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CONSERVATION OF KEY COASTAL WETLAND SITES IN THE RED RIVER DELTA: AN ASSESSMENT OF IBAS 10 YEARS ON

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Conservation of Key Coastal Wetland Sites in the Red River Delta: an assessment of IBAs 10 years on

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This report is compiled from literature surveys and conservation fieldwork carried out from November 2005 to March 2006 in the Red River Delta, Vietnam

Hanoi, 2006

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Cover Illustration: Black-faced Spoonbill *Platalea minor* by Martin Hale. Background: Black-faced Spoonbill at Xuan Thuy National Park by Nguyen Duc Tu.

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Conventions used

Bird names (common and scientific), sequence and species limits follow Robson (2000).

Plant names (scientific) follow Pham Hoang Ho (1999–2000).

Diacritical marks are omitted from Vietnamese names due to typographical limitations and the restricted understanding of international readers.

Abbreviations and acronyms used

asl – above sea level

Danida – Danish International Development Assistance

EN – Endangered

FIPI – Forest Inventory and Planning Institute

FPD – Forest Protection Department

GIS – Geographical Information System

IBA – Important Bird Area

IEBR – Institute of Ecology and Biological Resources

IUCN – World Conservation Union

KFEM – Korean Federation for Environmental Movements

KNCF – Keidanren Nature Conservation Fund

MARD – Ministry of Agriculture and Rural Development

MoNRE – Ministry of Natural Resources and Environment

NEA – National Environmental Agency

NEPA – National Environmental Protection Agency

NT – Near Threatened

VU – Vulnerable

Executive Summary

In 1996, working with the Forest Inventory and Planning Institute (FIPI) and funded by Danida, the BirdLife International Vietnam Programme conducted a comprehensive evaluation of key coastal zone wetland sites in the Red River Delta and identified seven priority sites for wetland conservation in this biodiversity-rich region of international importance. In 2001, six sites in the coastal zone of the Red River Delta were identified by BirdLife International as Important Bird Areas (IBAs) under internationally recognised criteria: An Hai, Tien Lang (Hai Phong city), Thai Thuy, Tien Hai (Thai Binh province), Xuan Thuy and Nghia Hung (Nam Dinh province).

Since 1996 there have been no comprehensive surveys of the six wetland IBAs in the Red River Delta. This study, funded by the Keidanren Nature Conservation Fund (KNCF), aimed to address this lack of information on the current status of these critical sites.

The specific objectives of the study were to:

- Collect and review all available literature on the key wetland sites in the Red River Delta, identify gaps in information and propose additional surveys as required;
- Collect data on the status and distribution of bird species at selected sites in the Red River Delta, particularly globally threatened and congregatory species;
- Collect data on the status of wetland habitats at each site; and
- Assess threats to bird diversity at each site, and formulate appropriate conservation recommendations.

The coastal zone of the Red River Delta supports large inshore fishery and aquaculture industries which are dependent on the maintenance of the ecological integrity of the mangrove forests, intertidal areas and associated habitats. As a result of an increasing human population coupled with economic growth, utilisation of natural resources has become intensive throughout the coastal zone and may no longer be sustainable. Project fieldwork was implemented during a five-month period between November 2005 and March 2006. As well as comprehensive counts of waterbirds at each site, other bird species present were noted and data obtained on the key flora, on socio-economic aspects of each site, on current levels of resource- and land-use by local communities, and on the levels of threats at each locality.

The project confirmed the single most important site for conservation in the Red River Delta is Xuan Thuy National Park, followed in order by Thai Thuy, Tien Hai, Tien Lang, Nghia Hung and An Hai.

With an increasing human population and over-exploitation of natural resources, it was predictable that sites without appropriate management would have fared badly since 1996. Nevertheless, it was particularly disappointing to see the decline in Nghia Hung. In 1996, BirdLife recommended this site was worthy of designation under the Ramsar Convention; today it would fail to meet the relevant criteria. Like other sites in the Red River Delta, it has mainly suffered because of over-hunting and habitat loss caused by over-exploitation of its natural resources.

Specific conservation management recommendations for each IBA are presented. However, addressing the major issues of continuing habitat loss and over-hunting are urgent conservation priorities if the globally important biodiversity in the Red River Delta is to be conserved for future generations.

The Red River Delta is a vital location for biodiversity conservation in Indochina. It is of paramount importance for migratory waterbirds visiting and passing through the region from north-east Asia and Siberia to Australasia, and there is an international obligation to maintain its integrity and habitat quality.

Tóm tắt (Executive Summary in Vietnamese)

Năm 1996, trong khuôn khổ một dự án do Danida, Chương trình BirdLife Quốc tế tại Việt Nam hợp tác với Viện Điều tra Quy hoạch Rừng (Viện ĐTQHR) đã tiến hành một đợt khảo sát toàn diện để đánh giá các vùng đất ngập nước ven biển trọng yếu ở đồng bằng Bắc Bộ và đã xác định được bảy vùng ưu tiên cho công tác bảo tồn đất ngập nước trong khu vực có tính đa dạng sinh học phong phú và có ý nghĩa toàn cầu này. Năm 2001, theo các tiêu chí được quốc tế công nhận, sáu vùng ở khu vực ven biển đồng bằng Bắc Bộ được BirdLife International xác định là Vùng Chim Quan trọng (VCQT) là: An Hải, Tiên Lãng (thành phố Hải Phòng), Thái Thụy, Tiền Hải (tỉnh Thái Bình), Xuân Thủy và Nghĩa Hưng (tỉnh Nam Định).

Từ năm 1996 đến nay, không có điều tra tổng thể về sáu VCQT ở đồng bằng Bắc Bộ. Nghiên cứu này do Quỹ Bảo tồn Thiên nhiên Keidanren (KNCF) tài trợ nhằm giải quyết khoảng thiếu hụt thông tin về hiện trạng của các vùng trọng yếu này.

Mục tiêu cụ thể của nghiên cứu này là:

- Thu thập và rà soát các tài liệu đã có về các vùng đất ngập nước quan trọng ở đồng bằng Bắc Bộ, xác định các yêu cầu thông tin cần điều tra bổ sung;
- Thu thập số liệu về tình trạng và phân bố của các loài chim tại một số khu quan trọng, đặc biệt là thông tin về các loài bị đe dọa và các loài tập trung với số lượng lớn;
- Thu thập số liệu về hiện trạng sinh cảnh đất ngập nước ở mỗi khu vực; và
- Đánh giá các mối đe dọa đối với tính đa dạng sinh học của khu hệ chim ở mỗi khu vực và đưa ra các kiến nghị bảo tồn phù hợp.

Vùng ven biển đồng bằng Bắc Bộ là nơi phát triển nghề đánh bắt thủy sản gần bờ. Sự tồn tại của nghề này phụ thuộc rất nhiều vào việc duy trì được tính toàn vẹn sinh thái của các khu rừng ngập mặn, các bãi ngập triều và các sinh cảnh liên quan khác. Do sự tăng dân số, cùng với sự tăng nhu cầu về các mặt hàng hải sản, đã thúc đẩy việc khai thác sử dụng tài nguyên thiên nhiên mạnh mẽ tại các vùng ven biển đến mức không bền vững.

Công việc thực địa của dự án được thực hiện trong năm tháng từ tháng 11/2005 đến tháng 03/2006. Ngoài việc tiến hành đếm toàn diện các loài chim nước ở mỗi vùng, các loài chim khác cũng được ghi nhận. Số liệu về các yếu tố chính về hệ thực vật và kinh tế xã hội, về vấn đề sử dụng đất và sử dụng tài nguyên của các cộng đồng địa phương và mức độ của các mối đe dọa ở mỗi vùng.

Kết quả của dự án khẳng định được một vùng đất ngập nước quan trọng cho công tác bảo tồn tại đồng bằng Bắc Bộ là Vườn Quốc gia Xuân Thủy, tiếp theo là các khu vực Thái Thụy, Tiền Hải, Tiên Lãng, Nghĩa Hưng và An Hải.

Với việc dân số ngày càng tăng và việc khai thác quá mức tài nguyên thiên nhiên, có thể nhận thấy các khu vực không được quản lý một cách phù hợp đã thay đổi theo hướng xấu đi nhiều so với năm 1996. Ngoài ra, sự xuống cấp của vùng Nghĩa Hưng là đặc biệt đáng thất vọng. Vào năm 1996, BirdLife đã kiến nghị vùng này xứng đáng được đề cử để công nhận là khu Ramsar nhưng đến nay thì không còn đáp ứng được các tiêu chí nữa. Cũng như các khu khác ở đồng bằng Bắc Bộ, vấn đề chính vùng này phải chịu đựng là do săn bắn quá mức và mất sinh cảnh do khai thác quá mức tài nguyên thiên nhiên.

Các kiến nghị bảo tồn đối với từng VCQT được đưa ra. Tuy nhiên, để bảo tồn được tính đa dạng sinh học có ý nghĩa toàn cầu của đồng bằng Bắc Bộ cho các thế hệ mai sau, cần phải có những biện pháp bảo tồn cấp thiết để giải quyết được vấn đề mất sinh cảnh và săn bắn quá mức.

Vùng đồng bằng Bắc Bộ là khu vực có ý nghĩa sống còn đối với công tác bảo tồn đa dạng sinh học ở Đông Dương. Vùng này cực kỳ quan trọng đối với các loài chim nước di cư đến và đi qua từ đông bắc Á và Xi bê ri đến châu Đại Dương và do đó việc duy trì tình toàn vẹn và chất lượng sinh cảnh của vùng là một nghĩa vụ quốc tế.

1. Introduction

This report presents the results of a literature review, two rapid field surveys plus more detailed surveys in winter 2005/2006 and incidental records from the coastal zone of the Red River Delta, conducted by the BirdLife International Vietnam Programme as part of the Keidanren Nature Conservation Fund (KNCF) funded project to investigate the current status of Important Bird Areas (IBAs) in the Red River Delta.

1.1 Background on the study area

The Red River rises in the Yunnan highlands in China and flows south-east for about 1,300 km before entering the Gulf of Tonkin through an extensive delta covering 17,000 km^2 located on the north-east coast of Vietnam. The delta includes the mouths of the Day, Thai Binh and Van Uc Rivers. The coastal zone of the Red River Delta comprises 12 districts in five provinces: Hai Phong, Thai Binh, Nam Dinh, Ninh Binh and Thanh Hoa (Pedersen and Nguyen Huy Thang 1996). To date only two protected areas–Xuan Thuy National Park (Vietnam's first Ramsar site) and Tien Hai Nature Reserve (covering 7,680 ha and 12,500 ha respectively or 1.2% of the total delta area)–have been fully established in the Red River Delta (Map1).

The coastal zone of the Red River Delta supports a complex system of natural and semi-natural vegetation. Natural vegetation consists mainly of salt-tolerant species and plant communities including mangrove, saltmarsh and dune vegetation. In brackish areas, two grassland communities comprising reed *Phragmites* sp. and sedge *Cyperus* sp. are found. As a result of high rates of coastal sedimentation and accretion in the Red River Delta, these plant communities are probably all seral vegetation formations. Away from the coastal zone, no natural habitats remain since the landscape is given over entirely to wet rice cultivation and areas of human settlement that include groves of bamboo and fruit trees.

The coastal area of the Red River Delta is an important stopover and wintering site for migratory waterbirds using the East-Asian or Australasian flyway. During spring and autumn, thousands of birds stop en route between their breeding grounds in northern Asia and wintering sites in the Indo-Malayan and Australasian regions. Major roosting areas for shorebirds exist on offshore islands at Xuan Thuy National Park, Thai Thuy proposed nature reserve and the coast of Nghia Hung district. To date, 15 bird species listed by BirdLife International (2005) as globally threatened or Near Threatened have been recorded from the Red River Delta: Chinese Egret *Egretta eulophotes*, Painted Stork *Mycteria leucocephala*, Black-headed Ibis *Threskiornis melanocephalus*, Black-faced Spoonbill *Platalea minor*, Baer's Pochard *Aythya baeri*, Ferruginous Pochard *A. nyroca*, Spotted Greenshank *Tringa guttifer*, Asian Dowitcher *Limnodromus semipalmatus*, Spoon-billed Sandpiper *Eurynorhynchus pygmeus*, Saunders's Gull *Larus saundersi*, Greater Spotted Eagle *Aquila clanga*, Imperial Eagle *A. heliaca*, Fairy Pitta *Pitta nympha*, Manchurian Reed Warbler *Acrocephalus tangorum* and Japanese Paradise-flycatcher *Terpsiphone atrocaudata*.

The coastal zone of the Red River Delta supports a large inshore fishery based principally on the exploitation of shellfish, crabs and shrimp. The viability of this fishery is dependent on the maintenance of the ecological integrity of mangrove forests, intertidal areas and other associated habitats. As a result of a growing human population, coupled with increasing demand for marine products, utilisation of natural resources has become highly intensive throughout the coastal zone and may no longer be sustainable. This ecosystem is further threatened by the reclamation of land for aquacultural development, resulting in the loss of thousands of hectares of productive intertidal areas and extensive areas of mangrove. The destruction of mangrove has serious consequences for the local and national economies as well as for wildlife, since mangrove acts as a buffer preventing

coastal erosion and plays an important role in sustaining the productivity of the inshore fishery by providing a refuge and feeding area for many marine species of major economic importance. Furthermore, the intertidal areas of the Red River Delta have been identified as internationally important for several threatened bird species. Based on the high levels of biodiversity, conservation importance and the productivity of its fisheries, there is an urgent need for conservation of sites in the Red River Delta to ensure their sustainable use.

In 1996, working with the Forest Inventory and Planning Institute (FIPI) and funded by Danida, the BirdLife International Vietnam Programme conducted a comprehensive evaluation of key coastal zone wetland sites in the Red River Delta and identified seven priority sites for wetland conservation. The project also formulated management recommendations for all key sites (Pedersen and Nguyen Huy Thang 1996). Later, in 2001, six sites in the coastal zone of the Red River Delta were identified as Important Bird Areas (IBAs): An Hai, Tien Lang (Hai Phong city), Thai Thuy, Tien Hai (Thai Binh province), Xuan Thuy and Nghia Hung (Nam Dinh province) (Tordoff (ed). 2002). However, after 1996, there have been no comprehensive wetland surveys in the Red River Delta.

1.2 Aim and objectives

The aim of this study was to assess wetland sites in the coastal zone of the Red River Delta previously recognised as Important Bird Areas (IBAs) (Tordoff (ed). 2002), specifically: An Hai (VN016), Tien Lang (VN015), Thai Thuy (VN014), Tien Hai (VN013), Xuan Thuy (VN017) and Nghia Hung (VN012). These sites are of international importance for bird conservation and meet internationally recognised criteria. IBAs are important for birds and usually support many other important animal and plant species.

The specific objectives of the study were to:

- Collect and review all available literature on the key wetland sites in the Red River Delta, identify gaps in information and propose additional surveys as required;
- Collect data on the status and distribution of bird species at selected sites in the Red River Delta, particularly globally threatened and congregatory species;
- Collect data on the status of wetland habitats at each site; and
- Assess threats to bird diversity at each site, and formulate appropriate conservation recommendations.

2. Methods

2.1 Definition of study area

The Red River Delta includes five coastal provinces; Hai Phong, Thai Binh, Nam Dinh, Ninh Binh and Thanh Hoa. Based on previous BirdLife studies (Pedersen and Nguyen Huy Thang 1996, Tordoff (ed.) 2002), only three provinces were chosen for this study; Hai Phong, Thai Binh and Nam Dinh. Within them are six IBAs; An Hai, Tien Lang, Thai Thuy, Tien Hai, Xuan Thuy and Nghia Hung.

2.2 Bird surveys

Birds were surveyed focusing on areas anticipated to support concentrations of waterbirds: river mouths, aquacultural ponds, saltpans and high tide roosts. Birds were observed using 8x32 and 10x40 binoculars, and spotting scopes. Bird identification was aided by reference to Robson (2000)

and Sonobe and Usui (1993). Additional information on threats to biodiversity was obtained through interviews with local people, border soldiers, district officials and site managers.

2.3 Vegetation surveys

Vegetation-type boundaries were plotted for each site and survey transects defined to sample all major types. Surveys were carried out by boat or on foot and methods included direct observation and sampling of plant communities, and interviews with local people. Photographs were taken of each vegetation type, and notes taken on plant composition and density at each location.

Plant lists were compiled using data from a 1996 survey (Pedersen and Nguyen Huy Thang 1996). Some species were identified and marked in the field, others were photographed and dry specimens brought to Hanoi for identification by morphological comparision with literature sources (Lecomte (eds.) 1907–1937, Humbert (ed.) 1948–1950, Anon. 1972–1976, and Pham Hoang Ho 1999–2000).

2.4 Site mapping methodology

2.4.1. Materials and software

1:50,000 Topographic maps.
MapInfo version 6.0, Microsoft version 4.3. Garmin GPS 12Xl.
Landsat TM7 Satellite Image, 2003.

2.4.2. Image classification

Landsat TM7 Satellite Images from 2003 were visualised and classified with each polygon coded. Habitat maps were constructed using the coded polygons and ground truthed using transects and survey points. Datasheets were used to collect information in the field, and digital photographs were used to help construct the maps. Information on previous and changing land-uses in the area was obtained by interviewing local people.

2.4.3. GIS methods

A Geographical Information System (GIS) was used to combine textual and spatial data. Final habitat maps were constructed using the overlay and thematic mapping functions of MapInfo version 6.0 and six maps were generated, covering sites between An Hai, Hai Phong city and Nghia Hung, Nam Dinh province.

3. Results

3.1 Literature review

The most comprehensive biodiversity study on the coastal wetlands of the Red River Delta was conducted in 1996 by the BirdLife International Vietnam Programme in collaboration with the Forest Inventory and Planning Institute (FIPI). Results were presented in Technical Report No. 8 of BirdLife Vietnam, entitled *The conservation of key coastal wetland sites in the Red River Delta* (Pedersen and Nguyen Huy Thang 1996). The report identified seven key wetland sites for biodiversity conservation in the Delta; Thuy Nguyen District, Van Uc Estuary, Thai Binh Estuary (Tien Lang District), Thai Binh Estuary (Thai Thuy District), Tien Hai Nature Reserve, Xuan Thuy Nature Reserve (now a National Park) and Nghia Hung District.

In 2001 and 2002, with financial support from Danida, BirdLife International in *Indochina* in collaboration with the Institute of Ecology and Biological Resources (IEBR) undertook the identification of Important Bird Areas (IBAs) in Vietnam. Based on available information, six sites in the Red River Delta were designated as IBAs; An Hai, Tien Lang, Thai Thuy, Tien Hai, Xuan Thuy and Nghia Hung.

In 2001, the NEA in collaboration with IUCN and FIPI identified wetland sites with high biodiversity and environment values in Vietnam (NEA 2001) in order to prepare a list of Wetland Reserves within the *Strategy for Wetland Conservation and Sustainable Utility*. The strategy later gained Prime Ministerial approval (Decree No. 109-2003/ND-CP dated 23 September 2003). Six coastal wetland sites within the delta were included; Thuy Nguyen District, Van Uc Estuary, Thai Binh Estuary (Tien Lang), Thai Binh Estuary (Thai Thuy), Tien Hai Nature Reserve and Xuan Thuy National Park. Information on biodiversity values and threats in this document was mainly cited from Pedersen and Nguyen Huy Thang (1996).

In 2000, under a subcontract from NEA, FIPI prepared Information Sheets on Ramsar Wetlands for several sites in Vietnam including two sites in the Red River Delta; Thai Thuy and Tien Hai. Again, information quoted was mainly cited from Pedersen and Nguyen Huy Thang (1996).

Additionally, field notes from researchers and birdwatchers were collected, mainly from Xuan Thuy National Park, plus a few from Thai Thuy, Nghia Hung and Tien Hai.

3.2 Field survey work

Surveys were conducted during the winter of 2005–2006 as follows:

Site	**Date(s) visited**			
An Hai	15–16 Nov. 2005	15 Dec. 2005	12-13 Jan. 2006	
Tien Lang	18 Nov. 2005	16–17 Dec. 2005		
Thai Thuy	17–18 Nov. 2005	16–18 Dec. 2005	10–11 Jan. 2006	10–12 Mar. 2006
Tien Hai	22 Nov. 2005	19 Dec. 2005	8–9 Jan. 2006	8–9 Mar. 2006
Xuan Thuy	19-21 Nov. 2005	20–21 Dec. 2005	6–7 Jan. 2006	6–7 Mar. 2006
Nghia Hung	23 Nov. 2005	22–23 Dec. 2005		

Two surveys were conducted during early 2005, the first from 12–15 January 2005 at An Hai and Tien Lang, the second from 23–26 March 2005 at Thai Thuy and Nghia Hung. Xuan Thuy and Tien Hai were not surveyed but records from selected visits during this winter were analysed: (Nguyen Duc Tu, from October 2004 to March 2005; Doppagne S., December 2004; and Korean Federation for Environmental Movements (KFEM), January 2005).

A total of 113 bird species was recorded during the field surveys. These included 66 waterbird species, 8 raptors and 30 passerines (see Appendices 1–7). Six species are considered globally threatened: Baer's Pochard *Aythya baeri* (VU), Spoon-billed Sandpiper *Eurynorhynchus pygmeus* (EN), Saunders's Gull *Larus saundersi* (VU), Greater Spotted Eagle *Aquila clanga* (VU), Imperial Eagle *A. heliaca* (VU) and Black-faced Spoonbill *Platalea minor* (EN), and one Near-Threatened: Ferruginous Pochard *Aythya nyroca*.

3.2.1 Waterbird numbers

In the 2005–2006 winter, six coastal sites in the Red River Delta of Vietnam were visited and totals for waterbird counts were as follows: An Hai (total 6,718 comprising 31 species), Nghia Hung

(3,123;19 species), Thai Thuy (18,153; 55 species), Tien Hai (4,878; 37 species), Tien Lang (681; 9 species) and Xuan Thuy (8,049; 45 species).

The commonest and most widespread waterbird species, each recorded at all six sites were: Little Egret *Egretta garzetta* (total bird days: 8,280); Kentish Plover *Charadrius alexandrinus* (4,290) and Black-headed Gull *Larus ridibundus* (4,598). Particularly notable were the 508 Little Ringed Plovers *Charadrius dubius* (some 1% of the Asian biogeographic population) recorded at Xuan Thuy IBA in November 2005; 503 Great Egrets *Casmerodius albus* (2% of the Asian biogeographic population) in January 2006, 520 Common Greenshanks *Tringa nebularia* (close to 550, 1% of the Asian biogeographic population) in December 2005 and 253 Gull-billed Terns *Gelochelidon nilotica* (1% of the Asian biogeographic population) in November 2005, all recorded at Thai Thuy IBA, and the 1,310 Kentish Plovers (more than 1% of the Asian biogeographic population) at Nghia Hung IBA in November 2005.

3.2.2 Key species recorded

In addition to significant counts of the commoner species given above, populations of the following globally threatened species were recorded, indicating the international importance of Vietnam's Red River Delta to their continued survival:

Black-faced Spoonbill *Platalea minor* (Endangered)

Vietnam, and more specifically the Red River Delta, is the world's third most important wintering site for this species, which was recorded in 2005–2006 at Tien Hai and Xuan Thuy IBAs. Around 50 birds were present all winter at the latter site, with a maximum of 74 recorded in January 2006, representing around 4% of the global population (Nguyen Duc Tu pers. comm.). Local people report small numbers of birds fitting this species's description visiting An Hai, Tien Lang and Thai Thuy IBAs.

Spoon-billed Sandpiper *Eurynorhynchus pygmeus* (Endangered)

Globally, this species appears to be in rapid decline, apparently through a combination of habitat loss at its breeding, passage and wintering sites. This underlines the extreme international importance of the regular, small numbers that continue to winter in Vietnam's Red River Delta. Four birds were seen at Thai Thuy IBA in January 2006, a single bird was present at Xuan Thuy IBA in December 2005 with two birds present there in January 2006. A decade ago, up to 27 could be found at Xuan Thuy, presumably reflecting the species's decline in recent years.

Saunders's Gull *Larus saundersi* (Vulnerable)

Thai Thuy IBA is particularly important for Saunders's Gull, with significant numbers of birds regularly recorded, including a maximum of 288 in January 2006, representing more than 3% of the global population. Smaller numbers (maximum 38) were reported from Tien Hai IBA and a few individuals at Xuan Thuy IBA.

Other threatened species

The following globally threatened and Near-Threatened species were also recorded, although the sites are unlikely to host significiant populations regularly: Baer's Pochard *Aythya baeri* (Vulnerable), a single male at Thai Thuy IBA in March 2006; Ferruginous Pochard *A. nyroca* (Near Threatened), eight in December 2005 and a single in January 2006 at Thai Thuy IBA; Greater Spotted Eagle *Aquila clanga* (Vulnerable), singles at both Thai Thuy and Tien Hai IBAs in March 2006; and Imperial Eagle *A. heliaca* (Vulnerable), a single at Thai Thuy IBA in December 2005.

4 Site accounts

This section provides a detailed description of each of the six Important Bird Areas (IBAs) assessed during this project, in a sequence running from north to south through the coastal Red River Delta. Following an assessment of a site's relative importance (for an explanation of how the points and ranking system was implemented, see Section 5 and Tables 1 and 2), the location and a brief description are given, followed by a summary of the status, key vegetation, socio-economic aspects, important avifauna, threats and conservation recommendations. Finally, an assessment of changes to the site since 1996 is made.

4.1 An Hai

Relative importance of site: Ranked 6 (6 points)
Province(s): Hai Phong
Protected Area status: None

Latitude: 20º49'N
Longitude: 106º45'E
Area: 5,000 ha
Altitude Range: 0–2 m asl
Important Bird Area (IBA): VN016

General Description. The coastal zone of Hai An district, Hai Phong city, stretches 9 km from Lach Tray Estuary in the south to the Cam Estuary in the north and east. The intertidal area in the Cam Estuary is narrow and deep but there is a wider intertidal area in the Lach Tray Estuary and at the southern tip of the district (Pedersen and Nguyen Huy Thang 1996, Tordoff (ed.) 2002). In the mouth of the Cam River are the islands of Dinh Vu and Vu Yen, both now entirely turned over to aquaculture. An industrial harbour was recently constructed in south-west Dinh Vu, causing major disturbance in the Cam rivermouth for a year (Nguyen Duc Tu and Le Trong Trai 2005). North of the Cam Estuary is the large island of Dam Nha Mac, Quang Ninh province, part of which is included in Ha Nam IBA (VN060). It is an important wintering site for waterbirds (Le Manh Hung *et al*. 2002). Along the entire coastline of Hai An District, particularly close to Lach Tray rivermouth, are many fish traps and shellfish farms. Areas inland have been converted into aquacultural ponds for algae, shrimp and crab production. Mangrove areas have largely been removed and this habitat now only exists as small, narrow fringes close to rivermouths (Nguyen Duc Tu and Le Trong Trai 2005).

Status. The site is currently unprotected.

Vegetation. The trees in alluvial mudflats in the Cam Estuary are mainly *Sonneratia caseolaris*. In the lower layer, dense stands of *Bruguiera gymnorrhiza* and *Aegiceras corniculatum* occur along with *Kandelia candel* and *Avicennia latana. Acanthus ilicifolius* is found at high densities on marginal alluvial coastal wetlands, and in upper alluvial sites, where *B. gymnorrhiza* and *Aegiceras corniculatum* occur. Mangrove habitat is threatened by aquacultural development, and there are tall scattered S. *caseolaris* trees in aquaculture ponds with some dieback taking place. A total of 2–3 km^2 of reedbed *Phragmites vallatonia* occurs in aquaculture ponds and in narrow strips along dykes in the Cam Estuary. Other species include *Casuarina equisetifolia, Annona glabra, Premma intergrifolia* and *Clerodendron inerme*, with herb species and lianas (*Canavalia cathartica, Derris trifoliata*) along marginal ponds. Species of Poaceae–*Cynodon dactylon* and *Paspalum paspalodes*–predominate along the Cam River dyke. Thinly scattered species include *Althernanthera sessilis, Ageratum conyzoides* and *Pluchea indica*, whilst scrub along dykes comprises *Cyperus*

malaccensis, Acrostichum aureum and *Opuntia dillenii*. Elsewhere scrub comprises *Excoecaria agallocha*, *Pandanus affinis* and *Lantana camara*.

Socio-economic issues. In 2000, a population census of the two coastal communities at An Hai (Nam Hai commune in the north and Trang Cat commune in the south), located in Hai An district, Hai Phong city, found there were 18,000 people from 6,000 families at a density of 900 people/km^2. Villages are concentrated along roads and bounded by sea dykes. The population varies, depending on the agricultural and aquacultural seasons, but is at its highest during harvesting; afterwards many villagers move to cities to find work. In the harvesting season, up to 1,000 outside labourers a day visit.

There are four principal industries in the area. The most labour intensive is rice production. Most families inside the sea dyke own a rice field which is cropped twice a year. About a fifth of the migrant workers are drawn to the area because of the highly profitable and economically viable aquaculture industries producing crabs and shrimps. The area under aquaculture stretches from the Cam Estuary (Nam Hai) along the dyke to the Lach Chay Estuary (Trang Cat). Banks around the ponds are high, and the ponds furthest inland are some 4 km from the sea dyke. The area under aquaculture is being expanded. *Gracilaria* occurs in brackish water ponds in the Cam Estuary (Nam Hai) and along the dyke of Trang Cat commune. Associated with the above industries are small-scale trade and service industries. An Hai is important for the local economy of nearby Hai Phong city.

Important avifauna. The intertidal mudflats at An Hai are important for migratory waterbirds, with up to 1,400 shorebirds observed in 1996 (Pedersen and Nguyen Huy Thang 1996) and around 900 in December 2005. The site is important for waterfowl, with large numbers reported passing through on autumn migration. However, at such times many hunters from Hai Phong city armed with shotguns are also active in the area. A large flock of around 1,100 ducks was observed close to the Lach Tray rivermouth in January 2005, comprising species such as Common Teal *Anas crecca*, Garganey *A. querquedula*, Spot-billed Duck *A. poecilorhyncha* and Northern Pintail *A. acuta* (Nguyen Duc Tu and Le Trong Trai 2005). The site recorded small numbers of two globally threatened species, Black-faced Spoonbill *Platalea minor* and Saunders's Gull *Larus saundersi*, in 1996 but neither has been seen subsequently, although local people describe birds fitting the spoonbill's description passing through in small numbers (Nguyen Duc Tu and Le Trong Trai 2005). Gulls *Larus* sp. frequent the site in winter, and a count of 3,133 Little Egrets *Egretta garzetta* in November 2005 is noteworthy.

Threatened species	Threat status	1995/1996 max count	2005/2006 max count	Notes
Black-faced Spoonbill *Platalea minor*	EN	1	0	Site probably does not regularly support a significant population.
Saunders's Gull *Larus saundersi*	VU	17	0	Site probably does not regularly support a significant population.

Threats. An Hai is heavily affected by human disturbance, pollution, infrastructure development and modification of natural habitats, with the result that the biodiversity value of the site is low. In addition, hunting is a severe threat, with no control over the indiscriminate use of mistnets and shotguns.

Conservation recommendations.

- Raise awareness among all stakeholders of the biodiversity and socio-economic values of An Hai, and generate a sense of responsibility for the conservation of the site among the local community.
- Control hunting by means of appropriate provincial, district or commune-level regulations, combined with training and appropriate incentives for local communities.
- Incorporate environmental considerations into future aquacultural development plans.

Changes since 1996. There has been widespread conversion of habitat since 1996, with significant loss of mangrove and, on Dinh Vu island, loss of a large reedbed of *Phragmites sp*. in the north and construction of an industrial harbour.

The site continues to be important for migrant waterfowl in autumn, despite the levels of hunting and other disturbance. Numbers of shorebirds appear to have declined (maxima of 1,400 in 1996, but only 900 in 2006), whilst gulls *Larus* sp. continue to frequent the mudflats in small numbers (up to 1,000 reported in 1996) (Pedersen and Nguyen Huy Thang 1996).

4.2 Tien Lang

Relative importance of site: Ranked 4 (10 points)
Province(s): Hai Phong
Protected Area status: None

Latitude: 20º39'N
Longitude: 106º39'E
Area: 5,000 ha
Altitude Range: 0–2 m asl

Important Bird Area (IBA): VN015

General Description. Tien Lang has 13 km of coastline stretching from the Thai Binh Estuary in the south to the Van Uc Estuary in the north. Each estuary has approximately 100 ha of old-growth mangrove, largely enclosed within aquacultural ponds, and extensive intertidal mudflats with two intertidal sandy islands in the Thai Binh Estuary (one in Hai Phong city, the other in Thai Binh province). To the south, the site borders Thai Thuy IBA (VN014) (Nguyen Duc Tu and Le Trong Trai 2005, Pedersen and Nguyen Huy Thang 1996).

Status. Although the area stretching from the Diem Dien River, Thai Binh province, to the Van Uc River, Hai Phong city, covering the Thai Binh Estuary in Thai Thuy and Tien Lang districts and the Van Uc Estuary was proposed as a nature reserve in 1996 and a nature reserve investment plan prepared, the precise boundaries of the proposed 5,000 ha reserve have not been defined. No investment plan has been prepared, nor is it included on the list of Special-use Forests to be established by the 2010, prepared by FPD of MARD. The site is currently under the management of Tien Lang District People's Committee (Tordoff *et al.* (eds.) 2004).

Vegetation. Natural vegetation comprises mainly *Sonneratia caseolaris, Bruguiera gymnorrhiza, Aegiceras corniculatum*, plus some *Acanthus ilicifolius* mainly in the Thai Binh Estuary, and a few *Kandelia candel* and *Avicennia latana*. On estuaries, *S. caseolaris* dominates with 5–6 trees/m^2, many of them up to 7 m tall, and 15–20 cm in diameter. The understorey is mainly *B. gymnorrhiza* and *Aegiceras corniculatum*, whilst *Acanthus ilicifolius* is mainly at the mangrove margins. In canals near the estuary, mangrove comprises *S. caseolaris*, *B. gymnorrhiza, Aegiceras corniculatum,*

Acanthus ilicifolius and *Phragmites vallatonia*, with *S. caseolaris* the dominant species, although few in number; around 2–3 trees/m^2. The understorey on alluvial soils is *B. gymnorrhiza* and *Aegiceras corniculatum* with 2–3 trees/m^2, but at reduced density in coastal wetland margins, where it is mixed with *P. vallatonia* and *A. ilicifolius*. Natural vegetation along dykes and the edges of aquacultural ponds is impoverished, and mainly comprises herb species such as *Fimbrystilis ferruginea, Dactyloctenium aegyptianum* and *Amaranthus spinosa* plus brush comprising *Ziziphus oenoplia, Clerodendrum inerme, Premma intergrifolia, Annona glabra, Lantana camara, Pandanus affinis, Datura metel* and *Lycianthes denticulata* plus 1–2 trees/m^2 of *Calotropis gigantea*.

Socio-economic issues. Around 22,000 people at a density of 700/km^2 live in the region of Tien Lang, Tien Lang district, Hai Phong city, in four coastal communes: Vinh Quang in the north, bordering the Van Uc River, Tay Hung in the west bordering the Thai Binh River, and Dong Hung and Tien Hung in the middle.

There is a high density of canals in the area, along which people live, with rice fields alternating between settlements. The main economy is agriculture, mostly rice production, with Vinh Quang commune having the largest area under production. Tobacco, sweet potato and vegetables are also grown. There is well developed aquaculture in Vinh Quang, Tien Hung and Dong Hung communes, with high-banked ponds 2–4 ha in area located inside the sea dykes. Shellfish farms are located in the tidal flats adjacent to mangrove to benefit from this alluvial sediment and nutrition source. Small-scale trade takes place between the communes in Thai Thuy district, Thai Binh province. Tonnes of vegetables are daily traded from Tien Lang to Thai Thuy with tonnes of salt coming in the opposite direction, transported by people on bicycles.

Important avifauna. Tien Lang is an important wintering and staging area for migratory shorebirds. The site formerly (at least) regularly supported small but significant populations of two globally threatened species: Black-faced Spoonbill *Platalea minor* and Saunders's Gull *Larus saundersi*, and probably continues to support the former, since local people were able to give an accurate description of this species. In addition, the site supports significant numbers of egrets, herons and shorebirds. During a survey in April 1996, large numbers of passage migrants were observed, including over 50,000 Barn Swallows *Hirundo rustica* and Sand Martins *Riparia riparia*, and more than 1,600 Black Bazas *Aviceda leuphotes* (Pesersen and Nguyen Huy Thang 1996). The mangrove is home to several species of passerine and provides important habitat during passage periods. Local people report that egrets and herons breed in the mangrove during June and July.

Threatened species	Threat status	1995/1996 max count	2005/2006 max count	Notes
Black-headed Ibis *Threskiornis melanocephalus*	NT	8*	0	Site probably does not regularly support a significant population.
Black-faced Spoonbill *Platalea minor*	EN	16	0	Site probably does not regularly support a significant population
Saunders's Gull *Larus saundersi*	VU	30	12**	Regular in small numbers.

* March 1994
** January 2005

Threats. The old-growth mangrove is threatened through enclosure within aquacultural ponds and selective cutting for fuel, whilst the intertidal mudflats are threatened by afforestation with mangrove. Disturbance by shellfish collectors is a threat, as is hunting with shotguns and mistnets. More than 500 m of mistnets were observed during a survey in 1996 (Pedersen and Nguyen Huy Thang 1996), whilst in 2005 a local man stated that several kilogrammes of small shorebirds were trapped each

night in this fashion (Nguyen Duc Tu and Le Trong Trai 2005). Two hunters with shotguns were seen on the main sea dyke in 2005, and local people said hunters from Hai Phong target this site because of the hunting ban at Thai Thuy. A large area of mangrove and mudflat was recently enclosed by newly constructed dykes in preparation for shrimp farming.

Conservation recommendations.

- Control hunting, particularly by outsiders, through implementation of appropriate provincial, district or commune-level regulations.
- Control unsustainable mass fishing and shellfish collection, and the disturbance to birds these activities entail.
- Introduce measures to ensure that aquacultural ponds are developed and managed sustainably and to prevent further mangrove die-off.
- Raise awareness among all stakeholders of the biodiversity and socio-economic values of the site, and generate a sense of responsibility for its conservation.

Changes since 1996. Tien Lang continues to support important populations of wintering and migrant waterbirds and to host small numbers of (at least) one globally threatened species regularly: Saunders's Gull *Larus saundersi*. Although control of hunting was recommended in 1996, it still takes place and the biodiversity value of the site has consequently diminished. Like Thai Thuy, a small population of Black-headed Ibises *Threskiornis melanocephalus* appears to have disappeared, which is of conservation concern as this species may now have disappeared as a breeding species in the Red River Delta. Whether this is due to habitat loss or over-exploitation is unknown.

4.3 Thai Thuy

Relative importance of site: Ranked 2 (25 points)
Province(s): Thai Binh
Protected Area status: None

Latitude: 20º33'N
Longitude: 106º38'E
Area: 13,696 ha
Altitude Range: 0–2 m asl

Important Bird Area (IBA): VN014

General Description. The site comprises Thai Thuy proposed nature reserve, which includes 16 km of coastline bordered by the Thai Binh River to the north and the Tra Ly River to the south. Near the rivermouths are the largest remaining areas of old-growth mangrove in the Red River Delta. Most coastal land in the district has been converted into aquacultural ponds, enclosing large areas of mangrove within them. The change of tidal regime has caused the destruction of vegetation inside the ponds and dieback of the mangrove. Other human impacts include felling of mangrove, and draining of ponds through water level control using sluice gates. A few small patches of sedge still exist inside aquacultural ponds. To the south of the Thai Binh rivermouth are extensive intertidal mudflats. Large areas have been afforested with mangrove (by a Danish Red Cross Project and National 661 Programme), with fish traps and shellfish farms outside the mangrove areas. West of this rivermouth is an area of saltpans. To the north, the site borders Tien Lang IBA (Nguyen Duc Tu and Le Trong Trai 2005).

Status. In 1996, the site was proposed as a nature reserve by the Thai Binh Provincial People's Committee and MARD, and an investment plan was prepared by FIPI and Thai Thuy District

People's Commitee in 1997. This proposed the establishment of a 13,696 ha nature reserve, comprising a strict protection area of 4,463 ha, a forest rehabilitation area of 7,695 ha and an administration and services area of 1,538 ha. However, the reserve has not yet been decreed by the government, nor a management board established. Thai Thuy is not included on the list of Special-use Forests to be established by 2010, prepared by the FPD of MARD. Currently, two local community groups are involved in management of the site: Thuy Truong and Thuy Xuan Commune Environment Groups in the north and south respectively.

Vegetation. The principal species of coastal areas are *Bruguiera gymnorrhiza, Kandelia candel, Aegiceras corniculatum* and *Acanthus ilicifolia*. The main tall species present, up to 3–4 m high, is *Sonneratia caseolaris*, which has been reduced to 3–6 trees/m^2 through cutting, and there are also scattered trees of *Avicennia latana, B. gymnorrhiza* and *Aegiceras corniculatum*. In the broken margins of alluvial soils *Acanthus ilicifolius* is developing well and *Aegiceras corniculatum* and *B. gymnorrhiza* sometimes up to 1.5 m tall are found. *Phragmites vallatonia* occurs mainly in aquacultural ponds adjacent to the estuary. In marshy areas between the dyke and the river *B. gymnorrhiza, Aegiceras corniculatum* and *K. candel* grow. Although plants are 5–7 years old they are only 0.7–1 m tall. Vegetation along dyke and pond margins includes *Ziziphus oenoplia, Datura metel, Clerodendrum inerme, Premma intergrifolia, Lantana camara, Pandanus affinis* and *Derris trifoliata*, and the recently recorded, climbing *Cayratia trifolia*. Much *Calotropis gigantea* has developed in patches 10–20 m long and 1–2 m wide. Several grass species maintain the soils along the dyke and throughout several herb species occur, including *Crinum asiaticum* and *Acrostichum aureum.*

Socio-economic issues. Around 29,000 people at a density of 2,300/km^2 live in the region of Thai Thuy, Thai Thuy district, in three communes; Thuy Truong, Thuy Xuan and Thuy Hai. The largest is Thuy Xuan commune with 11,000 people at a density of 3,000/km^2. Most live in the centre of the community and along the sea dykes. The economy of Thuy Xuan and Thuy Hai communes is based on fishing, aquaculture and salt production, with 70% of the people involved in fishing and aquaculture, 20% involved in salt production. Thuy Xuan, Thuy Hai communes and Diem Dien town produce roughly 60% of the district's total aquaculture production. Thuy Truong commune is largely involved in agriculture, mainly rice production, which is cropped twice a year, up to 10 tonnes per ha, and any aquaculture is located outside the main dyke in concrete-banked ponds 5 ha in size. Mangrove and grasses are grown in the ponds to prevent wave and storm damage. There is small-scale trade associated with the aquaculture and agriculture industries.

Important avifauna. Thai Thuy is one of the most important wintering areas for migratory birds in the Red River Delta, with around 100 species recorded at the site during 2005/2006 including six globally threatened or Near-Threatened species. Notably these included a maximum of 288 Saunders's Gulls *Larus saundersi*, some 3.4% of the Asian biogeographic (global) population,[2] and four individuals of the increasingly rare Spoon-billed Sandpiper *Eurynorhynchus pygmeus*. The others were two species of duck; Baer's Pochard *Aythya baeri* and Ferruginous Pochard *A. nyroca*, and two raptors; Greater Spotted Eagle *Aquila clanga* and Imperial Eagle *A. heliaca*, although the site is not likely to hold significant populations of any of these. All except the last of these threatened species are newly reported from the site, but of concern is the fact that the small populations of Chinese Egret *Egretta eulophotes*, Black-headed Ibis *Threskiornis melanocephalus* and Black-faced Spoonbill *Platalea minor* have apparently dwindled and disappeared over the last decade (Tordoff (ed.) 2002). The site continues to remain important for many species of shorebirds, herons, gulls and passerines. Of particular note are 503 Great Egrets *Casmerodius albus* (2% of the Asian biogeographic population) reported in January 2006, 520 Common Greenshanks *Tringa nebularia* (close to 550, 1% of the Asian biogeographic population) in December 2005 and 253 Gull-billed

Terns *Gelochelidon nilotica* (1% of the Asian biogeographic population) in November 2005. Particularly common species at the site include Black-tailed Godwit *Limosa limosa* (up to 349), Chinese Pond Heron *Ardeola bacchus* (up to 210), Black-crowned Night Heron *Nycticorax nycticorax* (up to 700), Little Egret *Egretta garzetta* (up to 2,500), Black-headed Gull *Larus ridibundus* (up to 1,245), Kentish Plover *Charadrius alexandrinus* (up to 450) and White-shouldered Starling *Sturnus sinensis* (around 2,000 birds). The site is also one of few regular locations for Purple Heron *Ardea purpurea* in northern Vietnam and a record of 100 White-vented Mynas in January 2005 is notable (Doppagne pers. comm.).

Threatened species	Threat status	1995/1996 max count	2005/2006 max count	Notes
Chinese Egret *Egretta eulophotes*	VU	1*	0	No subsequent records
Black-headed Ibis *Threskiornis*	NT	14	0	Declining or disappeared, no records since 2001
Black-faced Spoonbill *Platalea minor*	EN	23	0	Declining importance at this site, no records since 1999
Baer's Pochard *Aythya baeri*	VU	0	1	Site probably does not regularly support a significant population.
Ferruginous Duck *A. nyroca*	NT	0	8	Site probably does not regularly support a significant population.
Spoon-billed Sandpiper *Eurynorhynchus pygmeus*	EN	0	4	Possibly an important location for this species.**
Saunders's Gull *Larus saundersi*	VU	147	288	3.4% of the Asian biogeographic (global) population.
Greater Spotted Eagle *Aquila clanga*	VU	0	1	Site probably does not regularly support a significant population.
Imperial Eagle *A. heliaca*	VU	1	1	Site probably does not regularly support a significant population.
Great Egret *Casmerodius albus*		Recorded but no counted	503	2% of the Asian biogeographic population.
Gull-billed Tern *Gelochelidon nilotica*		Recorded but no counted	253	1% of the Asian biogeographic population

* October 1998
** A single bird also recorded January 2001.

Threats. The major threat at Thai Thuy is human disturbance caused by people fishing and collecting shellfish on the mudflats. Electric fishing was regularly observed in 2004 and in winter 2005/2006 (Nguyen Duc Tu and Le Trong Trai 2005). Loss of habitat through afforestation of intertidal mudflats with mangrove is another potential hazard, as is pollution from agricultural run-off (Tordoff (ed.) 2002, Pedersen and Nguyen Huy Thang 1996). Although hunting with mistnets, airguns and shotguns was observed in 1996, these activities are now strictly controlled and no evidence of any was observed in recent surveys. There is the constant threat of a resumption of unsustainable aquacultural development in the area (Nguyen Duc Tu and Le Trong Trai 2005).

Conservation recommendations.

- Hold meetings with local communities and authorities to discuss management of Thai Thuy. Create a management board or strengthen the existing local community environmental groups to ensure effective management of the site.

- Raise awareness among all stakeholders of the biodiversity and socio-economic values of the site, and generate a sense of responsibility for its conservation.
- Introduce measures to ensure that aquacultural ponds are developed and managed sustainably, to prevent further mangrove die-off.
- Establish a monitoring programme for key bird species, involving local people.
- Consider options for designating the site as a protected area, either at the national or provincial level in the medium-term.
- A long-term goal is that Thai Thuy should be designated a Ramsar site.

Changes since 1996. Thai Thuy continues to be the most important site for the globally threatened Saunders's Gull *Larus saundersi* in Vietnam, with significant numbers of birds recorded annually, and an apparent increase over the last decade. The site has also maintained its importance for terns (in particular Gull-billed Tern *Gelochelidon nilotica*) and egrets, especially Great Egret *Casmerodius albus*. Four globally threatened species have been recorded for the first time since 1996: Spoon-billed Sandpiper *Eurynorhynchus pygmeus*, Baer's Pochard *Aythya baeri*, Ferruginous Pochard *A. nyroca* and Imperial Eagle *Aquila heliaca*, and the first of these is especially significant. On the downside, the small but regular numbers of Black-headed Ibis *Threskiornis melanocephalus* and Black-faced Spoonbill *Platalea minor* that used to occur have both apparently dwindled to zero since 1996.

4.4 Tien Hai

Relative importance of site: Ranked 3 (19 points)
Province(s): Thai Binh
Protected Area status: Nature Reserve

Latitude: 20º18'N
Longitude: 106º36'E
Area: 12,500 ha
Altitude Range: 0–2 m asl

Important Bird Area (IBA): VN013

General Description. Tien Hai has 23 km of coastline with sandy beaches, stretching from the main Red River channel (Ba Lat River) in the south to the Tra Ly rivermouth in the north. It is dominated by aquacultural ponds, a large area of intertidal mudflats and two large, sandy islands, Con Thu and Con Vanh, both extensively afforested with the exotic *Casuarina equisetifolia*. The landward shore of the larger island, Con Vanh, has a large area of mangrove, mostly enclosed within aquacultural ponds. Tien Hai Nature Reserve lies in the southern part of the district, although earlier inappropriate development has led to some degradation of its natural habitats. It forms part of a contiguous ecological unit with Xuan Thuy National Park (VN017) (Nguyen Duc Tu and Le Trong Trai 2005, Tordoff (ed.) 2002).

Status. Tien Hai became an officially designated nature reserve in September 1994, with a management board comprising eight staff directed by the Chairman of Tien Hai District People's Committee. An investment plan, approved by the former Ministry of Forestry, was prepared by FIPI in 1995 that defined a 12,500 ha nature reserve. In 1995, the Ministry of Environment, Science and Technology expanded the Ramsar site of Xuan Thuy to include Vanh and Thu islands within Tien Hai Nature Reserve.

Vegetation. The main flora components are *Sonneratia caseolaris, Bruguiera gymnorrhiza, Aegiceras corniculatum* and *Kandelia candel*. Mangrove areas are of particular interest: along canals

towards Con Vanh are good stands of *S. caseolaris* with 2–3 trees/m^2 and 80–90% ground cover. Plants thin out towards the sea, where *B. gymnorrhiza* and *Aegiceras corniculatum* are also found. In places the mangrove has a clear three layer structure: *Acanthus ilicifolius* close to the water's edge, then *B. gymnorrhiza* and *Aegiceras corniculatum*, and finally *S. caseolaris*. In places *B. gymnorrhiza* and *Aegiceras corniculatum* grow 1–1.2 m tall with 100% ground cover. Along the main dyke and on pool edges, the exotic *Casuarina equisetifolia* is grown to prevent wave and sand damage. Mangrove on soils along canals consists mainly of *K. candel* and *B. gymnorrhiza*, much of it cut down and destroyed.

Long lines of *Agave americana* and *Youngia japonica* brush are developing along the sides of dykes, with an underbrush of *Sapium sebiferum* and *Ziziphus oenopli* trees and scattered *Pandanus affinis, Eupatorium odoratum, Datura metel* and *Clerodendrum kaempferi* bushes. *Wiktroemia indica* is scattered along the main dyke. Large *Sesuvium portulacastrum* and *Suaeda maritima* bushes are developing along the margins of some aquacultural ponds, which are good for soil retention. Scattered *Hibiscus tiliaceus* plants grow along the dykes and pond margins along with climbing species such as *Ampelopsis heterophylla* and *Cocculus orcubilatus. Nypa fruticans* is found on Con Vanh, which has the largest (2,000 ha) sand dune in Tien Hai Nature Reserve, where the exotic *Casuarina equisetifolia* is well established; the trees are 10–15 years old with 0.5–1 trees/m^2, most of them are 4–7 m tall. From the centre of this sand dune towards the mainland grow thick, 5–6 year-old *B. gymnorrhiza* and *Aegiceras corniculatum*, with up to 7–8 trees/m^2, sometimes mixed with *Sonneratia caseolaris* or *Kandelia candel*. Other vegetation includes *Lantana camara, Excoecaria agallocha* and *Ziziphus oenoplia*. Grasses include *Cynodon dactylon, Paspalum paspalodes, Pluchea indica* and *Oxalis corniculata.*

Socio-economic issues. Around 18,000 people at a density of roughly 550 people/km^2 live in Tien Hai Nature Reserve, in three communes: Nam Thinh in the north, Nam Hung in the centre and Nam Phu to the south.

The economy is based on agriculture and fishery. Inside the main dyke, rice is grown, particularly by Nam Hung commune. Nam Thinh commune has a long historical tradition of aquaculture and fishing, with more than 50% of the population being sea fishers. Extensive aquaculture ponds are developed in the Nam Thinh mudflat area. Nam Phu commune has a relatively small population. Con Vanh island has a seawall to protect against wave and storm damage, and inside are the relatively large aquaculture ponds of Nam Phu commune.

Important avifauna. Tien Hai is an important staging and wintering site for migratory ducks, gulls and shorebirds, although of less importance than nearby Xuan Thuy, possibly because of differences in sediment deposition patterns as a result of prevailing currents and levels of human impact (Tordoff (ed.) 2002. Recently small numbers (maximum 38) of the globally threatened Saunders's Gull *Larus saundersi* have been found wintering at Tien Hai, whilst there was a welcome return of Black-faced Spoonbill *Platalea minor* in 2006, following a sighting of six birds in 1996 (Pedersen and Nguyen Huy Thang 1996). A single Greater Spotted Eagle *Aquila clanga* was recorded in 2006. Although Tien Hai appears to be less important for gulls and ducks than a decade ago, it is still important for shorebirds, with almost 1,500 recorded in January 2006, including an impressive 285 Eurasian Curlews *Numenius arquata*, 165 Common Greenshanks *Tringa nebularia*, and more than 600 Kentish Plovers *Charadrius alexandrinus* counted in November 2005. Surveys in 2005/2006 recorded 59 species.

Threatened species	Threat status	1995/1996 max count	2005/2006 max count	Notes
Black-faced Spoonbill *Platalea minor*	EN	6	7	No records in the intervening period.
Saunders's Gull *Larus saundersi*	VU	2	38	Regular in small numbers.
Greater Spotted Eagle *Aquila clanga*	VU	0	1	Site probably does not regularly support a significant population

Threats. The biggest threat to biodiversity at Tien Hai is loss of key migratory bird habitats through afforestation of sandy islands with *Casuarina equisetifolia* and intertidal mudflats with mangrove. Other threats are disturbance to birds by people collecting shellfish and hunting.

Conservation recommendations.

- Preparation of a land-use plan for the site to reduce human pressure on the most critical areas for biodiversity, clearly define the nature reserve boundaries, and stop inappropriate actions such as afforestation of sandy islands with *Casuarina equisetifolia* or intertidal mudflats with mangrove.
- Designate Tien Hai as a Ramsar site, given that it meets relevant criteria.
- Strengthen the staff, infrastructure and training of the nature reserve management board to improve the effectiveness at enforcing protected area regulations.
- Establish a Site Support Group of local people to monitor the site and oversee its welfare.

Changes since 1996. In 1996, up to 1,000 gulls (mainly Heuglin's Gulls *Larus heuglini*) and 2,000 ducks (mainly Northern Shovelers *Anas clypeata*) were observed in the intertidal area of the Tra Ly estuary in early February (Pedersen and Nguyen Huy Thang 1996). By comparison, during surveys in 2005/2006, the maximum number of gulls and terns recorded was 334 and just nine ducks. Hence, there appears to have been a drastic reduction in numbers of these species utilising the site. Of significance, however, is the increase in numbers of Saunders's Gull *Larus saundersi* (from two in 1996 to 38 in 2005), and Tien Hai may prove to be a regular wintering location for this globally threatened species. Moreover, the proximity of Tien Hai to Xuan Thuy means it offers important additional habitat for the birds utilising the latter site.

4.5 Xuan Thuy

Relative importance of site: Ranked 1 (44 points)
Province(s): Nam Dinh
Protected Area status: National Park

Latitude: 20º13'N
Longitude: 106º33'E
Area: 12,000 ha
Altitude Range: 0-3 m asl

Important Bird Area (IBA): VN017

General Description. Xuan Thuy National Park is located in Giao Thuy district, Nam Dinh province (formerly Xuan Thuy district, Ha Nam Ninh province), in the coastal zone of the Red River Delta, south of the mouth of the main river channel. There is a high rate of sediment deposition, forming large intertidal mudflats which are important habitats for migratory waterbirds. There are three large

islands; Con Ngan, Con Lu and Con Xanh. Con Ngan, the largest, has a large area of mangrove almost entirely enclosed within agricultural ponds. Con Lu, a large sandy island, has coastal marshes and plantations of exotic *Casuarina equisetifolia*. The smallest sandy island, Con Xanh, is increasing in size through sediment deposition (Tordoff (ed.) 2002).

Status. In 1988, 12,000 ha of Xuan Thuy wetlands were designated as Vietnam's first Ramsar site. In 1993, an investment plan was prepared by FIPI and in September 1994, the 7,100 ha Xuan Thuy Nature Reserve was decreed by the government, a revised investment plan approved in January 1995 and a management board established. In 2003, Xuan Thuy was upgraded from a nature reserve to a national park and is currently managed by the Nam Dinh Provincial People's Committee, who approved a new investment plan in October 2003. The national park management board has 13 members and reports to the Nam Dinh Provincial Department of Agriculture and Rural Development.

Vegetation. Natural vegetation is dominated by *Bruguiera gymnorrhiza* and *Kandelia candel,* particularly on alluvial soils where there is 80–85% land coverage with trees 2–3 m tall. *Sonneratia caseolaris* is widely scattered, the trees mainly 3–4, but up to 5 m tall and 5–8 cm in diameter. In places, the mangrove includes *S. caseolaris, B. gymnorrhiza, Aegiceras corniculatum, K. candel* and *Acanthus iliciflius*, with the latter growing thickly at the margins. *Phragmites vallatonia* grows in large clumps in aquacutural ponds, sometimes with *B. gymnorrhiza* and *A. corniculatum* away from alluvial soils. The exotic *Casuarina equisetifolia* grows patchily along sandy pond edges. Away from alluvial soils, the Red River Delta's endemic *Scirpus kinsonensis* develops into large bushes, although it has been much reduced because of new aquacultural development. *Flagellaria indica* was formerly a plentiful climbing species, but is now much reduced through natural die-off and grazing. Natural vegetation along pond margins mainly comprises *Premma intergrifolia*, *Clerodendrum inerme, Annona glabra* and *Hibiscus iliaceus*. Along the margin of the main dyke, major species include *Calotropis gigantea, Sida rhombifolia, Ziziphus oenoplia* and *Datura metel* and one climbing species, *Derris trifoliata*. There are few grassland species, but some herbs are important for soil retention such as *Cynodon dactylon, Paspalum paspalodes* and *Cyperus stoloniferus. Ipomoea pes-caprae* and *Vitex rotundifolia* are found on sand dunes and pond margins. *Cyperus rotundus* is developing well, especially on some sand dunes on Con Lu.

Socio-economic issues. In 2002, 45,967 people (11,464 households) lived in the five buffer zone communities surrounding Xuan Thuy National Park at a density of 1,189 people/km^2. The major economic activity in the buffer zone is agriculture with almost 80% of the labourers involved in crop production (mainly rice) and livestock grazing. In their spare time, many of these people enter the core and buffer zone areas of the park for fishing, to collect shellfish and work for aquacultural pond owners during the algae harvesting season. Fishing and aquaculture has developed dramatically in recent years and involves more than 16% of the work force in the area. There is a total of 1,800 ha of aquacultural ponds, mainly around Bai Trong and Ngan Island in the park's buffer zone producing mainly shrimp, crabs, algae (*Gracilaria bodgettii*) and fish. Shellfish production was recently introduced and quickly became an important source of income for buffer zone inhabitants.

Marine products account for 36% of gross revenue for the area, agriculture for roughly 50%, whilst the balance comes from small-scale businesses.

Important avifauna. Xuan Thuy is the most important staging and wintering area for shorebirds, gulls and waterfowl in the coastal zone of the Red River Delta. During surveys in 1988 and 1994, more than 20,000 waterbirds were observed (Scott (ed.) 1989, Pedersen *et al.* 1998). During the spring of 1996, an estimated 33,000 shorebirds passed through the IBA (Pedersen and Nguyen Huy Thang 1996). Notably, Xuan Thuy regularly hosts several globally threatened and Near Threatened

species, including more than 70 Black-faced Spoonbills *Platalea minor*, the largest wintering population in Vietnam and the third largest in the world, tens of Saunders's Gulls *Larus saundersi*, with an exceptional count of 200 birds in March 1998 (2.4% of the Asian biogeographic (global) population), regular small numbers of wintering Nordmann's Greenshanks *Tringa guttifer* and, most significantly, Spoon-billed Sandpipers *Eurynorhynchus pygmeus*, with Asian Dowitchers *Limnodromus semipalmatus* regular on passage.

Internationally significant (at least 1% of the Asian biogeographic population) numbers of the following species have been recorded at Xuan Thuy in recent years: Little Ringed Plover *Charadrius dubius* (1%), Black-tailed Godwit *Limosa limosa* (3%), Eurasian Curlew *Numenius arquata* (2.6%), Spotted Redshank *Tringa erythropus* (3%) and Grey-tailed Tattler *Heteroscelus brevipes* (2.5%), whilst the impressive numbers of Little Egrets *Egretta garzetta* (4,500) come close to meeting the 1% criteria (of 5,000 individuals).

Finally, Xuan Thuy is an important site for non-waterbird migration, with large numbers of passerines, cuckoos and other birds passing through the IBA during spring and autumn migration. During 2004/2005, more than 100 bird species were recorded, including 26 passerine species, the commonest of them, White-shouldered Starling *Sturnus sinensis,* with around 5,000 individuals (Nguyen Duc Tu and Le Trong Trai 2005), whilst at least 20 migrant passerine species were seen over two days in April 2005 plus up to 40 Black Bazas *Aviceda leuphotes* (Doppagne pers. comm.).

Threatened species	**Threat status**	**1995/1996 max count**	**2005/2006 max count**	**Notes**
Spot-billed Pelican *Pelecanus philippensis*	VU	5	0***	Non-breeding visitor in small numbers.
Chinese Egret *Egretta eulophotes*	VU	2	0	Rare passage migrant and winter visitor.
Painted Stork *Mycteria leucocephala*	NT	30	0***	Regular non-breeding visitor, up to 30 per year.
Black-headed Ibis *Threskiornis melanocephalus*	NT	1*	1**	Unlikely the site regularly supports a significant population
Black-faced Spoonbill *Platalea minor*	EN	75	74	Regular winter visitor.
Baer's Pochard *Aythya baeri*	VU	6	0	Rare winter visitor, unlikely site regularly supports a significant population.
Spotted Greenshank *Tringa guttifer*	EN	6	0	Regular winter visitor in small numbers. 28 in 1997/1998.
Asian Dowitcher *Limnodromus semipalmatus*	NT	35	0	Regular passage migrant.
Spoon-billed Sandpiper *Eurynorhynchus pygmeus*	EN	27	2	Regular winter visitor in small numbers. 1996 total exceptional, usually 1–10.
Saunders's Gull *Larus saundersi*	VU	100	3	Regular winter visitor in variable numbers.
Fairy Pitta *Pitta nympha*	VU	0	0	Rare passage migrant. Unlikely site regularly supports a significant population. Two records to date.
Manchurian Reed Warbler *Acrocephalus tangorum*	VU	0	0	Rare passage migrant. Unlikely site regularly supports a significant population.

Threatened species	Threat status	1995/1996 max count	2005/2006 max count	Notes
Japanese Paradise-flycatcher *Terpsiphone atrocaudata*	NT	0	1	Rare passage migrant. Unlikely site regularly supports a significant population. One in April 2005.
Little Ringed Plover *Charadrius dubius*		Recorded but not counted	503	1% of the Asian biogeographic population.
Black-tailed Godwit *Limosa limosa*		5,000	152	Large numbers, up to 3% of Asian biogeographic population winter.
Eurasian Curlew *Numenius arquata*		Recorded but not counted	26	Regular winter visitor with maximum of 900, 2.6% of Asian biogeographic population recorded in 1997.
Spotted Redshank *Tringa erythropus*		Recorded but not counted	1	Regular winter visitor with maximum of 1,500, 3% of Asian biogeographic population, recorded in 1988.
Grey-tailed Tattler *Heteroscelus brevipes*		Recorded but not counted	0	Regular passage migrant, with largest count 1,000, 2.5% of Asian biogeographic population recorded in May 1997.

* August 2001
** A single bird also recorded February 2004 (Nguyen Duc Tu pers. comm.)
*** 2005/2006 surveys not conducted during summer when the species visits the site.

Threats. The greatest threat to biodiversity at Xuan Thuy is habitat loss. Mangrove afforestation of intertidal mudflats, aimed at land reclamation and foreshore protection, is changing the nature of the substrate and threatening to make these areas unsuitable for Black-faced Spoonbill, Saunders's Gull, Spoon-billed Sandpiper and other bird species, and this is reflected in the low counts of these species in recent years. Additionally, on Con Ngan, aquacultural intensification is leading to die-off of emergent vegetation, and the loss of bird roosting habitats. Sandy islands are being afforested with the exotic *Casuarina equisetifolia*, and the clearance of reedbed as a result of agricultural and aquacultural intensification has caused the loss of reedbed-specialist species.

Hunting, once a major threat, has declined significantly since the establishment of the reserve, but is still a problem over large areas of key habitat that lie outside its boundaries. Of the 12,000 ha Ramsar site, only 7,680 ha are included within the reserve. There are also high levels of human disturbance to the site through fishing and shellfish collection in the intertidal zone, and disturbance to birds by the dogs kept by workers at the aquacultural ponds (Tordoff (ed.) 2002).

Conservation recommendations.

Fishing and shellfish collection in the intertidal zone are taking place at unsustainable levels and threaten the integrity of the site. There is a pressing need to implement management practices that promote sustainable exploitation of the site's resources in a way that is compatible with biodiversity conservation.

- Develop a management plan for the national park, balancing the economic, coastal protection and biodiversity values of different habitats and promoting environmentally sustainable development.

- Strengthen community support for conservation of Xuan Thuy National Park through the Site Support Group established in 2003.
- Revise the protected area boundaries to incorporate important habitat for migratory waterbirds, including intertidal mudflats to the south-west of Con Lu and aquacultural ponds on Con Ngan.
- Stop further afforestation of intertidal mudflats with mangrove.
- Extend the responsibilities of the national park management board to include management of aquaculture and fishing activities.

Changes since 1996. The upgrading to Xuan Thuy to a national park in 2003 was an important step, and hunting has declined significantly in the last decade, at least inside the protected area. However, there has been significant habitat loss at the site over the last decade through continuing afforestation of mangrove and of sandy islands with the exotic *Casuarina equisetifolia*, and loss of reedbed to agricultural intensification.

The site continues to be the most important location in the Red River Delta for migratory waterbirds, and still hosts significant populations of several globally threatened species, albeit in reduced numbers from those reported a decade ago, and regionally important numbers of several commoner species, with thousands of ducks and shorebirds dependent on the site.

4.6 Nghia Hung

Relative Importance of Site: Ranked 5 (8 points)
Province(s): Nam Dinh
Protected Area status: None

Latitude: 19º58'N
Longitude: 106º10'E
Area: 7,600 ha
Altitude Range: 0–2 m asl
Important Bird Area (IBA): VN012

General Description. Nghia Hung is located in southern Nam Dinh Province and comprises 12 km of coastline between the Ninh Co estuary in the north and the Day estuary to the south. The main habitats are saltmarsh, sandy beaches and dunes, some of which have been afforested with the exotic *Casuarina equisetifolia*. Close to the estuaries are mangrove plantations. In recent years there has been rapid development, with the majority of land both inside and outside the Nghia Hung dyke converted into aquacultural ponds. Currently, north of the Day rivermouth, a project implemented by Military Zone No.3 is constructing a dyke system to create up to 800 ha for aquacultural development. This project will destroy 10 ha of mangrove plantation, currently under the management of Nghia Hung District FPD (Nguyen Duc Tu and Le Trong Trai 2005). There are two offshore islands, Dong Con Mo and Tay Con Mo.

Status. The mangrove is currently under the management of Nghia Hung District FPD. As a result of a 1996 survey (Pedersen and Nguyen Huy Thang 1996), FIPI and BirdLife proposed establishing a nature reserve at Nghia Hung. However, no investment plan has been prepared, neither has a nature reserve management board been established, nor has the site been included on the Special-use Forests list to be prepared by the FPD of MARD by 2010 (Tordoff *et al.* (eds.) 2004).

Vegetation. The dominant mangrove species is *Bruguiera gymnorrhiza*, which is mainly found between the subdyke and the Ninh Co River estuary at a density of 1–2 trees/m^2. It is particularly important for protecting the subdyke against wave damage. Closer to the estuary is *Acanthus ilicifolius*. About 40% of the mangrove in Nghia Hung is found inside ponds. Species include *Sonneratia caseolaris, B. gymnorrhiza, Aegiceras corniculatum* and *Kandelia candel*. In the innermost ponds, large banks of *Phragmites vallatonia* are developing, and the endemic *Scirpus kinsonensis* is proliferating in overflow areas; the starch-rich tubers are a favoured food source for migrant birds. *Casuarina equisetifolia* grows on two small sand dunes. The sandy beaches host *Ipomoea pes-caprae* and *Vitex rotundifolia*, and species of Poaceae and Cyperaceae can be found along the main dyke, subdyke and ponds where species such as *Annona glabra, Clerodendrum inerme, Ziziphus oenoplia, Calotropis gigantea, Wiktroemia indica, Pluchea indica, Phyxalis angulata*, and a brushwood, *Argemone mexicana* also occur. Herbs include *Oxalis corniculata, Centella asiatica* and *Suaeda maritima*.

Socio-economic issues. Around 10,000 people at a density of 500 people/km^2 live in two communes in the Nghia Hung area, located between the Day and Ninh Co estuaries: Nghia Phu commune in the north and Nam Dien commune in the south.

Nam Dien's economy is based on aquaculture, including shrimp, crab and shellfish farming, in the area between the dyke and the sand dunes. Extensive ponds and a canal system are under construction, with the furthest pond bank some 3 km to the east of the main dyke. Nghia Phu has up to 200 ha of saltmarsh covering approximately 80% of the commune. To control agricultural irrigation, the main dyke has been concreted. The mudflat areas in Nghia Hung district have been distributed amongst the 10 communes in the area, and pond construction is severely impacting on the ecological balance of the estuary.

Important avifauna. Nghia Hung was formerly an important staging and wintering site for migratory waterbirds, supporting significant numbers of wintering gulls, shorebirds and waterfowl. During April 1994, an estimated 30,000 shorebirds were present.[3] Nine globally threatened and Near-Threatened species used to occur, seven of them on a regular basis, but none were observed in 2005/6. The site regularly supported more than 1% of the Asian biogeographic population of Spotted Redshank *Tringa erythropus* and Lesser Sand Plover *Charadrius mongolus*. In November 2005, 1,310 Kentish Plovers *C. alexandrinus*, representing more than 1% of the Asian biogeographic population of this species and 461 Greater Sand Plovers *C. leschenaultii* were seen but little else of note. The two offshore islands are probably still of some importance for migratory passerines.

Threatened species	Threat status	1995/1996 max count	2005/2006 max count	Notes
Chinese Egret *Egretta eulophotes*	VU	3***	0	Site no longer holds a significant population.
Spot-billed Pelican *Pelecanus philippensis*	VU	4**	0	Site no longer holds a significant population.
Black-headed Ibis *Threskiornis elanocephalus*	NT	1**	0	Site never held a significant population.
Black-faced Spoonbill *Platalea minor*	EN	16*	0	Site no longer holds a significant population.
Nordmann's Greenshank *Tringa guttifer*	EN	5	0	Site no longer holds a significant population.
Asian Dowitcher *Limnodromus semipalmatus*	NT	8**	0	Site no longer holds a significant population.
Spoon-billed Sandpiper *Eurynorhynchus pygmeus*	EN	7**	0	Site no longer holds a significant population.
Saunders's Gull *Larus saundersi*	VU	260**	0	Site no longer holds a significant population.
Japanese Paradise-flycatcher *Terpsiphone atrocaudata*	NT	1	0	Site probably never held a significant population.
Kentish Plover *Charadrius alexandrinus*		Recorded but not counted	1,310	More than 1% of the Asian biogeographic population.

* maximum of 41 in 1994 (Tordoff (ed.) 2002).
** 1994 count (Tordoff (ed.) 2002).
*** 1993 count (Tordoff (ed.) 2002).

Threats. The main threats at Nghia Hung are hunting, over-exploitation of marine products and disturbance. Hunting is a particular threat to waterbird populations. During February 1996, 20 km of mistnets were observed in the intertidal area of Nghia Hung District. Hunters also used airguns and shotguns. The main quarry species were reportedly ducks and geese, which were sold for export to China (Pedersen and Nguyen Huy Thang 1996). In 2004, a system of bird traps using glue and decoys was observed at a shrimp pond (Nguyen Duc Tu and Le Trong Trai 2005. Despite the introduction of a hunting ban, levels of hunting have remained high at Nghia Hung because of a lack of enforcement and because local people depend heavily on exploitation of natural resources and do not understand why the ban was introduced. Nghia Hung District FPD has only four staff, which is insufficient to control hunting in the area, particularly during migration seasons. Disturbance to birds arising from shellfish collection is also a threat: during a survey in 1996, around 1,000 people were observed collecting shellfish in the intertidal zone (Pedersen and Nguyen Huy Thang 1996). There is no coastal zone management plan for the district, a lack of technical capacity among the district FPD staff, a basic lack of awareness of the biological value of mangrove and intertidal mudflats, and aquacultural development is unregulated.

Conservation recommendations.

- Raise awareness among all stakeholders of the biodiversity and socio-economic values of Nghia Hung, and generate a sense of responsibility for the conservation of the site among the local community.

- Control hunting by means of appropriate provincial, district or commune-level regulations, combined with training and appropriate incentives for local communities.
- Incorporate environmental considerations into future aquacultural development plans.

Changes since 1996. A survey of 18 coastal wetland sites in the Red River Delta by BirdLife International and FIPI in 1996 identified Nghia Hung as the second most important site for wetland conservation, and proposed the area be established as a nature reserve.[3] The effects of hunting, over-exploitation and habitat loss to aquaculture, however, have massively devalued the biodiversity importance of this site. Today, not one of the seven globally threatened bird species once found at Nghia Hung now occurs, and just one species (Kentish Plover *Charadrius alexandrinus*) occurs at a level of more than 1% of the Asian biogeographic population. An estimated 30,000 shorebirds were present in April 1994, but fewer than 1,000 shorebirds were recorded in late March 2005 (Nguyen Duc Tu and Le Trong Trai 2005). This has been a sad loss of what only a decade ago was one of the foremost sites for migrant waterbirds in Asia.

5. Site ranking

An attempt has been made to quantify and rank the six Red River Delta sites according to their conservation importance (see Tables 1 and 2).

It is important to appreciate, however, that although waterbirds may concentrate at a few sites, they utilise the entire coastal zone during migration where they are at risk from a variety of threats. Therefore, it is vital to implement appropriate conservation measures along the entire Red River Delta coastline and not just at a handful of key sites in order to protect the unique and globally important avifauna of the region.

Criteria used are explained in the notes to the scoring system (see Table 2). This ranking gives an order of relative importance for the six IBAs as follows: Xuan Thuy (first, 44 points), Thai Thuy (25 points), Tien Hai (19 points), Tien Lang (10 points), Nghia Hung (8 points) and An Hai (6 points).

6. General conclusions and recommendations

The Red River Delta is a vital location for biodiversity conservation in Indochina. It is of paramount importance for migratory waterbirds visiting and passing through the region from north-east Asia and Siberia to Australasia, and there is an international obligation to maintain its integrity and habitat quality.

However, a major threat to bird populations throughout the coastal zone of the Red River Delta is hunting, frequently in the form of mistnetting, often using taped calls. This technique is indiscriminate and particularly serious during migration periods. Hunting was identified as a potential problem at all sites, although hunting is nowadays stirctly controlled within Xuan Thuy National Park and at Thai Thuy IBA. Also significant is the threat of habitat loss, particularly conversion of mangrove and mudflats into aquacultural ponds. Better planning is required at all levels to develop aquaculture in a more sustainable manner.

Control of hunting and better land-use planning, particularly with respect to aquaculture development, are therefore the two key conservation issues that need to be addressed in the Red River Delta region. Specific conservation recommendations for each site are given in the relevant sections of this report.

Table 1: Relative ranking of the six IBAs surveyed in 2006

	AH	Score	TL	Score	TT	Score	TH	Score	XT	Score	NH	Score
Area (ha)	5,000	2	5,000	2	13,696	3	12,500	3	12,000	3	7,600	2
Species diversity	39	1	14	1	94	3	57	2	73	3	23	1
Habitat diversity	2	1	3	2	4	2	3	2	4	2	4	2
Contiguous	No	0	Yes	1	Yes	1	Yes	1	Yes	1	No	0
Species rarity	0	0	1VU	2	1NT,4VU,1EN	12	2VU,1EN	7	4NT,6VU,3EN	25	0	0
Congregatory species	0	0	0	0	2	2	0	0	5	5	1	1
Floral diversity	26	2	20	2	19	1	26	2	23	2	20	2
Conservation value	Unprotected	0	Unprotected	0	Local community management	1	Nature Reserve	2	National Park	3	Unprotected	0
TOTAL		6		10		25		19		44		8

Table 2: Scoring system used to rank sites

No. of Points	1	2	3
Area (ha)[1]	0-4,999	5,000-9,999	10,000+
Species diversity[2]	0-49 species	50-69 species	70+ species
Habitat diversity[3]	0-2	3+	
Contiguous[4]	Yes		
Species rarity 2006[5]	each NT	each VU	each EN
Congregatory species[6]	each species		
Floral diversity[7]	0-19	20-29	30+
Conservation value[8]	Community management	Nature Reserve	National Park

Notes: 1 Assumes the larger the area, the more biodiversity the site is likely to host; **2** Number of species recorded during field surveys in 2006; **3** Based on number of major habitat types; **4** Additional value if conservation sites adjacent to one another; **5** Scores depend on number of Near-Threatened and category of globally threatened species recorded; **6** Number of species with 1% of Asian biogeographic population recorded; **7** Based on number of native species reported by habitat surveys; **8** Based on level of protection for the site. AN = An Hai, TL = Tien Lang, TT = Thai Thuy, TH = Tien Hai, XT = Xuan Thuy, NH = Nghia Hung. NT = Near-Threatened, VU = Vulnerable, EN = Endangered.

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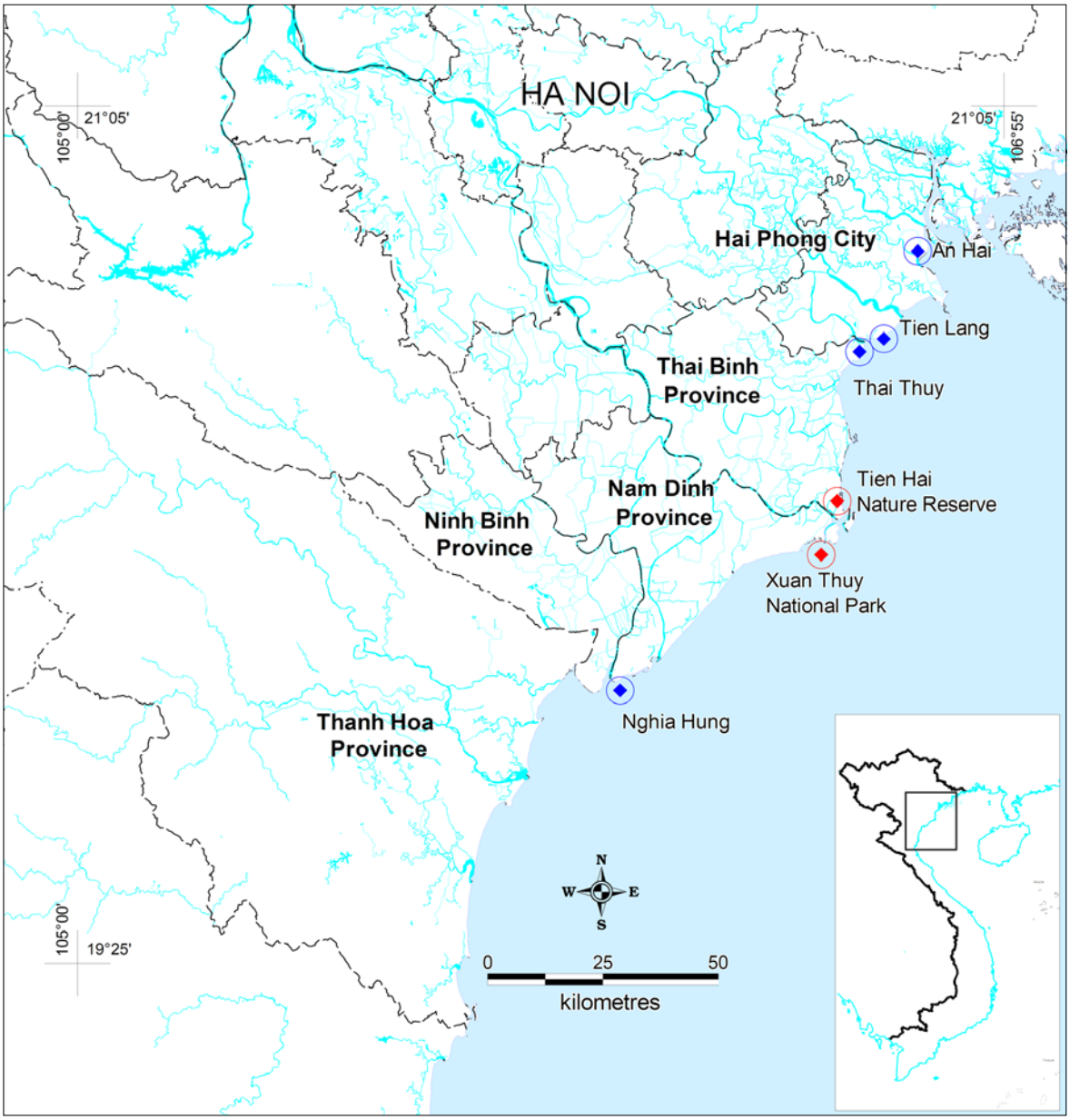
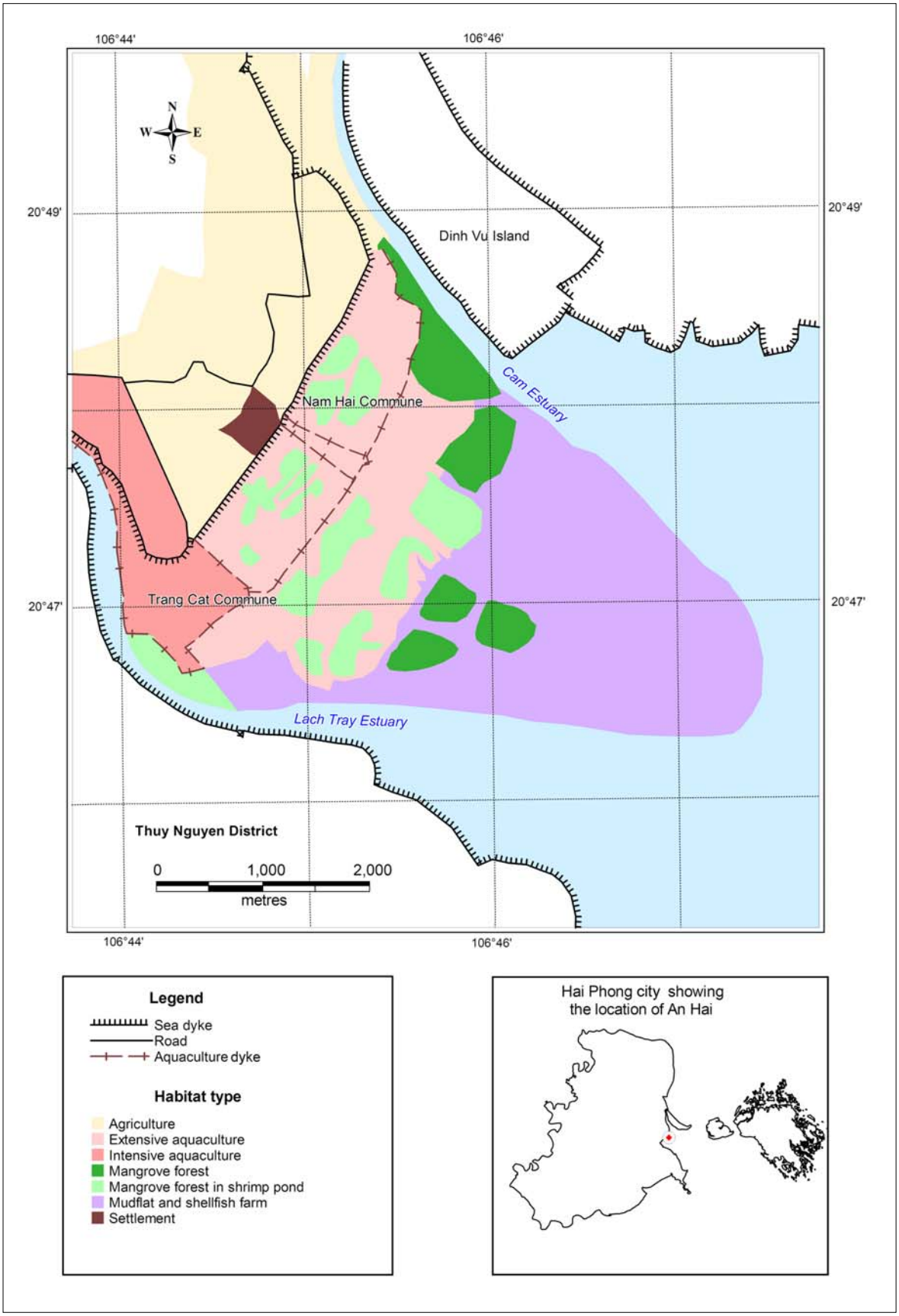
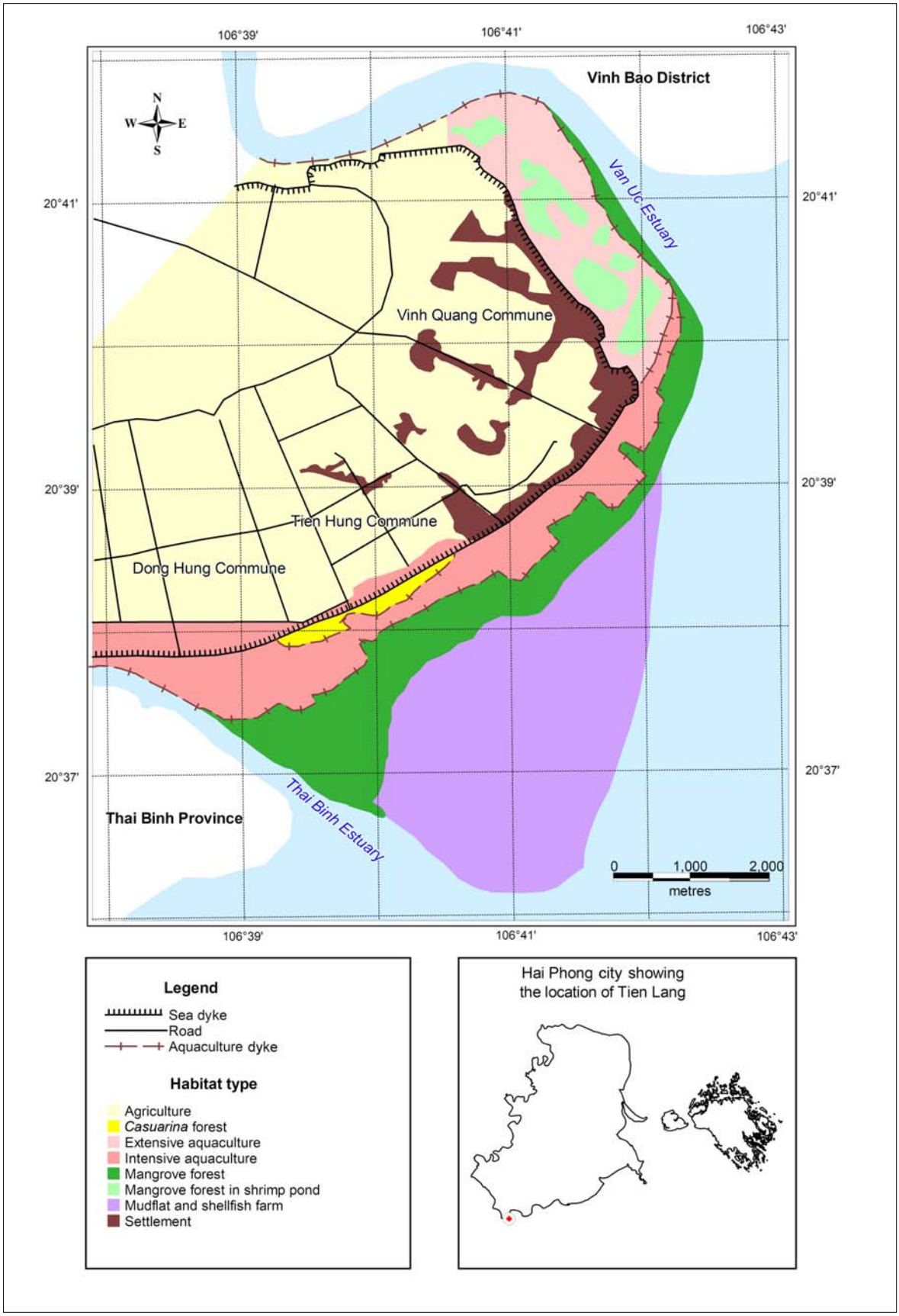
Map 1: Study areas in the Red River Delta



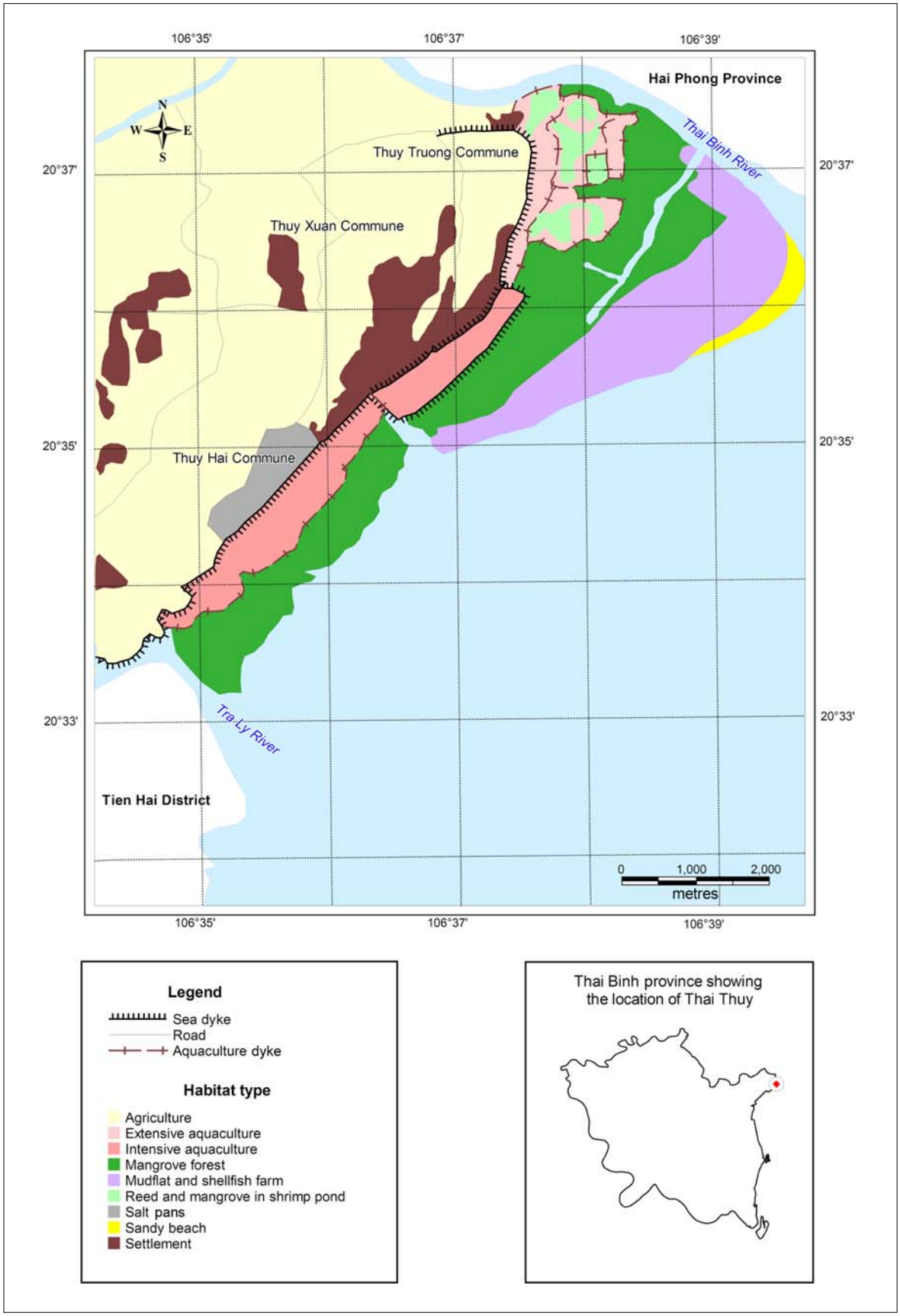
Map 2: Habitat of An Hai, Hai Phong city



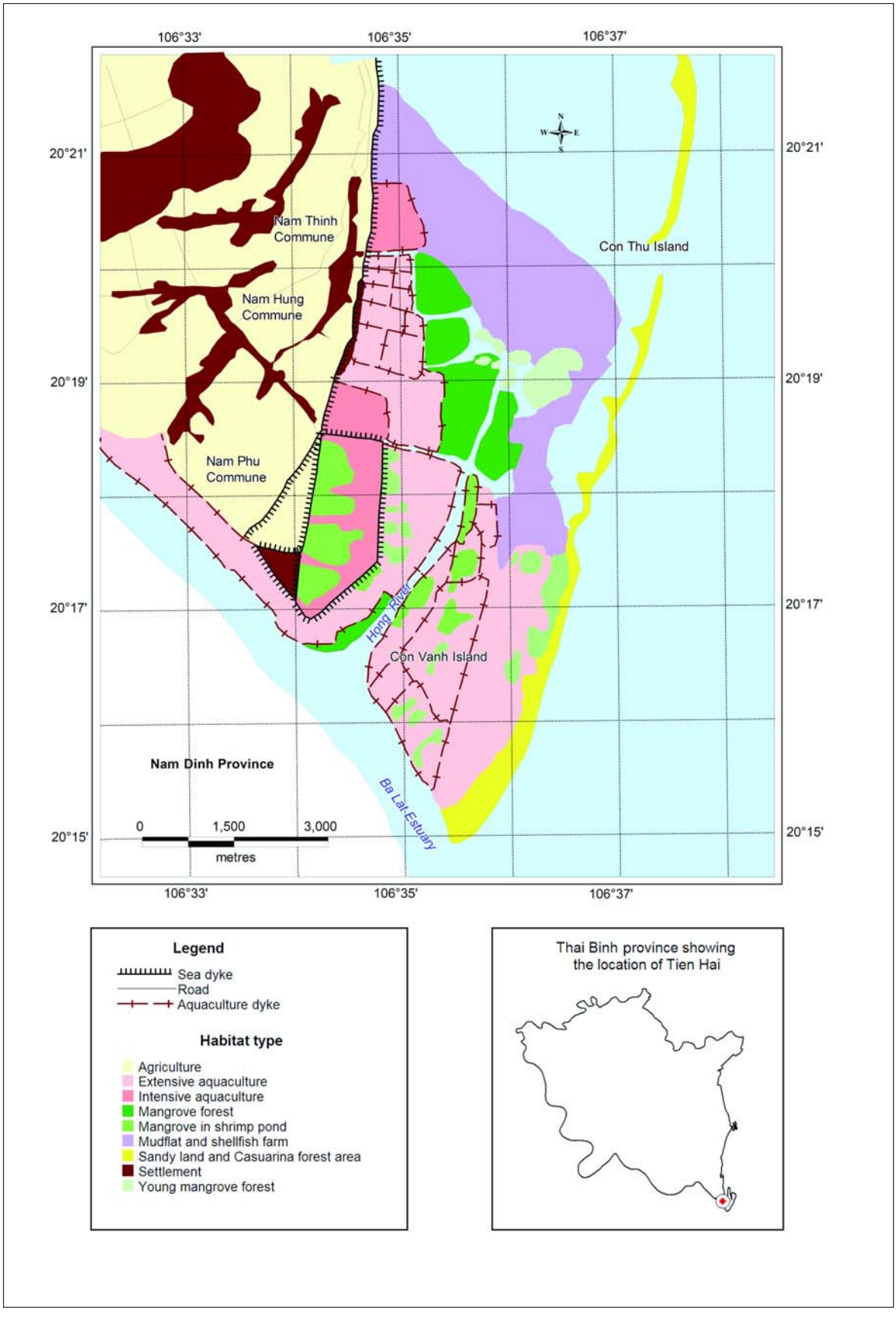
Map 3: Habitat of Tien Lang, Hai Phong city



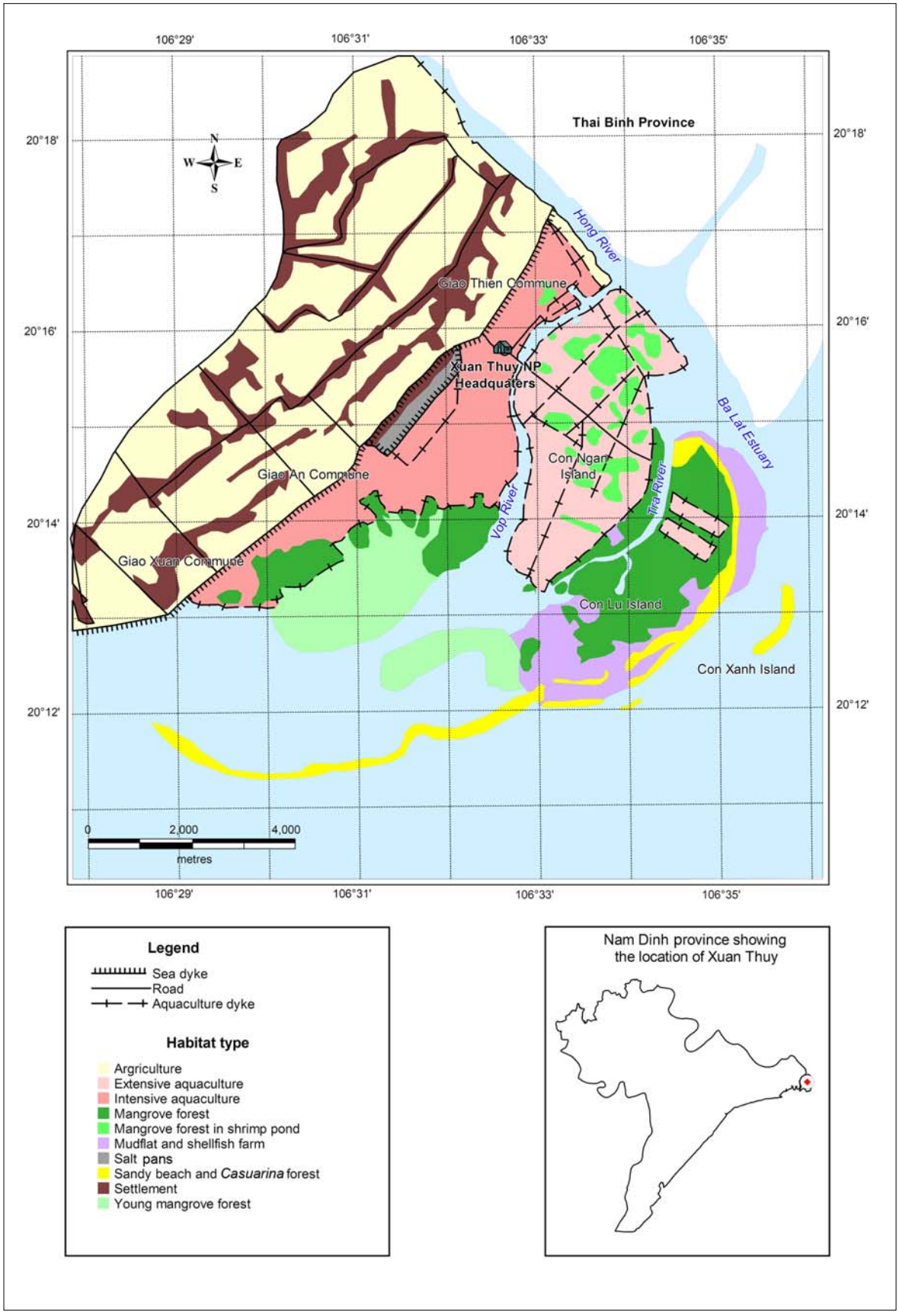
Map 4: Habitat of Thai Thuy, Thai Binh province



Map 5: Habitat of Tien Hai Nature Reserve, Thai Binh province



Map 6: Habitat of Xuan Thuy National Park, Nam Dinh province



Map 7: Habitat of Nghia Hung, Nam Dinh province

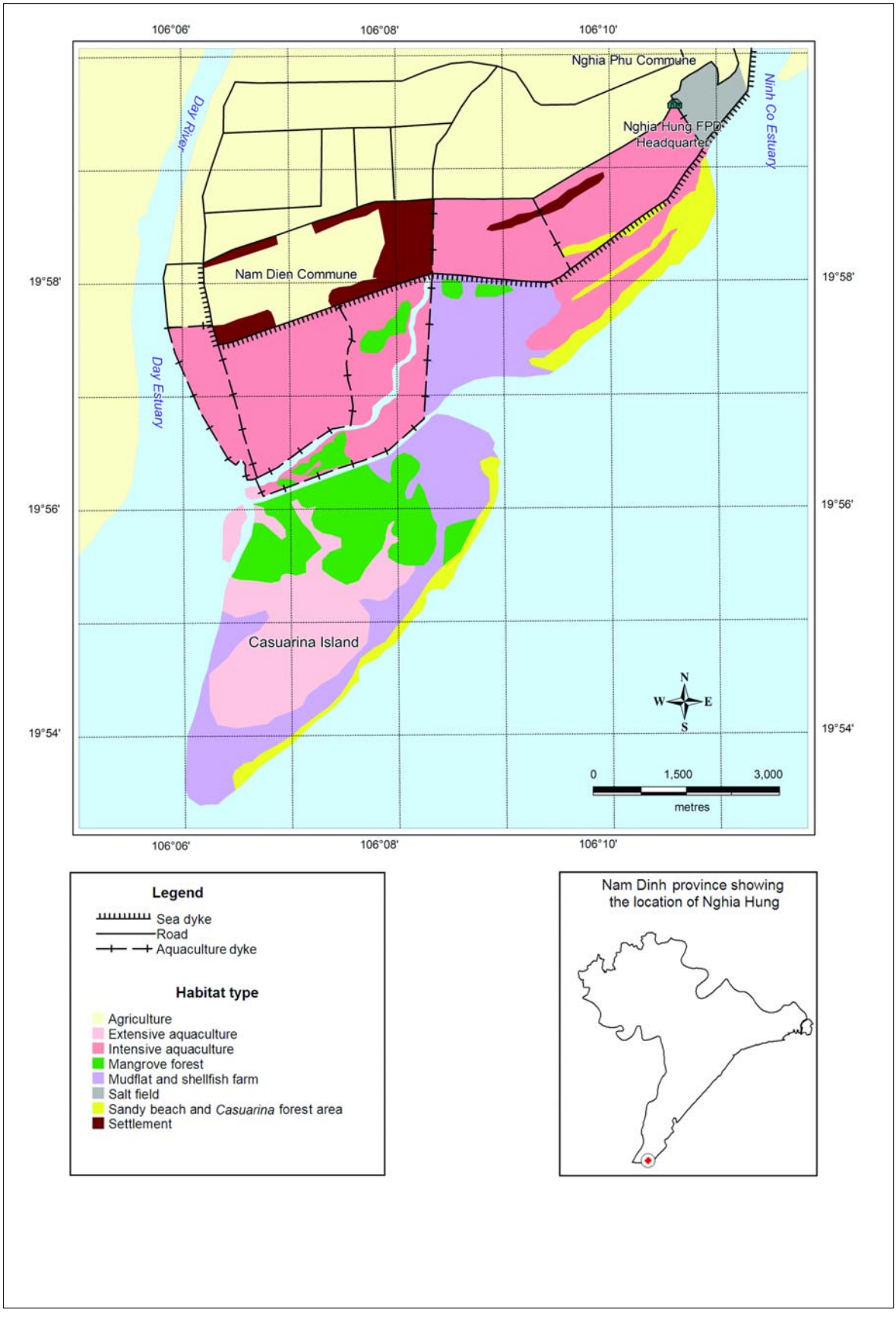


Plate 1: Key natural and man-made habitats in the coastal zone of the Red River Delta

Figure 1: Mangrove dominated by *Sonneratia caseolaris*–main channel of Red River, Tien Hai IBA.

Figure 4: Intertidual mudflats–an important feeding habitat for waterbirds, Thai Thuy IBA.

Figure 2: Mangrove on alluvial soils –here with *Sonneratia caseolaris, Bruguiera gymnorrhiza* and *Kandelia candel*, Xuan Thuy IBA.

Figure 5: Sandy beaches planted with exotic *Casuarina equisetifolia* – Con Mo Island, Nghia Hung IBA.

Figure 3: Extensive aquacultural ponds with emergent vegetation.

Figure 6: Shellfish farms–an increasingly common land-use in the Red River Delta.

Plate 2: Threats to biodiversity in the coastal zone of the Red River Delta

Figure 7: Hunting with guns–a man armed with an airgun, Tien Hai IBA.

Figure 10: Deforestation–mangrove trees are frequently felled for firewood.

Figure 8: Hunting with mistnets–often in conjunction with tape luring, this indiscriminate hunting technique kills many shorebirds, like this Sanderling *Calidris alba*, An Hai IBA.

Figure 11: Disturbance–fishing and shellfish collectors in the intertidal zone cause disturbance to feeding waterbirds, Thai Thuy IBA.

Figure 9: Disease–widespread poultry keeping puts wild migratory birds at risk of disease transmission from domestic birds, Nghia Hung IBA.

Figure 12: Habitat loss–conversion of exposed mudflats through dyke construction means there are less suitable places for shorebirds to feed, Tien Lang IBA.

Plate 3: Key bird species recorded in the coastal zone of the Red River Delta

Figure 13: Black–faced Spoonbill *Platalea minor* –Red River Delta, especially Xuan Thuy IBA, is the word's third most important wintering site for this Endangered species.

Figure 16: Ferruginous Pochard *Aythya nyroca*– small numbers of this Near-Threatened species are regular at Thai Thuy IBA.

Figure 14: Spoon-billed Sandpiper *Eurynorhynchus pygmeus*– the Red River Delta is an important wintering site for this rapidly declining Endangered species.

Figure 17: Baer's Pochard *Aythya baeri* –although rarely recorded in the Red River Delta, this Vulnerable species appears to be in decline throughout its range.

Figure 15: Saunders's Gull *Larus saundersi* – more than 3% of the global population of this Vulnerable species has been recorded wintering in the Red River Delta, mainly at Thai Thuy IBA.

Figure 18: Black-tailed Godwit *Limosa limosa* –a regular winter visitor in large numbers with the highest count to date of 5,000 at Xuan Thuy in April 1996, representing more than 3% of the Asian biogeographic population.

Appendix 1: Checklist of bird species recorded during field surveys winter 2005/2006

	Threatened species	AH	NH	TT	TH	TL	XT	Notes
1	Greylag Goose *Anser anser*	x						
2	Eurasian Wigeon *Anas penelope*	x		x	x		x	
3	Spot-billed Duck *A. poecilorhyncha*			x			x	
4	Northern Shoveler *A. clypeata*			x			x	
5	Northern Pintail *A. acuta*	x					x	
6	Garganey *A. querquedula*			x			x	
7	Common Teal *A. crecca*	x		x			x	
8	Common Pochard *Aythya ferina*			x				
9	Ferruginous Pochard *A. nyroca*			x				NT
10	Baer's Pochard *A. baeri*			x				VU
11	Common Hoopoe *Upupa epops*						x	
12	Common Kingfisher *Alcedo atthis*	x	x	x	x	x	x	
13	White-throated Kingfisher *Halcyon smyrnensis*	x		x			x	
14	Black-capped Kingfisher *H. pileata*	x		x	x		x	
15	Collared Kingfisher *Todiramphus chloris*				x			
16	Pied Kingfisher *Ceryle rudis*			x	x		x	
17	Greater Coucal *Centropus sinensis*			x	x		x	
18	Lesser Coucal *C. bengalensis*			x	x		x	
19	Spotted Dove *Streptopelia chinensis*			x				
20	Slaty-breasted Rail *Rallus striatus*		x	x	x		x	
21	White-breasted Waterhen *Amaurornis phoenicurus*	x		x			x	
22	Ruddy-breasted Crake *Porzana fusca*			x				
23	Purple Swamphen *Porphyrio porphyrio*			x			x	
24	Common Moorhen *Gallinula chloropus*			x			x	
25	Eurasian Coot *Fulica atra*			x				
26	Common Snipe *Gallinago gallinago*			x	x			
27	Black-tailed Godwit *Limosa limosa*	x	x	x	x		x	
28	Bar-tailed Godwit *L. lapponica*			x			x	
29	Whimbrel *Numenius phaeopus*				x		x	
30	Eurasian Curlew *N. arquata*	x			x		x	
31	Spotted Redshank *Tringa erythropus*			x	x		x	
32	Common Redshank *T. totanus*	x		x	x		x	
33	Marsh Sandpiper *T. stagnatilis*		x	x	x		x	
34	Common Greenshank *T. nebularia*	x	x	x	x		x	
35	Green Sandpiper *T. ochropus*			x				
36	Wood Sandpiper *T. glareola*	x		x				
37	Terek Sandpiper *Xenus cinereus*				x			
38	Common Sandpiper *Actitis hypoleucos*	x	x	x	x		x	
39	Ruddy Turnstone *Arenaria interpres*				x			
40	Great Knot *Calidris tenuirostris*	x	x	x	x		x	
41	Red Knot *C. canutus*			x	x		x	
42	Sanderling *C. alba*	x	x	x			x	

	Threatened species	AH	NH	TT	TH	TL	XT	Notes
43	Red-necked Stint *C. ruficollis*			x				
44	Dunlin *C. alpina*	x	x	x	x		x	
45	Curlew Sandpiper *C. ferruginea*			x				
46	Broad-billed Sandpiper *Limicola falcinellus*		x		x			
47	Spoon-billed Sandpiper *Eurynorhynchus pygmeus*			x			x	EN
48	Black-winged Stilt *Himantopus himantopus*				x			
49	Pacific Golden Plover *Pluvialis fulva*			x			x	
50	Grey Plover *P. squatarola*	x	x	x	x		x	
51	Little Ringed Plover *Charadrius dubius*	x	x	x	x		x	
52	Kentish Plover *C. alexandrinus*	x	x	x	x	x	x	
53	Lesser Sand Plover *C. mongolus*						x	
54	Greater Sand Plover *C. leschenaultii*	x	x	x	x		x	
55	Northern Lapwing *Vanellus vanellus*			x				
56	Heuglin's Gull *Larus heuglini*	x		x	x	x	x	
57	Pallas's Gull *L. ichthyaetus*			x				
58	Black-headed Gull *L. ridibundus*	x	x	x	x	x	x	
59	Saunders's Gull *L. saundersi*			x	x		x	VU
60	Gull-billed Tern *Gelochelidon nilotica*		x	x	x			
61	Caspian Tern *Sterna caspia*				x		x	
62	Great Crested Tern *Sterna bergii*			x				
63	Common Tern *S. hirundo*			x	x		x	
64	Whiskered Tern *Chlidonias hybridus*			x	x		x	
65	Osprey *Pandion haliaetus*	x						
66	Black-shouldered Kite *Elanus caeruleus*			x				
67	Eastern Marsh Harrier *Circus spilonotus*	x	x	x	x	x	x	
68	Common Buzzard *Buteo buteo*			x				
69	Greater Spotted Eagle *Aquila clanga*			x	x			VU
70	Imperial Eagle *A. heliaca*			x				VU
71	Common Kestrel *Falco tinnunculus*	x		x				
72	Peregrine Falcon *Falco peregrinus*	x		x	x		x	
73	Little Grebe *Tachybaptus ruficollis*	x		x	x	x	x	
74	Little Egret *Egretta garzetta*	x	x	x	x	x	x	
75	Grey Heron *Ardea cinerea*	x	x	x	x	x	x	
76	Purple Heron *A. purpurea*	x		x			x	
77	Great Egret *Casmerodius albus*	x	x	x	x	x	x	
78	Intermediate Egret *Mesophoyx intermedia*	x	x	x	x	x		
79	Cattle Egret *Bubulcus ibis*			x			x	
80	Chinese Pond Heron *Ardeola bacchus*	x		x	x	x	x	
81	Black-crowned Night Heron *Nycticorax nycticorax*	x		x	x		x	
82	Yellow Bittern *Ixobrychus sinensis*			x				
83	Black-faced Spoonbill *Platalea minor*				x		x	EN
84	Brown Shrike *Lanius cristatus*						x	

	Threatened species	AH	NH	TT	TH	TL	XT	Notes
85	Long-tailed Shrike *Lanius schach*	x		x	x		x	
86	Black-naped Oriole *Oriolus chinensis*			x				
87	White-throated Fantail *Rhipidura albicollis*			x				
88	Black Drongo *Dicrurus macrocercus*			x	x		x	
89	Japanese Thrush *Turdus cardis*			x				
90	Eurasian Blackbird *Turdus merula*		x	x			x	
91	Oriental Magpie Robin *Copsychus saularis*			x	x		x	
92	Common Stonechat *Saxicola torquata*			x			x	
93	Red-billed Starling *Sturnus sericeus*			x	x		x	
94	White-shouldered Starling *S. sinensis*			x		x	x	
95	White-vented Myna *Acridotheres cinereus*			x				
96	Crested Myna *A. cristatellus*			x				
97	Great Tit *Parus major*			x				
98	Barn Swallow *Hirundo rustica*	x	x	x	x	x	x	
99	Red-rumped Swallow *H. daurica*				x			
100	Light-vented Bulbul *Pycnonotus sinensis*			x				
101	Sooty-headed Bulbul *P. aurigaster*			x	x		x	
102	Plain Prinia *Prinia inornata*	x		x			x	
103	Japanese White-eye *Zosterops japonica*			x	x			
104	Common Tailorbird *Orthotomus sutorius*			x			x	
105	Dusky Warbler *Phylloscopus fuscatus*			x			x	
106	Yellow-browed Warbler *P. inornatus*			x				
107	Eurasian Tree Sparrow *Passer montanus*			x			x	
108	White Wagtail *Motacilla alba*	x		x	x		x	
109	Yellow Wagtail *M. flava*	x		x	x		x	
110	Grey Wagtail *M. cinerea*				x	x	x	
111	Paddyfield Pipit *Anthus rufulus*			x			x	
112	Olive-backed Pipit *A. hodgsoni*						x	
113	Red-throated Pipit *A. cervinus*			x				

Appendix 2: Checklist of birds recorded at An Hai during field surveys winter 2005/2006

	Species recorded	Nov-05	Dec-05	Jan-06
1	Greylag Goose *Anser anser*		24	
2	Eurasian Wigeon *Anas penelope*		120	
3	Northern Pintail *A. acuta*		14	
4	Common Teal *A. crecca*	60	15	
5	Duck species			123
6	Common Kingfisher *Alcedo atthis*	*	*	
7	White-throated Kingfisher *Halcyon smyrnensis*	*	*	
8	Black-capped Kingfisher *H. pileata*	*	*	
9	White-breasted Waterhen *Amaurornis phoenicurus*		1	
10	Black-tailed Godwit *Limosa limosa*	144	97	28

	Threatened species	Nov-05	Dec-05	Jan-06
11	Eurasian Curlew *Numenius arquata*	15	11	18
12	Common Redshank *Tringa totanus*	2	11	18
13	Common Greenshank *T. nebularia*	83	30	25
14	Green Sandpiper *T. ochropus*		3	
15	Common Sandpiper *Actitis hypoleucos*	8	4	
16	Great Knot *Calidris tenuirostris*		110	300
17	Sanderling *C. alba*	1	1	8
18	Dunlin *C. alpina*		30	300
19	Grey Plover *Pluvialis squatarola*	64	30	15
20	Little Ringed Plover *Charadrius dubius*	34	33	15
21	Kentish Plover *C. alexandrinus*	47	60	120
22	Greater Sand Plover *C. leschenaultii*	60	4	
23	Shorebird species	90	500	
24	Heuglin's Gull *Larus heuglini*	12	67	38
25	Black-headed Gull *L. ridibundus*		10	15
26	Osprey *Pandion haliaetus*			*
27	Eastern Marsh Harrier *Circus spilonotus*	*	*	
28	Common Kestrel *Falco tinnunculus*			*
29	Peregrine Falcon *F. peregrinus*		*	
30	Little Grebe *Tachybaptus ruficollis*	1	11	
31	Little Egret *Egretta garzetta*	3133	311	
32	Grey Heron *Ardea cinerea*	90		65
33	Purple Heron *A. purpurea*		3	
34	Great Egret *Casmerodius albus*	24	15	
35	Intermediate Egret *Mesophoyx intermedia*	35	29	
36	Chinese Pond Heron *Ardeola bacchus*	37	24	
37	Black-crowned Night Heron *Nycticorax nycticorax*	110		
38	Long-tailed Shrike *Lanius schach*	*	*	
39	Barn Swallow *Hirundo rustica*			*
40	Plain Prinia *Prinia inornata*		*	
41	White Wagtail *Motacilla alba*	*	*	

Appendix 3: Checklist of birds recorded at Tien Lang during field surveys winter 2005/2006

	Species recorded	Nov-05	Dec-05
1	Common Kingfisher *Alcedo atthis*		*
2	Kentish Plover *Charadrius alexandrinus*		16
3	Shorebird species	400	
4	Heuglin's Gull *Larus heuglini*		6
5	Black-headed Gull *L. ridibundus*	56	40
6	Eastern Marsh Harrier *Circus spilonotus*	*	
7	Little Grebe *Tachybaptus ruficollis*		6
8	Little Egret *Egretta garzetta*	72	25

	Species recorded	Nov-05	Dec-05
9	Grey Heron *Ardea cinerea*	4	
10	Great Egret *Casmerodius albus*	5	
11	Intermediate Egret *Mesophoyx intermedia*	8	5
12	Chinese Pond Heron *Ardeola bacchus*	3	35
13	White-shouldered Starling *Sturnus sinensis*		*
14	Barn Swallow *Hirundo rustica*	*	
15	Grey Wagtail *Motacilla cinerea*		*

Appendix 4: Checklist of birds recorded at Thai Thuy during field surveys winter 2005/2006

	Species recorded	Nov-05	Dec-05	Jan-06	Jan-06	Mar-06
1	Eurasian Wigeon *Anas penelope*		2			
2	Spot-billed Duck *A. poecilorhyncha*		2		3	1
3	Northern Shoveler *A. clypeata*	1	9			
4	Garganey *A. querquedula*		2		90	4
5	Common Teal *A. crecca*	61	42			8
6	Common Pochard *Aythya ferina*		12	5		
7	Ferruginous Pochard *A. nyroca*		8	1		
8	Baer's Pochard *A. baeri*					1
9	Duck species			40	15	70
10	Common Kingfisher *Alcedo atthis*	*	*	*		*
11	White-throated Kingfisher *Halcyon smyrnensis*	*	*			*
12	Black-capped Kingfisher *H. pileata*	*	*	*		*
13	Pied Kingfisher *Ceryle rudis*					*
14	Greater Coucal *Centropus sinensis*	*				*
15	Lesser Coucal *C. bengalensis*					
16	Spotted Dove *Streptopelia chinensis*					*
17	Slaty-breasted Rail *Rallus striatus*		1	2	1	1
18	White-breasted Waterhen *Amaurornis phoenicurus*	1	8	8	3	1
19	Ruddy-breasted Crake *Porzana fusca*		1			
20	Purple Swamphen *Porphyrio porphyrio*				1	
21	Common Moorhen *Gallinula chloropus*	98	136	172	30	47
22	Eurasian Coot *Fulica atra*	11	16	11		
23	Common Snipe *Gallinago gallinago*				30	
24	Black-tailed Godwit *Limosa limosa*	82	349	250		175
25	Bar-tailed Godwit *L. lapponica*				20	
26	Spotted Redshank *Tringa erythropus*		5			55
27	Common Redshank *T. totanus*	112	115	700		35
28	Marsh Sandpiper *T. stagnatilis*			3		210
29	Common Greenshank *T. nebularia*	148	520	180	5	25
30	Green Sandpiper *T. ochropus*					2
31	Wood Sandpiper *T. glareola*					1
32	Common Sandpiper *Actitis hypoleucos*		12	132		2

	Species recorded	Nov-05	Dec-05	Jan-06	Jan-06	Mar-06
33	Great Knot *Calidris tenuirostris*		12			55
34	Red Knot *C. canutus*		2			
35	Sanderling *C. alba*			41		2
36	Red-necked Stint *C. ruficollis*					15
37	Dunlin *C. alpina*		44	28		17
38	Curlew Sandpiper *C. ferruginea*					4
39	Spoon-billed Sandpiper *Eurynorhynchus pygmeus*			4		
40	Pacific Golden Plover *Pluvialis fulva*	5	128			41
41	Grey Plover *P. squatarola*	4	95	60	12	4
42	Little Ringed Plover	87			20	
43	Kentish Plover *C. alexandrinus*	82	10	450		350
44	Greater Sand Plover *C. leschenaultii*		80			23
45	Northern Lapwing *Vanellus vanellus*				1	
46	Shorebird species				200	
47	Heuglin's Gull *Larus heuglini*	2	15	44	3	130
48	Pallas's Gull *L. ichthyaetus*				2	
49	Black-headed Gull *L. ridibundus*	285	650	1,245	1,000	210
50	Saunders's Gull *L. saundersi*	44	5	167	288	2
51	Gull-billed Tern *Gelochelidon nilotica*	253			1	2
52	Great Crested Tern *Sterna bergii*				7	
53	Common Tern *S. hirundo*	210				
54	Whiskered Tern *Chlidonias hybridus*		345	60	50	
55	Black-shouldered Kite *Elanus caeruleus*					*
56	Eastern Marsh Harrier *Circus spilonotus*	*	*	*		*
57	Common Buzzard *Buteo buteo*					8
58	Greater Spotted Eagle *Aquila clanga*					1
59	Imperial Eagle *A. heliaca*		1			
60	Common Kestrel *Falco tinnunculus*					2
61	Little Grebe *Tachybaptus ruficollis*	11	17	46	10	10
62	Little Egret *Egretta garzetta*	596	520	2,500	200	230
63	Grey Heron *Ardea cinerea*	3	55	315	5	30
64	Purple Heron *A. purpurea*		17			5
65	Great Egret *Casmerodius albus*	188	6	503	50	10
66	Intermediate Egret *Mesophoyx intermedia*		6	35		6
67	Cattle Egret *Bubulcus ibis*		1	85	2	10
68	Chinese Pond Heron *Ardeola bacchus*	46	65	210	50	50
69	Black-crowned Night Heron *Nycticorax nycticorax*		500	85		700
70	Yellow Bittern *Ixobrychus sinensis*	4		1	2	
71	Long-tailed Shrike *Lanius schach*	*	*	*		*
72	Black-naped Oriole *Oriolus chinensis*					*
73	White-throated Fantail *Rhipidura albicollis*					*
74	Black Drongo *Dicrurus macrocercus*	*	*	*		*
75	Japanese Thrush *Turdus cardis*					*

	Species recorded	Nov-05	Dec-05	Jan-06	Jan-06	Mar-06
76	Eurasian Blackbird *T. merula*					*
77	Oriental Magpie Robin *Copsychus saularis*	*	*	*		*
78	Common Stonechat *Saxicola torquata*					*
79	Red-billed Starling *Sturnus sericeus*					*
80	White-shouldered Starling *S. sinensis*	*	*	*		*
81	White-vented Myna *Acridotheres cinereus*					*
82	Crested Myna *A. cristatellus*	*	*	*		*
83	Great Tit *Parus major*					*
84	Barn Swallow *Hirundo rustica*	*	*	*		*
85	Light-vented Bulbul *Pycnonotus sinensis*					*
86	Sooty-headed Bulbul *P. aurigaster*	*				*
87	Plain Prinia *Prinia inornata*		*			
88	Japanese White-eye *Zosterops japonica*			*		
89	Common Tailorbird *Orthotomus sutorius*					*
90	Dusky Warbler *Phylloscopus fuscatus*					*
91	Yellow-browed Warbler *P. inornatus*					*
92	Eurasian Tree Sparrow *Passer montanus*					*
93	White Wagtail *Motacilla alba*		*			*
94	Yellow Wagtail *M. flava*					*
95	Paddyfield Pipit *Anthus rufulus*					*
96	Red-throated Pipit *A. cervinus*					*

Appendix 5: Checklist of birds recorded at Tien Hai during field surveys winter 2005/2006

	Species recorded	Nov-05	Dec-05	Jan-06	Mar-06
1	Eurasian Wigeon *Anas penelope*				6
2	Duck sp.		9	6	
3	Common Kingfisher *Alcedo atthis*		*	*	*
4	Black-capped Kingfisher *Halcyon pileata*		*	*	*
5	Collared Kingfisher *Todiramphus chloris*		*	*	
6	Pied Kingfisher *Ceryle rudis*		*		
7	Greater Coucal *Centropus sinensis*				*
8	Lesser Coucal *C. bengalensis*				*
9	Slaty-breasted Rail *Rallus striatus*			1	
10	Common Snipe *Gallinago gallinago*			1	
11	Black-tailed Godwit *Limosa limosa*	250	33		1
12	Whimbrel *Numenius phaeopus*				1
13	Eurasian Curlew *N. arquata*				65
14	Spotted Redshank *Tringa erythropus*				
15	Common Redshank *T. totanus*		58	112	15
16	Marsh Sandpiper *T. stagnatilis*				3
17	Common Greenshank *T. nebularia*	81	103	165	8
18	Terek Sandpiper *Xenus cinereus*				1

	Species recorded	Nov-05	Dec-05	Jan-06	Mar-06
19	Common Sandpiper *Actitis hypoleucos*	4	9	5	
20	Ruddy Turnstone *Arenaria interpres*			1	
21	Great Knot *Calidris tenuirostris*			120	
22	Red Knot *C. canutus*			12	10
23	Dunlin *C. alpina*	240			2
24	Broad-billed Sandpiper *Limicola falcinellus*	14			
25	Black-winged Stilt *Himantopus himantopus*			32	
26	Grey Plover *Pluvialis squatarola*	43		2	21
27	Little Ringed Plover *Charadrius dubius*	120			
28	Kentish Plover *C. alexandrinus*	606			6
29	Greater Sand Plover *C. leschenaultii*	3			2
30	Shorebird species			700	
31	Heuglin's Gull *Larus heuglini*				
32	Black-headed Gull *L. ridibundus*	6	216	131	
33	Saunders's Gull *L. saundersi*		38	16	
34	Gull-billed Tern *Gelochelidon nilotica*		40	15	
35	Caspian Tern *Sterna caspia*		3	4	
36	Common Tern *S. hirundo*	44			
37	Whiskered Tern *Chlidonias hybridus*		40	90	
38	Eastern Marsh Harrier *Circus spilonotus*		*	*	*
39	Greater Spotted Eagle *Aquila clanga*				1
40	Peregrine Falcon *Falco peregrinus*			*	
41	Little Grebe *Tachybaptus ruficollis*		8	12	30
42	Little Egret *Egretta garzetta*	102		60	6
43	Grey Heron *Ardea cinerea*	14		2	27
44	Great Egret *Casmerodius albus*	24		25	
45	Intermediate Egret *Mesophoyx intermedia*			8	1
46	Chinese Pond Heron *Ardeola bacchus*	8		15	15
47	Black-crowned Night Heron *Nycticorax nycticorax*			1	
48	Black-faced Spoonbill *Platalea minor*				7
49	Long-tailed Shrike *Lanius schach*	*		*	*
50	Black Drongo *Dicrurus macrocercus*			*	
51	Oriental Magpie Robin *Copsychus saularis*				*
52	Red-billed Starling *Sturnus sericeus*				*
53	Barn Swallow *Hirundo rustica*	*		*	25
54	Red-rumped Swallow *H. daurica*				2
55	Sooty-headed Bulbul *Pycnonotus aurigaster*				*
56	Japanese White-eye *Zosterops japonica*				*
57	White Wagtail *Motacilla alba*				*
58	Yellow Wagtail *M. flava*				*
59	Grey Wagtail *M. cinerea*			*	

Appendix 6: Checklist of birds recorded at Xuan Thuy during field surveys winter 2005/2006

	Species recorded	Nov-05	Dec-05	Jan-06	Mar-06
1	Eurasian Wigeon *Anas penelope*		210		
2	Spot-billed Duck *A. poecilorhyncha*	48	10	18	2
3	Northern Shoveler *A. clypeata*		1	2	
4	Northern Pintail *A. acuta*			28	
5	Garganey *A. querquedula*	22	116		1
6	Common Teal *A. crecca*	986	430	86	35
7	Common Hoopoe *Upupa epops*		*		
8	Common Kingfisher *Alcedo atthis*	*	*		*
9	White-throated Kingfisher *Halcyon smyrnensis*	*	*		
10	Black-capped Kingfisher *H. pileata*	*	*	*	
11	Pied Kingfisher *Ceryle rudis*		*	*	*
12	Greater Coucal *Centropus sinensis*		*		
13	Lesser Coucal *C. bengalensis*		*		*
14	Slaty-breasted Rail *Rallus striatus*		7	2	
15	White-breasted Waterhen *Amaurornis phoenicurus*		9	5	
16	Purple Swamphen *Porphyrio porphyrio*				2
17	Common Moorhen *Gallinula chloropus*		4	1	
18	Black-tailed Godwit *Limosa limosa*	152	2	45	35
19	Bar-tailed Godwit *L. lapponica*	1			
20	Whimbrel *Numenius phaeopus*	11			
21	Eurasian Curlew *N. arquata*	26		16	
22	Spotted Redshank *Tringa erythropus*	1			1
23	Common Redshank *T. totanus*	70		42	30
24	Marsh Sandpiper *T. stagnatilis*	5		6	9
25	Common Greenshank *T. nebularia*	250	7	120	30
26	Common Sandpiper *Actitis hypoleucos*	3	4	11	4
27	Great Knot *Calidris tenuirostris*		120	950	
28	Red Knot *C. canutus*			32	
29	Sanderling *C. alba*		115	180	
30	Dunlin *C. alpina*	170	55	30	10
31	Spoon-billed Sandpiper *Eurynorhynchus pygmeus*		1	2	
32	Pacific Golden Plover *Pluvialis fulva*	7			
33	Grey Plover *P. squatarola*	146	2	36	2
34	Little Ringed Plover *Charadrius dubius*	508		12	
35	Kentish Plover *C. alexandrinus*	252	40	260	5
36	Lesser Sand Plover *C. mongolus*		2		
37	Greater Sand Plover *C. leschenaultii*	438	3	25	
38	Heuglin's Gull *Larus heuglini*	60	34	45	
39	Black-headed Gull *L. ridibundus*	184	165	49	140
40	Saunders's Gull *L. saundersi*	3		2	
41	Caspian Tern *Sterna caspia*	6			

	Species recorded	Nov-05	Dec-05	Jan-06	Mar-06
42	Common Tern *S. hirundo*			1	
43	Whiskered Tern *Chlidonias hybridus*			8	
44	Eastern Marsh Harrier *Circus spilonotus*	*	*	*	*
45	Peregrine Falcon *Falco peregrinus*			*	
46	Little Grebe *Tachybaptus ruficollis*		3		
47	Little Egret *Egretta garzetta*	120	120	60	30
48	Grey Heron *Ardea cinerea*	52	51	20	8
49	Purple Heron *A. purpurea*		1	1	
50	Great Egret *Casmerodius albus*	44	8	55	30
51	Cattle Egret *Bubulcus ibis*				50
52	Chinese Pond Heron *Ardeola bacchus*	16	40	40	50
53	Black-crowned Night Heron *Nycticorax nycticorax*	3			
54	Black-faced Spoonbill *Platalea minor*	46	50	74	17
55	Brown Shrike *Lanius cristatus*				*
56	Long-tailed Shrike *Lanius schach*	*	*		*
57	Black Drongo *Dicrurus macrocercus*	*	*	*	*
58	Eurasian Blackbird *Turdus merula*				*
59	Oriental Magpie Robin *Copsychus saularis*		*		
60	Common Stonechat *Saxicola torquata*				*
61	Red-billed Starling *Sturnus sericeus*				*
62	White-shouldered Starling *S. sinensis*	*			
63	Barn Swallow *Hirundo rustica*	*	*	*	*
64	Sooty-headed Bulbul *Pycnonotus aurigaster*		*		
65	Plain Prinia *Prinia inornata*		*	*	*
66	Common Tailorbird *Orthotomus sutorius*				*
67	Dusky Warbler *Phylloscopus fuscatus*				*
68	Eurasian Tree Sparrow *Passer montanus*				*
69	White Wagtail *Motacilla alba*		*	*	*
70	Yellow Wagtail *M. flava*				*
71	Grey Wagtail *M. cinerea*				*
72	Paddyfield Pipit *Anthus rufulus*				*
73	Olive-backed Pipit *A. hodgsoni*		*		

Appendix 7: Checklist of birds recorded at Nghia Hung during field surveys winter 2005/2006

	Species recorded	Nov-05	Dec-05
1	Common Kingfisher *Alcedo atthis*		*
2	Slaty-breasted Rail *Rallus striatus*		*
3	Black-tailed Godwit *Limosa limosa*	6	
4	Marsh Sandpiper *Tringa stagnatilis*	3	
5	Common Greenshank *T. nebularia*	56	5
6	Common Sandpiper *Actitis hypoleucos*		14
7	Great Knot *Calidris tenuirostris*		24
8	Sanderling *C. alba*		

	Species recorded	Nov-05	Dec-05
9	Dunlin *C. alpina*	110	12
10	Broad-billed Sandpiper *Limicola falcinellus*	2	
11	Grey Plover *Pluvialis squatarola*		51
12	Little Ringed Plover *Charadrius dubius*		150
13	Kentish Plover *C. alexandrinus*	1,310	11
14	Greater Sand Plover *C. leschenaultii*	416	10
15	Black-headed Gull *Larus ridibundus*	16	180
16	Gull-billed Tern *Gelochelidon nilotica*		24
17	Eastern Marsh Harrier *Circus spilonotus*	*	*
18	Little Egret *Egretta garzetta*	120	55
19	Grey Heron *Ardea cinerea*	265	250
20	Great Egret *Casmerodius albus*	24	3
21	Intermediate Egret *Mesophoyx intermedia*		2
22	Eurasian Blackbird *Turdus merula*		*
23	Barn Swallow *Hirundo rustica*	*	

Appendix 8: Checklist of plants found in coastal wetland sites in the Red River Delta

	Family, Genus and Species	AH	TL	TT	TH	XT	NH
	ACANTHACEAE						
1	*Acanthus ilicifolius*	*	*	*	*	*	*
2	*Ruellia tuberosa*	*		*			
	AGAVACEAE						
3	***Agave americana***				*		
	AIZOACEAE						
4	*Sesuvium portulacastrum*			*	*	*	*
	AMARANTHACEAE						
5	*Achyranthes aspera*	*	*	*	*	*	*
6	*Althernanthera sessilis*	*	*	*	*	*	*
7	*Amaranthus spinosa*	*	*	*	*	*	*
8	***Amaranthus viridis***		*	*	*	*	*
	AMARYLLDACEAE						
9	*Crinum asiaticum*	*	*	*	*	*	
	ANNONACEAE						
10	*Annona glabra*	*	*	*	*	*	*
	APIACEAE						
11	***Centella asiatica***						*
	ARECACEAE						
12	***Nypa fruticans***				*		
	ASCLEPIADACEAE						
13	***Calotropis gigantea***		*	*	*	*	*
	ASTERACEAE						
14	*Ageratum conyzoides*	*					

	Family, Genus and Species	AH	TL	TT	TH	XT	NH
15	*Bidens pilosa*	*	*	*	*	*	*
16	*Blumea balsamifera*		*				
17	*Eclipta alba*	*	*	*	*	*	*
18	*Eupatorium odoratum*	*	*	*	*	*	*
19	***Eupatorium reevesii***	*	*				
20	***Hypocheris radicata***			*	*		
21	***Lactuca raborowshi***						*
22	*Melanthera bicolor*		*	*			
23	*Parthenium hysterophorus*			*	*	*	*
24	***Pluchea indica***	*	*	*	*	*	*
25	*Pluchea pteropoda*	*	*	*	*	*	*
26	***Thepis divaricata***					*	*
27	*Wedelia calendulacea*		*	*	*	*	
28	***Youngia japonica***				*	*	
	CACTACEAE						
29	***Opuntia dillenii***	*	*	*	*	*	*
	COMBRETACEAE						
30	***Lumnitzera racemosa***					*	*
	CONVOLVULACEAE						
31	*Ipomoea pes-caprae*	*	*	*	*	*	*
32	***Ipomoea gracilis***	*					
	CUCURBITACEAE						
39	***Zehneria maysorensis***				*		
	CYPERACEAE						
33	***Cyperus rotundus***					*	*
34	*Cyperus malacccensis*	*	*	*	*	*	*
35	*Cyperus stoloniferus*	*	*	*	*	*	*
36	*Cyperus tegetiformis*	*	*	*	*	*	*
37	*Fimbrystilis ferruginea*	*	*				
38	*Scirpus kimsonensis*				*	*	*
	EUPHORBIACEAE						
40	*Excoecaria agallocha*	*	*	*	*	*	*
41	***Hura crepitans***	*					
42	***Pedilanthus tithymaloides***	*					
43	***Phyllanthus* sp.**						*
44	***Ricinus communis***			*	*	*	
45	***Sapium sebiferum***				*		
	FABACEAE						
46	***Canavalia cathartica***	*	*	*	*		
47	*Derris trifoliata*	*	*	*	*	*	*
48	***Mimosa* sp.**				*		
49	***Senna hirsuta***	*	*	*			
50	***Sesbania* sp.**						*

	Family, Genus and Species	AH	TL	TT	TH	XT	NH
	FLAGELLARIACEAE						
51	*Flagellaria indica*					*	
	GOODENIACEAE						
52	*Scaveola hainamnensis*	*	*	*	*	*	*
53	*Scaveola taccada*	*	*	*	*	*	*
	MALVACEAE						
54	*Hibiscus tiliaceus*	*	*	*	*	*	*
55	*Sida rhombifolia*	*	*	*	*	*	*
56	*Thespesia populnea*	*	*	*	*	*	*
57	*Urena lobata*	*	*	*	*	*	*
	MENISPERMACEAE						
58	***Cocculus orcubilatus***				*		
	MORACEAE						
59	*Ficus racemosa*		*	*			
	MYRSINACEAE						
60	*Aegiceras corniculatum*	*	*	*	*	*	*
61	*Oxalis corniculata*			*	*	*	*
	PANDACEAE	*	*	*	*	*	*
62	*Pandanus affinis*	*	*	*	*	*	*
	PAPAVERACEAE						
63	***Argemone mexicana***						*
	POACEAE						
64	***Chloris virgata***	*	*				
65	***Chrysopogon aciculatus***			*	*	*	*
66	*Cynodon dactylon*	*	*	*	*	*	*
67	*Dactyloctenium aegyptianum*	*	*	*	*	*	*
68	*Paspalum paspalodes*	*	*				
69	*Sporolobus virginicus*	*	*	*	*	*	*
	PTERIDACEAE						
70	*Acrostichum aureum*	*	*	*	*	*	*
	RHAMNACEAE						
71	***Ziziphus oenoplia***	*	*	*	*	*	*
	RHIZOPHORACEAE						
72	*Bruguiera gymnorrhiza*	*	*	*	*	*	*
73	*Kandelia candel*	*	*	*	*	*	*
	RUBIACEAE						
74	***Paederia foetida***		*	*			
	SOLANACEAE						
75	*Datura metel*		*	*	*	*	*
76	***Lycianthes denticulata***	*	*	*	*	*	*
77	***Physalis angulata***				*		
78	***Solanum incanum***	*	*	*	*		
79	***Solanum procumbens***		*	*	*	*	

	Family, Genus and Species	AH	TL	TT	TH	XT	NH
	SONNERATIACEAE						
80	*Sonneratia caseolaris*	*	*	*	*	*	*
	THYMELAEACEAE						
81	***Wiktroemia indica***				*	*	*
	VERBENACEAE						
82	*Avicennia marina*	*	*	*	*	*	
83	*Clerodendrum inerme*	*	*	*	*	*	*
84	*Clerodendrum intermedia*		*	*			
85	***Clerodendrum kaempferi***					*	*
86	***Lantana camara***	*	*	*	*	*	*
87	***Premma intergrifolia***	*	*	*	*	*	*
88	***Vitex rotundifolia***				*	*	*
89	*Vitex trifolia*			*	*		
	VITACEAE						
90	***Ampelopsis heterophylla***				*		
91	***Cayratia trifolia***			*	*		

Notes:
AH = An Hai; TL = Tien Lang; TT = Thai Thuy; TH = Tien Hai; XT = Xuan Thuy; NH = Nghia Hung.
Names in bold refer to species not previously listed by Pedersen and Nguyen Huy Thang (1996).

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The Keidanren Nature Conservation Fund (KNCF)

In April 1991, Keidanren (Japan Federation of Economic Organizations) announced its Global Environment Charter. The Charter states that corporations must keep in mind the need to protect ecosystems and conserve resources.

Japanese industry has made diligent efforts to cut pollution emissions and save energy. Many countries are showing great interest in our environmentally friendly technology, which has now reached an extremely high level. Japanese companies are being called upon to transfer these techniques and know-how to areas of the world where the natural environment has been badly damaged. The world's tropical rainforests, which have always provided a wonderful habitat for a tremendously wide variety of wildlife, are now under threat. To protect natural areas such as these, Japan's businesses are expected to provide strong support in the form of capital and personnel-training programs. The Keidanren Committee on Nature Conservation was formed in 1992 to facilitate these efforts. This Committee established the Keidanren Nature Conservation Fund to support activities including aid for foreign and Japanese NGO-administered nature conservation projects in developing countries, training for personnel who will work on international nature conservation projects, and the promotion of deeper understanding of environmental issues.

In April 2000 Keidanren Nature Conservation Fund was authorized as a Charitable trust by the Japanese Government, and the Sumitomo Trust & Banking Co., Ltd. was selected as a Trust of the Fund.

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BirdLife International

BirdLife International is a global conservation network of non-governmental organisations (NGOs) present in more than 100 countries, with more than 60 autonomous Partner organizations. Together BirdLife is the leading authority on the status of birds and their habitats. Over ten million people now support the BirdLife Partnership. Partners work together on shared priorities, programmes and policies, learning from each other to achieve real conservation results. The BirdLife Partnership is coordinated by a decentralised international secretariat, which supports the partnership to achieve the aims and objectives of BirdLife International. BirdLife International initiated its Vietnam Programme in 1988, which is an office of the secretariat based in Hanoi.

In Vietnam, BirdLife works with a variety of government and non-government organisations to:

- Support improved conservation planning and management of important habitats, sites and species;
- Advocate new ideas for integrating biodiversity conservation into planning and policy;
- Stimulate greater public interest in birds and biodiversity, and awareness of the need for biodiversity conservation;
- Develop capacity for improved management of important habitats, sites and species among local communities and government institutions responsible for conservation in Vietnam; and
- Provide information on biodiversity and protected areas to planners, policy makers and other interest groups.

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