米莎草	*Cyperus Iria L.*
落　葵	*Basella rubra Linn.*
小葉團扇薺	*Lepidium virginicum Linn.*
刺毛母草	*Urena lobata Linn*
黃　槿	*Hibiscus tiliaceus L.*
龍　葵	*Solanum nigrum Linn*
苦　楝	*Melia azedarach L.*
烏　桕	*Sapium sebiferum (L.) Roxb.*
篦　麻	*Ricinus communis L.*
飛揚草	*Euphorbia hirta L.*
山黃麻	*Trema orientalis (L.) Blume*
相思樹	*Acacia confusa Merr.*
印度田菁	*Sesbania sesban (L.) Merr.*
山地豆	*Alysicarpus vaginalis (L.) DC.*
花　生	*Arachis hypogea L.*
小葉山菜豆	*Phaseolus minimus Roxb*
雷公根	*Centella asiatica (L.) Urban.*
水菉子	*Kandelia candel (L.) Druce*

Table 2. (Continued)

Chinese name	Scientific name
蕃　薯	*Canna indica L.*
美人蕉	*Canna indica L. var. orientalis (Rosc.) Hook f.*
苧　麻	*Boehmeria nivea (L.) Gaud.*
羊　蹄	*Rumex crispus Linn var. japonicus (Meisn) Makino*
扛板歸	*Polygonum perfoliatum L.*
毛　蓼	*Polygonum barbatum L.*
紅辣蓼	*Polygonum glabrum Willd.*
臭　杏	*Chenopodium ambrosioides L.*
南　瓜	*Cucurbita moschata Duchesne var. melonaeformis Makino*
絲　瓜	*Luffa cylindrica (L.) M. Roem*
冬　瓜	*Benincasa hispida (Thunb.) Cogn.*
黃花酢醬草	*Oxalis corniculata L.*
紅鳳菜	*Gynura bicolor (Willd.) DC.*
山萵苣	*Lactuca indica (L.)*
台灣山萵苣	*Lactuca formosana Maxim.*
芋	*Colocasia esculenta (L.) Schott*
蔥	*Allium fistulosum Linn.*
雞屎腺	*Paederia scandens (Lour.) Merr.*
九層塔	*Ocimum tashiroi Hay.*
山鹽青	*Rhus semialata Murr. var. roxburghiana DC.*
番石榴	*Pasidium guajava Linn.*
綠　竹	*Bambusa oldhamii Munro*
榕　樹	*Ficus microcarpa L.f.*
馬齒莧	*Portulaca oleracea L.*
野慈菇	*Sagittaris trifolia L.*
布袋蓮	*Eichhornia crassipes Solms-Laub.*
血　桐	*Macaranga tanarius (L.) Muell-Arg.*
野梧桐	*Mallotus japonicus (Thunb) Muell-Arg.*
朱　槿	*Hibiscus rosa-sinensis L.*
苦賈菜	*Sonchus oleraceus L.*
茭白筍	*Zizania latifolia (Griseb.) Stapf*
豬　草	*Ambrosia elatior L.*
火炭母草	*Polygonum chinense L.*

Table 2. (Continued)

Chinese name	Scientific name
馬　蓼	*Polygonum posumbu Buch.-Ham ex Don.*
長梗滿天星	*Alternanthera philoxeroides (Moq.) Griseb*
葎　草	*Humulus scandens (Lour.) Merr*
黃野百合	*Crotalaria pallida Ait.*
紫茉莉	*Mirabilis jalapa L.*
越　瓜	*Cucumis melo L. var. conomon Makino forma albus Makino*
香　瓜	*Cucumis melo L.*
霧水葛	*Pouzolzia zeylanica (L.) Benn.*
銳葉牽牛	*Ipomoea acuminata (Vahl) Roem. & Schult.*
木　瓜	*Carica papaya L.*
姑婆芋	*Alocasia macrorrhiza (L.) Schott & Endl.*
水丁香	*Ludwigia octovalvis (Jacq.) Raven*
玉珊瑚	*Solanum pseudo-capsicum L.*
玉　米	*Zea mays L.*
台灣野稗	*Echinochloa crus-galli (L.) Beauv. var. formosensis Ohwi*
大花蔓陀羅	*Datura suaveolens (Humb. & Bonpl. ex Willd) Sweet*
大波斯菊	*Cosmos bipinnatus Cav.*
黃　瓜	*Cucumis sativus L.*
空心菜	*Ipomoea aquatica Forsk*
高野黍	*Eriochloa procera Retz.*
千金子	*Leptochloa chinensis (L.) Nees*
光高粱	*Sorghum nitidum (Vahl) Pers.*
茄　子	*Solanum melengena Linn.*
小葉桑	*Morus australis Poir.*
五爪龍	*Cayratia japonica (Thuub.) Gagnep.*
斷節莎	*Torulinium odoratum (L.) S. Hooper*
木風草	*Fimbristylis miliacea (L.) Vahl*
田間鴨嘴草	*Ischaenum rugosum Salisb var. segetum (Trin.) Hack*
鐵莧菜	*Acalypha australis L.*
苦　職	*Physalis angulata L.*
野路葵	*Melochia corchorifolia L.*
過江藤	*Phyla nodiflora (L.) Greene*
赤　藜	*Chenopodium album L. var. centrorubrum Makino*

Table 2. (Continued)

Chinese name	Scientific name
稗	*Echinochloa crus-galli (L.) Beauv. var. crus-galli (L.) Beauv.*
芒 稷	*Echinochloa colona (L.) Link*
磯子草	*Leptochloa panicea Ohwi*
加拿大蓬	*Erigeron canadensis L.*
構 樹	*Broussontia papyrifera (L.) L'Herit ex Vent*
合 萌	*Aeschynomene indica L.*
異花莎草	*Cyperus difformis L.*
無翅莎草	*Cyperus exaltutus Retz.*
阿穆爾草	*Cyperus amuricus Maxim.*
狗尾草	*Setaria viridis (L.) Beauv*
類雀稗	*Paspalidium punctatum (Burm) A. Camus*
圓果雀稗	*Paspalum orbiculare Forst.*
鰡魚胆	*Pluchea indica (L.) Less*
白 菜	*Brassica chinensis L.*
桃	*Prunus persica Stokes*
葱 蘭	*Zephyranthes candida (LindL) Herb*
艾	*Artemisia princeps Pamp. var. orientalis (Pamp) Hara.*
野甘草	*Scoparia dulcis L.*
山芙蓉	*Hibiscus taiwanensis Hu.*
颱風草	*Setaria palmifolia (Koen.) Stapf.*
金午時花	*Sida rhombifolia L.*
馬纓丹	*Lantana camara L.*
香 蕉	*Musa sapientum L.*
楊 桃	*Averrhoa carambola L.*
蓮 霧	*Syzygium samarangense (Blume) Merr. & Perry*
傘 草	*Cyperus alternifolius L.*
白鶏仔	*Mallotus paniculatus (Lam.) Muell-Arg.*
定經草	*Hedyotis diffusa Willd.*
刺 茄	*Solanum aculeatissium Jacq.*
金針菜	*Hemerocallis fulva L.*
甘 蔗	*Saccharum sinensis Roxb.*
芥 藍	*Brassica alboglabra Bail. var. acephala DC.*
象 草	*Pennisetum purpureum Schumach*

Table 2. (Continued)

Chinese name	Scientific name
沙　朴	*Celtis sinensis Personn*
苋　菜	*Amaranthus inamoenus Willd*
万年青	*Dracaera sanderiana Sander*
鱗豬耳	*Vandellia crustacea (L.) Benth*
長箭葉蓼	*Polygonum hastatosagittatum Makino*
水竹葉	*Murdannia keisak (Hassk.) Hand.-Mazz.*
蒼　耳	*Xanthium strumarium L. var. japonica (Widder) Hara*
黄鵝菜	*Youngia japonica (L.) DC.*
黄椰子	*Chrysalidocarpus lutescens WendL*
青　萍	*Lemna perpusilla Torr.*

Table 3. List of mollusca from mangrove swamp in Taiwan

Chinese name	Scientific name	Watzuwei	Chuwei	Guandu	Tungshi
粗文玉黍螺	*Littorina scabra*	+	+	+	+
圓玉黍螺	*Littorina strigata*	+	+	+	+
酒　螺	*Batillaria multiformis*	+	+	+	
細酒螺	*Batillaria cumingii*	+	+	+	+
縱助栓螺	*Cerithidea ornata*		+	+	
塔栓螺	*Cerithidea rhizophorum*		+	+	
栓　螺	*Cerithidea obtusa*	+	+		
淡菜（綠貽貝）	*Perna viridis*		+	+	+
瘤　蜷	*Thiara granifera*		+	+	
文　蛤	*Meretrix lusoria*		+	+	+
台灣杜鵑蛤	*Brachidoutes striatulus*	+			+
細紋黑蜑螺	*Neritina turrita*		+		
金寶螺	*Ampullarius conaliculatus*	+		+	
牡　蠣	*Crassostrea gigas*			+	+
血　蚶	*Tegillarca granosa*				+
環文蛤	*Cyclina sinensis*				+
公　代	*Laternula truncata*				+
竹　蟶	*Solen stictus*				+
白櫻蛤	*Macoma sp.*				+
蚵岩螺	*Thais clavigera*				+
蜑螯織紋螺	*Nassanus pullus*				+
小灰王螺	*Natica sp.*				+
栓海捲螺	*Cerithidea cingulata*				+

From: Lue, K. Y., M. C. Do, K. S. Chuang and B. L. Chang 1986 The protection plan for the natural environment in coasts of Taiwan – Inventory survey, planning and managements. Published by SWAN 57 p.

Table 4. Crabs of mangrove swamp in Taiwan

Chinese name	Scientific name	Tungshih	Watzuwei	Chuwei	Guandu
蝷	*Scylla serrata*	+	+	+	+
白　扇	*Uca lactea*	+	+	+	+
招　潮	*Uca arcuata*	+	+	+	+
台灣招潮	*Uca formosensis*	+	+	+	+
黃螯招潮	*Uca Vocans vocans*	+	+	+	+
砂　蟹	*Ocypode stimpsoni*	+	+	+	
大眼蟹	*Macrophthalmas dilatus*	+			
日本大眼蟹	*Macrophthalmus japonicus*	+	+	+	+
太平洋大眼蟹	*Macrophthalmus pacificus*	+			
海和尚	*Mictyris longicarpus*	+	+	+	
磯隱蟹	*Sesarma pictum*	+	+	+	+
隱　蟹	*Sesarma plicat*	+			
隱　蟹	*Sesarma dehaani*	+	+	+	+
濱　蟹	*Chasmagnathus convex*	+	+	+	+
葦　蟹	*Helice tridns tridens*	+	+	+	+
	Metopogoapsus messor	+			
	Charybdis annulata	+			
	Thalamita crenata	+			

From: Lue, K. Y., M. C. Do, K. S. Chuang and B. L. Chang 1986 The protection plan for the natural environment in coasts of Taiwan – Inventory survey, planning and managements. Published by SWAN 57 p.

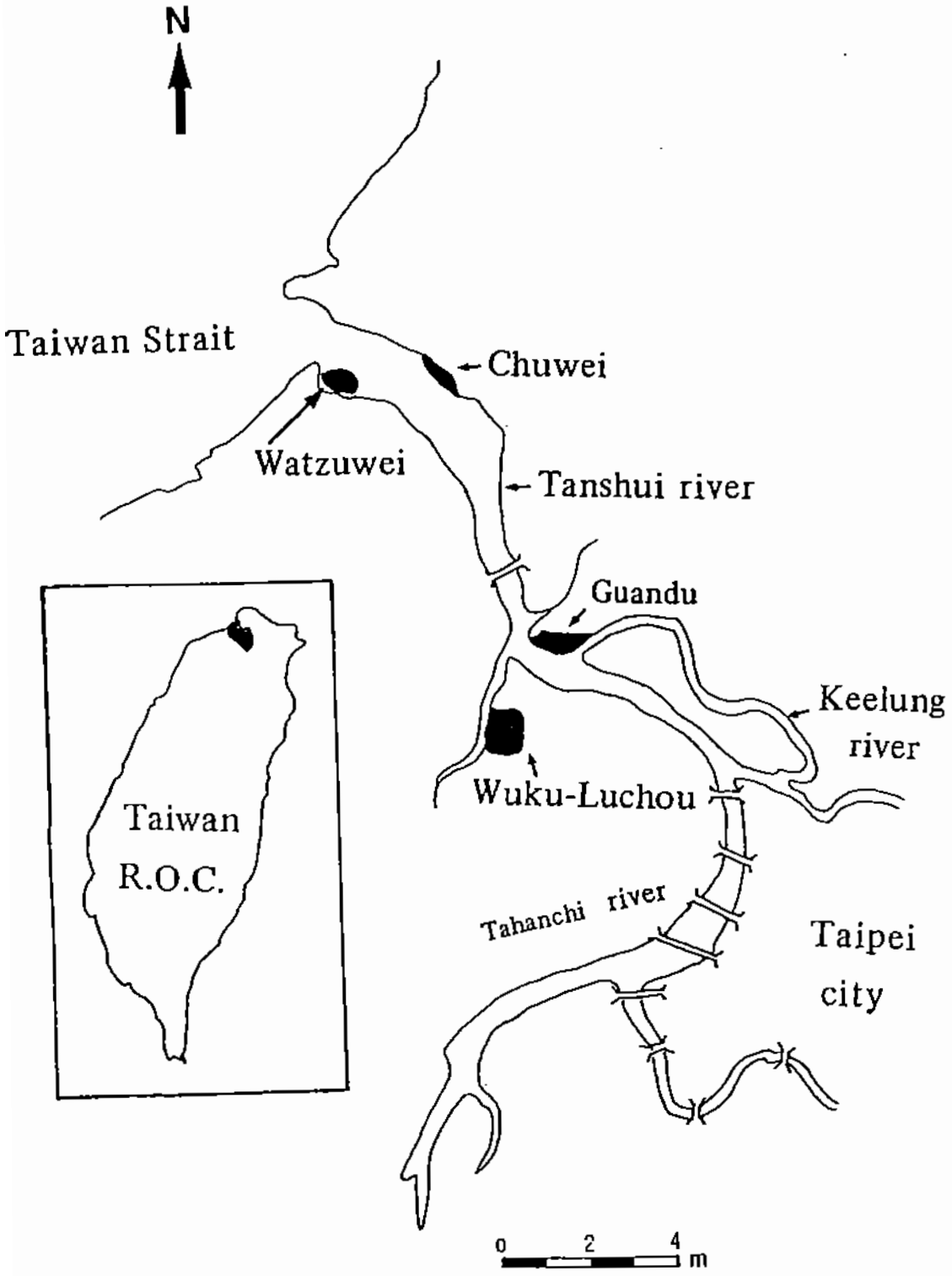

Fig. 2 The Location of Watzuwei, Chuwei, Guandu and Wuku-Luchou areas

Watzuwei WETLAND DATA SHEET

1. Country: Republic of China
   2. Date:
   3. Ref:

4. Name and address of compiler:

5. Name of wetland:
   Watzuwei Mangrove Swamp.

6. Geographical coordinates:
   121° E, 25° N.

7. Location:
   On the south bank of the mouth of Tanshui river.

8. Area:
   20 hectares.

9: Altitude:

10. Biogeographical province:

11. Wetland type:
    2, 7.

12. Description of site:

    (a) water regime:

    (b) water depth:

    (c) salinity/acidity:
        Salinity: 5‰ to 30‰(high tide).

    (d) fluctuations/permanence:
        Two tides daily.

    (e) tidal variations:
        About 3 m.

    (f) climatic conditions:
        Annual rainfall is about 2000 mm.
        Yearly average temperature : 22° C.
        Monthly average temperature: 15°- 29° C.

13. Principal vegetation:
    (a) aquatic vegetation:
        A pure stand of Kandelia candel.

    (b) plant communities in adjacent areas:
        Railroad-vine (Ipomoea pescaprae) grows on the sandy beach in the western section.

14. Land tenure:
    (a) of site:
        Owned by Forestry Bureau.

    (b) of surrounding areas:
        Private.

15. Conservation measures taken:
    (a) protected areas:
        Designated as an coast ecological protection area in 1985.

    (b) other measures:

16. Conservation measures proposed:
    (a) existing proposals:

    (b) new proposals:

17. Current land use:
    (a) at the wetland:

    (b) in surrounding areas:

18. Possible changes in land use and proposed development projects:
    (a) at the wetland:

    (b) in the water catchment area:
        A water treatment plant has been proposed to be built nearby.

19. Disturbances and threats:
    Pollution from the metropolitian area of Taipei, and proposed as site of a water treatment plant.

20. Conservation values:
    (a) economic and social values:

    (b) wildlife:
        Lists of birds attached. (Table 5)
        -- fish:

-- waterfowl:
One of the few areas where little ringed plovers breed in Taiwan. More than 100 species of migratory waders were recorded. The endangered Chinese egrets were also found here.

-- other fauna:
Eight species of crabs, 6 species of frogs, and 6 species of mollusca were found. (Table 4,6)

(c) special floral values

21. Research and facilities:
Crabs and mollusca were investigated by Dr. K. Y. Lue. Currently a banding program is being undertaken by Taipei Wild Bird Society in the swamp. This is a pilot study for the international bird banding program to be conducted in the very near future.

22. References:

23. Outline map of site:
Fig. 1,2,3,4

24. Criteria for inclusion:
2b, 2c, 3a.

Table 5. The avian fauna of Coastal Protected Area

Chinese name	Scientific name	Locaeion		
		Lanyangchi areas	Watzuwei area	Tungshi area
小鸊鹈	*Podiceps ruficollis*	×	×	×
大水薙烏	*Calonectris leucomelas*	×	×	
鷀　鷗	*Phalacrocorax carbo*	×		
黃小鷺	*Ixobrychus sinensis*	×	×	×
栗小鷺	*Ixobrychus cinnamomeus*	×	×	×
夜　鷺	*Nycticorax nycticorax*	×	×	×
牛背鷺	*Bubulcus ibis*	×	×	×
綠簑鷺	*Butorides striatus*	×	×	
大麻鷺	*Botaurus stelloris*	×	×	
黑　鷺	*Egretta scara*	×		
唐白鷺	*Egratta eulophotes*		×	
小白鷺	*Egretta garzetta*	×	×	×
中白鷺	*Egretta intermedia*	×	×	×
大白鷺	*Egretta alba*	×	×	×
紫　鷺	*Ardea purpurea*	×	×	
蒼　鷺	*Ardea cinerea*	×	×	×
沼　鷺	*Aredeola bacchus*	×	×	
琵　鷺	*Platalea leucorodia*	×	×	
黑頭白鷺	*Threskiornis melanocephala*	×	×	
白額雁	*Anser ablifrons*	×		
豆　雁	*Anser fabalis*		×	
花　鳧	*Tadorna tadorna*	×	×	
赤頸鳧	*Anas penelope*	×	×	
小水鴨	*Anas crecca*	×	×	
綠頭鴨	*Anas platyrhynchos*	×	×	×
花嘴鴨	*Anas poecilorhyncha*	×	×	
尖尾鴨	*Anas ccuta*	×	×	×
白眉鴨	*Anas quelquedula*	×	×	
琵鷺鴨	*Anas clypeata*	×	×	

From: Lue, K. Y., M. C. Do, K. S. Chuang and B. L. Chang 1986 The protection plan for the natural environment in coasts of Taiwan – Inventory survey, planning and managements. Published by SWAN 57 p.

Table 5. (Continued)

Chinese name	Scientific name	Location		
		Lanyangchi River month	Watzwei area	Tungshi area
澤　鳧	*Aythya fuligula*	×	×	
濱　鳧	*Tadorna ferruginea*	×	×	
赤膀鴨	*Anas strepera*	×	×	
眞　雁	*Anser albifrons*	×		
鴻　雁	*Anser cygnoides*	×		
弱　雁	*Anser erythropus*	×		
大　雁	*Anser fabalis*		×	
鵠	*Cygnus bewickii*	×		
黃嘴天鵝	*Cygnus cygnus*	×		
海秋沙	*Mergus serrator*	×		
鶚（魚鷹）	*Pandion haliaetus*	×	×	×
老　鷹	*Milvus migrans*	×	×	×
大冠鷲	*Spilornis cheela*		×	
澤　鵟	*Circus aeruginosuis*	×	×	
灰澤鵟	*Circus cyaneus*	×	×	
白澤鵟	*Circus melanoleucos*		×	
鵟	*Buteo buteo*	×	×	
毛足鵟	*Buteo lagopus*		×	
紅　隼	*Falco tinnunculus*	×	×	
隼	*Falco peregrinus*		×	×
円頂鶴	*Grus japonensis*	×		×
白頭鶴	*Grus monachus*		×	
白頂鶴	*Grus viplo*	×		×
三斑鶉	*Turnix suscitator*		×	×
秧　鷄	*Rallus aquaticus*	×	×	×
灰胸秧鷄	*Rallus striatus*	×	×	×
白胸秧鷄	*Amaurornis phoenicurus*	×	×	×
緋秧鷄	*Porzana fusca*	×	×	×
董　鷄	*Gallicrex cinerea*	×	×	×

Table 5. (Continued)

Chinese name	Scientific name	Location		
		Lanyangchi River month	Watzuwei area	Tungshi area
紅冠水鷄	*Gallinula chloropus*	×	×	×
白冠鷄	*Fulica atra*	×	×	
彩　鷸	*Rostratula benghalensis*	×	×	×
水　雉	*Hydrophasianus chirurgus*	×	×	×
跳　鴴	*Microsarcops cinereus*	×	×	
小濱鴴	*Vanellus vanellus*	×	×	×
黑胸鴴	*Pluvialis dominicus*	×	×	×
灰斑鴴	*Pluvialis squatarola*	×	×	×
東方環頸鴴	*Charadrius alexandrius*	×	×	×
蒙古鐵嘴鴴	*Charadrius mongolus*	×	×	×
小環頸鴴	*Charadrius dubius*	×	×	×
鐵嘴鴴	*Charadrius leschenaultii*	×	×	×
斑尾鷸	*Limosa lapponica*	×	×	×
黑尾鷸	*Limosa limosa*	×	×	×
中杓鷸	*Numenius phaeopus*	×	×	×
小杓鷸	*Numenius borealis*	×	×	×
鴉　鷸	*Numenius madagascariensis*	×	×	×
大杓鷸	*Numenius arquata*	×	×	×
赤足鷸	*Tringa totanus*	×	×	×
鶴　鷸	*Tringa erythropus*	×	×	×
小青足鷸	*Tringa stagnatilis*	×	×	×
青足鷸	*Tringa nebularia*	×	×	×
白腰草鷸	*Tringa ochropus*	×	×	×
鷹斑鷸	*Tringa glareola*	×	×	×
反嘴鷸	*Xenus cinerea*	×	×	×
磯　鷸	*Tringa hypoleucos*	×	×	×
黃足鷸	*Tringa brevipes*	×	×	×
翻石鷸	*Arenaria interpres*	×	×	×
針尾鷸	*Gallinago stenura*	×	×	

Table 5. (Continued)

Chinese name	Scientific name	Location		
		Lanyangchi River month	Watzuwei area	Tungshi area
中地鷸	*Gallinago megala*	×	×	×
田　鷸	*Gallinago gallinoga*	×	×	×
三趾鷸	*Crocethia alba*	×	×	×
漂　鷸	*Calidris canutus*	×	×	×
姥　鷸	*Calidris tenuirostris*	×	×	×
穉　鷸	*Calidris ruficolis*	×	×	×
丹氏穉鷸	*Calidris temminckii*	×	×	×
雲雀鷸	*Calidris submiula*	×	×	×
尖尾鷸	*Calidris acuminata*	×	×	×
濱　鷸	*Calidris alpina*	×	×	×
赤　鷸	*Calidris ferruginea*	×	×	×
寬嘴鷸	*Limicola falcinellus*	×	×	×
灰瓣足鷸	*Pholaropus fulicarius*	×	×	
紅領瓣足鷸	*Pholaropus lobatus*	×	×	
高蹺鴴	*Himantopus himantopus*	×	×	×
蠣　鴴	*Haematopus ostralegus*	×		×
燕　鴴	*Glareola pratincola*		×	×
黑尾鷗	*Larus crassirostris*	×		
大黑脊鷗	*Larus schistisagus*	×	×	
紅嘴鷗	*Larus ridibundus*	×	×	
黑腹燕鷗	*Sterna hybrida*	×	×	
白翅黑燕鷗	*Sterna leucopterus*	×	×	
鷗嘴燕鷗	*Sterna nilotica*	×	×	
裏海燕鷗	*Sterna caspia*	×		
燕　鷗	*Sterna hirundo*	×	×	
紅燕鷗	*Sterna dougallii*	×	×	
蒼燕鷗	*Sterna sumatrana*	×	×	
白眉燕鷗	*Sterna anaetheta*		×	
烏領燕鷗	*Sterna fuscata*	×	×	

Table 5. (Continued)

Chinese name	Scientific name	Location		
		Lanyangchi River month	Watzuwei area	Tungshi area
小燕鷗	*Sterna albifrons*	×	×	
鳳頭燕鷗	*Sterna bergii*	×	×	
金背鳩	*Streptopelia orientalis*		×	×
珠頸鳩	*Streptopelis chinensis*	×	×	×
番　鵑	*Centropus bengalensis*		×	
夜　鷹	*Caprimulgus affinis*		×	
短耳鴞	*Asio flammeus*		×	
小雨燕	*Apus affinis*	×	×	×
白腰雨燕	*Apus pacificus*	×		×
翠　鳥	*Alcedo atthis*	×	×	×
小雲雀	*Alauda gulgula*		×	
棕沙燕	*Riparia paludicola*	×	×	×
灰沙燕	*Riparia riparia*		×	
家　燕	*Hirundo rustica*	×	×	×
赤腰燕	*Hirundo daurica*	×	×	×
大卷尾	*Dicrurus macrocercus*	×	×	×
灰椋鳥	*Sturnus cineraceus*		×	×
噪林鳥	*Sturnus sinensis*		×	
家八哥	*Acridotheres tristis*		×	
八　哥	*Acridotheres critatellus*	×	×	×
禿鼻鴉	*Corvus frugilegus*		×	
大彎嘴	*Domatorninus erythrogenys*	×		
小彎嘴	*Pomatorhinus ruficollis*	×		
畫　眉	*Garrulax canorus*	×		
繡眼畫眉	*Alcippe morritonia*	×	×	×
白頭翁	*Pycnonotus sinensis*	×	×	×
野　鴝	*Erithacus calliope*	×	×	
黑喉鴝	*Saxicola torquata*	×	×	×
鉛磯鶇	*Monticola solitarius*	×	×	

Table 5. (Continued)

Chinese name	Scientific name	Location		
		Lanyangchi River month	Watzuwei area	Tungshi area
虎　鶇	*Zoothera dauma*	×	×	×
赤腹鶇	*Trudus chrysolaus*	×	×	×
白腹鶇	*Trudus pallidus*	×	×	×
斑點鶇	*Trudus naumanni*	×	×	×
短翅樹鶯	*Cettia diphone*	×	×	×
大葦鶯	*Acrocephalus arundinaceus*	×	×	×
極北柳鶯	*Phylloscopus borealis*	×	×	×
白頭錦鴒	*Cisticola exilis*	×	×	×
錦　鴒	*Cisticola juncidis*	×	×	×
灰頭鷦鶯	*Prinia flaviventris*	×	×	×
斑紋鷦鶯	*Prinia polychroa*	×	×	×
褐頭鷦鶯	*Prinia subflava*	×	×	×
西伯利亞灰斑鶲	*Muscicapa siberica*		×	
黃鶺鴒	*Motacilla flava*	×	×	×
灰鶺鴒	*Motacilla cinerea*	×	×	×
白鶺鴒	*Motacilla alba*	×	×	×
樹　鷚	*Anthus hodgsoni*	×		
赤喉鷚	*Anthus cervinus*	×	×	×
紅尾伯勞	*Lanius cristatus*	×	×	×
棕背伯勞	*Lanius schach*	×	×	×
綠繡眼	*Zosterops japonica*	×	×	
花　雀	*Fringilla montifringilla*		×	
金翅雀	*Carduelis sinica*	×	×	
小　鵐	*Emberiza pusilla*		×	
野　鵐	*Emberiza sulphurata*	×	×	×
金　鵐	*Emberiza aureola*		×	
黑臉鵐	*Emberiza spodocephala*	×	×	×
白腰文鳥	*Lonchura striata*	×	×	×
斑文鳥	*Lonchura punctulata*	×	×	×

Table 5. (Continued)

Chinese name	Scientific name	Location		
		Lanyangchi River month	Watzuwei area	Tungshi area
黑頭文鳥	*Lonchura malacca*	×	×	
白頭文鳥	*Lonchura maja*		×	
爪哇雀	*Padda oryzivora*	×		
麻　雀	*Passer montanus*	×	×	×
紅領綠鸚鵡	*Psittacula krameri*		×	×
紅　鳩	*Streptopelia tranquebarica*		×	×

Table 6. Amphibians and Reptiles of Watzuwei, Chuwei and Lanyanchi areas

Chinese name	Scientific name	Watzuwei	Chuwei	Lanyangchi
兩生類				
小雨蛙	*Microhyla ornata*	+		
黑眶蟾蜍	*Bufo melanosticus*	+	+	+
澤　蛙	*Rana limnocharis*	+	+	+
貢德氏蛙	*Rana guntheri*	+	+	+
拉都希氏蛙	*Rana latouchii*	+		
長腳赤蛙	*Rana longicrus*	+		
爬蟲類				
錦　蛇	*Elaphe taniura tressi*	+		
雨傘節	*Bungarus multicinctus*	+		
龜殼花	*Trimeresurus mucrosguamatus*	+		
赤尾鮐	*Trimeresurus steinegeri*	+		
花浪蛇	*Natrix stolata*	+		+
水　蛇	*Enhydris plumbea*	+	+	
過山刀	*Eaoeys dhumnades oshimai*		+	
中國石龍子	*Eumeces elegans*	+	+	
箕作氏攀蜥	*Japalura mitsukurii mitsukurii*	+		
蝎　虎	*Hemidactylus frenatus*	+		

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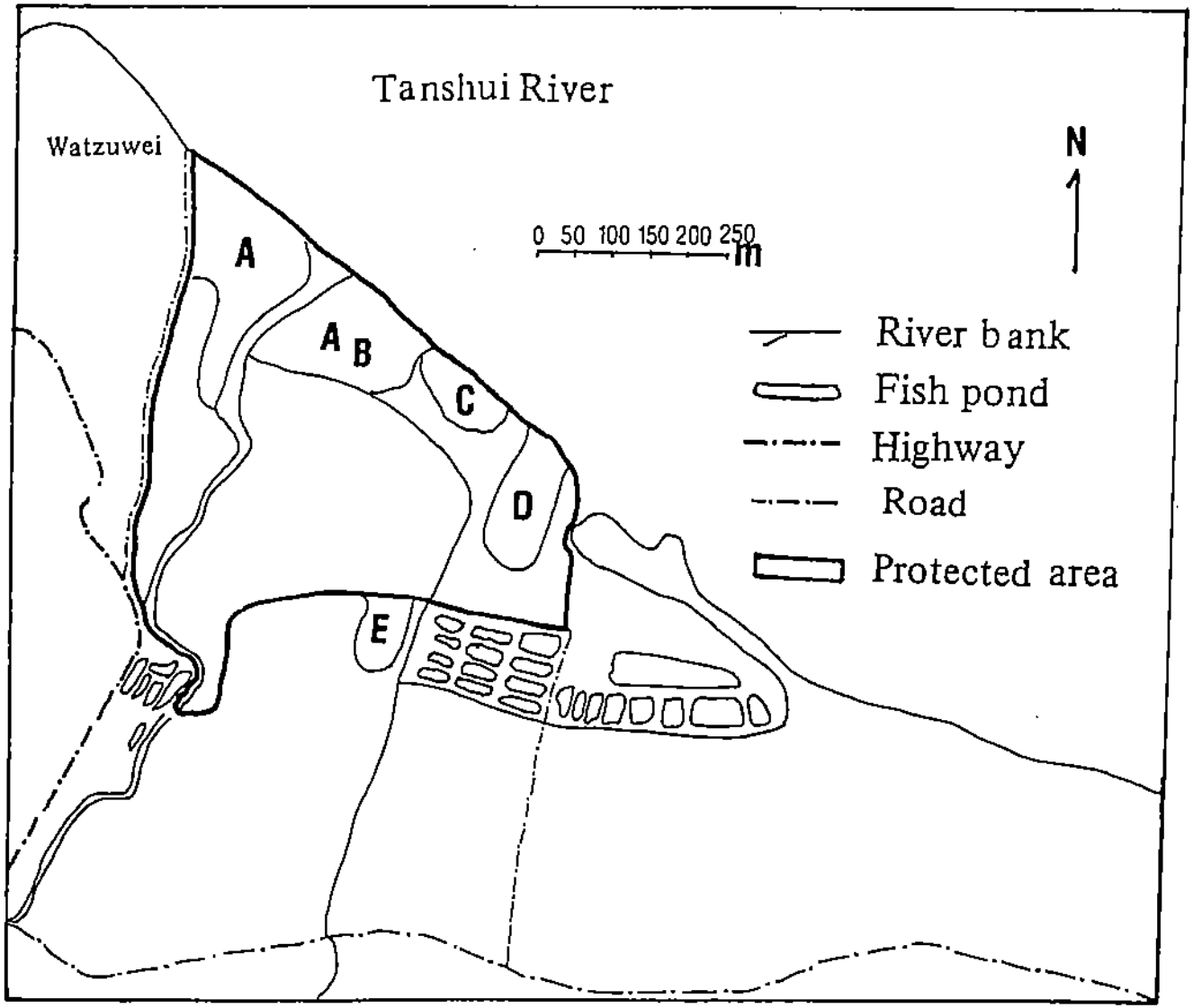

Fig. 3. The avian distribution at Watzuwei area (A) Charadriiade (B) Scolopacidae (C) Laridae (D) Ardeidae (E) Rallidae

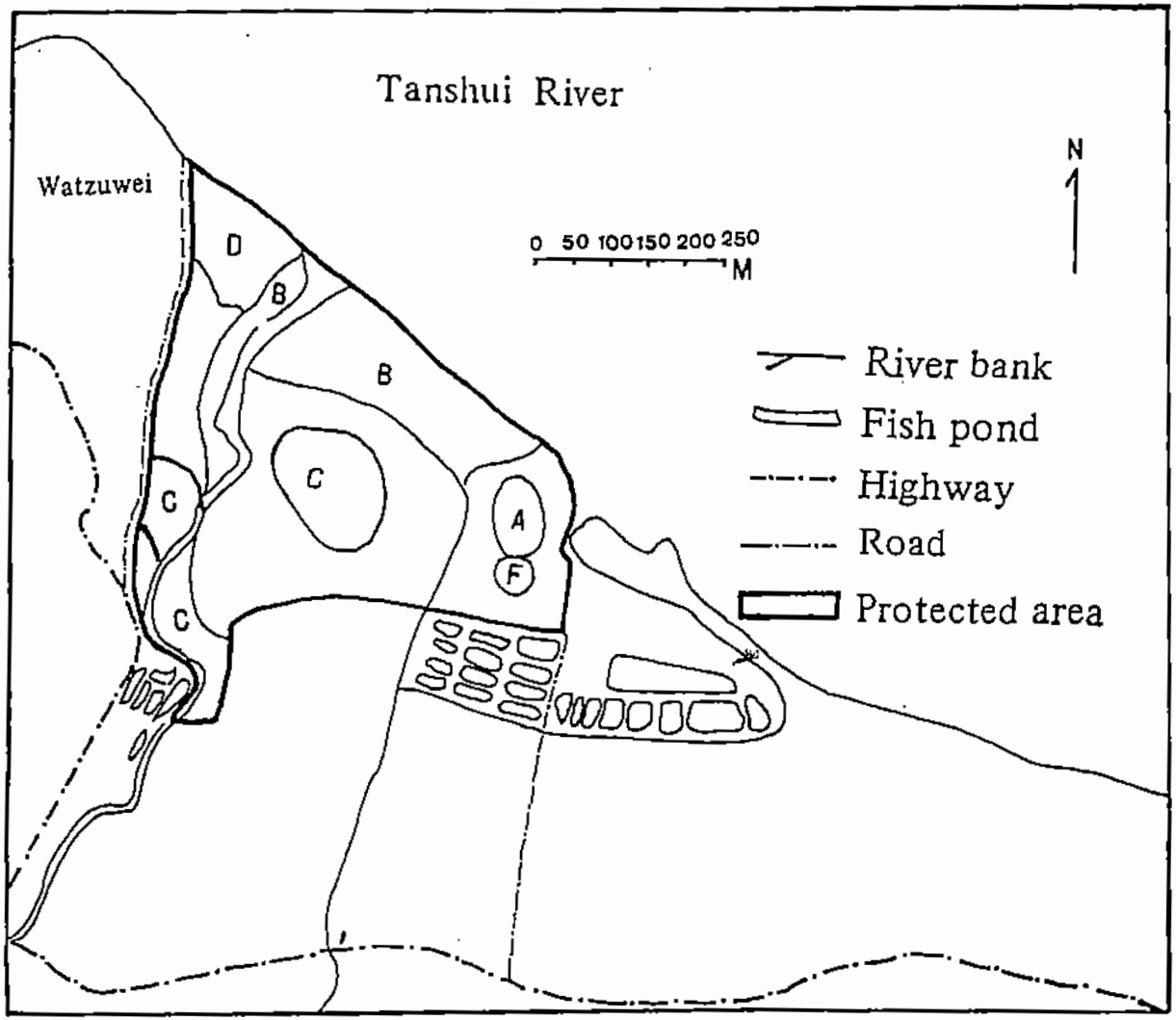

Fig. 4 The distribution of crabs at Watzuwei area. A Scylla serrata B Uca vocans vocans C Mictyris longicarpus D Ocypode stimpsoni E Uca lactea F Sesarma sp.

Chuwei WETLAND DATA SHEET

1. Country: Republic of China
2. Date:
3. Ref:

4. Name and address of compiler:

5. Name of wetland:
Chuwei Mangrove Swamp.

6. Geographical coordinates:

7. Location:
In the estuary of Tanshui river, about 5 km from the mouth of the river.

8. Area:
60 hectares.

9. Altitude:
-3m to 5m.

10. Biogeographical province:

11. Wetland type:
2, 7.

12. Description of site:

(a) water regime:

(b) water depth:

(c) salinity/acidity:
0 ‰ to 30 ‰ /pH 7.3-8.3.

(d) fluctuations/permanence:

(e) tidal variations:

(f) climatic conditions:

13. Principal vegetation:
(a) aquatic vegetation:

Dominated by Kandelia candel. Phragmites communis was found in high tide area.
The density of K. candel is higher than 2.5 individuals/ m^2.

(b) plant communities in adjacent areas:
There are about 58 species of plants invaded into the area above the limit of high tide.

14. Land tenure:
(a) of site:
Owned by Forestry Bureau.

(b) of surrounding areas:
Private and owned by Bureau of the Railroad.

15. Conservation measures taken:
(a) protected areas:
Designated as an ecological protection area in 1986.

(b) other measures:

16. Conservation measures proposed:
(a) existing proposals:

(b) new proposals:

17. Current land use:
(a) at the wetland:
Kept in natural state.

(b) in surrounding areas:
There are two aquacultural ponds for clams, Meretrix lusoria, locating on the east section.
One duck farm locating on the northeastern section.

18. Possible changes in land use and proposed development projects:
(a) at the wetland:
Aquacultural ponds.

(b) in the water catchment area:

19. Disturbances and threats:
a). Water pollution from Tanshui river.
b). Overharvesting on crabs, Scylla serrata.
c). Ducks reared in duck farms feed on swamp vegetation frequently.

20. Conservation values:
(a) economic and social values:
Breeding ground for several species of crabs, including the one (Scylla serrata) with high economic value, and for bivalves, Meretrix lusoria.

(b) wildlife:
Lists of birds, phytoplankton and zooplankton attached.

-- fish:
Periophthalmus cantonensis.

-- waterfowl:
More than 3000 individual birds such as cattle egret, little egret and night heron nesting in this swamp. Ducks, and waders were found during the migrating season.

-- other fauna:
15 species of crabs and 6 species of molluscas were recorded. The snail, Neritina turrita is a newly recorded species of snail from Taiwan area. Polychaets are quite abundant in the mud. (Table 3,4,6)

(c) special floral values
The largest pure stand of Kandelia candel in Taiwan.

21. Research and facilities:
Crab fauna and some basic ecological survey, including productivity were investigated by Dr. K. Y. Lue and his students, supported by NSC. Dr. C. H. Chou did allelopathy study in this swamp in 1982.

22. References:

23. Outline map of site:
Fig. 1,2

24. Criteria for inclusion:
2b, 2c, 3a.

Wuku and Luchou WETLAND DATA SHEET

1. Country:
Republic of China

2. Date:

3. Ref:

4. Name and address of compiler:

5. Name of wetland:
Wuku and Luchou Swamp.

6. Geographical coordinates:
121° E, 25° N.

7. Location:
In Taipei County, about 10 km from Taipei City.

8. Area:
500 hectares.

9: Altitude:
0 to 2 m.

10. Biogeographical province:

11. Wetland type:
20

12. Description of site:

(a) water regime:

(b) water depth:
2m.

(c) salinity/acidity:
0.01‰ to 2.0‰ / pH 7.5-10.5.

(d) fluctuations/permanence:

(e) tidal variations:

(f) climatic conditions:

13. Principal vegetation:
(a) aquatic vegetation:
Eichhornia crassipes (water hyacinth) is the dominant aquatic

plant. (Table 9,10)

(b) plant communities in adjacent areas:
Rice fields and vegetable fields.

14. Land tenure:
(a) of site:
Private.

(b) of surrounding areas:
Private.

15. Conservation measures taken:
(a) protected areas:
Classified as a flood denuded land.

(b) other measures:

16. Conservation measures proposed:
(a) existing proposals:
Proposed by the county government as a nature park and recreational area.

(b) new proposals:

17. Current land use:
(a) at the wetland:
Flood plain, used as a garbage dump for two nearby villages. Some sections are being reclaimed for industrial park.

(b) in surrounding areas:
Industrial parks.

18. Possible changes in land use and proposed development projects:
(a) at the wetland:

(b) in the water catchment area:

19. Disturbances and threats:
The water body is an eutrophic environment, algal bloom occurs yearround. The BOD (biological oxygen demand) values were higher than 10 ppm.

20. Conservation values:
(a) economic and social values:
More than 2,000 kg of fish were caught daily from this swamp three years ago. Tilapia mosambica is the main fish species.

(b) wildlife:
Lists of birds attached.

-- fish:
Twelve species of fishes were recorded. Tilapia mossambica is the major one.

-- waterfowl:
More than 105 species of birds were sighted at this wetland. (Table 7)

-- other fauna:
Eleven species of mollusca, 6 species of frogs, and 2 species of turtles. (Table 8)

(c) special floral values
Chlorophyll content value of the water collected monthly were all above 10 ug/l.

21. Research and facilities:
An ecological survey was conducted by Dr. K. Y. Lue, supported by the National Science Council.

22. References:
a. Lue, Kuang Yang and Hang Ye Tsai. 1979. The avian fauna of Wuku and Luchou swamp. Biological Bulletin of NTNU. 14:33-46.
b. Lue, Kuang Yang. 1983. An ecological study on Wuku and Luchou swamp. Biological Bulletin of NTNU. 18:29-56.

23. Outline map of site:
Fig. 1,2

24. Criteria for inclusion:
2c.

Table 7. The avian fauna of Wuku and Luchou swamp

Chinese name	Scientific name	Chinese name	Scientific name
小鸊鷉	*Podiceps ruficollis*	白冠雞	*Fulica atra*
蒼　鷺	*Ardea cinerea*	董　雞	*Gallicrex cinerea*
黃頭鷺	*Bubulcus ibis*	紅冠水雞	*Gallinula chloropus*
大白鷺	*Egretta alba*	緋秧雞	*Porzana fusca*
唐白鷺	*Egretta eulophotes*	水　雉	*Hydrophasianus chirurgus*
小白鷺	*Egretta garzetta*	東方環頸鴴	*Charadrius alexandrinus*
中白鷺	*Egretta intermedia*	黑胸鴴	*Charadrius dominicus*
黑　鷺	*Egretta sacra*	小環頸鴴	*Charadrius dubius*
栗小鷺	*Ixobrychus cinnamomeus*	斑　鴴	*Charadrius squatarolus*
黃小鷺	*Ixobrychus sinensis*	小辮鴴	*Vanellus vanellus*
夜　鷺	*Nycticorax nyticorax*	磯　鷸	*Actitis hypoleucos*
琵　鷺	*Platalea leucorodia*	濱　鷸	*Calidris alpina*
尖尾鴨	*Anas acuta*	漂　鷸	*Calidris canutus*
琵嘴鴨	*Anas clypeata*	滸　鷸	*Calidris ferruginea*
小水鴨	*Anas crecca*	猛　鷸	*Calidris ruficollis*
羅文鴨	*Anas falcata*	雲雀鷸	*Calidris subminuta*
綠頭鴨	*Anas platyrhynchos*	田　鷸	*Capella gallinago*
花嘴鴨	*Anas poecilorhyncha*	大地鷸	*Capella hardwickii*
白眉鴨	*Anas querquedula*	中地鷸	*Capella megala*
澤　兗	*Aythya fuligula*	黃足鷸	*Heteroscelus brevipes*
秋沙鴨	*Mergus merganser*	黑尾鷸	*Limosa limosa*
澤　鵟	*Circus aeruginosus*	中杓鷸	*Numenius phaeopus*
灰澤鵟	*Circus cyaneus*	青足鷸	*Tringa nebularia*
老　鷹	*Milvus migrans*	鷹斑鷸	*Tringa glareola*
大冠鷲	*Spilornis cheela*	白腰草鷸	*Tringa ochropus*
鵂　鶹	*Circus melanoleucos*	小青足鷸	*Tringa stagnatilis*
魚　鷹	*Pandion haliaetus*	赤足鷸	*Tringa totanus*
紅　隼	*Falco tinnunculus*	紅領瓣足鷸	*Phalaropus lobatus*
矛　隼	*Falco rusticolus*	燕　鷗	*Glareola maldivarum*
白腹秧雞	*Amauronis phoenicurus*	黑腹燕鷗	*Childonias hybrida*

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Table 7. (Continued)

Chinese name	Scientific name	Chinese name	Scientific name
白翅黑燕鷗	*Childonias leucopterus*	短翅樹鶯	*Cetta diphone*
黑背鷗	*Larus argentatus*	白頭錦鴗	*Cisticola exilis*
紅嘴鷗	*Larus ridibundus*	錦　鴗	*Cisticola juncidis*
小燕鷗	*Sterna albifrons*	灰頭鷦鶯	*Prinia flaviventris*
紅燕鷗	*Sterna dougallii*	褐頭鷦鶯	*Prinia subflava*
燕　鷗	*Sterna hirundo*	赤喉鷚	*Anthus cervinus*
珠頸斑鳩	*Streptopelia chinensis*	褐色鷚	*Anthus spinoletta*
金背鳩	*Streptopelia orientalis*	白鶺鴒	*Motacilla alba*
紅　鳩	*Streptopelia transquebarica*	灰鶺鴒	*Motacilla cinerea*
番　鵑	*Centropus bengalensis*	黃鶺鴒	*Motacilla flava*
小雨燕	*Apus affinis*	紅尾伯勞	*Lanius cristatus*
翠　鳥	*Alcedo atthis*	棕背伯勞	*Lanius schach*
小雲雀	*Alauda gulgula*	八　哥	*Acridotheres cristatellus*
家　燕	*Hirundo rustica*	家八哥	*Acridotheres tristris*
洋　燕	*Hirundo tahitica*	灰椋鳥	*Sturnus cineraceus*
棕沙燕	*Riparia paludicola*	小椋鳥	*Sturnus philippensis*
大卷尾	*Dicrurus macrocercus*	斑文鳥	*Lonchura punctulata*
白頭翁	*Pycnonotus sinensis*	尖尾文鳥	*Lonchura striata*
野　鴝	*Erithacus calliope*	樹麻雀	*Passer montanus*
藍磯鶇	*Monticola solitaria*	小　鵐	*Emberiza pussilla*
黑喉鴗	*Saxicola torquata*	黑臉鵐	*Emberiza spodocephala*
斑點鶇	*Turdus naumanni eunomus*	綠綉眼	*Zosterops japonica*
紅尾鶇	*Turdus naumanni naumanni*	紅領綠鸚鵡	*Psittacula krameri*
大葦鶯	*Acrocephalus arundinaceus*		

Table 8. Invertebrate fauna of Wuku and Luchou swamp

Phylum	Species
Platyhelminthes	*Dugesia sp.*
Annelida	*Tubifex sp.*
Arthropoda	*Cyclops sp.*
	Daphnia sp.
	Diaptomus sp.
	Macrobranchium rosembergii
Mollusca	*Cyclophor sp.*
	Gyraulus spirillis
	Radix auricularia swinhoei
	Radix japonica
	Segmentina formosana
	Semisulcospira libertina libertina
	Semisulcospira libertina trachea
	Sinotaia quadrata
	Thiara granifera
	Thiara tuberculata
	Thiara tuberculata formosana

From: Lue, K. Y. 1983 An ecological study on Wuku and Luchou swamp Bio. Bull. of NTNU 18-29-56.

Table 9. The most abundant phytoplankton of Wuku and Luchou Swamp

Class	Species	Relative abundance
Cyanophyceae	*Chroococus limneticus*	++**
	Lyngbya sp.	+++
	*Oscillatoria sp. (3)**	+++
	Spirulina sp.	+++++
Chlorophyceae	*Actinastrum hantzschii*	+
	Closterium sp. (3)	+++
	Dictyosphaerium ehrenbergianum	+
	Eudorina sp.	+++
	Pediastrum duplex	+
	Scenedesmus abundans	+
	Scenedesmus acuminatus	+
	Scenedesmus quadricauda	+
	Spirogyra sp.	+
Euglenophyceae	*Euglena oxyuris*	+
	Euglena sp.	++
	Phacus pleuronectes	++
Bacillariophyceae	*Cyclotella striata*	+
	Cymbella tumida	+
	Cymbella sp.	++
	Melosira varians	++
	Navicula sp.	+++
	Nitzschia sigma	+
	Nitzschia sp.	+
	Surirella biwaensis	++
	Synedra sp.	+++

* The figure in parenthesis indicates the number of species found.

** "+ + + + +" most abundant, " + + + + " abundant, " + + + " common, "+ +" few, "+"rare.

Table 10. The floral list of Wuku and Luchou swamp

Chinese name	Scientific name	Chinease name	Scientific name
朴　樹	*Celtis sinensis Persoon*	刺　莧	*Amaranthus spinosus L.*
構　樹	*Broussonetia papyrifera (L.)*	綠　莧	*Amaranthus viridis L.*
糙葉榕	*Ficus irisana Elmer*	水辣菜	*Ranunculus sieboldii Miq.*
榕　樹	*Ficus microcarpa L. f.*	木防己	*Cocculus trilobus (Thunb.)*
稜果榕	*Ficus septica Burm. f.*	金魚藻屬	*Ceratophyllum sp.*
雀　榕	*Ficus wightiana Wall.*	亭　歷	*Rorippa indica (L.)*
葎　草	*Humulus scandens (Lour.)*	相思樹	*Acacia confusa Merr.*
小葉桑	*Morus australis Poir.*	濱刀豆	*Canavalia lineata (Thunb.)*
霧水葛	*Pouzolzia zeylanica (L.)*	變葉山螞蝗	*Desmodium heterophyllum (Willd.)*
珊瑚藤	*Antigonon leptopus Hook. & Arn.*	菜　豆	*Phaseolus vulgaris L.*
清飯藤	*Polygonum chinense L.*	豌　豆	*Pisum sativum L.*
水　蓼	*Polygonum hydropiper L.*	葛　藤	*Pueraria lobata (Willd.)*
蠶繭草	*Polygonum japonicum Meisn.*	台灣葛	*Pueraria montana (Lour.)*
早苗蓼	*Polygonum lapathifolium L.*	濱豇豆	*Vigna marina (Burm.)*
扛板歸	*Polygonum perfoliatum L.*	酢醬草	*Oxalis corniculata L.*
春　蓼	*Polygonum persicaria L.*	紫花酢醬草	*Oxalis corymbosa DC.*
皺葉酸模	*Rumex crispus L.*	乳仔草	*Euphorbia hirta L.*
紫茉莉	*Mirabilis jalapa L.*	小葉大戟	*Euphorbia makinoi Hayata*
馬齒莧	*Portulaca oleracea L.*	錫蘭饅頭果	*Glochidium zeylanicum (Gaertn.)*
松葉牡丹	*Portulaca pilosa L.*	野　桐	*Mallotus japonicus (Thunb.)*
落　葵	*Basella alba L.*	粗糠柴	*Mallotus philippensis (Lam.)*
菁芳草	*Drymaria cordata (L.)*	葉下珠	*Phyllanthus urinaria L.*
鵝兒腸	*Stellaria aquatica (L.)*	苦　楝	*Melia azedarach L.*
藜	*Chenopodium album L.*	馬甲子	*Paliurus ramosissimus (Lour.)*
土荊芥	*Chenopodium ambrosioides L.*	山葡萄	*Ampelopsis brevipedunculata (Maxim.)*
小　藜	*Chenopodium serotinum L.*	地　錦	*Parthenocissus tricuspidata (Sieb & Zucc.)*
台灣牛膝	*Achyranthes aspera L.*	木芙蓉	*Hibiscus mutabilis L.*
節節花	*Alternanthera nodiflora R. Br.*	裂瓣朱槿	*Hibiscus schizopetalus Hook. f.*
空心蓮子菜	*Alternanthera philoxeroides (Moq.)*	黃　槿	*Hibiscus tiliaceus L.*
蓮子菜	*Alternanthera sessilis (L.)*	南美朱槿	*Malvaviscus arboreus (L.)*

From: Lue, K. Y. 1983 An ecological study on Wuku and Luchou swamp Bio. Bull. of NTNU 18-29-56.

Table 10. (Continued)

Chinese name	Scientific name	Chinease name	Scientific name
細葉金午時花	*Sida acuta Burm. f.*	艾	*Artemisia princeps Pamp.*
金午時花	*Sida rhombifolia L.*	白花鬼針	*Bidens pilosa L.*
野棉花	*Urena lobata L.*	南國小薊	*Cirsium japonicum DC.*
木　瓜	*Carica papaya L.*	昭和草	*Crassocephalum rabens (Juss. ex Jacq.)*
毛盤黃花水丁香	*Ludwigia epilobioides Maxim.*	鱧　腸	*Eclipta prostrata L.*
水丁香	*Ludwigia octovalvis (Jacq.)*	地膽草	*Elephantopus mollis H. B. K.*
雷公根	*Centella asiatica (L.)*	紫背草	*Emilia sonchifolia (L.)*
菲島天胡荽	*Hydrocotyle benguetensis Elmer.*	白頂飛蓬	*Erigeron annuus (L.)*
台灣天胡荽	*Hydrocotyle formosana Masamune*	加拿大蓬	*Erigeron canadensis L.*
天胡荽	*Hydrocotyle sibthorpioides Lam.*	野茼蒿	*Erigeron sumatrensis Retz.*
烏面馬	*Plumbago zeylanica L.*	台灣澤蘭	*Eupatorium formosanum Hayata*
涼喉茶	*Hedyotis lindleyana Hook.*	兎仔菜	*Ixeris chinensis (Thunb.)*
雞屎藤	*Paederia scandens (Lour.)*	刀傷草	*Ixeris laevigata (Blume.)*
甕　花	*Ipomoea aquatica Forsk.*	台灣山苦苣	*Lactuca formosana Maxim.*
地　瓜	*Ipomoea batatas (L.)*	鵝仔菜	*Lactuca indica L.*
番仔藤	*Ipomoea cairica (L.)*	鯽魚膽	*Pluchea indica (L.)*
野牽牛	*Ipomoea obscura (L.)*	苣　菜	*Sonchus arvensis L.*
破布子	*Cordia dichotoma Forst. f.*	一枝香	*Vernonia cinerea (L.)*
杜虹花	*Callicarpa formosana Rolfe.*	雙花蟛棋菊	*Wedelia biflora (L.)*
苦林盤	*Clerodendrum inerme (L.)*	天蓬草舅	*Wedelia prostrata (Hook. & Arn.)*
金露華	*Duranta repens L.*	黃鵝菜	*Youngia japonica (L.)*
馬纓丹	*Lantana. camara L.*	三脚剪	*Sagittaria trifolia L.*
塔　花	*Clinopodium gracile (Benth.)*	馬　藻	*Potamogeton crispus L.*
龍　葵	*Solanum nigrum L.*	土茯苓	*Heterosmilax indica A. DC.*
六角定經草	*Mazus pumilus (Brum. f.) steenis*	菝　葜	*Smilax china L.*
野甘草	*Scoparia dulcis*	布袋蓮	*Eichhornia crassipes (Mart.)*
大車前	*Plantago major L.*	鴨舌草	*Monochoria vaginalis (Burm. f.)*
布骨消	*Sambucus formosana Nakai*	鴨跖草	*Commelina communis L.*
藿香薊	*Ageratum conyzoides L.*	白竹仔葉	*Commelina diffusa Burm. f.*
茵　蔯	*Artemisia capollaris Thunb.*	水竹葉	*Murdannia keisak (Hassk.)*

Table 10. (Continued)

Chinese name	Scientific name	Chinease name	Scientific name
扁穗莎草	*Cyperus compressus L.*	兩耳草	*Paspalum conjugatum Berg.*
異花莎草	*Cyperus difformis L.*	雀　稗	*Paspalum thunbergii Kunth ex Steud.*
鹹　草	*Cyperus malaccensis Lam.*	海雀稗	*Paspalum vaginatum Sw.*
香附子	*Cyperus rotundus L.*	蘆　葦	*Phragmites communis (L.)*
短葉水蜈蚣	*Kyllinga brevifolia Rottb.*	莠狗尾草	*Setaria geniculata (Lam.)*
多柱扁莎	*Pycreus polystachyos (Rottb.)*	狗尾草	*Setaria viridis (L.)*
綠　竹	*Bambusa oldhamii Munro*	台灣矢竹	*Sinobambusa kunishii (Hayata)*
刺　竹	*Bambusa stenostachya Hackel*	鼠尾粟	*Sporobolus fertilis (Stend.)*
狗牙根	*Cynodon dactylon (L.)*	姑婆芋	*Alocasia maerorhiza (L.)*
馬　唐	*Digitaria sanguinalis (L.)*	青　萍	*Lemna perpusilla Torr.*
水　稗	*Echinochloa crus-galli (L.)*	紅　蕉	*Musa coccinea Ander.*
牛筋草	*Eleusine indica L.*	朱　蕉	*Cordyline fruticosa (L.)*
五節芒	*Miscanthus floridulus (Labill.)*	槐葉蘋	*Salvinia nataus (L.)*
金平芒	*Miscanthus kanehirai Honda*	滿江紅	*Azolla pinnata R. Brown.*
水生黍	*Panicum paludosum Roxb.*	海金沙	*Lygodium japonicum (Thunb.)*
舖地黍	*Panicum repens L.*	香　蒲	*Typha orientalis Presl.*

Duck Pond WETLAND DATA SHEET

1. Country:
Republic of China

2. Date:

3. Ref:

4. Name and address of compiler:

5. Name of wetland:
Duck Pond.

6. Geographical coordinates:
25°10'N, 121°33'E.

7. Location:
In Yangmingshan National Park, northern Taiwan.

8. Area:
9 m^2.

9: Altitude:
850m.

10. Biogeographical province:

11. Wetland type:
15.

12. Description of site:

(a) water regime:
Local rainfall.

(b) water depth:
0 to 4m.

(c) salinity/acidity:
Fresh water.

(d) fluctuations/permanence:
No.

(e) tidal variations:
No.

(f) climatic conditions:

13. Principal vegetation:

(a) aquatic vegetation:
Isoetes taiwanensis dominates. Other species are *Eriocaulon chishingsanensis*, *Schoenoplectus mucroxatus* subsp. *robustus*, *Eleocharis dulcis*, *Nymphoides indica*, *Sphaecrocaryum malaccense*, *Juncus effusus*, *Elaeocharis congesta* var. *japonica*, *Juncus leschenaultii*, and *Isachne globosa*.

(b) plant communities in adjacent areas:
See attached list. (Table 11)

14. Land tenure:
(a) of site:
Owned by Ministry of the Interior.

(b) of surrounding areas:
Owned by Ministry of the Interior.

15. Conservation measures taken:
(a) protected areas:
Already protected by Ministry of the Interior..

(b) other measures:

16. Conservation measures proposed:
(a) existing proposals:

(b) new proposals:

17. Current land use:
(a) at the wetland:

(b) in surrounding areas:
Recreation.

18. Possible changes in land use and proposed development projects:
(a) at the wetland:

(b) in the water catchment area:

19. Disturbances and threats:
Visitor intrusion and specimen collection.

20. Conservation values:
(a) economic and social values:
Very valuable for research and educational purposes.

(b) wildlife:
-- fish:

Channa asiatica.

-- waterfowl:

-- other fauna:
Rana longicrus.

(c) special floral values
Isoetes taiwanensis in the pond is an endangered species. (Table 11)

21. Research and facilities:
Basic research has been conducted by Professor Huang.

22. References:
Huang, Tseng-chieng 1984. Plants in Yangmingshan National Park.

23. Outline map of site:
Fig. 1,5

24. Criteria for inclusion:

Table 11. The floral list of Duck pond, Yangmingshan National Park

Chinese name	Scientific name	Chinease name	Scientific name
過山龍	*Lycopodium cernum L.*	中原氏杜鵑	*Rhododendron nakaharai Hay.*
台灣水韭	*Isoetes taiwanensis DeVol*	台灣龍膽	*Gentiana atkinsonii Burk. var. formosana (Hay.) Yamamoto*
芒　萁	*Dicranopteris linearis (Burm. f.) Under*	倒地蜈蚣	*Torenia concolar Lindly var. formosana Yamazaki*
裏　白	*Diplopterygium glaucum (Houtt.) Nakai*	大車前草	*Plantago major L.*
碗　蕨	*Dennstaedtia scabra (Wall.) Moore*	桔梗蘭（山菅蘭）	*Dianella ensifolia (L.) DC. ex Redoute.*
栗　蕨	*Histiopteris incisa (Thunb.) J. Sm.*	鴨舌草	*Monochoria vaginalis (Burm. f.) Presl*
烏　蕨	*Sphenomeris chusana (L.) Copel*	燈心草	*Juncus effusus L. var. decipiens Buchen*
小毛蕨	*Christella acuminata (Houtt.) L'ev.*	錢　蒲	*Juncus leschenaultii Gay ex Laplharpe*
柳　杉	*Cryptomeria japonica (L. f.) D. Don*	七星山穀精草	*Eriocaulon chishingsanensis Chang*
清飯藤	*Polyganum chinense L.*	針　蘭	*Eleocharis congesta D. Don subsp. japonica (Miq.) T. Koyama*
紅楠（豬腳楠）	*Persea thunbergii (Sied. et Zucc.) Kostermans*	荸　薺	*Eleocharis dulcis (Burm. f.) Trin. ex Henschel*
昆欄樹	*Trochodendron aralioides Sieb. et Zucc.*	水毛花	*Schoenoplectus mucronatus (L.) Palla subsp. robustus (Miq.) T. Koyama*
大屯細辛	*Asarum taitonensis Hay.*	草山翦股穎	*Agrotis sozanensis Hay.*
細葉山茶	*Camellia tenuifolia (Hay.) Chen-Stuart*	地毯草	*Axonopus compressus (Sw.) P. Beauv.*
假柃木	*Eurya crenatifolia (Yamamota) Kobuski*	柳葉箬	*Isachne globosa (Thunb.) Ktze.*
地耳草（小還魂）	*Hypericum japonicum Thunb. ex Murray*	印度鴨嘴草	*Ischaemum indicum (Houtt.) Merr.*
楓　香	*Liquidambar fomosana Hance*	五節芒	*Miscanthus floridulus (Labill.) Warb. ex Schum. & Laut.*
狹瓣八仙花	*Hydrangea angustipetala Hay.*	台灣芒	*Miscanthus sinensis Anders. var. formosanus Hack.*
刺　莓	*Rubus taiwanianus Matsum.*	雀　稗	*Paspalum thunbergii Kunth ex Steud.*
變葉懸鉤子	*Rubus shinkoensis Hay.*	毛花雀稗	*Paspalum dilatatum Poir.*
野　桐	*Mallotus japonicus (Thunb.) Muell.-Arg.*	囊穎草	*Sacciolepis indica (L.) Chase*
燈稱花（烏骨雞）	*Ilex asprella (Hook. & Arn.) Champ.*	海　蔥	*Sphaerocaryum malaccense (Trin.) Pilger*
野鴨椿	*Euscaphis japonica (Thunb.) Kanitz*		
虎　葛	*Cayratia japonica (Thunb.) Gagnep.*		
野牡丹	*Melastoma candidum D. Don*		
小二仙草	*Haloragis micrantha (Thunb.) R. Br.*		
雷公根	*Centella asiatica (L.) Urban*		
天胡荽	*Hydrocotyle sibthorpioides Lam.*		
白珠樹	*Gaultheria leucocarpa Blume forma cumingiana (Vidal) Sleumer*		

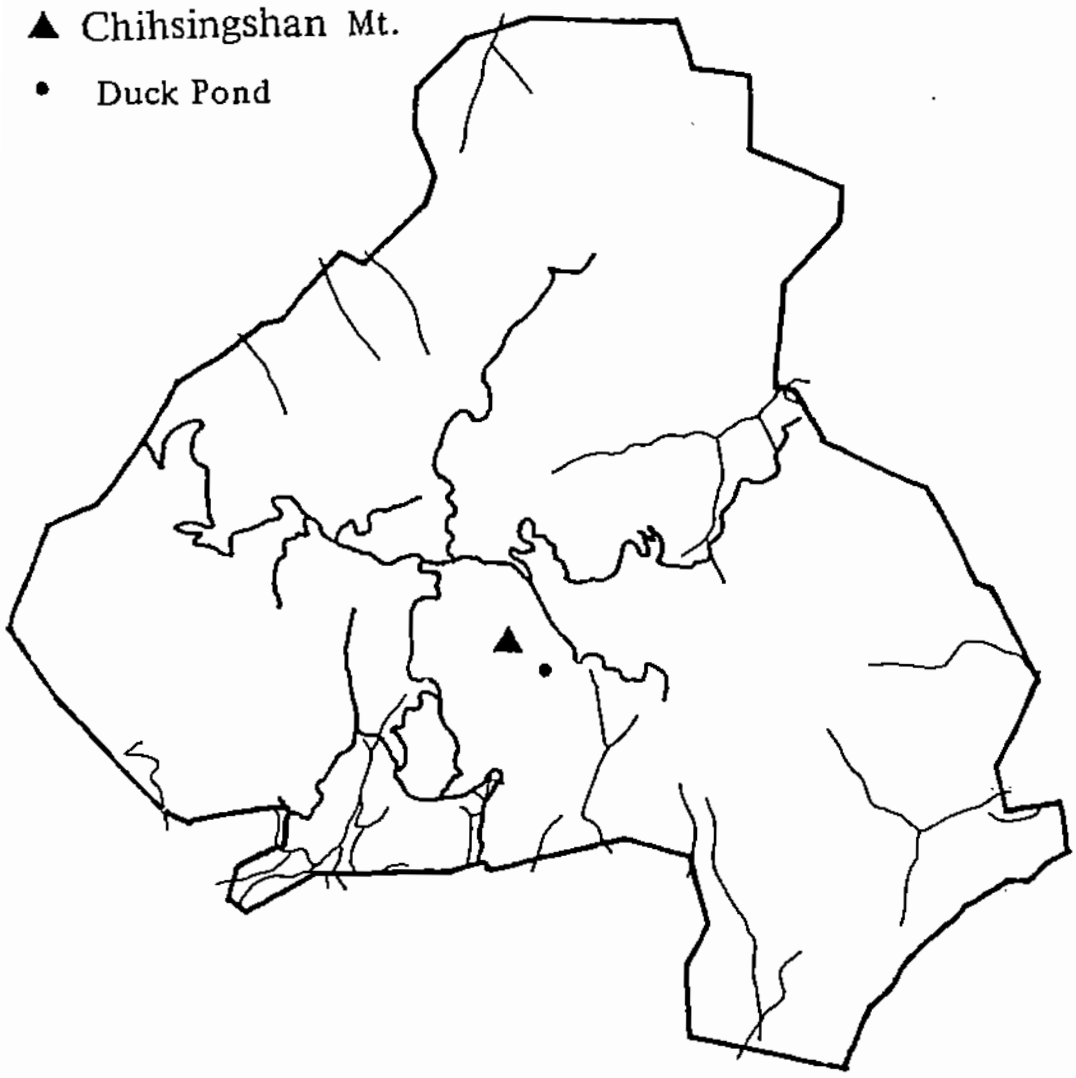


Fig. 5. The location of Duck Pond in Yangmingshan National Park

Yuenyang Lake WETLAND DATA SHEET

1. Country:
Republic of China

2. Date:

3. Ref:

4. Name and address of compiler:

5. Name of wetland:
Yuenyang Lake.

6. Geographical coordinates:
24°35'N, 121°24'E.

7. Location:
Sinchu County, northeastern Taiwan.

8. Area:
The lake area is 3.6 ha. The marsh area encircling the lake is 2.2 ha.

9: Altitude:
1670m.

10. Biogeographical province:

11. Wetland type:
15.

12. Description of site:

(a) water regime:
Local rainfall.

(b) water depth:
0-15m.

(c) salinity/acidity:

(d) fluctuations/permanence:

(e) tidal variations:

(f) climatic conditions:
temperate heavy moist

13. Principal vegetation:
(a) aquatic vegetation:
Potamogeton octandra, Sparganium fallax, and Scirpus mucronatus in the

lake, Miscanthus transmorrisonensis, Scirpuos mucronatus, Scirpus morrisonensis, Rhododendron mariesii, and Rhamnus crenata in the marsh. (Table 13)

(b) plant communities in adjacent areas:
Chamaecyperis formosensis and Chamaecyperis taiwanensis in adjacent area.

14. Land tenure:
(a) of site:
Owned by Taiwan Forest Bureau.

(b) of surrounding areas:
Owned by Taiwan Forest Bureau.

15. Conservation measures taken:
(a) protected areas:
Designated as Yuenyang Lake Nature Reserve (374 hectares) in 1986.

(b) other measures:

16. Conservation measures proposed:
(a) existing proposals:

(b) new proposals:

17. Current land use:
(a) at the wetland:

(b) in surrounding areas:

18. Possible changes in land use and proposed development projects:
(a) at the wetland:
No development project has been proposed.

(b) in the water catchment area:
No major development project has been proposed.

19. Disturbances and threats:
Occasional hunting and visitor intrusion.

20. Conservation values:
(a) economic and social values:
It is valuable for studying hydrophytic and hygrophytic plants, cypress forest, liverworts, mosses, and waterfowls.

(b) wildlife:
-- fish:

-- waterfowl:

-- other fauna:
A list of birds found in Yuenyang Lake Nature Reserve attached. (Table 12)

(c) special floral values
There are 180 species of seed plants, and 28 species of ferns, four of which (Sparganium fallax, Galium trifidum, Carex onoei, and Rhynchospora alba) are newly recorded species.

21. Research and facilities:
Basic research was conducted by T. Liu and K. S. Hsu.

22. References:
Liu, Tsing and Kou-Shi Hsu 1973, Ecological Study on the Yuenyang Lake Area Reserve. Taiwan Forestry Research Institute No.273.

23. Outline map of site:
Fig. 6

24. Criteria for inclusion:
2b, 2c, 3a

Table 12. List of birds found in Yuenyan Lake Natural Reserve

Chinese name	Scientific name
灰林鴿	*Columbidae pulchricollis*
鶻　鶻	*Glaucidium brodiei*
巨嘴鴉	*Corvus macrothynchos*
臺灣樫鳥	*Garrulus glandarius*
金翼白眉	*Garrulax morrisonianus*
白耳畫眉	*Heterophasia auricularis*
藪　鳥	*Liocichla steerei*
山紅頭	*Stachyris ruficeps*
冠羽畫眉	*Yuhina brunneiceps*
栗背林鴝	*Tarsiger johnstoniae*
棕面鶯	*Seicercus albogularis*
小䴙䴘	*Podiceps ruficollis*
白眉鴨	*Anas querquedula*
蛇　鷹	*Spilarnis cheela*

Table 13. List of plants in Yuenyang Lake Natural Reserve

尖葉槭	*Acer insulare Makino*
臺灣掌葉槭	*Acer palmata Thunb. var. pubescens Li*
擬鱗毛蕨	*Acrophorus stipellatus (Wall.) Moore*
霧社黃肉楠	*Actinodaphne mushaensis (Hay.) Hay.*
玉山鬼督郵	*Ainsliaea morrisonicola Hay.*
臺灣赤楊	*Alnus formosana Mak.*
臺灣小膜蓋蕨	*Araiostegia parvipinnula (Hay.) Copel.*
華紫金牛	*Ardisia chinensis Benth.*
雨傘仔	*Ardisia corncudentata Mez.*
硃砂根	*Ardisia crenata Sims.*
臺灣天南星	*Arisaema formosana Hay.*
阿里山肢節蕨	*Arthromeris lehmanni (Mett.) Ching*
細　辛	*Asarum macranthum Hook. f.*
紅苞鱗蓋蕨	*Athyrium nakanoi Makino*
深山野牡丹	*Barthea formosana Hay.*
阿里山小蘗	*Berberis alpicola C. Schneider*
紫大紫珠	*Callicarpa randaiensis Hay.*
川上氏	*Carex japonica Thunb. var. subtransverosa T. Koyama*
柃葉薹	*Carex onoei Fr. et Sav.*
威氏粗榧	*Cephalotaxus wilsoniana Hay.*
紅　檜	*Chomaecyparis formosensis Matsum.*
扁　柏	*Chamacyparis taiwanensis Masam. et Suzuki*
臺灣貓兒眼睛草	*Chrysosplenium formosanum Hay.*
紅淡比	*Cleyera japonica Thunb.*
三葉茀蕨	*Crypsinus hastatus (Thunb.) Copel.*
玉山茀蕨	*Crypsinus quasidivaricatus (Hay.) Copel.*
細葉虎刺	*Damnacanthus angustifolius Hay.*
伏牛花	*Damnacanthus indicus Gaertn. f.*
薄葉虎皮楠	*Daphniphyllum membranaceum Hay.*
臺灣杞李葉	*Dendropanax pellucido-punctatus (Hay.) Kaneh.*
碗　蕨	*Dennstaedtia scabra (Wall.) Moore*
阿里山假寶鐸花	*Disporposis arisanensis Hay.*
薯　豆	*Elaeocarpus japonieus Sieb. et Zucc.*
阿里山舌蕨	*Elaphoglossum conforme (Sw.) Schott.*
菊唐草	*Ellisiophyllum pinnatum (Wall.) Makino*

Table 13. (Continued)

田代氏澤蘭	*Eupatorium tashiroi Hay.*
僞柃木	*Eurya crenatifolia (Yamam.) Kobuski*
厚葉柃木	*Eurya glaberrima Hay.*
柃　木	*Eurya japonica Thunb.*
小葉四葉葎	*Galium trifidum Linn.*
臺灣白珠樹	*Gaultheria cumingiana Vidal*
高山白珠樹	*Gaultheria itoana Hay.*
臺灣龍膽	*Gentiana formosana Hay.*
臺灣胡麻花	*Heloniopsis umbellata Bak.*
裡　白	*Hicriopteris glauca (Thunb.) Ching*
臺灣毛蕊木	*Hugeria lasiostemon (Hay.) Maekawa*
大枝掛繡球	*Hydrangea integra Hay.*
水亞木	*Hydrangea paniculata Sieb.*
金錢薄荷	*Hydrocotyle javanica Thunb.*
金絲桃屬	*Hypericum sp.*
琉球冬青	*Ilex mutchagara Makino*
白花八角	*Illicium tashiroi Maxim.*
燈心草	*Juncus effusa Linn. var. decipiens Buchev.*
日本女貞	*Ligustrum japonicum Thunb.*
陵齒蕨	*Lindsaea odorata Roxb.*
漸尖葉金銀花	*Lonicera acuminata Wall.*
紅星金銀花	*Lonicera hypoglauca Miq.*
過山龍	*Lycopodium cernuum Linn.*
石　松	*Lycopodium clavatum Linn.*
線葉蔓石松	*Lycopodium pulcherrimum Wall.*
反捲葉石松	*Lycopodium quasipolytrichoides Hay.*
長柄千屈塔	*Lycopodium serratum Thunb. var. longipetiolatum Spr.*
南　燭	*Lyonia ovalifolia (Wall.) Drude*
細葉露蕊	*Mecodium polyanthos (Sw.) Copel.*
高山芒草	*Miscanthus transmorrisonensis Hay.*
臺北玉葉金花	*Mussaenda taihokuensis Masam.*
小葉鐵仔	*Myrsine africana Linn.*
蔓竹杞	*Myrsine stolonifera (Koidz.) Walker*
銳葉新木薑子	*Neolitsea acuminatissima (Hay.) Kaneh. et Sasaki*
黑果薄柱草	*Nertera nigricarpa Hay.*

Table 13. (Continued)

野沿階草	*Ophiopogon scaber Ohwi*
紫　萁	*Osmunda japonica Thunb.*
阿里山酢漿草	*Oxalis griffithii Edgew. et Hook. f.*
蘭嶼馬蘭	*Parachampionella rankanensis (Hay.) Bramek.*
臺灣金星蕨	*Parathelypteris castanea (Tagawa) Ching*
地　錦	*Parthenocissus tricuspidanta (Sieb. et Zucc.) Planch*
山椒草	*Pellionia radicans Wedd.*
三裂葉山椒草	*Pellionia trilobulata Hay.*
柄囊蕨	*Peranema cyatheoides Don*
臺灣石楠	*Photinia lucida (Decaisne) Schneid.*
雲　杉	*Picea morrisonicola Hay.*
臺灣五葉松	*Pinus morrisonicola Hay.*
馬醉木	*Pieris taiwanensis Hay.*
臺灣瘤足蕨	*Plagiogyria glauca (Bl.) Mett. var. philippinensis Christ.*
耳形瘤足蕨	*Plagiogyria stenoptera (Hance) Diels*
一葉蘭	*Pleione formosana Hay.*
秋雀翹	*Polygonum sieboldii Meisn.*
犁壁草	*Polygonum thunbergii Sieb. et Zucc.*
線葉眼子菜	*Potamogeton octandra Poir.*
蕨	*Pteridium aquilinum (Linn.) Kuhn. var. latiusculum (Desv.) Und.*
鈍齒鼠李	*Rhamnus crenata Sieb. et Zucc.*
田代氏石斑木	*Rhaphiolepis indica Lindl. var. tashiroi Hay. ex Mats. et Hay.*
臺灣杜鵑	*Rhododendron formosanum Hemsl.*
岩生杜鵑	*Rhododendron kawakamii Hay.*
瑞山紅	*Rhododendron mariesii Hemsl. et Wilson*
白刺子莞	*Rhynchospora alba (Linn.) Vahl*
小金櫻	*Rosa taiwanensis Nak.*
毛莓懸鉤子	*Rubus shinkoensis Hay.*
刺莓寒莓	*Rubus spectinellus Maxim. var. trilobus Koidz.*
裡白懸鉤子	*Rubus swinhoei Hance*
玉山變豆菜	*Sanicula petagnioides Hay.*
蓬萊肉穗草	*Sarcopyramis delicata Robins.*
江　某	*Schefflera octophylla (Lour.) Harms.*
臺灣鵝掌柴	*Schefflera taiwaniana (Nak.) Kaneh.*
玉山莞	*Scirpus morrisonensis Hay.*

Table 13. (Continued)

水毛花	*Scirpus mucronatus Linn.*
全緣卷柏	*Selaginella delicatula (Desv.) Alston*
疏葉卷柏	*Selaginella remotifolia Spring*
臺灣黃菀	*Senecio taiwanensis Hay.*
裂緣花	*Shortia exappendiculata Hay.*
深山茵芋	*Skimmia reevesiana Fort.*
東亞黑三稜	*Sparganium fallax Graebn.*
濕地泥炭苔	*Sphagnum palustre Linn.*
溪頭野木瓜	*Stauntonia keitaoensis Hay.*
玉山假沙梨	*Stranvaesia niitakayamensis Hay.*
平遮那灰木	*Symplocos heishanensis Hay.*
光葉山礬	*Symplocos lancifolia Sieb. et Zucc.*
厚皮香	*Ternstroemia gymnanthera (Wight et Arn.) Sprague*
南湖蠅蘭	*Tipularis odorata Fukuyama*
附地菜	*Trigonotis elevato-venosa Hay.*
玉山肺形草	*Tripterospermum lanceolatum (Hay.) Hara ex Sasaki*
雲葉樹	*Trochodendron aralioides Sieb. et Zucc.*
鐵　杉	*Tsuga chinensis Pritz.*
米飯花	*Vaccinium bracteatum Thunb.*
高山越橘	*Vaccinium merrillianum Hay.*
假繡球	*Viburnum furcatum Bl. ex Maxim.*
狹葉糯米樹	*Viburnum integrifolium Hay.*
紅珠仔	*Viburnum luzonicum Rolfe.*
臺灣莢蒾	*Viburnum taiwanianum Hay.*
茶匙黛	*Viola diffusa Ging.*
川上氏茶匙黛	*Viola kawakamii Hay.*
堇　菜	*Viola verecunda A. Gray*
書帶蕨	*Vittaria flexuosa F'ee*
哈氏狗脊蕨	*Woodwardia harlandii Hook.*
東方狗脊蕨	*Woodwardia orientalis Sw.*
大久保氏桫葉蕨	*Xiphopteris okuboi (Yatabe) Copel.*
玉山箭竹	*Yushania niitakayamensis (Hay.) Keng. f.*

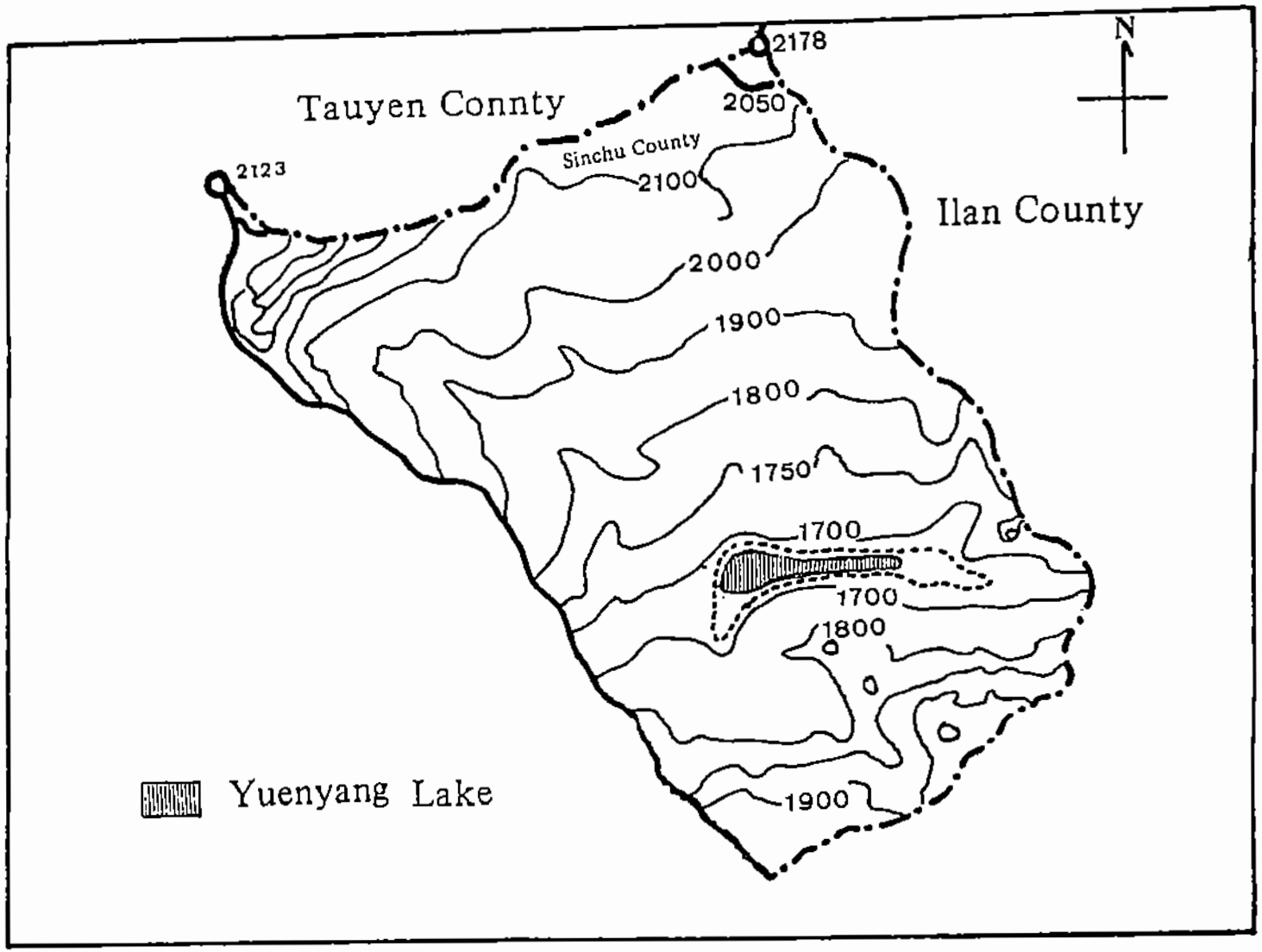


Fig. 6. The location of Yuenyang Lake natural reserve

Lanyangchi WETLAND DATA SHEET

1. Country: Republic of China
2. Date:
3. Ref:

4. Name and address of compiler:

5. Name of wetland:
Lanyangchi Estuary.

6. Geographical coordinates:
121° E, 24° N.

7. Location:
An estury located at the mouth of Lanyangchi, northeastern corner of Ilan city.

8. Area:

9: Altitude:

10. Biogeographical province

11. Wetland type:
2.

12. Description of site:

(a) water regime:

(b) water depth:
3m.

(c) salinity/acidity:
0‰ to 10‰.

(d) fluctuations/permanence:
Two tides daily.

(e) tidal variations:
About 3 m.

(f) climatic conditions:

13. Principal vegetation:
(a) aquatic vegetation:
Phragmites communis.

(b) plant communities in adjacent areas:
Rice fields.

14. Land tenure:
(a) of site:
Bureau of the Waters.

(b) of surrounding areas:
Private.

15. Conservation measures taken:
(a) protected areas:
Designated as a coastal protected area by National Park Department, Ministry of the Interior in 1985.

(b) other measures:
Established as a bird sanctuary by Bureau of Tourism about ten years ago.

16. Conservation measures proposed:
(a) existing proposals:

(b) new proposals:

17. Current land use:
(a) at the wetland:

(b) in surrounding areas:
Rice fields, aquacultural ponds, and sandy beach.

18. Possible changes in land use and proposed development projects:
(a) at the wetland:

(b) in the water catchment area:

19. Disturbances and threats:
Water pollution from Ilan city, water hyacinth in the river, and illegal hunting for ducks.

20. Conservation values:
(a) economic and social values:
A major place for watching migrating waders and ducks in Taiwan.
(b) wildlife:
Lists of birds attached. (Table 5)

-- fish:

-- waterfowl:
Ducks, geese, and egrets.

-- other fauna: (Table 6)

(c) special floral values

21. Research and facilities:

22. References:

23. Outline map of site:
-- Fig. 1,7

24. Criteria for inclusion:
2c.

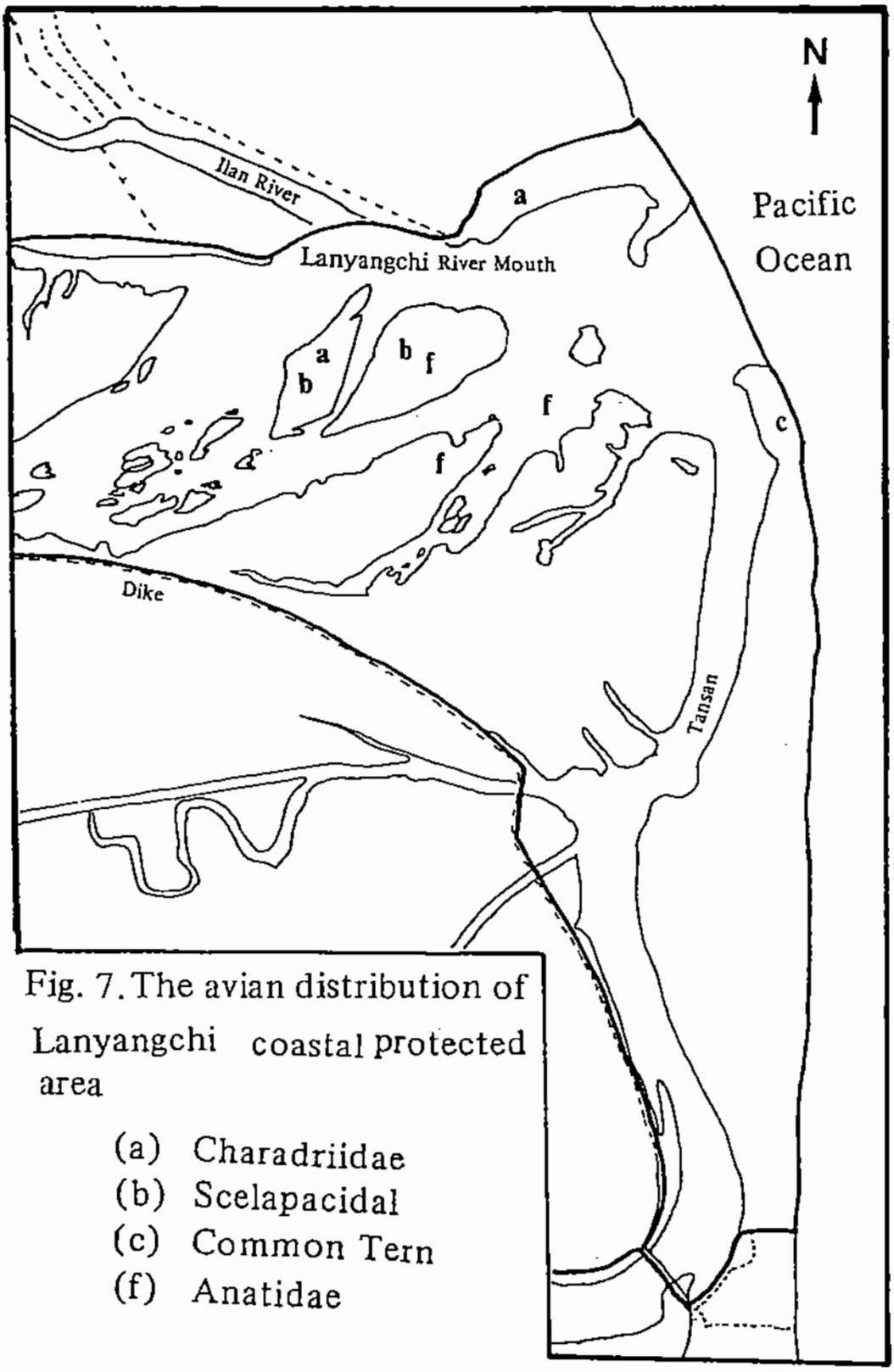


Fig. 7. The avian distribution of Lanyangchi coastal protected area

(a) Charadriidae
(b) Scelapacidal
(c) Common Tern
(f) Anatidae

Table 13 b. Vegetation Composition at Lanyang estuary

+ rare ++ common +++ abundant

plant name	abundance			
	sand dune	windbreak	marsh	upland
樟科 Lauraceae				
Cassytha filiformis 無根藤	+	+		
蝶形花科 Papilionaceae				
Alysicarpus vaginalis 山地豆				+
Canavalia lineata 濱刀豆	++			
Dolichos lablab 肉豆				+
Sesbania sesban 印度田菁				+
Vigna marina 濱豇豆	+			
木麻黃科 Casuarinaceae				
Casuarina equisetifolia 木賊葉木麻黃		++		
桑科 Moraceae				
Ficus microcarpa 榕樹				+
Morus australis 小葉桑				+
錦葵科 Malvaceae				
Hibiscus tiliaceus 黃槿		++		
Sida rhombifolia 金午時花				+
Urena lobata 野棉花				+
太戟科 Euphorbiaceae				
Macaranga tanarius 血桐				+
Ricinus communis 蓖麻				+
Sapium sebiferum 烏桕				+
藤黃科 Clusiaceae				
Calophyllum inophyllum 瓊崖海棠		++		
夾竹桃科 Apocynaceae				
Cerbera manghas 海檬果		++		

	abundance			
	sand dune	windbreak	marsh	upland
茜草科 Rubiaceae				
Paederia scandens 鵝屎藤				+
馬鞭草科 Verbenaceae				
Callicarpa formosana 杜虹花				+
Clerodendrum inerme 苦藍盤				++
Lantana camara 馬纓丹		++		+
Phyla nodiflora 過江藤				+
Verbena officinalis 馬鞭草				+
Vitex rotundifolia 蔓荊	++	+		
十字花科 Cruciferae				
Barbarea othocera var. *formosana* 山芥菜				+
Cardamine flexuosa 焊菜				+
石竹科 Caryophyllaceae				
Stellaria aquatica 鵝兒腸				+
Stellaria media 繁縷				+
馬齒莧科 Portulacaceae				
Portulaca oleracea 馬齒莧				+
Portulaca pilosa 毛馬齒莧	+	+		
蓼科 Polygonaceae				
Polygonum chinense 火炭母草				+
Polygonum lapathifolium 早苗蓼				+
Rumex japonicus 羊蹄				+
莧科 Amaranthaceae				
Celosia argentea 青葙				+
Alternanthera sessilis 蓮子菜				++
柳葉菜科 Onagraceae	++			
Oenothera tetraptera 月見草				
繖形科 Umbelliferae				
Centella asiatica 地棠草		+		
草海桐科 Goodeniaceae				
Scaevola sericea 草海桐	+			
菊科 Compositae				

	abundance			
	sand dune	windbreak	marsh	upland
Ageratum conyzoides 藿香薊				+
Artemisia princeps var. *Orientalis* 艾				+
Bidens pilosa var. *minor* 咸豐草		+		
Centipeda minima 石胡荽				+
Cotula chinensis 假吐金菊				+
Crassocephalum crepidioides 昭和草				++
Eclipta prostrata 鱧腸				+
Emilia sonchifolia 紫背草	+			+
Erigeron canadensis 加拿太蓬	+	+		+
Eupatorium formosana 台灣澤蘭				+
Gnaphalium purpureum 鼠麴舅	+			+
Ixeris chinensis 兎仔菜		+		+
Ixeris laevigata var. *oldhami* 刀傷草	+	+		
Ixeris repens 濱剪刀股	+			
Lactuca formosana 台灣山苦苣	+			
Wedelia biflora 雙花蟛蜞菊	+++	++		+
Youngia japonica 黃鵝菜				+
茄科 Solanaceae				
Physalis angulata 燈籠草				+
Solanum nigrum 龍葵				+
旋花科 Convolvulaceae				
Ipomoea pes-capre 馬鞍藤	+++	++		
玄參科 Scrophulariaceae				
Scoparia dulcis 珠仔草				+
Vandellia anagallis 定經草				+
唇形科 Labiatae				
Scutellaria rivularis 向天盞				+
酢醬草科 Oxalidaceae				
Oxalis corniculata 酢醬草				+
Oxalis corymbosa 紫花酢醬草				+
鴨跖草科 Commelinaceae				
Murdannia keisak 水竹葉				++

	abundance			
	sand dune	windbreak	marsh	upland
雨久花科 Pontederiaceae				
Eichhornia crassipes 布袋蓮			+++	
露兜樹科 Pandanaceae				
Pandanus odoratissimus var. *sinensis* 林投		+++		+
莎草科 Cyperaceae				
Carex pumila 小海米	++			
Carex kobomugi 海米	+	+		
Cyperus malaccensis subsp. *monophyllus* 單葉毓草			++	
Kyllinga brevifolia 短葉水蜈蚣				+
禾本科 Gramineae				
Brachiaria mutica 巴拉草				++
Cynodon dactylon 狗牙根				+
Digitaria ciliaris 升馬唐				+
Digitaria radicosa 小馬唐				+
Echinochloa crus-galli var. *formosana* 台灣野稗				+
Eleusine indica 牛筋草				+
Imperata cylindrica var. *major* 白茅	+++	++		
Miscanthus floridulus 五節芒	++	+		+++
Panicum repens 舖地黍	+			++
Paspalum conjugatum 兩耳草				+
Pennisetum purpureum 象草				+++
Phragmites communis 蘆葦		+++		
Saccharum spontaneum 甜根子草				++
Spinifex littoreus 濱刺麥	++	+		
Sporobolus fertilis 鼠尾栗				+

Tatu WETLAND DATA SHEET

1. Country: Republic of China
   2. Date:
   3. Ref:

4. Name and address of compiler:

5. Name of wetland:
   Tatu Estuary.

6. Geographical coordinates:
   24°10'N, 120°28'E.

7. Location:
   In the northwest of Changhua County, central Taiwan.

8. Area:
   About 150 hectares.

9: Altitude:
   -5 to 5m.

10. Biogeographical province:

11. Wetland type:
    2, 8.

12. Description of site:

    (a) water regime:

    (b) water depth:
        0 to 3m.

    (c) salinity/acidity:

    (d) fluctuations/permanence:

    (e) tidal variations:

    (f) climatic conditions:

13. Principal vegetation:
    (a) aquatic vegetation:
        Dominated by Phragmites communis and Paspalum vaginatum.

(b) plant communities in adjacent areas:
See attached list. (Table 14)

14. Land tenure:
(a) of site:
Owned by Ministry of Economic Affairs.

(b) of surrounding areas:
Owned by Ministry of Economic Affairs.

15. Conservation measures taken:
(a) protected areas:
Proposed as a bird sanctuary.

(b) other measures:

16. Conservation measures proposed:
(a) existing proposals:

(b) new proposals:

17. Current land use:
(a) at the wetland:

(b) in surrounding areas:
Abandoned fish ponds.

18. Possible changes in land use and proposed development projects:
(a) at the wetland:
Proposed as a coal ash deposit site by Taiwan Power Co..

(b) in the water catchment area:
Proposed use for some industrial development projects.

19. Disturbances and threats:
Air pollution and water pollution from industrial development.

20. Conservation values:
(a) economic and social values:
Popular for bird watching.

(b) wildlife:
-- fish:
See attached list. (Table 15)

-- waterfowl:
See attached list. (Table 15)

-- other fauna:
See attached list. (Table 15)

(c) special floral values
Two rare species, Myoporum bontioides and Gymnodinium aeruginosum, were found here.

21. Research and facilities:
Basic research has been done by Professors Huang and Lin of National Taiwan University.

22. References:

23. Outline map of site:
Fig. 1,8

24. Criteria for inclusion:
2b

Table 14. List of plants at Tatu Estuary

Chinease name	Scientific name
木麻黃	*Casuarina equisetifolia L.*
葎　草	*Humulus scandens (Lour.) Merr.*
長葉羊蹄	*Rumex crispus L.*
臭　杏	*Chenopodium ambrosioides L.*
裸花鹹蓬	*Suaeda nudiflora (Willd.) Moq.*
土牛膝	*Achyranthes aspera L. var. indica L.*
刺　莧	*Amaranthus spinosus L.*
番　杏	*Tetragonia tetragonoides (Pall.) Ktze.*
馬齒莧	*Portulaca oleraceae L.*
落　葵	*Basella rubra L.*
芥藍菜	*Brassica alboglabra Bail. var. acephala DC.*
小團扇薺	*Lepidium virginicum L.*
相思樹	*Acacia confusa Merrill*
山地豆	*Alysicarpus vaginalis (L.) DC.*
含羞草	*Mimosa pudica L.*
豌　豆	*Pisum sativum L.*
印度田菁	*Sesbania sesban (L.) Merr.*
匍匐大戟	*Euphorbia prostrata Ait.*
冬葵子	*Abutilon indicum (L.) Sweet*
黃　槿	*Hibiscus tiliaceus L.*
賽　葵	*Malvastrum coromandelianum (L.) Garoke*
細葉金午時花	*Sida acuta Burm. f.*
野棉花	*Urena lobata L.*
葫　蘆	*Lagenaria leucantha (Duchesne) Rusby*
番石榴	*Psidium guajava L.*
雷公根	*Centella asiatica (L.) Urban*
茴　香	*Foeniculum vulgare Gaertn.*
華牽牛	*Ipomoea sinensis (Desr.) Choisy*
馬鞍藤	*Ipomoea pes-caprae (L.) Sweet subsp. brasiliensis (L.) Ooststt.*
馬纓丹	*Lantana camara L.*

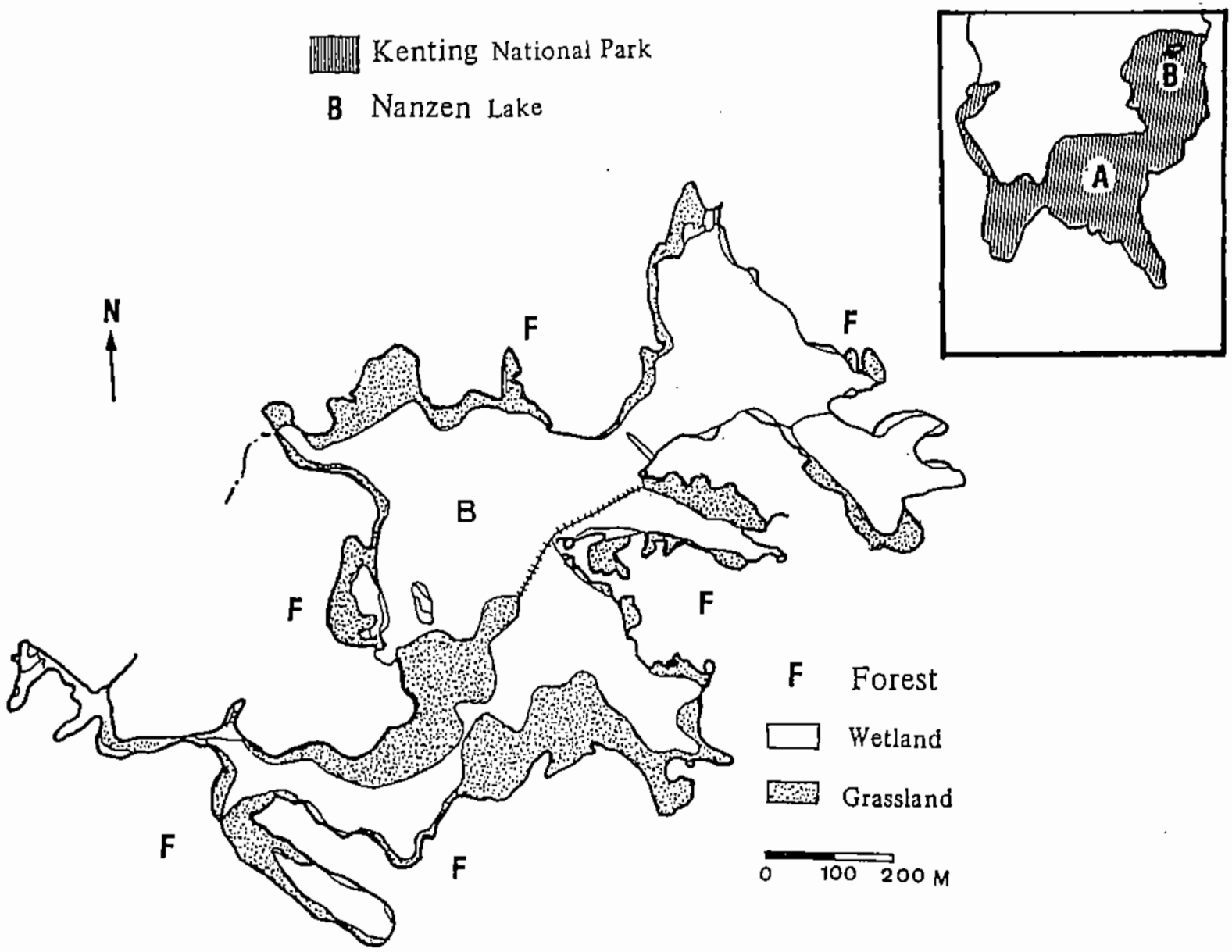


Fig. 12. The location and vegetation map of Nanjen Lake

Table 14. (Continued)

Chinease name	Scientific name
鴨舌癀	*Phyla nodiflora (L.) Greene*
曼陀羅	*Datura metel L.*
印度茄	*Solanum indicum L.*
龍　葵	*Solanum nigrum L.*
有骨消	*Sambucus formosana Nakai*
紫花藿金菊	*Ageratum houstonianum Miller*
小白花鬼針	*Bidens pilosa L. var. minor (Blume) Sherff*
茼　蒿	*Chrysanthemum coronarium L.*
鱧　腸	*Eclipta prostrata L.*
紫背草	*Emilia sonchifolia (L.) DC.*
加拿大蓬	*Erigeron canadensis L.*
臺灣澤蘭	*Eupatorium formosanum Hayata*
兎仔菜	*Xeris chinensis (Thunb.) Nakai*
苍　耳	*Xanthium strumarium L. var. japonica (Widder) Hara*
蒺藜草	*Cenchrus echinatus L.*
臺灣虎尾草	*Chloris formosana (Honda) Keng*
狗牙根	*Cynodon dactylon (L.) Pers.*
龍爪茅	*Dactyloctenium aegyptium (L.) P. Beauv.*
稗	*Echinochloa crus-galli (L.) Beauv.*
水　稻	*Oryza sativa L.*
舖地黍	*Panicum repens L.*
海雀稗	*Paspalum vaginatum Sw.*
象　草	*Pennisetum purpureum Schumach.*
舖地狼尾草	*Pennisetum cladestinum Hochst. ex Chiov.*
蘆　葦	*Phragmites communis (L.) Trin.*
紅毛草	*Rhynchelytrum repens (Willd.) C. E. Huff.*
馬尼拉芝	*Zoysia matrella (L.) Merr.*
林　投	*Pandanus odoratissimus L. f. var. sinensis (Warb.) Kanehira*

Table 15. The faunal list of Tatu Estuary

	Chinese name	Scientific name
Mammals	田鼷鼠（月鼠）	*Mus formosanus*
哺乳類	赤背條鼠（黑帶鼠）	*Apodemus agrarius*
	小黃腹鼠	*Rattus losea*
	鬼　鼠	*Bandicota indica*
	溝鼠（褐鼠）	*Rattus norvegicus*
	台灣鼹鼠	*Talpa micrura*
	臭鼩（錢鼠）	*Suncus murinus*
	赤腹松鼠	*Callosciurus erythraeus*
Birds	蒼　鷺	*Ardea cinerea*
鳥　類	牛背鷺	*Bubulcus ibis*
	大白鷺	*Egretta alba*
	小白鷺	*Egretta garzetta*
	中白鷺	*Egretta intermedia*
	夜　鷺	*Nycticorax nycticorax*
	栗小鷺	*Ixobrychus cinnamomeus*
	紫　鷺	*Ardea purpurea*
	小鸊鷉	*Podiceps ruficollis*
	黑面琵鷺	*Platalea minor*
	黑頭白鷺	*Threskrornis melanocephalao*
	尖尾鴨	*Anas acuta*
	小水鴨	*Anas crecca*
	花嘴鴨	*Anas paecilorhyncha*
	赤頸鳧	*Anas penelope*
	白眉鴨	*Anas guerguedula*
	琵嘴鴨	*Anas clypeata*
	綠頭鴨	*Anas platyrhynehos*
	羅文鴨	*Anas falcota*
	濱　鳧	*Tadorna ferruginea*
	鈴　鴨	*Aythya marila*
	花　鳧	*Tadorna tadorna*

Table 15. (Continued)

	Chinese name	Scientific name
Birds	美國小水鴨	*Anas orecea*
鳥　類	老　鷹	*Milvus migrans*
	灰面鵟	*Butastur indicas*
	灰澤鵟	*Circus cyaneus*
	澤　鵟	*Circus aeruginosus*
	赤腹鷹	*Accipiter soloensis*
	雀　鷹	*Accipiter virgutus*
	黃嘴角鴞	*Otus spilocephalus*
	紅　隼	*Falco tinnunculus*
	雉（環頸雉）	*Phasianus colchicus*
	竹　鷄	*Bambusicola thoracua*
	棕三趾鶉	*Turnix suscitator*
	小三趾鶉	*Turnix sylvatica*
	緋秧鷄	*Purzana fusca*
	灰胸秧鷄	*Rallus striatus*
	董　鷄	*Gallicrex cinerea*
	紅冠水鷄	*Gallinula chloropus*
	鳧　翁	*Fulica atra*
	白腹秧鷄	*Amaurornis phoenicurus*
	秧　鷄	*Rallus aquaticus*
	水　雉	*Hydrophasianus chirurgus*
	彩　鷸	*Rostratula benghalensis*
	小環頸鴴	*Chavadrius dubius*
	東方環頸鴴	*Charadrius alexandrinus*
	蒙古鐵嘴鴴	*Charadrius mongolus*
	斑　鴴	*Pluvialis squatarola*
	黑胸鴴	*Charadrius dominicus*
	小辮鴴	*Vanellus vanellus*
	紅胸鴴	*Charadrius asiaticus*
	小杓鷸	*Numenius minutus*

Table 15. (Continued)

	Chinese name	Scientific name
Birds	中杓鷸	*Numenius phaeopus*
鳥　類	大杓鷸	*Numenius arguata*
	蹼　鷸	*Numenius madagascariensis*
	黑尾鷸	*Limosa limosa*
	斑尾鷸	*Limosa lapponica*
	赤足鷸	*Tringa totanus*
	小青足鷸	*Tringa stagnatilis*
	青足鷸	*Tringa nebularia*
	白腰草鷸	*Tringa achropus*
	鷹斑鷸	*Tringa glareula*
	磯　鷸	*Tringa hypoleueos*
	黃足鷸	*Tringa incana*
	反嘴鷸	*Xenus cinereus*
	翻　領	*Arenaria interpres*
	田　鷸	*Capella gallinago*
	漂　鷸	*Calidris canutus*
	姥　鷸	*Calidris tenuirostris*
	穉　鷸	*Calidris ruficollis*
	雲雀鷸	*Calidris minutilla*
	尖尾鷸	*Calidris acuminata*
	濱　鷸	*Calidris alapina*
	尅　鷸	*Calidris ferruginea*
	三趾鷸	*Crocethia alba*
	寬嘴鷸	*Limicola falcinellus*
	流蘇鷸	*Philomachus pugnax*
	鶴　鷸	*Tringa erythropus*
	針尾鷸	*Capella stenura*
	高蹺鴴	*Himantopus himantopus*
	反嘴鴴	*Recurvirostta*
	紅領瓣足鷸	*Phalarpous lobatus*

Table 15. (Continued)

	Chinese name	Scientific name
Birds	燕　鴴	*Glareola pratincola*
鳥　類	黑脊鷗	*Larus argentatus*
	紅嘴鷗	*Larus ridibundus*
	黑腹燕鷗	*Chlidonias hydrida*
	白翅黑燕鷗	*Chlidonias leucoptera*
	紅燕鷗	*Sterna dougallii*
	蒼燕鷗	*Sterna sumatrana*
	小燕鷗	*Sterna albifrons*
	玄燕鷗	*Anous stolidus*
	黑嘴鷗	*Carus saundersi*
	鷗嘴燕鷗	*Gelochelidon nilotica*
	鷗	*Larus canus*
	燕　鷗	*Sterna nirundo*
	斑頸鳩	*Streptopelia chinensis*
	紅　鳩	*Streptopelia tranquebarica*
	翠翼鳩	*Chalcophaps indica*
	番　鵑	*Centropus bengalensis*
	杜　鵑	*Cuculus canorus*
	筒　鳥	*Cuculs saturatus*
	大慈悲心鳥	*Cuculus sparverivides*
	小雨燕	*Apus affinis*
	白腰雨燕	*Apus pacificus*
	棕沙燕	*Riparia paludiccla*
	家　燕	*Hirundo rustica*
	洋　燕	*Hirundo tahitica*
	赤腰燕	*Hirundo daurica*
	翡　翠	*Alcedo atthis*
	伯　雲	*Alauda gulgula*
	大捲尾	*Dicrurus macrocerus*
	樹　鵲	*Crypsirina formosae*

Table 15. (Continued)

	Chinese name	Scientific name
Birds	喜　鵲	*Pica pica*
鳥　類	青背山雀	*Parus monticulus*
	粉紅鸚嘴	*Paradoxornis webbiana*
	畫　眉	*Garrulax canorus*
	小彎嘴畫眉	*Pamatorhinus ruficollis*
	白頭翁	*Pyononotus sinensis*
	紅嘴黑鵯	*Hypsipetes madayascariensis*
	黃尾鴝	*Phoenicurus auroreus*
	黑喉鴝	*Saxicola torquata*
	藍磯鶇	*Monticola sulitaria*
	斑點鶇	*Turdus naumanni*
	野　鴝	*Erithacus colliope*
	灰叢鴝	*Saxicola ferrea*
	赤腹鶇	*Turdus chrysolaus*
	白眉鶇	*Turdus obscurus*
	白腹鶇	*Turdus pallidus*
	虎　鶇	*Zoothera dauma*
	斑紋鷦鶯	*Prinia polychroa*
	短尾鴗	*Cettia squamciaps*
	大葦鶯	*Acrocephalus arundinaceu*
	極北柳鶯	*Phyllcscopus borealis*
	錦　鴝	*Cisticola juncidis*
	白頭錦鴝	*Cisticola exilis*
	褐頭鷦鶯	*Prinia subflava*
	灰頭鷦鶯	*Prinia flaviventris*
	短翅樹鶯	*Cettia diphone*
	小　鴗	*Cettia fortipes*
	黃眉鴝	*Locustella fasciolata*
	褐色柳鶯	*Phylloscopus fascatus*
	黃眉柳鶯	*Phylloscopus inornatus*

Table 15. (Continued)

	Chinese name	Scientific name
Birds	黑頸鶲	*Hypothymis azurea*
鳥　類	灰斑鶲	*Muscicapa griseisticta*
	黃胸青鶲	*Muscicapa hyperythra*
	寬嘴鶲	*Muscicapa latirostris*
	黃鶺鴒	*Motacillida flava*
	灰鶺鴒	*Motasilla cinerea*
	白鶺鴒	*Motacilla alba*
	樹　鷚	*Anthus hodgsoni*
	赤喉鷚	*Anthus cervinus*
	大花鷚	*Anthus novaesealandiae*
	紅尾伯勞	*Lanius cristatus*
	紅頭伯勞	*Lanius bucephalus*
	棕背伯勞	*Canius schach*
	八　哥	*Acridotheres cristatellus*
	灰椋鳥	*Sturnus cineraceus*
	噪林鳥	*Zosterops japonica*
	綠繡眼	*Zosterops japonica*
	麻　雀	*Passer montanus*
	尖尾文鳥	*Lonchura striata*
	斑文鳥	*Lonchura punctulata*
	黑臉鵐	*Emberiza spodocephala*
	銹　鵐	*Emberiza rutila*
	臘嘴雀	*Cocothraustes coccothraustes*
	小　鵐	*Emberiza pusilla*
	野　鵐	*Emberiza sulphurata*
	爪哇雀	*Padda oryzivera*
Reptile	臭青公	*Elaphe carinate*
爬蟲類	飯匙倩	*Naja naja*
	草花蛇	*Nutrix piscator*
	南　蛇	*Ptyas mucosus*

Table 15. (Continued)

	Chinese name	Scientific name
Reptile	花浪蛇	*Natrix stolata*
爬蟲類	斯文豪氏攀木蜥蜴	*Jupulura swinhonis*
	中國石龍子	*Eumeces chinensis*
	蛇　母	*Takydromus septentrionalis*
	守　宮	*Gekko japonicus*
Amphibians	黑眶蟾蜍	*Bufo melanoslicus*
兩棲類	澤　蛙	*Rana limnocharis*
	小雨蛙	*Microhyla ornata*
	虎皮蛙	*Ranu tigrina*
	貢德氏赤蛙	*Rana guentheri*
	中國樹蛙	*Hyla chinensis*
	金線蛙	*Rana plancyi*
Butterflies	日本紋白蝶	*Pieris rapae*
蝴　蝶	黃　蝶	*Eurema hecabe*
	孔雀紋挾蝶	*Precis almana*
	雌紅紫挾蝶	*Hypolimnas misipprs*
	黃挾蝶	*Polygonia c-aureum*
	紫斑蝶	*Euploea syvestor*
	青帶鳳蝶	*Graphium surpedon*
	黑鳳蝶	*Papilio protenor*
	黃鳳蝶	*Papilio machaon*
	烏鴉鳳蝶	*Papilio bianor*
	白三線蝶	*Tacoraea perius*
	琉球紫挾蝶	*Hypdimnas bolina*
	端紅蝶	*Hebomoia glancippe*
	紫端斑蝶	*Euploea mulciber*
	青斑蝶	*Parantica situ*
	台灣琉球小灰蝶	*Celastrina argiolus*
	台灣粉蝶	*Appias lyncida*
	雌白黃蝶	*Lxias pyrene*

Table 15. (Continued)

	Chinese name	Scientific name
Butterflies	大紅紋鳳蝶	*Byasa Polyeuctes*
蝴　蝶	石牆蝶	*Cyrestis thyodamus*
	樹間蝶	*Melanitis leda*
	黑樹間蝶	*Melanitis phedima*
	黑擬挾蝶	*Precis iphita*
	蛇目蝶科	*Satyridae*
	鳳蝶科	*Papilionidae*
Fish	白　鰻	*Anguilla japonica*
魚　類	鱓　鰻	*Anguilla marmorata*
	鯉　魚	*Cyprinus carpio*
	鯽　魚	*Carassius auratus*
	羅漢魚	*Pararasbora parva*
	青　魚	*Mylopharyngodon pic*
	草　魚	*Ctonopharyngodon idella*
	白　鰱	*Hypophthalmichthys molitrix*
	鱊　魚	*Rhodeus spinalis*
	台灣石鮒	*Acheilognathus himantegus*
	平頷鱸	*Zacco platypus*
	粗首鱸	*Zacco pachycephalus*
	斑　鰶	*Sacrocheilichtys niyripinnis*
	泥　鰌	*Misgurnus anguillicaudatus*
	花　鰌	*Cobitis taenia*
	粗鱗土鰌	*Misgurnus decemcirrosus*
	黃　鰗	*Fluta alba*
	鱧　魚	*Channa maculata*
	七星鱧	*Channa asiatica*
	大肚魚	*Gambusia patruelis*
	吳郭魚	*Tilapia sp.*
	烏　魚	*Mugil cephalus*
	汙鰨鯔	*Liza melanoptera*

Table 15. (Continued)

	Chinese name	Scientific name
Fish	台灣鯔	*Liza formosae*
魚　類	大鱗鯔	*Liza macrolepis*
	鬥　魚	*Macropodus opercularis*
	花身鷄魚	*Therapon jarbus*
	斑海鯰	*Arius maculatus*
	棕塘鱧	*Eleotris fusca*
	大彈塗魚	*Boleophthalms pectinirostris*
	青彈塗魚	*Scartelaos viridis*
	彈塗魚	*Periophthalmus cantonensis*
	極樂鰕虎	*Rhinogobius giurinus*
	銀紋笛鯛	*Lutyanus argentimaculatus*
	波路莖齒蛇鰻	*Pisoodonophis boro*
	食蟹莖齒蛇鰻	*Pisoodonophis cancvivorus*

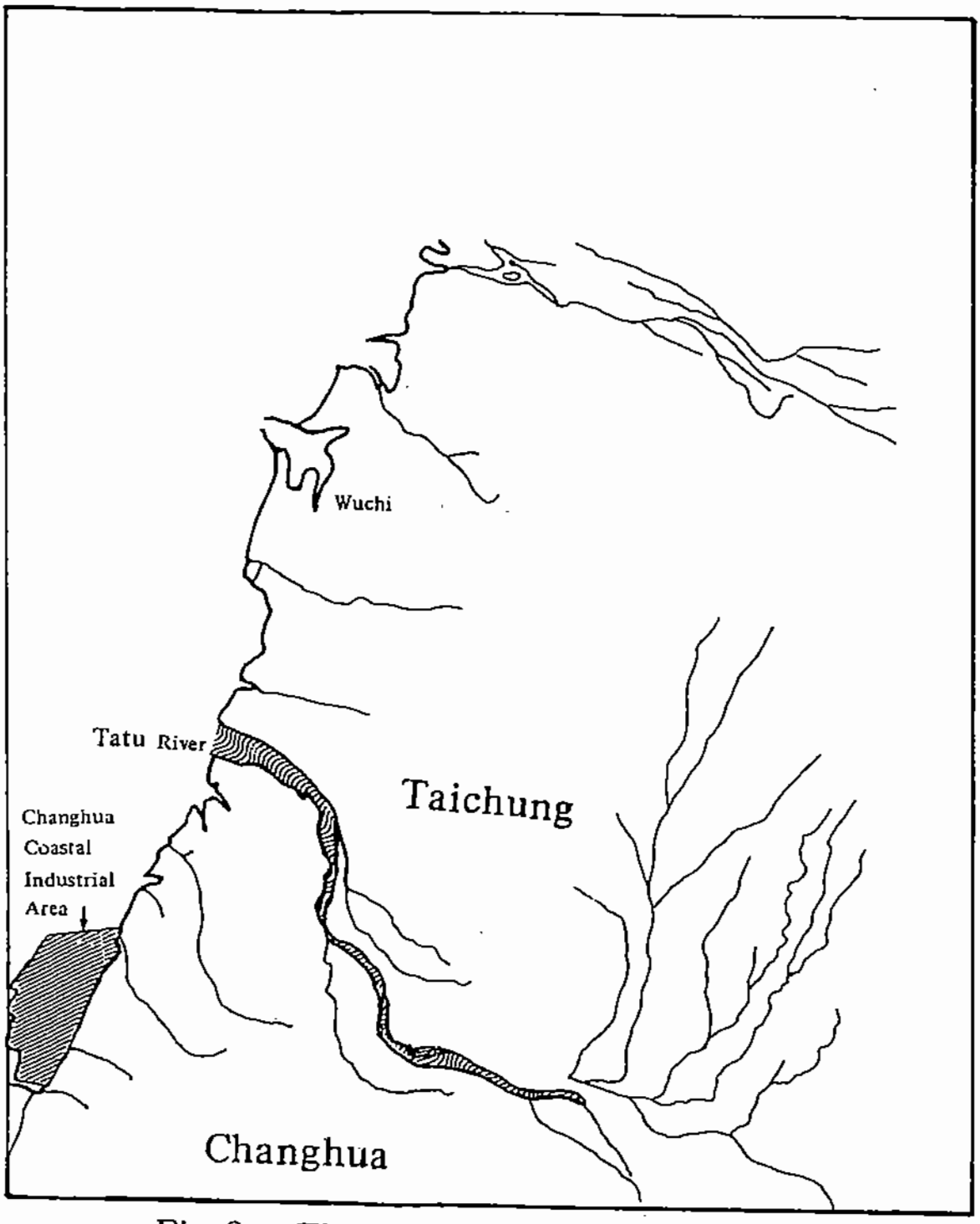


Fig. 8. The map of Tatu esturay

Tungshih WETLAND DATA SHEET

1. Country:
Republic of China

2. Date:

3. Ref:

4. Name and address of compiler:

5. Name of wetland:
Tungshih Mangrove.

6. Geographical coordinates:
23° 27'N, 120° 9'E.

7. Location:
West coast of Chiayih County, Taiwan.

8. Area:
About 30 hectares.

9: Altitude:
Close to sea level.

10. Biogeographical province:

11. Wetland type:
7

12. Description of site:

(a) water regime:

(b) water depth:
0.5 to 1m at high tide

(c) salinity/acidity:
20‰ to 35‰

(d) fluctuations/permanence:

(e) tidal variations:

(f) climatic conditions:

13. Principal vegetation:
(a) aquatic vegetation:
Mixed forest of Avicennia marina, Kandelia candel & Rhizophora mucronata.

(b) plant communities in adjacent areas:
Atriplex nummularia, Myoporum bontioides, etc.

14. Land tenure:
(a) of site:
Public

(b) of surrounding areas:
Private

15. Conservation measures taken:
(a) protected areas:
Proposed under the Coastal Zone Protection Project.

(b) other mersures:

16. Conservation measures proposed:
(a) existing proposals:
protected under the Coast Zone Protection Project.

(b) new proposals:

17. Current land use:
(a) at the wetland:
Oyster and clam culture around the mangrove.

(b) in surrounding areas:
Aquaculture.

18. Possible changes in land use and proposed development projects:
(a) at the wetland:
A tidal land development project is being proposed.

(b) in the water catchment area:

19. Disturbances and threats:
Invasion of shellfish culture, polluted water, sediment, tidal land development, etc.

20. Conservation values:
(a) economic and social values:
Promoting the productivity of oysters and clams of surrounding areas; research and education purposes.

(b) wildlife:
-- fish:
Some economic fish.

-- waterfowl:
Nesting sites of egrets and herons, many other waterfowls.

(Table 5)

-- other fauna: (Table 4)

(c) special floral values:
Mangrove, particularly the endangered Rhizophora mucronata, can be protected.

21. Research and facilities:
Detailed investigation, including the pattern of change during the past 30 years, as well as the interpretation system are being studied.

22. References:
Chen,Ming-yih and Yuan-ching Lee 1978. Tungshih Mangrove Forest and Egretry. Journal of Science & Engineering XV:117-128.

23. Outline map of site:
Fig. 1,9,10

24. Criteria for inclusion:

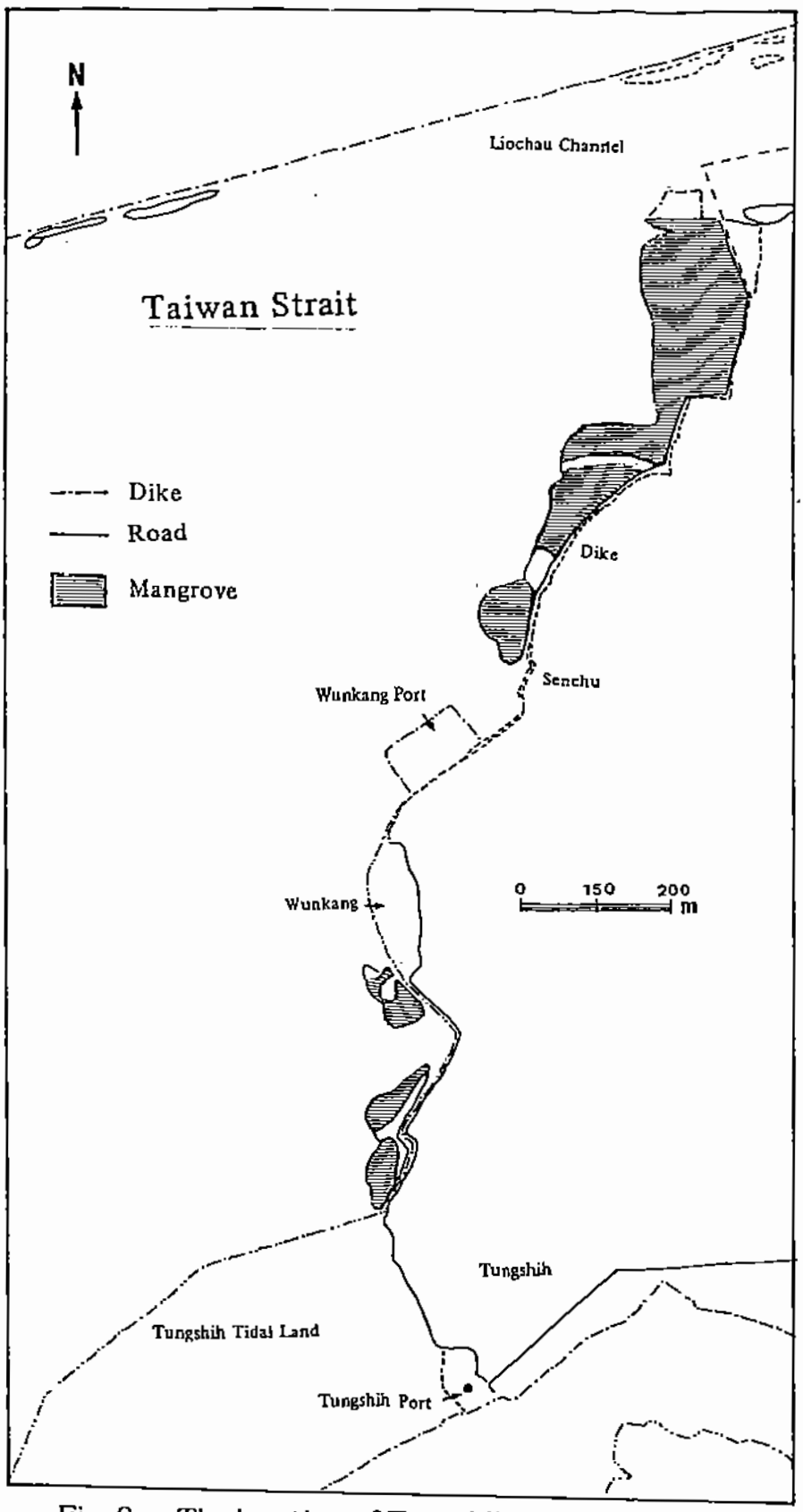


Fig. 9. The location of Tungshih protected area

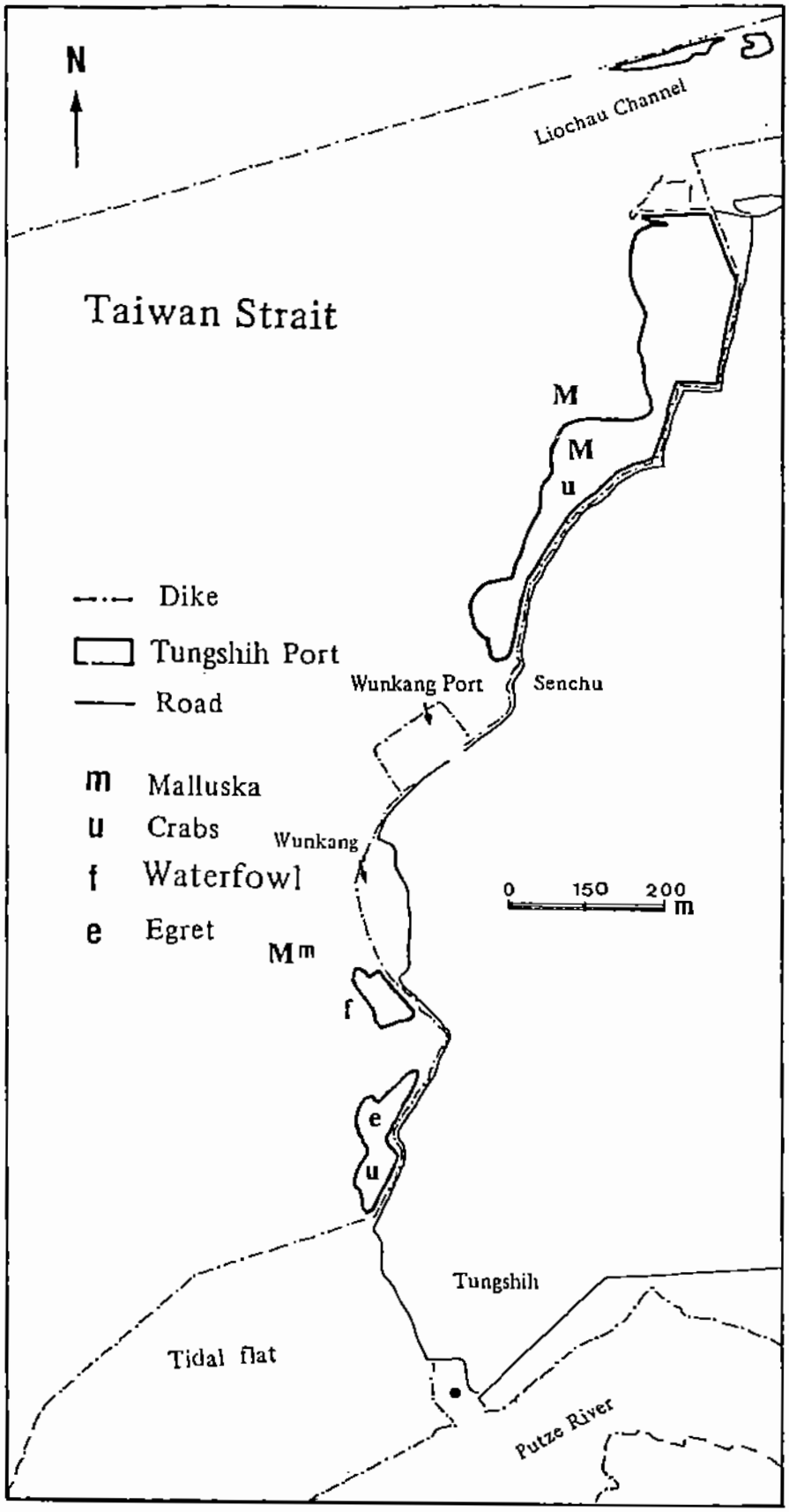


Fig..10. The avian distribution of Tungshih area

Payu Lake WETLAND DATA SHEET

1. Country:
Republic of China

2. Date:

3. Ref:

4. Name and address of compiler:

5. Name of wetland:
Payu Lake.

6. Geographical coordinates:
22°44'N, 120°53'E.

7. Location:
Boundary of Pintung and Taitung Counties, Southern Taiwan.

8. Area:
5.13 hectares.

9. Altitude:
2040m.

10. Biogeographical province:

11. Wetland type:
15.

12. Description of site:

(a) water regime:
Local rainfall.

(b) water depth:
1.5m.

(c) salinity/acidity:
/ Neutral.

(d) fluctuations/permanence:

(e) tidal variations:

(f) climatic conditions:

13. Principal vegetation:
    (a) aquatic vegetation:
        Chara sp. is the only large aquatic plant.

    (b) plant communities in adjacent areas:

14. Land tenure:
    (a) of site:
        Owned by Forestry Bureau.

    (b) of surrounding areas:
        Owned by Forestry Bureau.

15. Conservation measures taken:
    (a) protected areas:

    (b) other measures:

16. Conservation measures proposed:
    (a) existing proposals:
        Protected area is planned.

    (b) new proposals:

17. Current land use:
    (a) at the wetland:
        Carp reared in the lake by Pintung County Government.

    (b) in surrounding areas:
        Occasional hunting.

18. Possible changes in land use and proposed development projects:
    (a) at the wetland:

    (b) in the water catchment area:

19. Disturbances and threats:
    Carp rearing and hunting.

20. Conservation values:
    (a) economic and social values:
        Very valuable for research and educational purposes.

    (b) wildlife: Lists of birds, phytoplankton, and zooplankton attached.
        -- fish:

        -- waterfowl:

-- other fauna:
Many kinds of birds, which belong mainly to the Timaliinae, Hirundinidae, Apodidae, and Turdinae, inhabit the surrounding forests. (Table 16)

(c) special floral values
A virgin Taiwania forest in the northeast of Payu Lake.

21. Research and facilities:
Basic research was conducted by Otsu et. al in 1984.

22. References:
Otsu, Takashi, Takeo Kato, Chyng-Shyan Tzeng and Wan-Fu Chang 1984. Some Limnological Remarks on Lake Pa-Yu Chi, Southern Taiwan. Annals of the Tohoku Geographical Association 36(4): 247-256.

23. Outline map of site:
Fig. 1, 11.

24. Criteria for inclusion:
2b, 2c, 3a.

Table 16. The avian fauna of Payu Lake

Chinese name	Scientific name
深山竹雞	*Arborophila crudigularis*
竹　雞	*Bambusicola thoracica*
綠　鳩	*Treron sieboldii sororius*
灰林鴿	*Columba pulchrocollis*
領角鴞	*Otus bakkamoena glabripes*
鵂　鶹	*Glaucidium brodiei pardalotum*
灰林鴞	*Strix aluco yamadae*
雨　燕	*Apus affinis subfurcatus*
大白腰雨燕	*Apus pacificus pacificus*
五色鳥	*Megalaima oorti nuchalis*
大赤啄木	*Dendrocopos leucotos insularis*
毛腳燕	*Delichon urbica nigrimentalis*
赤腰燕	*Hirundo striolata striolata*
灰鶺鴒	*Motacilla cinerea robustis*
紅山椒魚	*Pericrocotus solaris griseigularis*
河　烏	*Cinclus pallasii pallasii*
小鶯鶲	*Brachgpteryx montana goodfellowi*
栗背林鴝	*Erithacus johnstoniae*
鉛色水鶲	*Rhyacornis fuliginosus affinis*
彎嘴畫眉	*Pomatorhinus erythrocnemis erythrocnemis*
小彎嘴畫眉	*Pomatorhinus ruficollis musicus*
鱗胸鷦鶯	*Pnoepyga pusilla formosae*
山紅頭	*Stachyris ruficeps praecognitus*
竹　鳥	*Garrulax poecilorhynchus poecilorphynchus*
白喉笑鴗	*Garrulax albogularis ruficeps*
金翼白眉	*Garrulax morrisonianus*
藪　烏	*Liocichla steeri*
紋翼畫眉	*Actinodura morrisoniana*
灰頭花翼畫眉	*Alcippe cinereiceps formosana*
綉眼畫眉	*Alcippe morrisonia morrisonia*
白耳畫眉	*Heterophasia auricularis*
冠羽畫眉	*Yuhina brunneiceps*
綠畫眉	*Yuhina zantholeuca zantholeuca*

Table 16. (Continued)

Chinese name	Scientific name
黃羽鸚嘴	*Paradoxornis gularis morrisoniana*
深山鶯	*Cettia acanthizoides concolor*
褐樹鶯	*Bradypterus seebahmi seebahmi*
棕面鶯	*Abroscopus albogularis fulrifacies*
火冠戴菊鳥	*Regulus goodfellowi*
黃胸青鶲	*Niltava vivida vivida*
紅尾鶲	*Muscicapa ferruginea*
青背山雀	*Parus monticolus insperatus*
紅頭山雀	*Aegithalos concinnus concinnus*
茶腹鳾	*Sitta europaea sinensis*
巨嘴鴉	*Corvus macrorhynchos colonorum*
星　鴉	*Nucifraga caryocatactes owstoni*
樫　鳥	*Garrulus glandarius taivanus*
小卷尾	*Dicrurus aeneus braunianus*

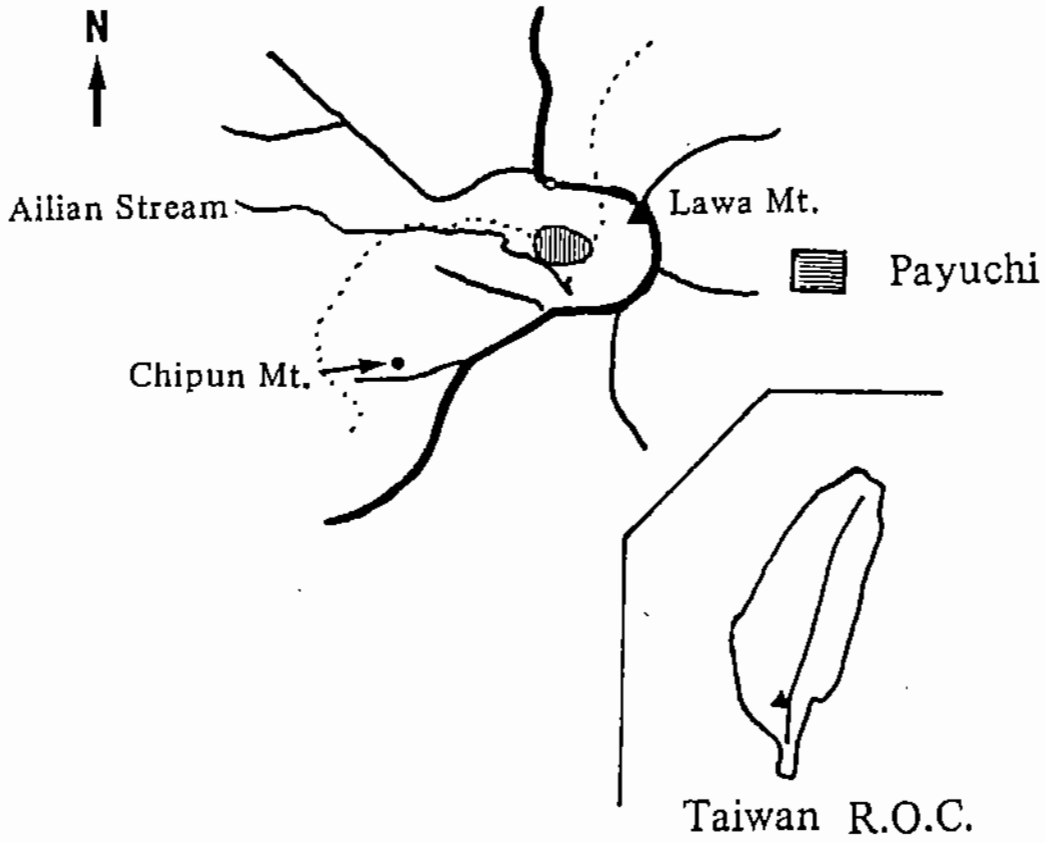


Fig. 11. The location of Payu Lake

Nanjen Lake WETLAND DATA SHEET

1. Country:
Republic of China

2. Date:

3. Ref:

4. Name and address of compiler:

5. Name of wetland:
Nanjen Lake.

6. Geographical coordinates:
22°05'N, 120°50'E.

7. Location:
Located on at the northeastern part of Kenting National Park, Hengchun peninsula.

8. Area:
150 hectares.

9. Altitude:
319m.

10. Biogeographical province:

11. Wetland type:
14, 19.

12. Description of site:

(a) water regime:
Local rainfall.

(b) water depth:
50 to 150 cm.

(c) salinity/acidity:
0 - 0.4 ‰ / pH 5 - 7.

(d) fluctuations/permanence:
Influenced by rainfall.

(e) tidal variations:

(f) climatic conditions:
Rainfall: 1700 - 2000 mm/yr, Rainy season: Jun.- Sep.
Temperature: yearly average: 23°C, max.:30°C, min.: 15°C
Monthly average humidity: 72 - 84 %

13. Principal vegetation:

(a) aquatic vegetation:
Dominant species are listed below: (Table 20)
Submergent species are Najas minor, Spirogyra arcta, and Riccia fluitans.
Floating species are Nymphoides cristata, Nymphaea rubra, and Azolla pinnata.
Emergent species are Eleocharis dulcis, Schoenoplectus juncoides, Leersia hexandra, and Sagittaria trifolia.

(b) piant communities in adjacent areas:
Tropical monsoon forest and some grassland.

14. Land tenure:

(a) of site:
Private.

(b) of surrounding areas:
Public.

15. Conservation measures taken:
(a) protected areas:
Designated as Nanjen Ecological Preservation Area within Kenting National Park in 1984.

(b) other measures:
Bird sanctuary.

16. Conservation measures proposed:
(a) existing proposals:

(b) new proposals:
Bird sanctuary.

17. Current land use:
(a) at the wetland:
Abandon rice field and reservoir

(b) in surrounding areas:
Virgin forest.

18. Possible changes in land use and proposed development projects:
(a) at the wetland:
None.

(b) in the water catchment area:
Build a check dam to maintain water levels.

19. Disturbances and threats:
Leersin hexandra is growing quickly in the area.
It will change the ecological circumstances.

20. Conservation values:
(a) economic and social values:

Scientific research and conservation.

(b) wildlife:

-- fish:
There are 21 species, dominated by exotic Tilapia sp. (Table 19)

-- waterfowl:
Eighty species of birds were recorded, half of them were waterfowls. (Table 17)

-- other fauna:
Ten species of shrimps, 9 species of snails, 5 species of crabs, 14 species of amphibians, and 24 species of reptiles were found. (Table 18, 19)

(c) special floral values
Four valuable or rare species of aquatic plants were found:
Rotala wallichii (newly recorded species in Taiwan)
Floscopa scandens (rare species)
Isachne miliaceaeb (rare species)
Monochoria korsakowii (rare species in Taiwan). (Table 20)

21. Research and facilities:

An ecological station will be established in 1987.

22. References:

a. Wang, Y. 1985. The ecological survey on birds at Nanjen Ecological Area, Keng-ting National Park. 68pp.

b. Chen, C. H., C. L. Wang. 1985. Ecological studies on the aquatic plants of Nanjen Mountain, Kengting National park. 210pp.

c. Lue. K. Y., M. C. Do, S. H. Cheng and S. Y. Lue 1985. The limnological study and the survey on amphibians and neptiles from Nanjen Lake. Published by SWAN 56 p.

23. Outline map of site:
Fig. 1, 12

24. Criteria for inclusion:
2b, 2c, 3a.

Table 17. Avian fauna of Nanjen Lake

Scientific name		Scientific name	
小鸊鹈	*Podiceps ruficollis*	小環頸鴴	*Charadrius dubius*
鸕鷀	*Phalacrocorax carbo*	東方環頸鴴	*Charadrius alexandrinus*
蒼鷺	*Ardea cinerea*	磯鷸	*Tringa hypoleueos*
牛背鷺	*Bubulcus ibis*	田鷸	*Capella gallinago*
大白鷺	*Egretta alba*	鶺斑鷸	*Tringa glareola*
中白鷺	*Egretta intermedia*	白腰草鷸	*Tringa ochropus*
小白鷺	*Egretta garzetta*	小燕鷗	*Sterna albifrons*
栗小鷺	*Ixobrychus cinnamomeus*	翠翼鳩	*Chalcophaps indica*
黃小鷺	*Ixobrychus sinesis*	斑頸鳩	*Streptopelia chinensis*
夜鷺	*Nycticorax nycticorax*	金背鳩	*Streptopelia orientalis*
尖尾鴨	*Anas acuta*	綠鳩	*Sphenurus sieboldii*
琵嘴鴨	*Anas clypeata*	紅鳩	*Streptopelia tranquebarica*
小水鴨	*Anas crecca*	領角鴞	*Otus bakkamoena*
赤頸鴨	*Anas penelope*	黃嘴角鴞	*Otus spilocephalus*
野鴨	*Anas platyrhynchos*	小雨燕	*Apus affinis*
花嘴鴨	*Anas poecilorhyncha*	翠鳥	*Alcedo atthis*
白眉鴨	*Anas querquedula*	赤翡翠	*Halcyon coromanda*
澤鴨	*Aythya fuligule*	五色鳥	*Megalaima oorti*
鳳頭蒼鷹	*Accipiter trivirgatus*	小雲雀	*Alauda gulgula*
灰面鵟	*Butastur indicus*	岩燕	*Delicon urbica*
老鷹	*Milvus migrans*	家燕	*Hirundo rustica*
大冠鷲	*Spilornis cheelahoya*	洋燕	*Hirundo tahitica*
鵟	*Buteo buteo*	棕沙燕	*Riparia paludicola*
灰澤鵟	*Circus cyaneus*	烏鴉	*Corvus macrorhynchus*
魚鷹	*Pandion haliaetus*	樹鵲	*Cypsirina formosae*
紅隼	*Falco tinnunculus*	台灣藍鵲	*Urocissa caerulea*
竹鷄	*Bambusicola thoracica*	頭烏線	*Alcippe brunnea*
深山竹鷄	*Arborophila crudigularis*	繡眼畫眉	*Alcippe morrisonia*
白腹秧鷄	*Amaurornis phoenicurus*	褐嘴畫眉	*Pomatorhinus erythrogenys*
紅冠水鷄	*Gallinula chloropus*	小彎嘴畫眉	*Pomatorhinas ruficollis*

Table 17. (Continued)

Scientific name		Scientific name	
山紅頭	*Stachyris ruficeps*	樹鷚	*Anthus hodgsoni*
棕耳鵯	*Hypsipetes amaurotris*	褐色鷚	*Authus spinoletta*
烏頭翁	*Pycnonotus taivanus*	白鶺鴒	*Motacilla alba*
紅嘴黑鵯	*Hypsipetes madagascariensis*	灰鶺鴒	*Motacilla cinerea*
藍磯鶇	*Monticola solitarius*	黃鶺鴒	*Motacilla flava*
白尾鴝	*Cinclidium leucurum*	紅尾伯勞	*Lanius cristatus*
虎鶇	*Zoothera dauma*	綠啄花鳥	*Dicaeum concolor*
短翅樹鶯	*Cettia diphone*	綠繡眼	*Zosterops japonica*
褐頭鷦鶯	*Prinia subflava*	麻雀	*Passer montanus*
黑枕藍鶲	*Hypothymis azurea*		
赤喉鷚	*Anthus cervinus*		

Table 18. Amphibian and Reptile fauna of Nanjen Lake

	Chinese name	Scientific name
Amphibian	中華大蟾蜍	*Bufo bufo gargarigans*
	莫氏樹蛙	*Rhacophorus moltrechti*
	褐樹蛙	*Rhacophorus robustus*
	艾氏樹蛙	*Rhacophorus eiffingeri*
	白頷樹蛙	*Polypedates leucomystax*
	日本河鹿樹蛙	*Rhacophorus japonicus*
	虎皮蛙	*Rana tigrina rugulosa*
	拉都希氏蛙	*Rana latouchi*
	澤　蛙	*Rana limnocharis*
	腹斑蛙	*Rana adenopleura*
	斯文豪氏蛙	*Rana narina swinhoana*
	金線蛙	*Rana plancyi*
	小姬蛙	*Microhyla ornata*
	希蒙氏姬蛙	*Microhyla heymonsi*
Reptiles	赤背松柏根	*Holarchus formosanus*
	紅斑蛇	*Dinodon rufozonatum rufozonatum*
	過山刀	*Zaocys dhumnades shima*
	梭德氏遊蛇	*Natrix sauteri*
	斯文豪氏遊蛇	*Natrix swinhonis*
	茶斑蛇	*Psammodynastes pulverulentus*
	錦　蛇	*Elaphe taeniura friesi*
	青　蛇	*Eurypholis major*
	百步蛇	*Agkistrodon acutus*
	龜殼花	*Trimeresurus mucrosquamatus*
	赤尾青竹絲	*Trimeresurus gramineus*
	雨傘節	*Bungarus multicinctus*
	眼鏡蛇	*Naja naja atra*
	守　宮	*Gekko japonicus*
	蝎　虎	*Hemidactylus frenatus*
	半葉趾虎	*Hemiphyllodactylus typus*
	南台草蜥	*Takydromus sauteri*
	台灣地蜥	*Platyplacopus kuehnei*
	長尾南蜥	*Mabuya longicaudata*

Table 18. (Continued)

	Chinese name	Scientific name
Reptiles	台灣滑蜥	*Scincella formosensis*
	鮑氏蜓蜥	*Sphenomorphus boulengeri*
	印度蜓蜥	*Sphenomorphus indicus*
	麗紋石龍子	*Eumeces elegans*
	箕作氏攀木蜥蜴	*Japalura mitsukurii mitsukurii*

Table 19. Fish, Crustacean and Mollusca of Nanjen Lake

	Chinese name	Scientific name
Fish	雜交種吳郭魚	*Tilapia (Hybrid)*
	極樂吻鰕虎魚	*Rhinogobius giurinus (Rutter)*
	溪　鰕	*Rhyacichthys aspro (Kuhl and Van Hasselt)*
	寬頰禿頭鯊	*Sicyopterus macrostetholepis (Bleeker)*
	黃　鱔	*Monopterus albus (Zuiew)*
	塘蝨魚	*Clarias fuscus (Lacépède)*
	羅漢魚	*Pseudorasbora parva (Temminck and Schlegel)*
	鯽	*Carassius auratus (Linn.)*
	鱓　鰻	*Anguilla marmorata Quoy et Gaimard*
	眼斑厚唇鯊	*Chonophorus ocellaris (Broussonnet)*
	棕塘鱧	*Eleotris fusca (Bloch and Schneider)*
	曙首厚唇鯊	*Chonophorus melanocephalus (Bleeker)*
	雙帶禿頭鯊	*Stiphodon elegans (Steindachner)*
	花身鵐魚	*Therapon jarbua (Forsskal)*
	湯　鯉	*Kuhlia marginata (Cuvier and Valenciennes)*
	大肚魚	*Gambusia affinis (Baird and Girard)*
	日本禿頭鯊	*Sicyopterus japonicus (Tanaka)*
	褐吻鰕虎魚	*Rhinogobius brunneus (Temminck et Schlegel)*
	大鱗副泥鰍	*Paramisgurnus dabryanus (Dabry de Thiersant)*
	短鰭頭	*Gerres abbreviatus Bleeker*
	黃足笛鯛	*Lutjanus fulvus (Bloch & Schneider)*
Crustacean	條紋沼蝦	*Macrobranchium sophronicum (Holthuis)*
	台灣沼蝦	*Macrobranchium formosense (Bate)*
	寬掌沼蝦	*Macrobranchium hirtimanus (Olivier)*
	郝氏沼蝦	*Macrobranchium horstii (De Man)*
	金刺沼蝦	*Macrobranchium lar (Fabricius)*
	短腕沼蝦	*Macrobranchium latimanus (Von Martens)*
	日本沼蝦	*Macrobranchium nipponense (de Haan)*
Mollusca	中國圓田螺	*Cipangopaludina chinensis (Gray)*
	方形環棱螺	*Bellamya guadrata (Denson)*
	瘤　蜷	*Tarebia granifera (Lamarck)*
	網　蜷	*Melanoides tuberculata (Müller)*
	台灣錐實螺	*Radix swinhoei (H. Adams)*

Table 19. (Continued)

	Chinese name	Scientific name
Mollusca	台灣類扁蛸	*Polypylis hemisphaerula (Benson)*
	壁蜑螺	*Septaria janelli (Recluz)*
	棘石蜑螺	*Clithon corona angulosa (Récluz)*
	稜　蚌	*Cristaria discoidea (Lea)*

Table 20. The list of aquatic plants in Nanjen Lake

Chinese name	Scientific name
火炭母草	*Polygonum chinense L.*
辣旱蓼（紅辣蓼）	*Polygonum glabrum Willd.*
長箭葉蓼	*Polygonum hastatosagittatum Makino*
睫穗蓼（馬蓼）	*Polygonum longisetum De Bruyn*
毛　蓼	*Polygonum virginianum L. var. filiforme (T.) Nakai*
清芳草	*Drymaria cordata (L.) Willd. subsp. diandra (Blume) I. Duke ex Hatusima*
蓮子草（滿天星）	*Alternanthera sessilis (L.) R. Br. ex Rome. & Schult.*
紅花睡蓮	*Nymphaea rubra Roxb. ex Salisb*
地耳草(小還魂絲繩)	*Hypericum japonicum Thunb. ex Murray*
台灣懸鉤子	*Rubus formosensis Ktze.*
紅梅消（茅莓）	*Rubus parvifolius L.*
變葉山螞蝗	*Desmodium heterophyllum (Willd.) DC.*
三點金草（蠅翅草）	*Desmodium triflorum (L.) DC.*
含羞草	*Mimosa pudica L.*
酢醬草	*Oxalis corniculata L.*
葉下珠（珠仔草）	*Phyllanthus urinaria L.*
野棉（虱母草）	*Urena lobata L.*
克菲亞草	*Cuphea carthagenensis (Jacq.) Macbrids*
瓦氏水豬母乳	*Rotala wallichii (Hook. f.) Koehne*
水丁香	*Ludwigia octovalvis (Jacq.) Raven*
白花水龍	*Ludwigia peploides (HBK.) Raven subsp. scipulacea (Ohwi) Raven*
小花水丁香	*Ludwigia perennis L.*
雷公根（蚶殼草）	*Centella asiatica (L.) Urban*
台灣天胡荽（變地錦）	*Hydrocotyle formosana Masamune*
水芹菜	*Oenanthe javanica (Blume) DC.*
銀蓮花	*Nymphoides cristata (Roxb.) Ktze.*
小破得力	*Borreria laevia (Lamk.) Grieseb.*
定經草（珠仔菜）	*Hedyotis diffusa Willd.*
甕菜（空心菜）	*Ipomoea aquatica Forsk*
頭花四方骨	*Hyptis rhomboides Mart. & Gal.*
仙草舅	*Mesona procumbens Hemsl.*
紫蘇草	*Limnophila aromatica (Lam.) Merr.*
鳥子草（通泉草）	*Mazus miquelii Makino*

Table 20. (Continued)

Chinese name	Scientific name
倒地蜈蚣（釘地蜈蚣）	*Torenia concolor Lindley var. formosana Yamazaki*
雞舌癭	*Vandellia anagallis Yamazaki var. verbenaefolia (Colsm) Yamazaki*
藍豬耳	*Vandellia crustacea (L.) Benth.*
柳葉水蓑衣	*Hydrophila salicifolia Nees*
爵　床	*Justicia procumbens L.*
絲葉狸藻	*Utricularia exoleta R. Br.*
短柄半邊蓮	*Lobelia alsinoides Lam.*
半邊蓮（水仙花草，雞磨仔草）	*Lobelia chinensis Lour*
小花下田菊	*Adenostemma lavenia var. parviflorum (Bl.) Hochreut.*
藿香薊	*Ageratum conyzoides L.*
紫花藿香薊	*Ageratum houstonianum Mill.*
艾	*Artemisia princeps Pamp. var. orientalis (Pamp.) Hara.*
生毛將軍	*Blumea lacera (Burm.) DC.*
石胡荽（吐金莫）	*Centipeda minima (L.) A. Braun & Ascherson*
白花小薊	*Cirsium japonicum DC. var. takaoense Kitamura*
昭和草	*Crassocephalum rabens (Juss. ex Jacq.) S. Moore.*
土茯苓	*Dichrocephala intergrifoli (L. F.) Ktze.*
鱧　腸	*Eclipta prostrata L.*
紫背草（一點紅）	*Emilia sonchifolia (L.) DC.*
野蒲高（野塘蒿）	*Erigeron sumatrensis Retz.*
鼠麴草	*Gnaphalium affine D. Don*
鼠麴舅	*Gnaphalium purpureum L.*
刀傷草	*Ixeris laevigata (Bl.) Sch.-Bip. ex Max. var. oldhami (Max.) Kitamura*
假吐金菊	*Soliva anthemifolia R. Br.*
一枝香	*Vernonia cinerea (L.) Less.*
肉穗野牡丹	*Sarcopyramis delicata C. B. Robinson*
三脚剪（水芋，野慈菇）	*Sagittaria trifolia L.*
小茨藻	*Najas minor Allioni*
沿階草	*Ophiopogon japonicus (L. f.) Ker.-Gawl.*
雨久花	*Monochoria korsakowii Regel et Maack*
鴨舌草	*Monochoria vaginalis (Burm. f.) Presl*
小葉燈心草（火花石菖）	*Juncus wallichianus Laharpe*
水竹葉（竹仔菜）	*Commelina diffusa Burm. f.*

Table 20. (Continued)

Chinese name	Scientific name
蔓蓮荷（節花草）	*Floscopa scandens Lour*
細竹葉草（中國水竹葉）	*Murdannia simplex (Vahl.) Brenan*
明潭穀精草	*Eriocaulon merrillii Ruhl. var. suishaense (Hayata)*
異花莎草	*Cyperus difformis L.*
畦畔莎草	*Cyperus haspan L.*
毛軸莎草	*Cyperus pilosus Vahl.*
牛毛氈	*Eleocharis acicularis (L.) Romer & Schult*
針　蘺	*Eleocharis congesta D. Don subsp. japonica (Miq.) T.*
荸薺（水灯心草）	*Eleocharis dulcis (Burm. f.) Trin. ex Henschel*
尖穗飄拂草	*Fimbristylis acuminata Vahl.*
小畦畔飄拂草	*Fimbristylis aestivalis (Retz.) Vahl. Enum.*
竹子飄拂草	*Fimbristylis dichotoma (L.) Vahl.*
四稜飄拂草	*Fimbristylis quinquangularis (Vahl.) Kunth*
短葉水蜈蚣	*Kyllinga brevifolia Rottb.*
多柱扁莎	*Pycreus polystachyos (Rottb.) P. Beauvois*
紅鱗扁莎	*Pycreus sanguinolentus (Vahl.) Nees ex C. B. Clarke*
大井氏水莞（藺）	*Schoenoplectus juncoides (Roxb.) Palla*
水毛花	*Schoenoplectus mucronatus (L.) Palla subsp. robustus (Miq.) T. Koyama*
小松毯薦	*Scirpus fuirenoides maxim*
看麥娘	*Alopecurus aequalis Sobol. var. amurensis (K.) Ohwi*
蓋　草	*Arthraxon hispidus (Thunb.) Makino*
竹節草	*Chrysopogon aciculatus (Retz.) Trin.*
佛歐里馬唐	*Digitaria fauriei Ohwi.*
稗	*Echinochloa crus-galli (L.) Beauv.*
台灣野稗	*Echinochloa crus-galli (L.) Beauv. var. formosensis Ohwi*
牛虱草	*Eragrostis unioloides (Retz.) Nees ex steud.*
類黍柳葉箬	*Isachne miliaceae Roth.*
柳葉箬	*Isachne globosa (Thunb.) Ktze.*
芒穗鴨嘴草	*Ischaemum aristatum L.*
李氏禾	*Leersia hexandra Sw.*
竹葉草	*Oplismenus compositus (L.) Beauv.*
舖地黍	*Panicum repens L.*
兩耳草（二耳草）	*Paspalum conjugatum Berg.*

Table 20. (Continued)

Chinese name	Scientific name
圓果雀稗	*Paspalum orbiculare Forst.*
金絲草	*Pogonatherum crinitum (Thunb.) Kunth*
囊穎草	*Sacciolepis indica (L.) Chase*
狗尾草	*Setaria viridis (L.) Beauv.*
鼠尾栗	*Sporobolus fertilis (Steud.) W. D. Clayton*
菰（茭白筍）	*Zizaniz latifolia (Griseb.) Stapf.*
白　菖	*Acorus calamus L.*
芋	*Colocasia antiquorum Schott. var. esculenta Engler*
七星山薑	*Alipinia shimadai Hayata*
穗花山茶（水薑花）	*Hedychium coronarium Koenig*
綬　草	*Spiranthes sinensis (Per.) Ames*

Lungnantan WETLAND DATA SHEET

1. Country: Republic of China
2. Date:
3. Ref:

4. Name and address of compiler:

5. Name of wetland:
Lungnantan.

6. Geographical coordinates:

7. Location:
Located at about 3 km southeast of the town of Hengchun.

8. Area:
About 175 hectares.

9: Altitude:
<50m.

10. Biogeographical province:

11. Wetland type:
14

12. Description of site:
(a) water regime:
Local rainfall.

(b) water depth:
3.5 m.

(c) salinity/acidity:
Freshwater.

(d) fluctuations/permanence:
Fluctuated greatly between the rainy and dry season.

(e) tidal variations:

(f) climatic conditions:

13. Principal vegetation:
(a) aquatic vegetation:

(b) plant communities in adjacent areas:
Paddy rice, onion and Leucaena plantations.

14. Land tenure:
    (a) of site:
        Public.

    (b) of surrounding areas:
        Private.

15. Conservation measures taken:
    (a) protected areas:
        Designated as scenic area of Kenting National Park in 1984.

    (b) other measures:

16. Conservation measures proposed:
    (a) existing proposals:

    (b) new proposals:
        Bird sanctuary.

17. Current land use:
    (a) at the wetland:
        Reservoir, fish and clam culture.

    (b) in surrounding areas:
        Agriculture for rice, sisal hemp (Agave rigida var. sisalana), etc.

18. Possible changes in land use and proposed development projects:
    (a) at the wetland:

    (b) in the water catchment area:
        Increase and fluctuation of water level.

19. Disturbances and threats:

20. Conservation values:

    (a) economic and social values:
        Irrigation and public water supply for Hengchun area.

    (b) wildlife:

        -- fish:
           Thirteen species of freshwater fish, Tilapia sp. is the most abundant.

        -- waterfowl:
           Over 70 species of waterfowl (ducks, coots, rails, hens, stints, and snaipes, et al.). Duck is the dominant species.

        -- other fauna:

(c) special floral values

21. Research and facilities:
Bird surveys have been conducted occasionally.

22. References:
a. Lin, Yao-sung 1985. Wildlife Survey at Kengting National Park. In Chinese.

23. Outline map of site:
Fig. 13

24. Criteria for inclusion:
The lake is one of the most popular spots in Taiwan for birdwatching. Each fall, after September, most of the migrant birds such as ducks, herons, and plovers from Siberia and Japan rest there on their way to the Philippines. Some of them stay there through the winter. 2b,2c.

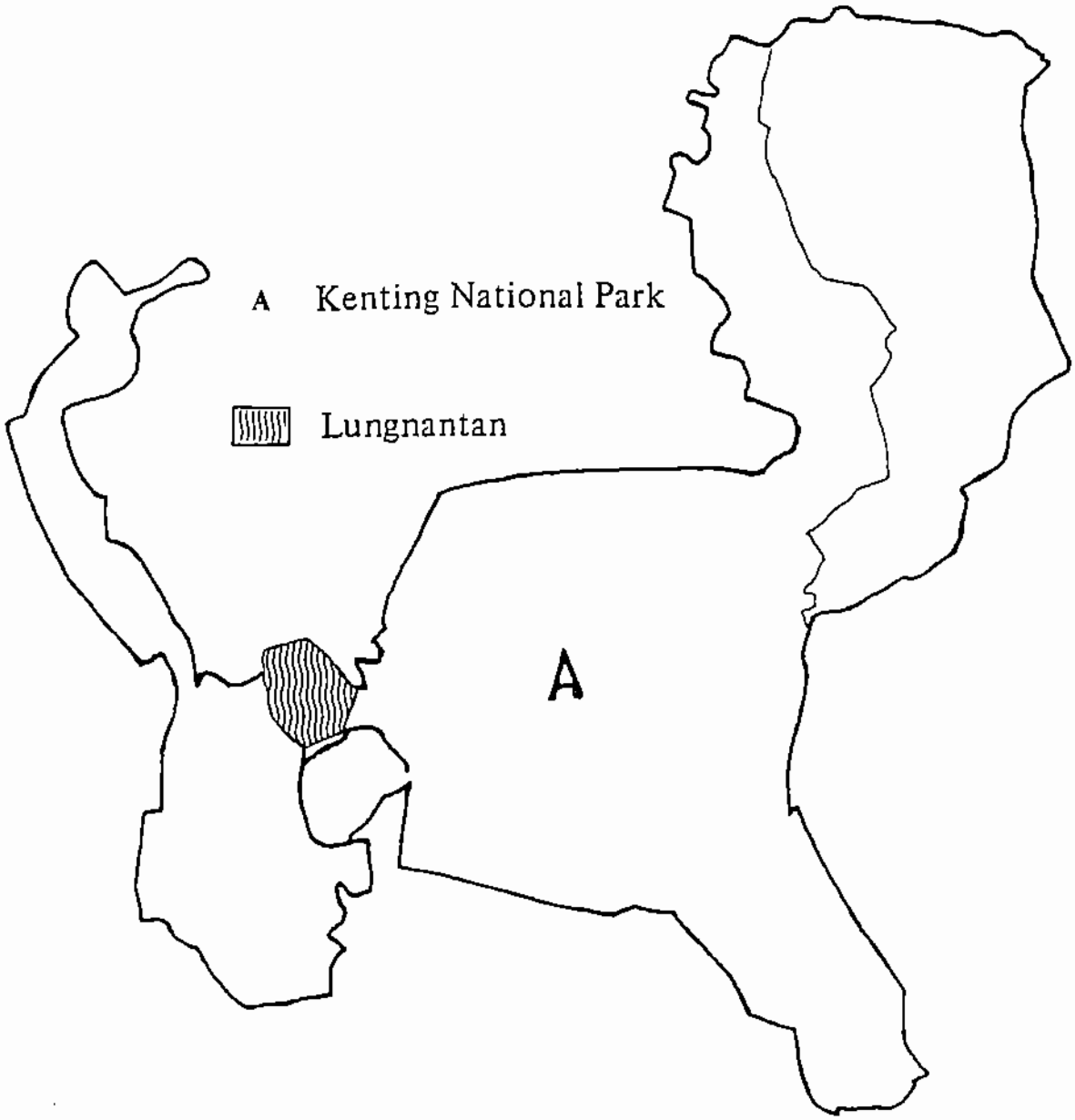


Fig. 13. The location of Lungnantan

附錄三　關渡自然公園之發展

Development of Guandu Nature Park

Abstract

The 55-hectare Guandu Marsh, located northwest of Taipei City, Taiwan, Republic of China, is situated at the confluence of the Tanshui and Keelung Rivers. The marsh has an unique ecological environment, dominated by *Pharagmits communis, Cyperus malaccensis* and *Kandelia candel.*

There is a 10-m-wide dike seperating a 98-hectare farmland from the Guandu Marsh. Since 1978, about 10 hectares of farmland have been flooded and become marsh and grassland. Over 175 species of hygrophytes, hydrophytes, xerophyes and woody plants were found in the area. There are two types of rice cultivation in the rice-fields. The first type is to plant the rice seedlings in March and harvest in July. The short stems left behind are burned to rid of the *Ampularium canaliculatus* which feed on the rice plant. The other type is to harvest two crops within a year; the first crop is harvested in July, the roots of the cut plants are left unburned to allow new stems of the second corp to grow. The cutting of rice alone, accompanied by the migratory season of birds, makes the rice-field a very nice environment for the birds. However, burning after cutting makes the ricefield an ideal habitat which lasts longer.

Among the marsh land, the nearby farmland and shallow ponds, are over one hundred species of birds. Most of them are migratory birds. The dominant bird species include dunlins, little-ringed plovers, common sandpipers, little stints,wood sandpipers, Kentish plovers, little egrets, cattle egrets and common terns. During high tide, most of the birds fly from the marsh land into the nearby shallow ponds and rice-fields on the other side of the dike.

However, most of these areas have recently been destroyed by soil dumping and land reclamation for other uses. To protect the birds and improve land use, the Council of Agriculture and Taipei City Government, Republic of China, designated the marsh land as a natue preservation area and the nearby 50 ha of farmland as a nature park, respectively, to serve multiple purposes, i.e. conservation, education and recreation.

The Nature Park is planned to be surrounded by a wall of trees and a canal to prevent human disturbance. Within the tree walls, 43 ha of land will be managed as a bird sanctury, and 7 ha will be used for recreational and eduational purposes. In the former, a highly diversified habitat including grassland, rice-fields, reeds, shallow ponds, deep ponds, mud flats, bamboo grove, shrubs and trees will be established. In the latter, observation stations, an education center and other facilities related to nature watching will be set up.

A detailed construction plant of Guandu Nature Park will be finished in 1987, and the construction will begin in 1989. The park is expected to be completed within four years.

INTRODUCTION

In northern Taiwan, Guandu is famous for its marsh and bird resources. Many bird watchers and nature lovers visit this area for recreation every year. To protect the bird and let the people have a chance to get close to nature in the city, the Taipei City Government, Republic of China, decided to establish a Nature Park at Guandu in October 1985.

ENVIRONMENT

Guandu is located at the northwest corner of Taipei, near the junction of the Tanshui and the Keelung rivers . It takes only about forty minutes to get there from the central part of Taipei city either by train or by car. According to the history of Ch'ing-Dynasty, Guandu was a plain at first. It became a very big lake due to an earthquake in April 1694. In the following 18 years cultivation, the Guandu area was cultivated and managed into a delta and farmland.

In 1968, a 4-m high dike was built, and the Guandu area was divided into two parts. The part within the dike is farmland, part of the farmland will become Nature Park in the future. The part on the other side of the dike is marsh land, and become an Ecological Preservation Area in 1986. Within the dike, 10 hectares of farmland has been flooded and become marsh and grass land since 1978. Paspulum repens and Paspalum distidium began to grow here.

The Ecological Preservation Area, in which Kandelia candel colonies used to dominate, gradully became marsh land, after the farmland had been abandoned. A salt-mesophytes community, composed mainly of three species of plants, i.e. Phragmits communis, Cyperus malaccensis and Kandelia candel, has developed since 1968.

In the farmland, there are two methods of rice cultivation. The first method is to plant the rice seedlings in March and harvest in July. The short stems left behind are burned to eliminate the Ampularium canaliculatus which feed on the rice plant. The other method is to harvest two crops within a year. The first crop is harvested in July, and the roots of the cut plants are left unburned to allow new stems of the second crop to grow. The cutting of rice alone, accompanied by the migratory season of birds, makes the rice-field a very nice environment for the birds. However, burning after cutting makes the ricefield an ideal habitat which lasts longer.

In the farmland of Guandu, there are areas where soil was dumped. Here, xerophytes invaded naturally, some woody plants such as Trema orientalis grew naturally, and others were planted artificially. Evevtually, Guandu became a highly diversified

habitat of grassland, rice fields, reeds, shallow ponds, mudflats and trees, which is very attractive to birds.

BIRD RESOURCES

Composition

During the last 12 years, a total of 193 bird species have been identified the Guandu area, which includes 45 percent of the bird species in Taiwan. According to the survey conducted from August 1983 to May 1984, 138 species were identified (Table 1). Among them, the number of the resident, the migrant and the exotic species were 42, 87 and 9, respectively. Seven of them were endemic subspecies , which included Black Drongo, Chinese Bulbul, Tawny Wren Warbler, Crested Myna, Spotted-necked Dove, Rufous-backed Shrike and Chestnut Munia. The Tree Sparrow, Cattle Egret, Little Egret, Night Heron, Barn Swallow, House Swift, Chinese White-eye, Black Drongo, Tawny Wren Warbler and Yellow-bellied Wren Warbler were the most commonly seen residents.

At Guandu, the major migrant birds include Common Sandpiper, Kentish Plover, Little Ringed Plover, Dunlin and Yellow wagtail.They are not only more abundant but also stay longer at Guandu than the other species. The Northern Phalarope, Teal, Rufous-necked stint and wood sandpiper are also abundant, but they visit Guandu for a comparatively shorter period of time. Among the above listed birds, dunlins are the most interesting as they always fly and turn synchronously in a flock which may contain over one thousand birds.

Some rare bird species also have been recorded, such as White Ibis, White-naped Crane, Ruddy Shelduck and Chinese Egret. The Chinese Egret, moreover, is also an endangered species of the world and has been listed in the Red Data Book.

The four exotic species are House Myna, Java Sparrow, Budgerigar and Rose-ringed Parakeet. They probably eacaped from cages and then settled in Guandu.

Seasonal variation

The seasonal change in the number of the bird species at Guandu involves three peaks - in September - October, January, and April - May (Fig. 14). These peak periods coincide with the arrival of migratory birds to Taiwan. The seasonal variation of the number of resident species is less obvious. Twenty-five species were found in September, but only 14 to 19 species in other months.

The length of migrants stay is various, depending on the species and different seasons (Fig. 14). Among those 20 more

abundant migrants, Dunlin, Little Ringed Plover, Common Sandpiper, Yellow Wagtail, Kentish Plover, Rufous-necked Stint, Gray Wagtail and Greenshank stay at Guandu the longest (From autumn through spring). The other species stay at Guandu for just one or two seasons. The Wood Sandpiper, Common Snipe, Sharp-tailed Sandpiper, Golden Plover and Northern Phalarope, all are guests only in the autumn and spring. The Teal comes only in the autumn (October to November), while its population is not so abundant as in other aquatic areas, such as the middle water of the Tanshui river under Huajiang Bridge, another proposed sanctuary for duck. Some flocks of Great Egret, Gray Heron and Red-throated Pipit were found mostly in the winter. Curlew Sandpiper and Mongolian Plover are the special spring guests at Guandu.

Distribution

Egrets were found mostly on the canopy of mangrove. Large flocks of Dunlins and plovers, Gray Heron, and Red-throated Pipit were found mostly in the winter. Curlew Sandpiper and Mongolian Plover ate benthic algae. During high tide, the delta is diminished or submerged; only the canopy of mangrove and the upper parts of weeds and straw are left above the water level. At this time, the sandpipers, stints and plovers will fly over the dike and stay in the rice fields or ponds (Fig. 15). Usually people find the Northern Phaloropes turning around in ponds, wheras Common Snipe, Wood Sandpipers, and Green Sandpiper walking in the rice fields. Therefore, rice fields and ponds are important resting areas for these migratory birds during the high tide.

STATUS AND CONSERVATION

The campaign to establish a bird sanctuary started nearly six years ago. An appeal for protection of waterbirds in the Guandu area was started in early spring 1981. At the end of that year, the Taipei City Government held the first bird protection meeting to discuss the conservation of Guandu and other areas in Taipei. In 1983, the Taipei City Government finally designated an 117 - ha bird sanctuary at Guandu, which includes the present Guandu Marsh outside the dike and some farmland and wetland within the Guandu dike. However, due to the poor management of the bird sanctuary and the lack of a plan to purchase the land from the landowners, the effort was a failure. Since 1983, more soil dumping and land reclamation occured on the bird habitat. Protection of birds in Guandu became an hot issue in mass media. Finally in October 1985, the Taipei City Government decided to establish a 50-hectare Nature Park (Fig. 16) within the Guandu dike. In April 1986, the Council of Agriculture designated the Guandu Marsh land as Nature Preservation Area based on the Cultural Assests Preservation Act, which gives the

most strict protection. In addition, the Taipei City Government established the Guandu Nature Park Construction Committe and invited us to make detailed planning. Although Guandu Nature Park will be established eventually, it still faces the following difficults which need to be solved.

1. The price of the land is very expensive. The cost of purchasing 50 hectaces of farmland will be probably over seventy million US dollars and it takes time for the Taipei City government to negotiate with landowners.

2. Since the Guandu Nature Park is our first bird sanctuary, we need more knowledge and experience in managing the waterbirds and wetlands.

Although the establishment of Guandu Nature Park was the result of a six year campaign by many wildlife biologists, Taipei Wild Bird Society, reporters and many citizens in Taiwan but we also got some help from Wild Bird Society of Japan (WBSJ). We thank Mr. Noritaka Ichida and Mr. Takao Ogawara in WBSJ very much for their help in our campaign and in the detailed planning of Guandu Nature Park. Dr. Derek A. Scott, Dr. G. V. T. Matthews, and Dr. Joost van der Ven in IWRB also gave us much valuable help. With their helps, we visited seven bird sanctuaries in Britain and got much useful information for our planning of the Nature Park.

The success of Guandu Nature Park will not only protect the migratory bird at Guandu, but will also stimulate the establishment of more bird sanctuaries in other areas of Taiwan. For the last two years, the concept of building Guandu bird sanctuary has been spread all over Taiwan. It is believed that there are several other potential wetlands of bird sanctuary that can be established in the future, if the Guandu Nature Park successes.

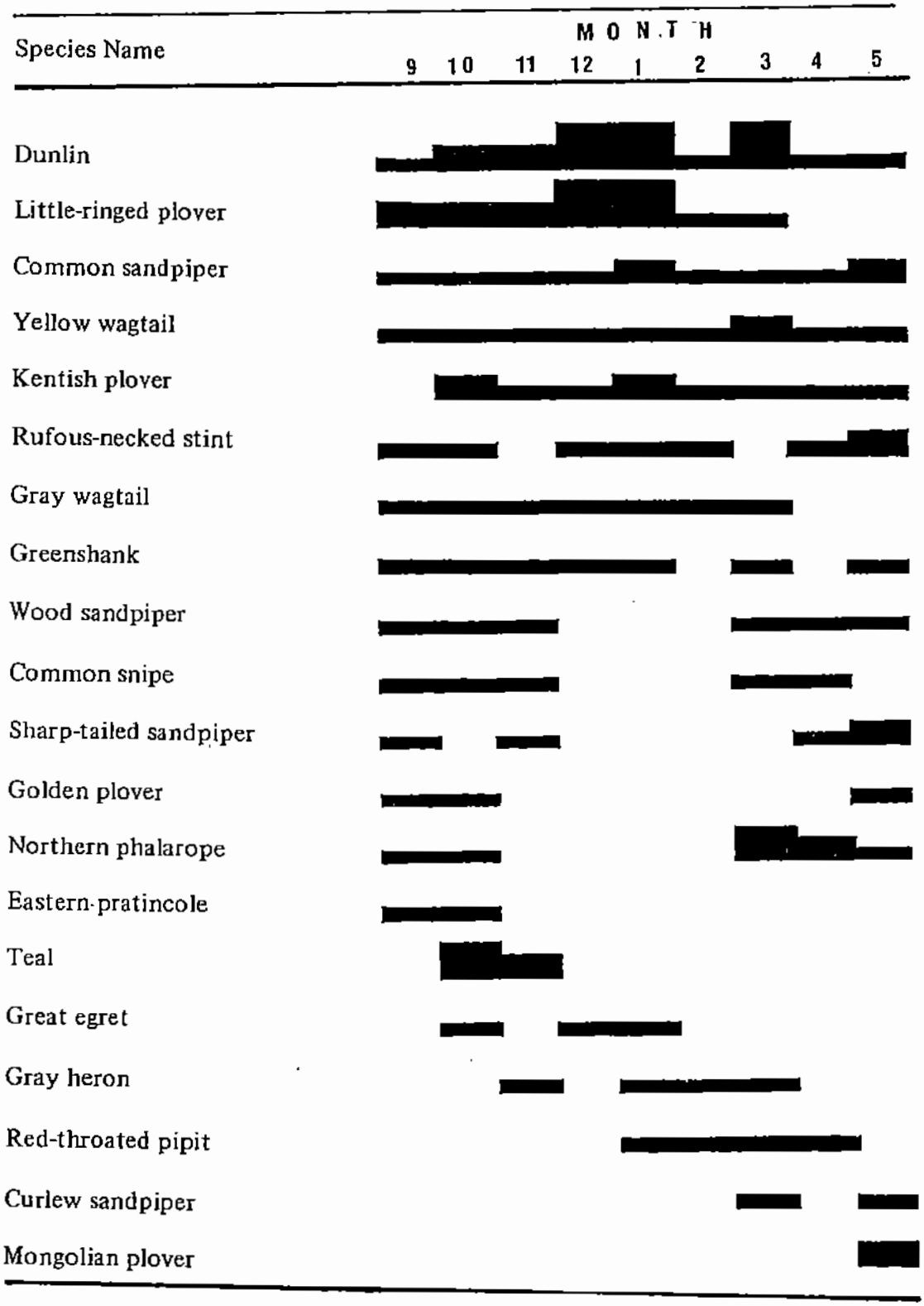
The campaign to establish bird sanctuary at Guandu has also stimulated bird-watching activities there. Between 1974 and 1984, the membership of Taipei Wild Bird Society was less than hundred persons, but it jumped to 700 in the last two years. The weekend after the Taipei City Government announced the establishment of the Guandu Nature Park on October 5, 1985, the Guandu bird sanctuary attracted over ten thousand people there. Every Sunday over 100 new bird watchers attend the Taipei Wildbird Society routine bird watching activities. All government agencies in the Republic of China such as the Council of Agricalture, the Department of Interior, the Committee of Cultural Assets and, the Taipei City Government all support the establishment of the Nature Park. The success of the Guandu bird protection campaign was a big step in the wetland and waterfowl consevation movement for our country.

The detail planning has been conducted by a group of experts

from various fields, such as botany, zoology, eduction, hydrology, geography, soil, recreation, landscape planning, architecture, wildlife management and bird sanctuary. The planning is expected to be completed by late June 1987. The construction will start in 1988.

In the preliminary planning, 43 hectares of the land will be used for bird sanctuary and 7 hectares for receational and educational purposes (Fig. 17). A highly diversified habitat such as grassland, rice fields, reed, shallow water pond, deep water pond, mud flat, shrub and tree will be established within the 43-ha. land. An education center, trails, parking lot and activity area will be included within the remaining area. Along the edge of the bird sanctuary, people can watch the bird closely through the window of hides.

Table 21. Seasonal change in the relative abundance (dark area) of the 20 most common migrants.



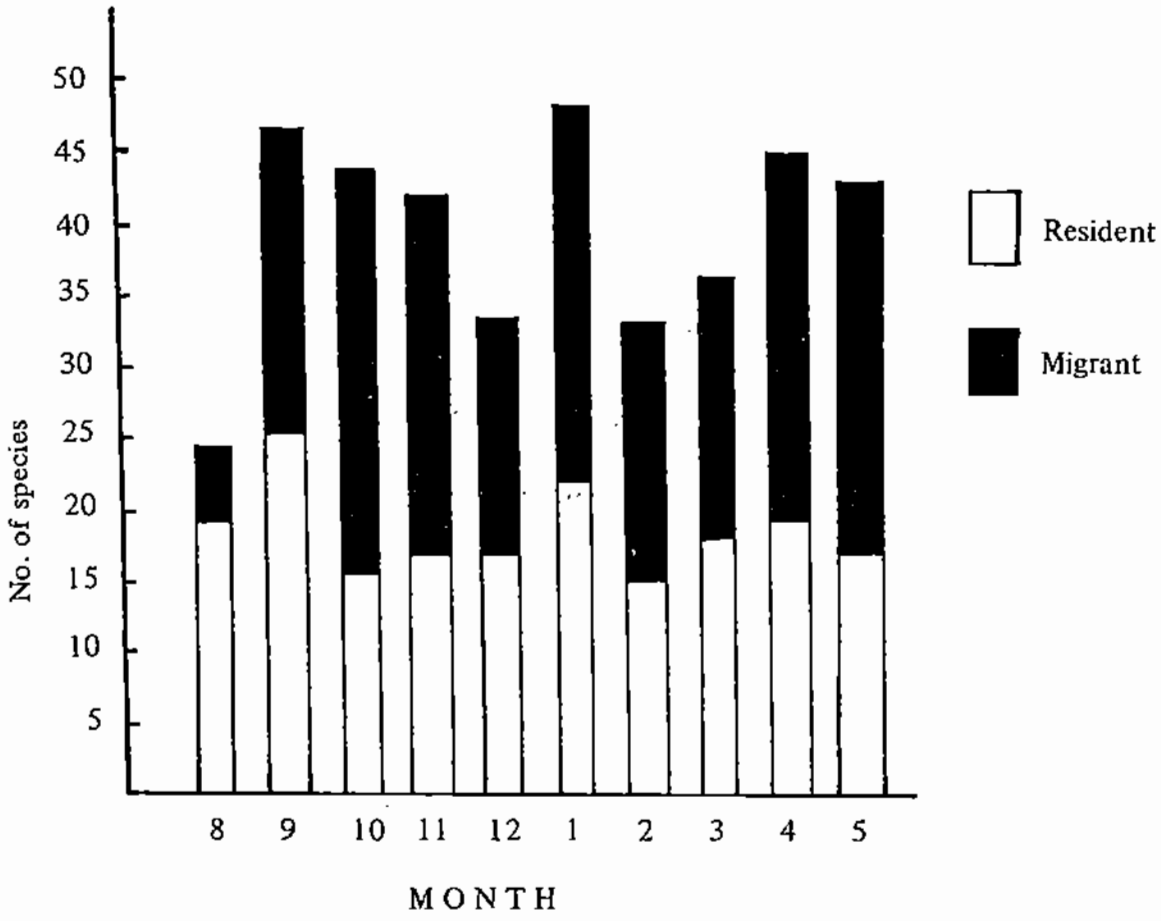


Fig.14: Seasonal change in the number of resident and migratory bird species at Guandu

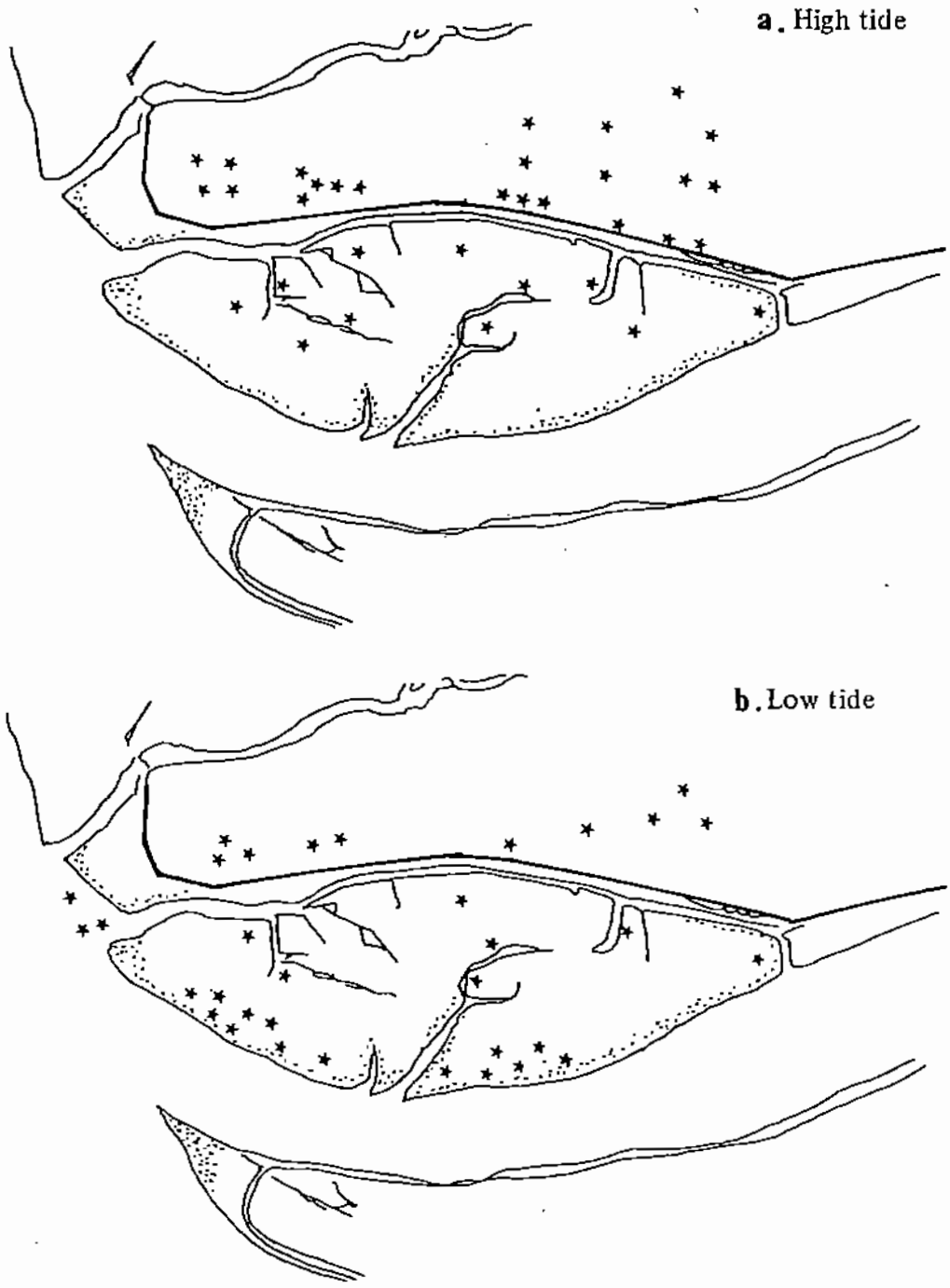


Fig.15: The distribution of bird resource at Guandu area in (a) high tide, and (b) low tide periods.

* relative abundance

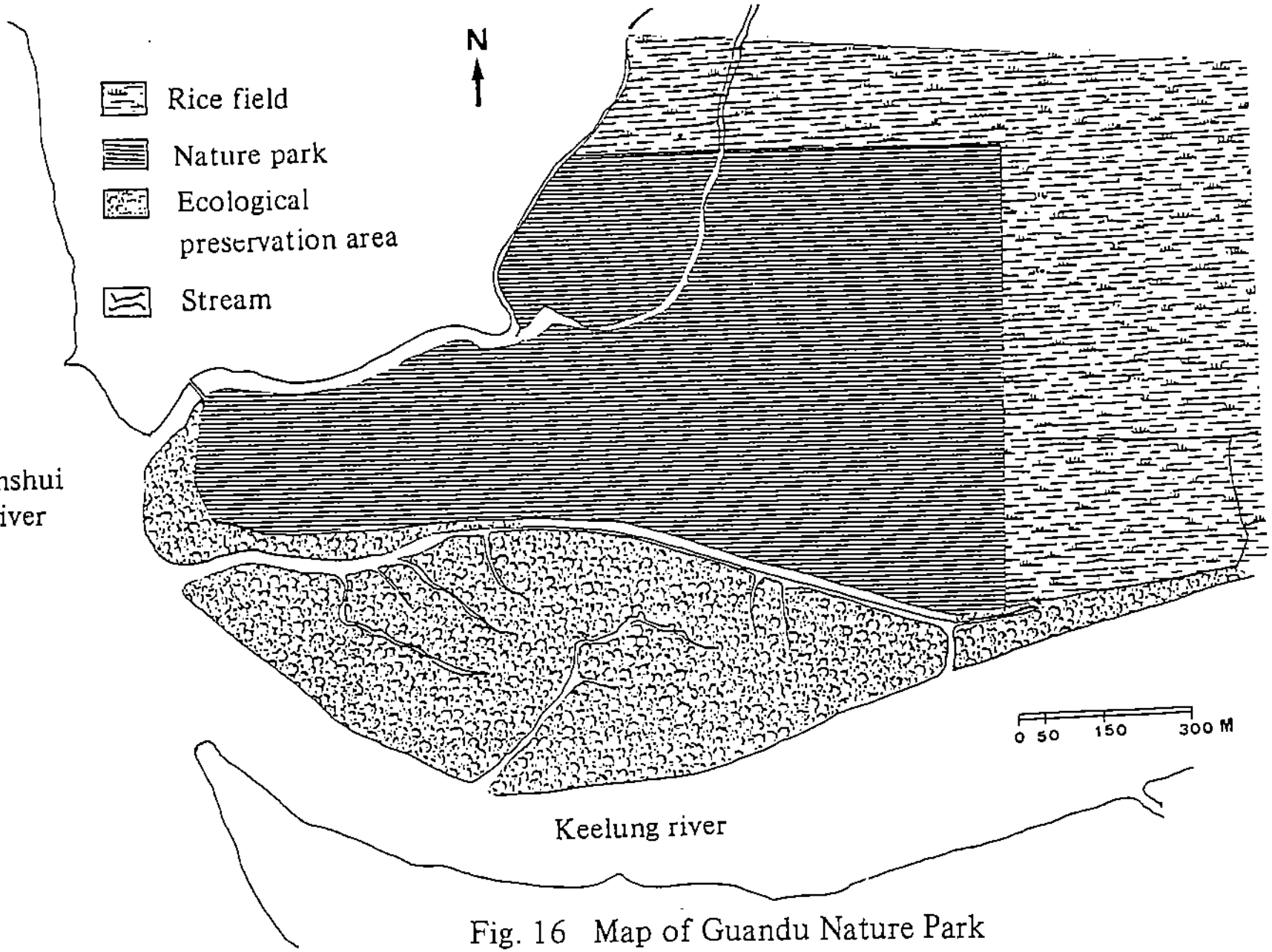


Fig. 16 Map of Guandu Nature Park

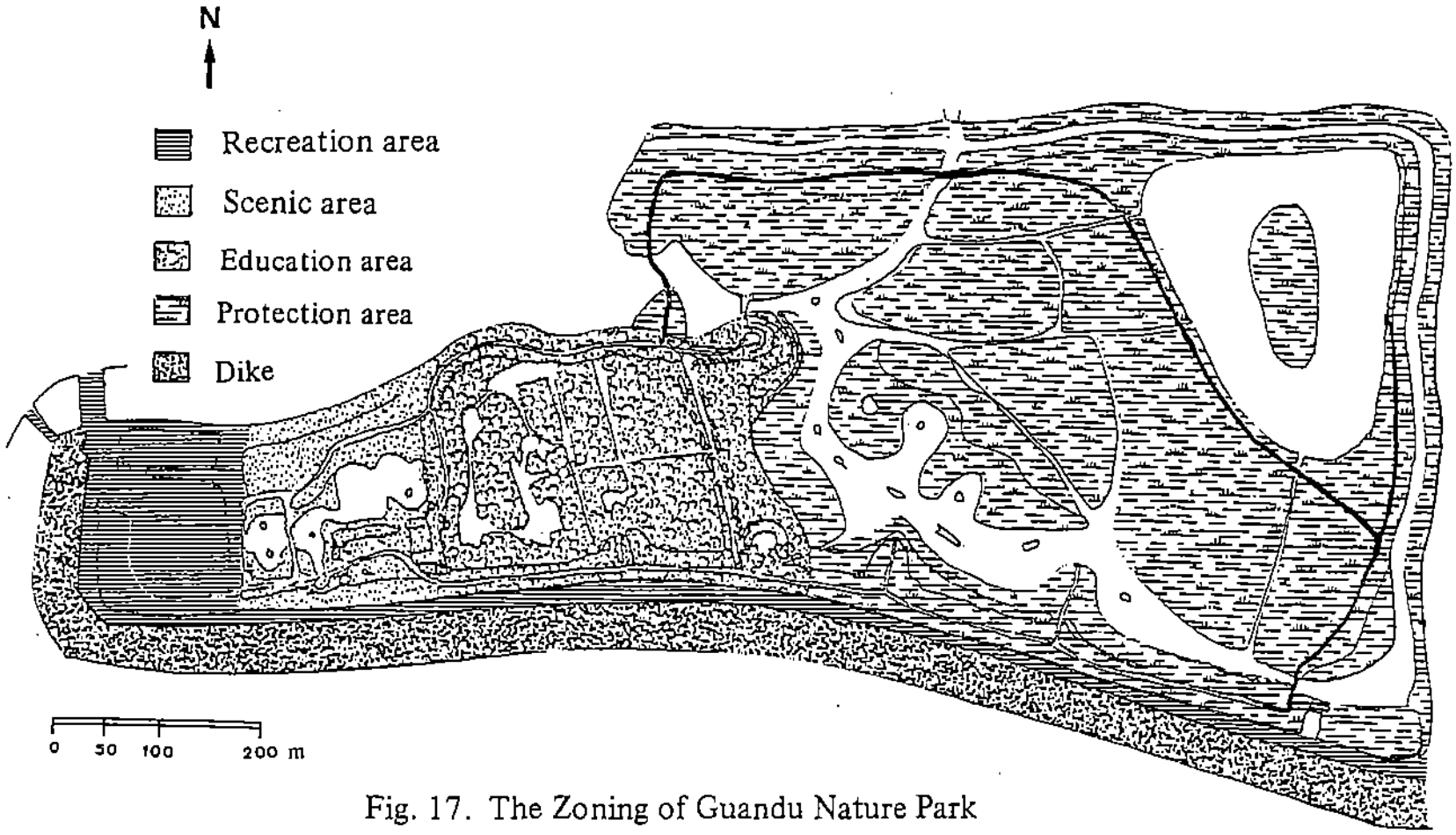


Fig. 17. The Zoning of Guandu Nature Park