

GHANA

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Shining Drongo *Dicrurus atripennis*. (ILLUSTRATION: NIK BORROW)

GENERAL INTRODUCTION

The Republic of Ghana shares borders with Côte d'Ivoire to the west, Togo to the east and Burkina Faso to the north while, to the south, it borders the Gulf of Guinea with a coastline of some 550 km, from where it extends inland for c.675 km. The total land area is 238,533 km². The population of the country is 18.9 million (1998 estimate) with an annual growth-rate of 2.8%. Around 50% of the population is under 15 years old. The labour force is estimated at 8.2 million, of whom some 80% are women. Of the total labour force, 54% are engaged in agriculture, fisheries and forestry, 18.7% in industry, 15.2% in trading and clerical jobs, and the remainder in services, transportation, communication and professional careers. According to the World Bank, Ghana had a per capita GDP of US\$390 in 1995, growing at around 6% per annum.

Some 12% of the land area is cultivated pastureland occupies 15% and forest and woodlands 36%. The main sources of energy currently are fuelwood (70% of national energy usage) and electricity. Fuelwood consumption was estimated at 12 million m³ in 1985 (IIED 1992). The Volta Lake, the largest man-made lake in Africa, generates some 90% of the country's hydroelectric power.

The topography is undulating and more than half of the country lies below 150 m. Altitudes elsewhere range up to 450 m along ridges and escarpments, while the highest peak in the country, Mount Afadjato (885 m), is situated in the Akwapim-Togo Range which extends north-eastwards from east of the Volta Lake to the Togo border. Most of the country lies on the Precambrian Shield of West Africa, with Precambrian rocks widespread and overlain by sandstones, shales, mudstones, limestones and tillites. Three main soil groups are identifiable: forest oxisols and ochrosols in the forest zone, savanna ochrosols and groundwater laterites in the savanna zone and a complex mosaic of various soil-types in the coastal zone.

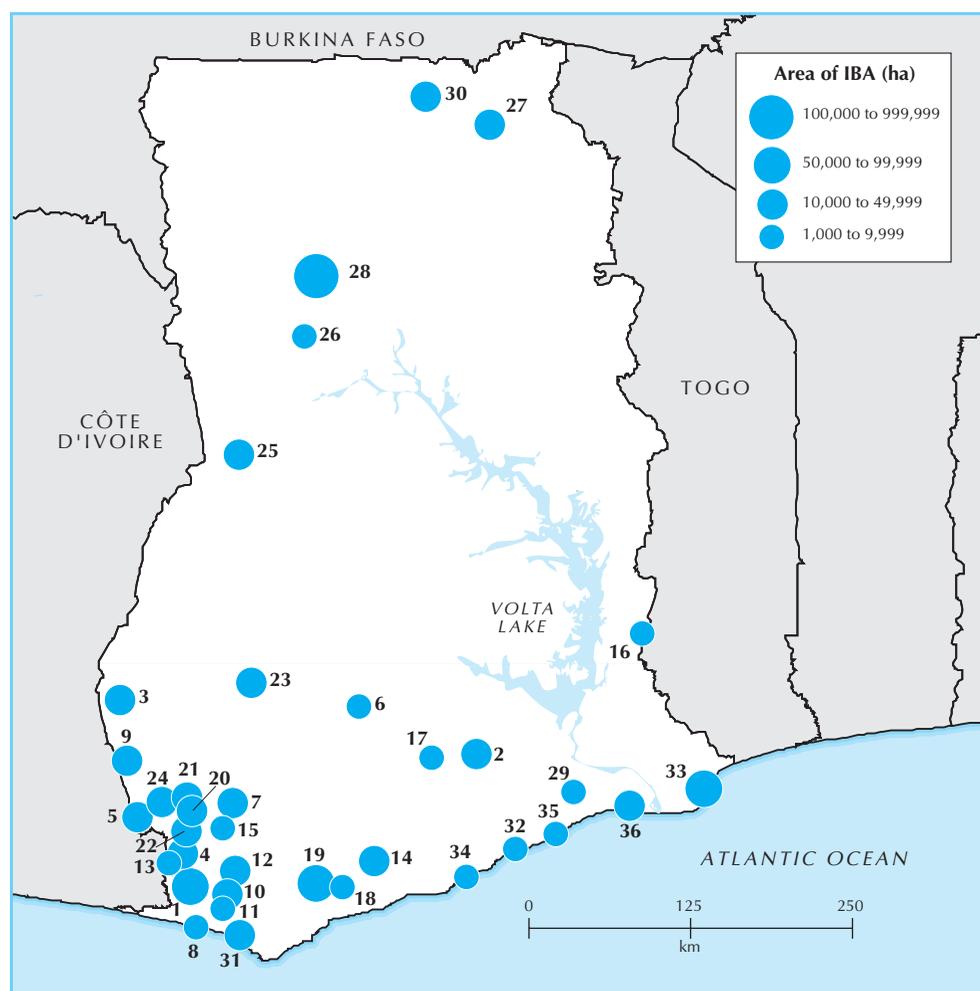
There are two main climatic zones, defined by rainfall. The northern part of the country is characterized by a single rainy season extending from April to October/November, where the average

annual precipitation is in the range 900–1,300 mm. The southern part of the country experiences two rainy seasons, between March and June/July and from October to November. Average annual precipitation here exceeds 2,000 mm. The south-eastern part of the country forms part of the dry Dahomey Gap where average rainfall is lower, c.700–900 mm per year.

Three main ecological zones are identifiable in the country: the forest zone, the interior savanna and the coastal savanna. The forest zone extends over much of the south-western part of the country and originally covered approximately 82,000 km², some 34% of the land area, and represents the eastern end of the Upper Guinea forest block, an area of high species diversity and endemism. Seven main forest-types have been recognized within the zone (Hall and Swaine, 1981), wet evergreen, moist evergreen, upland evergreen, moist semi-deciduous, dry semi-deciduous, southern marginal and south-east outlier forest. This classification is used here since it offers the most detailed description of the Ghanaian forests.

It is estimated that over 70% of the country's original closed forest has been destroyed (IIED 1992), leaving only about 11% as intact forest, the bulk of which is within protected areas. Deforestation is attributed mainly to clearance for agricultural purposes, timber logging and bush fires and is estimated at a rate of 22,000 ha per annum (Hawthorne 1990). The high rate of deforestation has resulted in a patchwork of secondary vegetation and farmlands outside reserved lands. The reserved lands themselves have been subjected to various degrees of disturbance and only a few of the reserves still remain relatively unmodified. Hawthorne and Abu-Juam (1995) classify Ghanaian Forest Reserves into categories (Conditions 1–6), based on the status of the vegetation, and prioritize the reserves for conservation action on the basis of a 'Genetic Heat Index' (see Glossary).

The interior savanna covers an estimated 136,000 km², and extends over the northern two-thirds of the country, accounting for 57% of the total land area. The vegetation consists of two types, Guinea Savanna, characterized by tall grasses with scattered, fire-tolerant trees, and Sudan Savanna, which is restricted to the extreme



Map 1. Location and size of Important Bird Areas in Ghana.

Table 1. Summary of Important Bird Areas in Ghana.

36 IBAs covering at least 11,494.5 km²

IBA code	Site name	Administrative region	Criteria (see p. 11; for A2/A3 codes, see Tables 2/3)					
			A1	A2 084	A3 A04	A05	A4i	A4iii
GH001	Ankasa Resource Reserve–Nini-Sushien National Park	Western	✓	✓		✓		
GH002	Atewa Range Forest Reserve	Eastern	✓	✓		✓		
GH003	Bia National Park and Resource Reserve	Western	✓	✓		✓		
GH004	Boin Tano Forest Reserve	Western	✓	✓		✓		
GH005	Boin River Forest Reserve	Western	✓	✓		✓		
GH006	Bosomtwe Range Forest Reserve	Ashanti	✓	✓		✓		
GH007	Bura River Forest Reserve	Western	✓	✓		✓		
GH008	Cape Three Points Forest Reserve	Western	✓	✓		✓		
GH009	Dadieso Forest Reserve	Western	✓	✓		✓		
GH010	Draw River Forest Reserve	Western	✓	✓		✓		
GH011	Ebi River Shelterbelt Forest Reserve	Western	✓	✓		✓		
GH012	Fure River Forest Reserve	Western	✓	✓		✓		
GH013	Jema-Asemkrom Forest Reserve	Western	✓	✓		✓		
GH014	Kakum National Park–Assin Attandaso Resource Reserve	Central	✓	✓		✓		
GH015	Mamiri Forest Reserve	Western	✓	✓		✓		
GH016	Mount Afadjato–Agumatsa Range forest	Volta	✓	✓		✓		
GH017	Nsuensa Forest Reserve	Eastern	✓	✓		✓		
GH018	Pra-Sushien Forest Reserve	Central	✓	✓		✓		
GH019	Subri River Forest Reserve	Western	✓	✓		✓		
GH020	Tano-Anwia Forest Reserve	Western	✓	✓		✓		
GH021	Tano-Ehuro Forest Reserve	Western	✓	✓		✓		
GH022	Tano-Nimiri Forest Reserve	Western	✓	✓		✓		
GH023	Tano-Offin Forest Reserve	Ashanti	✓	✓		✓		
GH024	Yoyo River Forest Reserve	Western	✓	✓		✓		
GH025	Bui National Park	Brong-Ahafo, Northern					✓	
GH026	Damongo Scarp Forest Reserve	Northern					✓	
GH027	Gambaga Scarp (East) Forest Reserve	Upper East					✓	

IBA code	Site name	Administrative region	Criteria (see p. 11; for A2/A3 codes, see Tables 2/3)					
			A1	A2 084	A3 A04 A05		A4i	A4iii
GH028	Mole National Park	Northern			✓			
GH029	Shai Hills Resource Reserve	Greater Accra			✓			
GH030	Tankwidi Forest Reserve	Upper East			✓			
GH031	Amansuri wetland	Western					✓	
GH032	Densu Delta Ramsar Site	Greater Accra					✓	✓
GH033	Keta Lagoon Ramsar Site	Volta					✓	✓
GH034	Muni-Pomadze Ramsar Site	Central				✓	✓	
GH035	Sakumo Lagoon Ramsar Site	Greater Accra					✓	✓
GH036	Songor Ramsar Site	Greater Accra					✓	✓
Total number of IBAs qualifying:			24	24	6	25	6	4

north-eastern tip of the country, and consists of shorter grasses with widely scattered trees.

The coastal savanna zone covers approximately 12,000 km², some 5% of the land area. This zone runs westward from the Togo border, includes the delta of the Volta river, and narrows in width until it is pinched out in the Sekondi–Takoradi area, just east of Ghana's southernmost extremity, Cape Three Points. The terrain in the eastern part of the zone comprises gently sloping hills bordering the Akwapim–Togo range and flat land along the coast. The vegetation consists of grasses and shrubs. Some mangrove stands occur in the south-east, around the Volta lagoons, and also in the west around the Amanzuri wetlands. Most of the mangrove forests in the east are degraded as a result of heavy exploitation.

ORNITHOLOGICAL IMPORTANCE

From the data provided by Grimes (1987), plus a few more recent additions, the total number of bird species confirmed for Ghana stands at 725. These include 405 non-passerines and 320 passerines, of which 494 are known or thought to be resident and 176 are regular seasonal migrants, including 100 from the Palearctic.

Seventeen species of global conservation concern have been recorded from Ghana, of which two, *Circus macrourus* (NT) and *Gallinago media* (NT), are non-breeding migrants from the Palearctic, the former common or at least was previously so, the latter uncommon, while a third, *Sterna balaenarum* (NT), is a rare non-breeding visitor to the Ghanaian coast from southern Africa. The remaining 14 are resident; *Agelastes melagrides* (VU), *Scotopelia ussheri* (EN), *Ceratogymna cylindricus* (NT), *C. elata* (NT), *Melignomon eisentrauti* (VU), *Campephaga lobata* (VU), *Phyllastrephus baumannii* (NT), *Bleda eximia* (VU), *Criniger olivaceus* (VU), *Malaconotus lagdeni* (NT), *Illadopsis rufescens* (VU), *Picathartes gymnocephalus* (VU), *Bathmocercus cerviniventris* (VU) and *Lamprotornis cupreocauda* (NT).

The lowland forest zone of south-western Ghana falls within the Upper Guinea forests Endemic Bird Area (EBA 084) and 11 of its 15 species occur in Ghana (see Table 2), all but one of which,

Apalis sharpei, are also species of global conservation concern. Parts of two biome-restricted assemblages occur in Ghana; the Guinea–Congo Forests biome (A05), of which 180 species have been recorded, and the Sudan–Guinea Savanna biome (A04), 37 of whose species occur (see Table 3). Ghana is also important for waterbirds, being on the boundary of the East Atlantic Flyway and the Mediterranean Flyway (Smit and Piersma 1989). The country's wetlands receive significant numbers of waterbirds as non-breeding migrants from the Palearctic and support internationally important populations of 22 waterbird species (Ntiamoa-Baidu 1991, Piersma and Ntiamoa-Baidu 1995, Rose and Scott 1997).

CONSERVATION INFRASTRUCTURE AND PROTECTED-AREA SYSTEM

Conservation efforts in Ghana date back to the early twentieth century when, as a result of a rapidly expanding population and the associated increased demand for wildlife resources and cultivated land, for both food and cash-crops (mainly oil-palm, coffee, and cocoa), levels of forest destruction increased significantly. Concern over the declining forest resources led the colonial administrators to consider the need to conserve part of Ghana's forests. A Forestry Department was established in 1909 and a bill proposing the establishment of Forest Reserves (areas legally constituted for permanent forestry production) was drafted in 1911. This, however, met with serious local opposition and it was not until 1927 that the Forest Ordinance was passed which gave the colonial government authority to establish Forest Reserves irrespective of the opinion of local people. The earliest reserves were established in the forest zone in the 1920s and 1930s, while reserves in the savanna zone date from the 1940s to the early 1970s.

The concern of the early foresters was to safeguard the future of the timber industry and to maintain environmental and ecological stability. Thus, Forest Reserves were established along the forest–savanna borders to prevent the advancement of savanna vegetation into the forest zone. Hilly areas were reserved to protect the sources

Table 2. The occurrence of restricted-range species within Important Bird Areas in Ghana. Sites that meet the A2 criterion are highlighted in **bold**. Species of global conservation concern are highlighted in **bold blue**.

084 – Upper Guinea forests Endemic Bird Area (11 species in Ghana; 24 sites meets the A2 criterion)																									
IBA code:	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	017	018	019	020	021	022	023	024	
<i>Agelastes meleagrides</i>		✓		✓										✓						✓	✓				
<i>Scotopelia ussheri</i>	✓																								
<i>Ceratogymna cylindricus</i>	✓		✓			✓				✓				✓			✓	✓	✓		✓	✓			
<i>Campephaga lobata</i>	✓?																								
<i>Bleda eximia</i>	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Criniger olivaceus</i>	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	
<i>Illadopsis rufescens</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Picathartes gymnocephalus</i>																									
<i>Apalis sharpei</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Bathmocercus cerviniventris</i>																									
<i>Lamprotornis cupreocauda</i>	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓		✓	
Number of species recorded:	8	5	6	5	5	4	5	5	5	6	5	5	5	7	4	3	4	4	6	6	7	6	4	4	

Table 3. The occurrence of biome-restricted species at Important Bird Areas in Ghana. Sites that meet the A3 criterion are highlighted in **bold**. Species of global conservation concern are highlighted in **bold blue**. Any other species with a restricted range are highlighted in blue.

A04 – Sudan–Guinea Savanna biome (37 species in Ghana; six sites meet the A3 criterion)																										
IBA code:	025	026	027	028	029	030	IBA code:	025	026	027	028	029	030													
<i>Falco alopex</i>							<i>Nectarinia coccinigaster</i>		✓	✓	✓	✓														
<i>Poicephalus senegalus</i>	✓	✓	✓	✓	✓	✓	<i>Emberiza affinis</i>				✓															
<i>Musophaga violacea</i>	✓	✓	✓	✓	✓		<i>Nesocharis capistrata</i>				✓															
<i>Merops bulocki</i>	✓				✓		<i>Pytilia phoenicoptera</i>				✓		✓													
<i>Coracias cyanogaster</i>					✓	✓	<i>Pytilia hypogrammica</i>				✓															
<i>Lybius dubius</i>	✓	✓	✓	✓		✓	<i>Lagonosticta rufopicta</i>				✓															
<i>Galerida modesta</i>							<i>Lagonosticta rara</i>				✓															
<i>Hirundo leucosoma</i>					✓		<i>Lagonosticta larvata</i>		✓		✓															
<i>Lanius gubernator</i>							<i>Estrilda caerulescens</i>		✓		✓	✓														
<i>Corvinella corvina</i>	✓	✓	✓	✓	✓		<i>Estrilda troglodytes</i>					✓														
<i>Cossypha albicapilla</i>	✓				✓		<i>Vidua interjecta</i>																			
<i>Mymecocichla albigrons</i>					✓		<i>Vidua togoensis</i>																			
<i>Turdoides reinwardtii</i>					✓		<i>Petronia dentata</i>		✓	✓	✓		✓													
<i>Cisticola rufigiceps</i>					✓		<i>Plocepasser superciliosus</i>				✓															
<i>Cisticola rufus</i>					?		<i>Ploceus heuglini</i>	✓		✓	✓															
<i>Hypergerus atriceps</i>	✓				✓	✓	<i>Lamprotornis purpureus</i>				✓	✓														
<i>Eremomela pusilla</i>	✓	✓	✓	✓	✓	✓	<i>Lamprotornis chalcurus</i>				✓															
<i>Muscicapa gambagae</i>			✓				<i>Ptilostomus afer</i>				✓															
<i>Anthoscopus parvulus</i>					✓		Number of species recorded:	9	9	9	29	10	5													
A05 – Guinea–Congo Forests biome (180 species in Ghana; 25 sites meet the A3 criterion)																										
IBA code:	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	017	018	019	020	021	022	023	024	025	034
<i>Tigriornis leucolophus</i>	✓			✓							✓			✓												
<i>Bostrychia rara</i>																										
<i>Pteronetta hartlaubi</i>	✓		✓											✓												
<i>Dryotriorchis spectabilis</i>																										
<i>Accipiter erythropus</i>	✓		✓	✓										✓										✓	✓	
<i>Urotriorchis macrourus</i>	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓			✓	✓	✓	
<i>Spizaetus africanus</i>	✓													✓							✓					
<i>Francolinus lathamii</i>	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓				✓	✓		✓		✓		
<i>Francolinus achantensis</i>		✓	✓			✓	✓			✓	✓	✓	✓	✓	✓			✓		✓						✓
<i>Agelastes meleagrides</i>	✓			✓										✓						✓	✓					
<i>Sarothrura pulchra</i>		✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
<i>Himantornis haematopus</i>		✓		✓					✓					✓						✓	✓		✓	✓		
<i>Canirallus oculus</i>														✓												
<i>Columba unicincta</i>	✓	✓	✓	✓		✓													✓		✓					
<i>Turtur brehmeri</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Psittacus erithacus</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	
<i>Agapornis swindermanus</i>			✓											✓												
<i>Tauraco persa</i>	✓	✓				✓								✓		✓		✓		✓	✓				✓	✓
<i>Tauraco macrorhynchus</i>	✓	✓	✓	✓				✓		✓	✓			✓	✓			✓		✓	✓		✓			
<i>Cercococcyx mechowi</i>	✓	✓	✓	✓	✓			✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			
<i>Cercococcyx olivinus</i>		✓				✓											✓	✓		✓			✓			
<i>Chrysococcyx flavigularis</i>				✓	✓					✓		✓														
<i>Centropus leucogaster</i>	✓	✓	✓			✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						✓
<i>Otus icterorhynchus</i>														✓												
<i>Bubo poensis</i>														✓												
<i>Bubo shelleyi</i>																										
<i>Bubo leucostictus</i>														✓												
<i>Scotopelia ussheri</i>	✓																									
<i>Jubula lettii</i>																										
<i>Glauclidium tephronotum</i>					✓									✓	✓							✓				
<i>Caprimulgus binotatus</i>	✓																									
<i>Caprimulgus nigriscapularis</i>																										
<i>Telacanthura melanopygia</i>														✓												
<i>Rhaphidura sabini</i>			✓	✓										✓							✓		✓			
<i>Neafrapus cassini</i>														✓												
<i>Apus batesi</i>	✓																				✓		✓			
<i>Alcedo leucogaster</i>		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Ispidina lecontei</i>			✓	✓	✓		✓			✓			✓							✓		✓	✓	✓		
<i>Halcyon badia</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Merops gularis</i>	✓	✓	✓		✓								✓								✓		✓			
<i>Merops muelleri</i>	✓		✓																							

Table 3 ... continued. The occurrence of biome-restricted species at Important Bird Areas in Ghana. Sites that meet the A3 criterion are highlighted in **bold**. Species of global conservation concern are highlighted in **bold blue**. Any other species with a restricted range are highlighted in blue.

A05 – Guinea-Congo Forests biome ... continued (180 species in Ghana; 25 sites meet the A3 criterion)																										
IBA code:	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	017	018	019	020	021	022	023	024	025	034
<i>Merops breweri</i>																										
<i>Merops malimbicus</i>														✓												
<i>Eurystomus gularis</i>	✓		✓		✓			✓	✓			✓	✓	✓	✓				✓		✓	✓			✓	
<i>Phoeniculus castaneiceps</i>	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓		✓	✓	✓	✓	
<i>Tockus albocristatus</i>	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Tockus hartlaubi</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Tockus camurus</i>			✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓						✓			✓		✓	
<i>Tockus fasciatus</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Ceratogymna fistulator</i>	✓		✓	✓	✓		✓	✓					✓	✓	✓				✓	✓		✓	✓		✓	
<i>Ceratogymna subcylindricus</i>	✓		✓	✓										✓					✓	✓						
<i>Ceratogymna cylindricus</i>	✓		✓			✓				✓				✓					✓	✓			✓			
<i>Ceratogymna atrata</i>	✓		✓					✓		✓	✓			✓	✓				✓	✓						✓
<i>Ceratogymna elata</i>	✓		✓					✓		✓	✓	✓		✓					✓	✓						
<i>Gymnobucco calvus</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Gymnobucco peli</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Pogoniulus scolopaceus</i>	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓		✓	
<i>Pogoniulus atroflavus</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓
<i>Pogoniulus subsulphureus</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Buccanodon duchaillui</i>	✓				✓		✓							✓					✓			✓				
<i>Tricholaema hirsuta</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Trachyphonus purpuratus</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓			✓			✓
<i>Indicator maculatus</i>		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Indicator willcocksi</i>		✓	✓		✓		✓		✓	✓	✓		✓	✓	✓				✓		✓	✓	✓	✓	✓	✓
<i>Melichneutes robustus</i>	✓			✓																						
<i>Melignomon eisentrauti</i>							✓							✓												
<i>Prodotiscus insignis</i>										✓	✓			✓	✓											
<i>Sasia africana</i>																										
<i>Campethera maculosa</i>														✓								✓				
<i>Campethera nivosa</i>	✓		✓	✓	✓			✓		✓		✓		✓	✓	✓								✓	✓	
<i>Campethera caroli</i>	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓			✓	✓	✓	✓		✓		✓	✓
<i>Dendropicus gabonensis</i>	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓							✓			✓		✓	
<i>Dendropicus pyrrhogaster</i>	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓			✓		✓	
<i>Smithornis rufolateralis</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Hirundo nigrita</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Psalidoprocne nitens</i>	✓			✓										✓							✓				✓	
<i>Psalidoprocne obscura</i>	✓			✓										✓										✓		✓
<i>Coracina azurea</i>													✓	✓	✓						✓	✓			✓	
<i>Campephaga lobata</i>	✓?																									
<i>Andropadus gracilis</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓			✓	✓	✓	✓
<i>Andropadus ansorgei</i>			✓		✓								✓	✓	✓					✓			✓			
<i>Andropadus curvirostris</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Calyptocichla serina</i>	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓					✓		✓	✓	✓	✓	✓
<i>Baeopogon indicator</i>	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Ixonotus guttatus</i>	✓		✓		✓		✓	✓			✓	✓	✓	✓	✓					✓			✓		✓	✓
<i>Chlorocichla simplex</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Thescelocichla leucopleura</i>	✓		✓		✓			✓		✓			✓	✓	✓								✓	✓	✓	✓
<i>Phyllastrephus scandens</i>						✓								✓			✓								✓	✓
<i>Phyllastrephus baumanni</i>																										
<i>Phyllastrephus albigularis</i>		✓	✓		✓				✓					✓				✓	✓	✓			✓		✓	✓
<i>Phyllastrephus icterinus</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Bleda syndactyla</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Bleda eximia</i>	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Bleda canicapilla</i>	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Nicator chloris</i>	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Criniger barbatus</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Criniger calurus</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Criniger olivaceus</i>	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓						✓	✓	✓	✓	✓	✓	✓
<i>Dryoscopus sabinii</i>		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Laniarius leucorhynchus</i>														✓												
<i>Malaconotus cruentus</i>		✓																								
<i>Prionops caniceps</i>	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓	✓
<i>Neocossyphus fraseri</i>		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 3 ... continued. The occurrence of biome-restricted species at Important Bird Areas in Ghana. Sites that meet the A3 criterion are highlighted in **bold**. Species of global conservation concern are highlighted in **bold blue**. Any other species with a restricted range are highlighted in blue.

A05 – Guinea–Congo Forests biome ... continued (180 species in Ghana; 25 sites meet the A3 criterion)																										
IBA code:	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	017	018	019	020	021	022	023	024	025	034
<i>Neocossyphus poensis</i>		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Zoothera princei</i>	✓																									
<i>Alethe diademata</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Stiphornis erythrothorax</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Cossypha cyanocampter</i>																										
<i>Cercotrichas leucosticta</i>	✓		✓																							
<i>Illadopsis cleaveri</i>	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓
<i>Illadopsis rufescens</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Illadopsis puveli</i>																										✓
<i>Illadopsis fulvescens</i>	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Phyllanthus atripennis</i>																										
<i>Picathartes gymnocephalus</i>																										
<i>Apalis nigriceps</i>	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓		✓		✓	✓		✓	✓	✓
<i>Apalis sharpei</i>	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Cameroptera supercilialis</i>	✓	✓	✓			✓				✓			✓	✓	✓	✓	✓	✓			✓		✓			✓
<i>Cameroptera chloronota</i>			✓		✓									✓		✓										
<i>Bathmocercus cerviniventris</i>																										
<i>Eremomela badiceps</i>	✓	✓	✓	✓										✓							✓		✓			
<i>Sylvietta virens</i>	✓	✓	✓	✓	✓	✓			✓			✓		✓	✓	✓	✓	✓	✓	✓	✓				✓	✓
<i>Sylvietta denti</i>			✓											✓												
<i>Macrosphenus kempii</i>		✓	✓			✓				✓				✓		✓	✓	✓			✓					✓
<i>Macrosphenus concolor</i>	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Hylia prasina</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Hylia violacea</i>			✓	✓										✓							✓		✓			
<i>Fraseria ocreata</i>	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Fraseria cinerascens</i>	✓		✓																							
<i>Muscicapa ussheri</i>				✓										✓							✓		✓			
<i>Muscicapa olivascens</i>			✓						✓					✓						✓						
<i>Muscicapa epulata</i>			✓	✓	✓		✓			✓		✓	✓	✓	✓						✓		✓	✓	✓	✓
<i>Muscicapa comitata</i>	✓		✓		✓									✓			✓	✓			✓					
<i>Muscicapa tessmanni</i>																										
<i>Muscicapa cassini</i>	✓	✓		✓																	✓					
<i>Myioparus griseigularis</i>		✓	✓		✓					✓		✓			✓				✓		✓	✓	✓	✓	✓	✓
<i>Bias flammulatus</i>														✓												
<i>Batis occulta</i>	✓																						✓		✓	
<i>Platysteira castanea</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Platysteira blissetti</i>		✓												✓		✓										✓
<i>Erythrocerus mcallii</i>	✓		✓		✓	✓								✓				✓						✓		
<i>Trochocercus nigromitratus</i>	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓			✓			✓		✓	✓	✓	✓
<i>Trochocercus nitens</i>	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Terpsiphone rufiventer</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Parus funereus</i>														✓												
<i>Anthoscopus flavifrons</i>																										
<i>Anthreptes fraseri</i>	✓		✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓	✓	✓
<i>Anthreptes gabonicus</i>																										
<i>Anthreptes rectirostris</i>	✓			✓										✓							✓		✓			
<i>Nectarinia seimundi</i>			✓											✓								✓		✓		
<i>Nectarinia batesi</i>																										
<i>Nectarinia reichenbachii</i>																										
<i>Nectarinia cyanolaema</i>	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓	✓	✓
<i>Nectarinia fuliginosa</i>																										
<i>Nectarinia adelberti</i>	✓	✓	✓	✓		✓				✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Nectarinia minulla</i>														✓												
<i>Nectarinia johannae</i>	✓		✓	✓																						
<i>Nectarinia superba</i>	✓	✓	✓	✓		✓								✓			✓				✓					✓
<i>Pholidornis rushiae</i>			✓	✓										✓												
<i>Parmoptila rubrifrons</i>										✓				✓												
<i>Nigrita fusconota</i>	✓	✓	✓	✓		✓								✓		✓	✓	✓								
<i>Nigrita bicolor</i>	✓	✓	✓	✓	✓	✓				✓				✓				✓				✓		✓		✓
<i>Nigrita luteifrons</i>																										
<i>Spermophaga haematina</i>	✓	✓	✓		✓		✓	✓	✓	✓		✓		✓	✓	✓	✓	✓			✓	✓		✓		✓
<i>Ploceus aurantius</i>																										

Table 3 ... continued. The occurrence of biome-restricted species at Important Bird Areas in Ghana. Sites that meet the A3 criterion are highlighted in **bold**. Species of global conservation concern are highlighted in **bold blue**. Any other species with a restricted range are highlighted in blue.

A05 – Guinea–Congo Forests biome ... continued (180 species in Ghana; 25 sites meet the A3 criterion)																										
IBA code:	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	017	018	019	020	021	022	023	024	025	034
<i>Ploceus nigerrimus</i>														✓				✓								
<i>Ploceus tricolor</i>			✓			✓								✓				✓		✓	✓		✓			
<i>Ploceus albinucha</i>	✓		✓	✓	✓				✓												✓		✓	✓		
<i>Ploceus preussi</i>			✓	✓	✓									✓							✓		✓			
<i>Malimbus cassini</i>	✓			✓																						
<i>Malimbus scutatus</i>	✓	✓	✓	✓	✓		✓			✓	✓	✓		✓	✓						✓	✓	✓			
<i>Malimbus nitens</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Malimbus malimbicus</i>	✓	✓	✓	✓		✓	✓		✓					✓			✓	✓		✓	✓		✓	✓	✓	✓
<i>Malimbus rubricollis</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Poeyoptera lugubris</i>														✓												
<i>Onychognathus fulgidus</i>			✓			✓								✓												
<i>Lamprotornis cupreocauda</i>	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓			✓	
<i>Oriolus brachyrhynchus</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Oriolus nigripennis</i>	✓		✓	✓										✓							✓		✓			
<i>Dicurus atripennis</i>	✓		✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓	✓	✓
Number of species recorded:	106	77	114	81	88	70	69	69	69	77	74	76	71	137	78	45	62	74	74	59	95	76	70	79	10	19
? Presence unconfirmed.																										

of major rivers and to prevent erosion and reserves were scattered throughout the forest zone to maintain hydrological and climatic conditions and also to serve as timber production reserves. Currently, there are over 280 Forest Reserves covering a total area of 23,729 km² under the administration of the Forestry Department. It is estimated that 75% of the reserves comprise production reserves which are exploited for timber, while the remaining 25% are protection reserves, many perhaps too inaccessible to be worked for timber (Hall and Swaine 1981). No clear wildlife management practices are included in the management plans of Forest Reserves, but a measure of wild-animal protection is afforded through conservation of habitat and the fact that permission is required to enter and hunt within reserves.

Ghana's wildlife laws date back to 1901. These were based on the 1900 London Convention which made it obligatory for colonial governments to ensure that game was not merely exploited, but managed within the African colonies. The first game reserves were constituted in 1909, but no department with responsibility for wildlife protection was created and little provision was made for staffing and funding. In 1953, game preservation was put under the Tsetse Control Unit, which was established in 1949 with the mandate of eradicating the tsetse fly *Glossina morsitans*, the vector of sleeping sickness. Ironically, the policy of the Tsetse Control Unit was to eliminate the tsetse fly by the extirpation of thousands of herbivorous game animals. The Tsetse Control department was abolished soon after independence in 1957 and the Game Section of the Tsetse Control Unit was transferred to the Department of Forestry; the Wild Animal Preservation Ordinance was amended, the earlier depleted reserves were de-gazetted and three new reserves were proposed, Mole, Shai Hills and Owabi (Cansdale 1964). The Game Branch of the Forestry Department was upgraded to the Department of Game and Wildlife in 1965 and given the responsibility of managing Ghana's wildlife resources both within and outside conservation areas.

The first Wildlife Policy for Ghana was adopted in 1974. It recognized the role of protected areas in wildlife conservation and advocated the establishment of wildlife conservation areas containing representative assemblages of Ghana's fauna and flora in all the major ecological zones in the country. In 1993, a joint National Forestry and Wildlife Policy was formulated. This policy aims at developing the nation's forest and wildlife resources to maintain environmental quality and sustainable flow of economic, scientific and educational benefits to all Ghanaians. Following this, Ghana's Wildlife Policy was revised in 1994 to include a stronger emphasis on local community participation in wildlife conservation

The parent legislation on which all the wildlife conservation regulations in the country are based is the Wild Animals Preservation Act of 1961 (Act 43). This empowers the President of the Republic of Ghana to make regulations for the protection of wildlife and sets out five schedules of animals to be given various

degrees of protection or control. Subsequent to this, several Legislative Instruments (LI) have been passed to address specific aspects of wildlife conservation, including the legal establishment of wildlife conservation areas. The key ones are:

- LI 171(1962)—Established Owabi Waterworks Game Reserve, Mole Game Reserve and Shai Hills Game Reserve and prescribed prohibited activities in Game Reserves.
- LI 685 (1971)—Outlined restrictions on hunting, game licences, game and trophy export permits and listed schedules of animals protected in Ghana. Schedule 1 concerns wholly protected animals, the hunting, capture and destruction of which are prohibited at all times and includes 28 species of mammal, eight species of reptiles and 13 species of birds as well as all birds of prey and owls. The second schedule lists animals—the hunting, capture and destruction of which are prohibited during the closed season, from 1 August to 1 December. The young and lactating mothers of species listed under this schedule are also protected at all times. Forty-eight species of mammal, seven reptiles and five families of bird are listed. The third schedule includes species whose hunting, capture and destruction are prohibited only during the closed season, and includes three species of mammal and three families of bird. LI 685 has subsequently been amended by LI 1284 (1983) and LI 1357 (1988), which made possession of any protected animal illegal, defined new fines and fees (including fees for ivory and ivory products) and amended the first and second schedules of protected species; and LI 1452 (1989) which abolished group hunting and instituted a licence for trading in wild animals and keeping of wild animal pets.
- LI 710 (1971)—Established Mole National Park, Digya National Park, Bui National Park, Shai Hills Game Production Reserve, Kogyae Strict Nature Reserve and Owabi Wildlife Sanctuary, thus repealing LI 171 of 1962. This was followed by various amendments, including LI 881 and LI 961 (1974), LI 1022 (1975), LI 1084, LI 1085 (1976) and LI 1105 (1977), which established other reserves and amended the boundaries of some existing ones.

There are currently 16 legally constituted wildlife conservation areas under the administration of the Wildlife Department, comprising six National Parks, one Strict Nature Reserve, six Resource Reserves and three Wildlife Sanctuaries. In addition, there are two proposed wildlife conservation areas and six Ramsar Sites. The established and proposed terrestrial sites cover an area of 13,049 km², or 5.46% of Ghana's total land area. The proposed Ramsar Sites account for a further 1,725 km². Thus, 6.18% of the country is designated for wildlife conservation.

In addition to the forest and wildlife reserves controlled by central government, there are a number of small, traditionally protected patches of forest scattered all over Ghana. Such areas are referred to by various vernacular names such as abosompow

or asoneyeso (shrine); mpanyinpow (ancestral forest); nsamanpow (burial grounds) and, collectively, as sacred groves (Ntiamao-Baidu 1995). These groves are protected by customary laws, and their conservation is effectively enshrined in taboos and numerous cultural/religious rites, maintained through fear and reverence for the gods and ancestral spirits (Ntiamao-Baidu 1995, Ntiamao-Baidu *et al.* 1992). The total number and area of sacred groves is unknown, but exceeds 1,900, of which some 80% are located in the southern parts of the country. The small sizes of the groves limit their individual conservation value. However, there is some evidence that they are important botanically in preserving scattered patches of primary forest. According to Hall and Swaine (1981), the only surviving examples of the inner zone subtype of dry semi-deciduous and southern marginal forest-types are found in sacred groves. In many areas, sacred groves are the only remnant forest amidst severely degraded forestlands and farmlands, and are thus important islands of significant conservation potential for remnant communities of flora and fauna.

Grainger (1994) compiled a protected-area system plan for Ghana. This document examined the existing protected-area network and concluded that representative examples of each of the four major biogeographic zones it recognized in the country (the Guineo–Congolian, the Sudanian, Guineo–Congolian/Sudanian transitional and the Volta) are included within the current system of protected areas. It found that, of the 10 main vegetation formations identifiable in Ghana, wet evergreen forest and mangrove forest are well represented, as is tall-grass savanna although, for the latter, the inclusion of an additional protected area in the Gambaga escarpment region was recommended. However, short-grass savanna, moist and dry semi-deciduous forest and south-eastern outlier forest-types are all under represented, and even in areas where these forest-types are protected, they are either degraded or restricted to small portions of the protected area. Upland evergreen forest and southern marginal forest are also unrepresented in the wildlife protected-area system, although these are well represented in Forest Reserves, under the jurisdiction of the Forestry Department. With the current pressures on land in Ghana, the opportunities for establishing new Forest Reserves are almost non-existent and there is therefore an obvious need to increase protection efforts and introduce wildlife conservation strategies into existing Forest Reserve management policies.

The hunting, capture and destruction of any animal, as well as the collection or destruction of any plant, is legally prohibited in all wildlife conservation areas. The Chief Wildlife Officer has the authority to grant permission for the collection of flora and fauna from reserves, but this authority is exercised only for scientific purposes. Policy regarding the use of Forest Reserves is more flexible. Production reserves may be awarded as timber concessions, in which case they are expected to be logged under prescribed conditions. In most cases, the local people who originally owned the land retain the rights for hunting and the collection of certain products from Forest Reserves, with permission from the forestry officer. Farms may also be allowed on small portions for some reserves.

The effectiveness of protective measures in forest and wildlife reserves varies from one reserve to another, but nowhere is 100% protected. While Forest Reserves are under constant pressure from illegal farming, illegal hunting continues in all wildlife conservation areas. Over-exploitation and habitat destruction remain the major causes of the decline of wild animal populations in Ghana. Other threats include ineffective legislation and the lack of adequate manpower and resources to manage existing reserves and enforce regulations, as well as inadequate coordination of conservation efforts. The discussions under way to reorganize both the forestry and wildlife departments under one body, the Ghana Forestry Commission, may help to improve coordination and, perhaps, encourage more efforts to protect wildlife in Forest Reserves.

INTERNATIONAL MEASURES RELEVANT TO THE CONSERVATION OF SITES

Ghana has ratified the Convention on Biological Diversity, the Convention on Migratory Species, the Convention on International Trade in Endangered Species, the Convention to Combat

Desertification, the Convention on Climate Change, the World Heritage Convention and the Ramsar Convention, under which six Ramsar Sites have been designated (Owabi Wildlife Sanctuary, Muni-Pomadze, Densu Delta, Sakumo, Songor and Keta). Ghana also participates in the UNESCO Man and Biosphere Programme and one Biosphere Reserve, Bia National Park, has been designated. All terns (Sterninae) are on the country's list of protected species, as part of Ghana's commitment to the Bonn Convention. Regionally, Ghana is also signatory to the African Convention on the Conservation of Nature and Natural Resources.

The Wildlife Department is the implementing agency for the Africa Convention, Bonn Convention, Ramsar and CITES, while the Biodiversity Convention is presently overseen by the Ministry of Environment, Science and Technology. Despite the fact that Ghana has taken steps to fulfil its obligations under these international instruments, there are no provisions in any of the country's wildlife laws which give clear legal backing for the enforcement of their principles and obligations.

OVERVIEW OF THE INVENTORY

Data for this study were collected between 1994 and 1997. Sites were identified from literature reviews and field surveys. The literature review offered limited site-specific information, with the exception of some more recent studies, such as Dutson and Branscombe (1990), Holbech (1996) and Moyer (1995). For the field inventory, we started with a list of all conservation areas (including Forest Reserves, wildlife conservation areas and a few reasonably-sized sacred groves). We compiled available data on the avifauna for these sites (which was very scanty) and focused field studies on: (a) sites which, from available data, appeared to be ornithologically important; (b) all wildlife conservation areas, both established and proposed; and (c) all Condition 1, 2 and 3 Forest Reserves, following the classification system of Hawthorne and Abu-Juam (1995) (see 'Glossary').

Details of methodology used in the field surveys are given in Ntiamao-Baidu, Owusu *et al.* (2000). Bird data for each site include information from the literature as well as all species recorded by sight and sound, during the field visits (both on an *ad hoc* basis and in systematic surveys), using transect counts, timed species-counts and mist-netting. Key references used for bird identification were Mackworth-Praed and Grant (1970, 1973), Brown *et al.* (1982), Urban *et al.* (1986), Fry *et al.* (1988), Keith *et al.* (1992) and Serle *et al.* (1992).

A total of 36 Important Bird Areas (IBAs) are identified in this inventory (Map 1, Table 1), covering an area of 11,494.5 km², some 4.8% of the country's total land area. Of this total IBA area, 42% is forest, 48% is savanna and 9.2% is wetland. With two exceptions, Mount Afadjato (GH016) and Amansuri wetland (GH031), all the sites fall within some form of protected area (National Park, Forest Reserve, wildlife protected area or Ramsar Site). Following their identification as IBAs, the Ghana Wildlife Society has initiated work with the communities living within and around the two unprotected sites, to get these sites legally designated as community nature reserves.

Twenty-four sites qualify under both the A1 and A2 criteria, with those selected for the latter holding, between them, eight of the 11 restricted-range species of the Upper Guinea forests EBA (Table 2). Six sites qualify under the A3 criterion for the Sudan–Guinea Savanna biome, between them holding 31 of the 37 species that are restricted to the biome and that are known from Ghana, while 25 sites qualify for the Guinea–Congo Forests biome, at which occur, collectively, 160 of the 180 biome species recorded nationally (Table 3). Six sites qualify under the A4i criterion, and four under the A4iii criterion, for holding significantly large congregations of waterbirds. Four resident species of global conservation concern—*Phyllastrephus baumanni*, *Malaconotus lagdeni*, *Picathartes gymnocephalus* and *Bathmocercus cerviniventris*—are not known to occur at any of the selected sites, while there is only an unconfirmed report of a fifth, *Campephaga lobata*, from a single site. These were not recorded during field surveys and there have been no recent sightings of these species, apart from a doubtful record of *Phyllastrephus baumanni* at Tano Ehuro (Dutson and Branscombe 1990).

COMMENTS ON THE INVENTORY

- The authors accept responsibility for the avifaunal data from the field surveys.
- Assessment of forest condition at forest IBAs follows the definitions of Hawthorne and Abu-Juam (1995), as follows.
 - Condition 1 forest: Forest in excellent condition with few (<2%) signs of human disturbance or fire damage, with good canopy and virgin or late secondary forest throughout.
 - Condition 2 forest: Forest in good condition with <10% heavily disturbed; logging damage restricted or light and well dispersed, fire damage none or peripheral.
 - Condition 3 forest: Forest slightly degraded, obviously disturbed or degraded and usually patchy, but with good forest predominant.
 - Condition 4 forest: Forest mostly degraded, obviously disturbed and patchy, but with bad forest predominant.
 - Condition 5 forest: Forest very poor, with coherent canopy <25%, i.e. with more than 75% disturbed.

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and survey techniques. We also acknowledge the assistance of the Remote Sensing Unit of the University of Ghana for preparing the site maps. The support and assistance of the management and field staff of the Wildlife Department and the Forestry Department are gratefully acknowledged.

GLOSSARY

GHI/Genetic Heat Index a measure of the distinctiveness and conservation importance of an area of forest, derived from a composite assessment of the taxonomy, ecology and distribution of its constituent tree species. Thus, forests with tree species not closely related to other taxa, which are sensitive to environmental change and, in particular, are rare nationally and/or internationally, are awarded a higher GHI than those composed of widely distributed tree species, tolerant of a broad range of environmental conditions and which belong to speciose genera and families, etc. (Hawthorne and Abu-Juam 1995).

Hill Sanctuaries proposed special protected areas on forested hills with slopes steeper than 16°, on which logging is already forbidden, to conserve soils and water and which, because of their gradients, mostly have never been farmed or otherwise disrupted. (Hawthorne and Abu-Juam 1995).

salvage felling unlimited felling of largest trees.

stool a stool for a village, town or traditional area in the Akan culture represents a chiefdom and is supposed to embody the ancestors, lands and property of a given area. The chief who occupies the stool holds the lands and property in trust for present and future generations of his people. ‘Stool’, as used in the text, refers to the traditional area, e.g. the ‘Jema stool’ implies the people and lands in the Jema traditional area.

Taungya system an agroforestry practice in which farmers are allowed to cultivate logged land on reserves, but are obliged to plant tree species to take over once the farm is exhausted.

SITE ACCOUNTS

Ankasa Resource Reserve– Nini-Sushien National Park

Admin region Western

Coordinates 05°15'N 02°36'W

Area 52,400 ha Altitude 35–170 m

GH001

A1, A2 (084), A3 (A05)

National Park,
Resource Reserve

Site description

The Ankasa Resource Reserve and Nini-Sushien National Park are situated in the Western Region to the north of the Axim–Mpataba road. The vegetation of the two conservation areas is wet evergreen forest and the two are reported to be botanically similar. Nini Sushien is classified as Condition 1 Forest while Ankasa Resource Reserve is Condition 2. There is a village, Nkwanta, situated some 8 km inside the reserve, whose farms cover an area of approximately 100 ha; here there is also an abandoned coconut plantation. The southern parts of Ankasa were logged from the early 1960s up to about 1974. Logging intensity was, however, relatively low due to the small amounts of commercially valuable timber.

Birds

See Box and Tables 2 and 3 for key species. This is one of the few sites in the country where the avifauna has been well studied and, to date, is known to support the largest number of threatened species of any forest site. *Scotopelia ussheri* is known from two records, one from Ankasa river and one from Nini Sushien river, while *Agelastes meleagrides* is reported to be killed occasionally by hunters in Ankasa Resource Reserve and there is a single record from Sushien river. There is also an unconfirmed sighting of *Campephaga lobata* (see Table 3). The avifauna at the site includes eight species of birds of prey, eight species of hornbills and a number of species, such as *Tigriornis leucolophus*, which were recorded at only a few other sites.

Key species

A1	<i>Agelastes meleagrides</i>	<i>Bleda eximia</i>
	<i>Scotopelia ussheri</i>	<i>Criniger olivaceus</i>
	<i>Ceratogymna cylindricus</i>	<i>Illadopsis rufescens</i>
	<i>Ceratogymna elata</i>	<i>Lamprotornis cupreocauda</i>

A2 (084) Upper Guinea forests EBA: Eight of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.

A3 (A05) Guinea–Congo Forests biome: 106 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.

Other threatened/endemic wildlife

All 10 forest primates recorded in Ghana, including *Cercocebus atys* (LR/nt), *Cercopithecus diana roloway* (CR), *Procolobus badius waldroni* (CR), *Procolobus verus* (LR/nt), *Colobus vellerosus* (VU) and *Pan troglodytes* (EN), have been reported in the past. Recent surveys confirmed the occurrence of *C. diana roloway*. Other species of conservation concern occurring in the area include *Loxodonta africana cyclotis* (EN), *Tragelaphus euryceros* (LR/nt), *Cephalophus ogilbyi* (LR/nt), *C. dorsalis* (LR/nt) and *Profelis aurata*.

Conservation issues

The Ankasa Resource Reserve and Nini-Sushien National Park comprise the former Ankasa River Forest Reserve, designated in 1934. In 1976 the reserve was split into the Ankasa Game Production Reserve (now termed Resource Reserve, 34,900 ha), and the Nini-Sushien National Park (17,500 ha), with the Nini-Sushien river forming the boundary between the two, and the administrative authority shifted from the Forestry Department to the Wildlife Department. Ankasa is considered to be the ‘hottest’ forest in Ghana, with a GHI of 301, indicating a particularly high density of rare species. Nini Sushien (GHI 205) contains one of the few remaining blocks of relatively untouched forest in the country. This, plus the faunal diversity of the site, makes the two areas one of the most important sites for conservation of forest biodiversity in Ghana. Current protection efforts are inadequate, staffing levels are low and staff have little motivation. Hunting and illegal exploitation of non-timber forest products are evident in many parts of the reserves. Recent financial support from the European Union under the Ghana Protected Area Development Programme is expected to enhance protection of the site.

Further reading

Dutson and Branscombe (1990), Holbech (1996), Martin (1976, 1991), Oates *et al.* (1997).

Atewa Range Forest Reserve
GH002

Admin region Eastern

Coordinates 06°10'N 00°36'W

A1, A2 (084), A3 (A05)

Area 23,200 ha Altitude 500–700 m

Forest Reserve

Site description

Atewa Range Forest Reserve is located near Kibi town, to the west of the Accra–Kumasi road. This range of hills, aligned approximately north–south, are steep-sided with more or less flat summits. They represent the last remains of the Tertiary penplain that once covered southern Ghana and are characterized by very ancient bauxitic soils. The reserve lies within the moist semi-deciduous forest zone. About 17,400 ha of the reserve is upland evergreen forest. Atewa is, together with Tano Offin (GH023), one of only two Forest Reserves in the country at which this forest-type occurs and these two reserves together hold c.95% of the upland evergreen forest in the country. The diverse flora contains submontane elements, with characteristic herbaceous species, and abundant and diverse epiphytic and terrestrial ferns; many plant species found here are not known to occur elsewhere in Ghana. The bovials (seasonal marshy grasslands on bauxite outcrops), swamps and thickets that occur here are also thought to be nationally unique.

Birds

See Box and Tables 2 and 3 for key species. The avifauna includes a significant number of nationally rare species such as *Columba unicincta*, *Cercococcyx olivinus*, *Smithornis capensis*, *Indicator exilis*, *I. maculatus*, *Bleda syndactyla* and *Trochocercus nitens*. The raptors *Urotriorchis macrourus*, *Polyboroides typus*, *Accipiter tachiro* and *Stephanoetus coronatus* still occur.

Key species

A1	<i>Bleda eximia</i>	<i>Illadopsis rufescens</i>
	<i>Criniger olivaceus</i>	<i>Lamprotornis cupreocauda</i>
A2 (084)	Upper Guinea forests EBA: Five of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.	
A3 (A05)	Guinea–Congo Forests biome: 77 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.	

Other threatened/endemic wildlife

Atewa forests contain many plant species not found elsewhere in the country; *Celtis durandii* was recorded in Ghana from this area. Six endemic butterfly species *Mylothris atewa*, *Deudorix* sp. nov., *Cupidesthes* sp. nov., *Anthene aurea*, *A. helpsi* and *Acraea kibi*, from a total of 460 also occur here—the largest number of species yet recorded from a single small forest anywhere in West Africa. Mammals include *Cephalophus dorsalis* (LR/nt) and *Neotragus pygmaeus* (LR/nt).

Conservation issues

The site is an important watershed and was designated as a Forest Reserve in 1926 to protect the headwaters of the Birim, Densu and Ayensu rivers and their tributaries, and also to maintain forest-cover on the steep slopes of the hills, thereby preventing excessive erosion. The site is traditionally owned by the Akim Abuakwa Traditional Area but, as a Forest Reserve, it is under the administration of the Forestry Department. Atewa is classified as a Condition 3 reserve (GHI 84). Between 1959 and 1975, 4.1% of the area of Atewa was converted to *Cedrela* plantation under the taungya system. The lower slopes are severely degraded and covered with abandoned farms. Mining and illegal logging constitute the major threat to the site. The last official logging was recorded in 1991, but illegal logging continues. The reserve has gold and bauxite deposits. There is evidence of gold prospecting and illegal gold mining. Although the bauxite deposits are of low grade, so mining is currently considered uneconomic, there is no guarantee that this situation will not change. The Forest Reserve has been proposed as a high-priority Hill Sanctuary. In 1994, the reserve was designated as a Special Biological Protection Area by the Ghana Forestry Department and has, under the country's system of classification of Forest Reserves, recently been proposed as a Globally Significant Biodiversity Area. Atewa is, without doubt, one of the Forest Reserves most meriting an improvement in protection status.

Further reading

Ghana Wildlife Society (1998), Grimes (1987), Hall and Swaine (1981), Hawthorne and Abu-Juam (1995), Larsen (1994), Ntiamao-Baidu *et al.* (2000a).

Bia National Park and Resource Reserve
GH003

Admin region Western

A1, A2 (084), A3 (A05)

Coordinates 06°33'N 03°05'W

National Park, Resource Reserve,

Area 30,600 ha Altitude 170–643 m

Biosphere Reserve

Site description

Bia National Park and Resource Reserve is located near the Asempaneye village, c.60 km from Sefwi Wiawso, the district capital. The forest is transitional between moist evergreen and moist semi-deciduous. The site is surrounded by mixed farms and secondary forest. The forest was logged in 1980, which has resulted in a very broken canopy with few large trees and much low, dense vegetation. Evidence of hunting is apparent in both the National Park and Resource Reserve. Annual average precipitation is in the range 1,500–1,700 mm.

Birds

See Box and Tables 2 and 3 for key species.

Key species

A1	<i>Ceratogymna cylindrica</i>	<i>Criniger olivaceus</i>
	<i>Ceratogymna elata</i>	<i>Illadopsis rufescens</i>
	<i>Bleda eximia</i>	<i>Lamprotornis cupreocauda</i>
A2 (084)	Upper Guinea forests EBA: Six of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.	
A3 (A05)	Guinea–Congo Forests biome: 114 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.	

Other threatened/endemic wildlife

Pan troglodytes (EN) still occurs. There is a population of *Loxodonta africana cyclotis* (EN), estimated at 300–500. Also present are *Tragelaphus euryceros* (LR/nt), *Cephalophus dorsalis* (LR/nt) and *C. silvicultor* (LR/nt).

Conservation issues

Bia was first declared a Forest Reserve in 1935 and designated as the Bia Tributaries South Forest Reserve in 1940, with an area of 30,600 ha. The reserve was given National Park status in 1974 but, within three years, 22,800 ha of the park was downgraded to a Game Production Reserve (now termed Resource Reserve) to allow logging, leaving only c.7,800 ha as Bia National Park. The forest of the National Park (Condition 4, GHI 55), has a poorer structure than the Resource Reserve (Condition 3, GHI 58). Thus, Bia is heavily degraded and the Resource Reserve is actively being logged. Levels of protection have been poor as a result of inadequate and poorly motivated staff, lack of equipment and shortage of funds; poaching is heavy. Despite the much reduced populations of most species of large mammals in Bia, the area is one of the few areas in the country known to support *Pan troglodytes*. Bia is currently receiving financial support from the European Union, under the Ghana Protected Area Development Programme, and it is expected that this will improve protection of the site.

Further reading

Hawthorne and Abu-Juam (1995), Holbech (1992), Martin (1982, 1991), Oates *et al.* (1997), Taylor and Macdonald (1978).

Boin Tano Forest Reserve
GH004

Admin region Western

Coordinates 05°29'N 02°39'W

A1, A2 (084), A3 (A05)

Area 12,900 ha Altitude 60–105 m

Forest Reserve

Site description

Boin-Tano (or Boi-Tano) shares a common boundary with Tano-Nimire Forest Reserve (GH022) and is located in Enchi Forest District. The area is traditionally owned jointly by the Omanhene of Aowin Traditional Council and the Boinso, Omape and Jema stools. The entire reserve was under logging concession prior to its designation as a reserve; logging was last recorded in 1980. The vegetation is mainly wet evergreen forest. Access is difficult because of the many watercourses, with two main rivers, the Tano and the Bisao, running

through the reserve and resulting in much swamp habitat. There are a few authorized farms in the reserve.

■ Birds

See Box and Tables 2 and 3 for key species. A total of 107 species have been confirmed, including *Agelastes meleagrides* (a flock of 10 birds sighted in August 1989). Species most frequently recorded include *Tauraco macrorhynchus*, *Tockus fasciatus*, *Andropadus latirostris*, *Phyllastrephus icterinus* and *Nectarinia olivacea*.

Key species

A1	<i>Agelastes meleagrides</i> <i>Criniger olivaceus</i>	<i>Illadopsis rufescens</i> <i>Lamprotornis cupreocauda</i>
A2 (084)	Upper Guinea forests EBA: Five of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.	
A3 (A05)	Guinea–Congo Forests biome: 81 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.	

■ Other threatened/endemic wildlife

Mammals include *Cephalophus sylvicultor* (LR/nt), *Colobus vellerosus* (VU) and *Pan troglodytes* (EN), with the latter reported to occur in reasonable numbers, but under heavy hunting pressure.

■ Conservation issues

The reserve was designated a Forest Reserve in 1967. The forest is only lightly disturbed (Condition 2) with a high GHI (202). Very little faunal protection occurs in the reserve, and all species, including *Agelastes meleagrides* and *Pan troglodytes*, were being hunted in the early 1990s, with professional hunters coming from Samreboi town to the north. The site is one of the few reserves where the occurrence of these two species has been confirmed. A more detailed survey to establish their current status is needed and there is also a need for better enforcement of faunal protection. Chewing-sticks and other non-timber forest products are collected.

■ Further reading

Dutson and Branscombe (1990).

Boin River Forest Reserve

GH005

Admin region Western
Coordinates 05°44'N 02°56'W
Area 27,800 ha Altitude 75–180 m
A1, A2 (084), A3 (A05)
Forest Reserve

■ Site description

The Boin River Forest Reserve is situated about 5 km from Enchi town and extends to the international frontier with Côte d'Ivoire in the west. The reserve lies close to the Enchi–Yakasi and Enchi–Nyame Bekyere roads. The site is hilly with swamps in the valleys. The vegetation is transitional between moist evergreen and wet evergreen forest and is mostly undisturbed (about two-thirds of the reserve is unlogged), with a few farms, the extent of which is insignificant. The north-eastern portion was logged between 1964 and 1973.

■ Birds

See Box and Tables 2 and 3 for key species. This is one of four sites where *Glaucidium tephronotum* was recorded.

Key species

A1	<i>Bleda eximia</i> <i>Criniger olivaceus</i>	<i>Illadopsis rufescens</i> <i>Lamprotornis cupreocauda</i>
A2 (084)	Upper Guinea forests EBA: Five of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.	
A3 (A05)	Guinea–Congo Forests biome: 88 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.	

■ Other threatened/endemic wildlife

Mammals include *Tragelaphus euryceros* (LR/nt), *Pan troglodytes* (EN), as well as about 50 *Loxodonta africana cyclotis* (EN). *Procolobus badius waldroni* (CR) used to occur.

■ Conservation issues

The site was designated a Forest Reserve in 1932 and is one of the few reserves with significant areas of intact primary forest (Condition 2,

GHI 93). Like most Forest Reserves in Ghana, there is very little, if any, faunal protection; poaching is widespread. The site certainly merits further studies and better protection status.

■ Further reading

Hawthorne and Abu-Juam (1995), Holbech (1996), Oates *et al.* (1997).

Bosomtwe Range Forest Reserve

GH006

Admin region Ashanti
Coordinates 06°30'N 01°25'W
Area 7,900 ha Altitude 120–477 m
A1, A2 (084), A3 (A05)
Forest Reserve

■ Site description

The Bosomtwe Range Forest Reserve is situated some 20 km from the village of Beposo, east of Bekwai town. The vegetation is moist semi-deciduous forest. About 5% of the reserve (378 ha) comprises *Cedrela*, *Entandrophragma angolense*, *Khaya ivorensis*, *Pterygota* and *Terminalia superba* plantations. The last logging was recorded in 1986. Several farms exist in parts of the reserve.

■ Birds

See Box and Tables 2 and 3 for key species. Species recorded include *Ceratogymna cylindricus* which was recorded in only 12 of the 50 forest sites covered in the IBA survey.

Key species

A1	<i>Ceratogymna cylindricus</i> <i>Bleda eximia</i>	<i>Illadopsis rufescens</i>
A2 (084)	Upper Guinea forests EBA: Four of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.	
A3 (A05)	Guinea–Congo Forests biome: 70 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.	

■ Other threatened/endemic wildlife

None known to BirdLife International.

■ Conservation issues

The reserve was designated in 1931 and is classified as a Hill Sanctuary. The condition of the forest is poor, a mosaic of Condition 3 and 4, with a low GHI (46). Increased fire protection for this reserve has been recommended.

■ Further reading

Hawthorne and Abu-Juam (1995).

Bura River Forest Reserve

GH007

Admin region Western
Coordinates 05°50'N 02°18'W
Area 10,300 ha Altitude 120–275 m
A1, A2 (084), A3 (A05)
Forest Reserve

■ Site description

Bura River Forest Reserve is located near Dunkwa town in the Wassa-Amenfi District and is connected to two smaller reserves, the Angoben and Totua Shelterbelts. The reserve includes several steep-sided hills, some exceeding 275 m and numerous streams, including the Bura river, flow through the reserve to drain into the Tano and Ankobra rivers. Large parts of the reserve, particularly the north, remain untouched although southern parts are heavily disturbed and there are a few farms. Mean annual rainfall is c.1,626 mm.

■ Birds

See Box and Tables 2 and 3 for key species.

Key species

A1	<i>Melignomon eisentrauti</i> <i>Bleda eximia</i> <i>Criniger olivaceus</i>	<i>Illadopsis rufescens</i> <i>Lamprotornis cupreocauda</i>
A2 (084)	Upper Guinea forests EBA: Five of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.	
A3 (A05)	Guinea–Congo Forests biome: 69 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.	

Other threatened/endemic wildlife

None known to BirdLife International.

Conservation issues

The site was designated a Forest Reserve under local bye-laws in 1931 and by the Forest Ordinance in 1939. Exploitation of forest produce for local use is permitted. Heavy logging was carried out in about 30 compartments in 1975–1976, and salvage logging occurred in one compartment in 1992.

Further reading

Hawthorne and Abu-Juam (1995), Holbech (1996).

Cape Three Points Forest Reserve

GH008

Admin region Western

Coordinates 04°50'N 02°30'W

A1, A2 (084), A3 (A05)

Area 5,035 ha Altitude 91–152 m

Forest Reserve

Site description

Cape Three Points reserve is located near Princes Town in the Western Region of Ghana. The scenic beauty of the area and proximity of forest to the sea (c.3 km from the coast) make it nationally unique. The site has a series of small hills with altitudes varying between 91–152 m and is drained by only one river, the Nyan. The eastern part of the reserve adjoins rubber plantations and there are farms in the surrounding unreserved forest, while seven occur in the reserve itself. Although there has been some illegal felling of trees for fish smoking, a large proportion of the reserve (some 3,200 ha of the northern part) remains intact. The reserve has been extensively studied botanically, with plant collections dating from as far back as 1780. Mean annual rainfall in the area is c.1,400 mm.

Birds

See Box and Tables 2 and 3 for key species. Although relatively small, Cape Three Points reserve supports an interesting avifauna and is one of the relatively few sites from where *Ceratogymna elata* was recorded.

Key species

A1	<i>Ceratogymna elata</i>	<i>Illadopsis rufescens</i>
	<i>Bleda eximia</i>	<i>Lamprotornis cupreocauda</i>
	<i>Criniger olivaceus</i>	

A2 (084) Upper Guinea forests EBA: Five of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.

A3 (A05) Guinea–Congo Forests biome: 69 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.

Other threatened/endemic wildlife

Mammals reported include *Cercocebus atys lunulatus* (CR), *Cercopithecus diana roloway* (CR) and *Tragelaphus eurycerus* (LR/nt).

Conservation issues

The site was declared a Forest Reserve in 1949. The forest is only lightly disturbed (Condition 2) with a high GHI (220), which has prompted calls for its complete protection. There is evidence of past gold-mining activity, including prospecting pits and small abandoned mines, and there have also been some recent moves to carry out further prospecting in the area. Wildlife resources are under severe threat from the large human population in the area. The site, with beautiful beaches and an old castle nearby, offers good opportunities for tourism.

Further reading

Hawthorne and Abu-Juam (1995), Holbech (1996).

Dadieso Forest Reserve

GH009

Admin region Western

Coordinates 06°08'N 03°02'W

A1, A2 (084), A3 (A05)

Area 17,100 ha Altitude 100–180 m

Forest Reserve

Site description

The Dadieso Forest Reserve is located beside the Enchi–Dadieso road in the south-west of the country. The western boundary of the reserve

coincides with the international border with Côte d'Ivoire. The site is linked to two other Forest Reserves, Boin River (GH005) and Yoyo (GH024) through a small corridor forest, Disue Forest Reserve. The terrain comprises a series of hills with swampy valleys and the forest is transitional between moist evergreen and wet evergreen. Apart from some random roadside felling of trees along the road, the reserve is primary forest in good condition.

Birds

See Box and Tables 2 and 3 for key species.

Key species

A1	<i>Bleda eximia</i>	<i>Illadopsis rufescens</i>
	<i>Criniger olivaceus</i>	<i>Lamprotornis cupreocauda</i>

A2 (084) Upper Guinea forests EBA: Five of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.

A3 (A05) Guinea–Congo Forests biome: 69 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.

Other threatened/endemic wildlife

Rapid surveys revealed a rich faunal diversity, including 37 species of large mammal, seven species of bat and 15 species of reptile. Species of conservation concern reported to occur in the area include *Tragelaphus euryceros* (LR/nt), *Procolobus verus* (LR/nt), *Cercopithecus diana* (VU), *Pan troglodytes* (EN) and *Loxodonta africana cyclotis* (EN).

Conservation issues

Unlike most others in the country, this pristine forest was designated a Forest Reserve only relatively recently (1977). The reserve is the only forest in Ghana scored as Condition 1, (GHI 116) and was recently designated a Globally Significant Biodiversity Site by the Forestry Department. The site certainly merits complete protection, being one of the few significant undisturbed blocks of forest remaining in the country. A more detailed study is required to establish the faunal importance of the site.

Further reading

Ghana Wildlife Society (1998), Hawthorne and Abu-Juam (1995), Holbech (1996).

Draw River Forest Reserve

GH010

Admin region Western

Coordinates 05°12'N 02°20'W

A1, A2 (084), A3 (A05)

Area 23,500 ha Altitude 46–138 m

Forest Reserve

Site description

Draw River Forest Reserve is located some 6 km from Bansa, to the west of the Nkroful–Bansa road. The terrain comprises ranges of hills which curve from north-west to south. The Draw river traverses the eastern portion of the reserve. Logging of the forest started in 1978 and was continuing in the early 1990s, when only a single compartment remained unlogged.

Birds

See Box and Tables 2 and 3 for key species. In addition to the two listed below, the site also holds five other species of hornbill, *Ceratogymna atrata*, *C. fistulator*, *Tockus fasciatus*, *T. camurus* and *T. hartlaubi*.

Key species

A1	<i>Ceratogymna cylindricus</i>	<i>Criniger olivaceus</i>
	<i>Ceratogymna elata</i>	<i>Illadopsis rufescens</i>
	<i>Bleda eximia</i>	<i>Lamprotornis cupreocauda</i>

A2 (084) Upper Guinea forests EBA: Six of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.

A3 (A05) Guinea–Congo Forests biome: 77 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.

Other threatened/endemic wildlife

Tragelaphus euryceros (LR/nt) is reported to be common and *Cephalophus dorsalis* (LR/nt), *C. ogilbyi* (LR/nt), *Pan troglodytes* (EN), *Cercopithecus diana roloway* (CR) and *Loxodonta africana cyclotis* (EN) also all occur.

■ Conservation issues

Traditional ownership of the forest is vested in the paramount stool of Gwira Bansa Traditional Area and the Aiyinase and Basake stools of the Eastern Nzema Traditional Area. The area has been proposed as a Hill Sanctuary, with some forest completely protected. However, intensive logging is expected to reduce the state of the forest from Condition 2 to Condition 3 (GHI varies from 115 to over 200). No recent mining activities are known, but old gold pits were found in some places near the Draw river. The proximity of this reserve to the Nini Sushien National Park and Ankasa Resource Reserve (GH001) make it extremely important for forest elephant conservation since populations in the area are believed to move between the two sites. Hunting is a serious threat although other non-timber forest products such as chewing-sticks, canes, poles, oil-palm and raphia palms are also exploited.

■ Further reading

Hawthorne and Abu-Juam (1995), Holbech (1996).

Ebi River Shelterbelt Forest Reserve

GH011

Admin region Western

Coordinates 05°07'N 02°22'W

A1, A2 (084), A3 (A05)

Area 2,600 ha Altitude 15–90 m

Forest Reserve

■ Site description

The Ebi River Shelterbelt Forest Reserve lies to the south of the Nwini river and west of Ankobra river and is c.19 km from the coast. The terrain is gently undulating and the reserve is crossed by the Ebi and Fiakpole rivers. The altitude varies from 15–60 m, although Bedoako hill, in the extreme south-east, rises to over 90 m. The soil is mainly loamy clay, but there is gravel in some areas. The vegetation is wet evergreen forest. A large part of the reserve (2,238 ha) is under timber concessions. There are records of logging from 1978–1989 and in several areas of its western part logging was severe.

■ Birds

See Box and Tables 2 and 3 for key species. The site is one of the four at which *Tigriornis leucolophus* was recorded.

Key species

A1	<i>Ceratogymna elata</i>	<i>Illadopsis rufescens</i>
	<i>Bleda eximia</i>	<i>Lamprotornis cupreocauda</i>
	<i>Criniger olivaceus</i>	

A2 (084) Upper Guinea forests EBA: Five of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.

A3 (A05) Guinea–Congo Forests biome: 74 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.

■ Other threatened/endemic wildlife

Tragelaphus euryceros (LR/nt) is reported to occur.

■ Conservation issues

Ownership of the forest lies with the paramount stool of the Eastern Nzema Traditional Area. The Ebi Shelterbelt was demarcated and designated as a Forest Reserve in 1939 to ‘act as shelterbelt and to check the spread of grass conditions’. The boundaries were sited to exclude farms at the time of reservation, but the Nkrofo to Adubrim footpath runs through the reserve.

■ Further reading

Hawthorne and Abu-Juam (1995), Holbech (1996).

Fure River Forest Reserve

GH012

Admin region Western

Coordinates 05°22'N 02°17'W

A1, A2 (084), A3 (A05)

Area 15,800 ha Altitude 75–260 m

Forest Reserve

■ Site description

The Fure River Forest Reserve is situated 11 km south-west of Prestea town and is bisected by the Prestea–Nkwanta road. The terrain

comprises steep-sided hills and deep valleys that become flooded in the rainy season. Parts of this forest have been heavily degraded as a result of timber exploitation; 3,004 ha is under logging concessions while 641 ha are *Cedrela odorata* plantation, which was established in 1971–198. Areas in both the north and the south are still intact. Average annual rainfall is c.1,750 mm.

■ Birds

See Box and Tables 2 and 3 for key species.

Key species

A1	<i>Ceratogymna elata</i>	<i>Illadopsis rufescens</i>
	<i>Bleda eximia</i>	<i>Lamprotornis cupreocauda</i>
	<i>Criniger olivaceus</i>	

A2 (084) Upper Guinea forests EBA: Five of the 11 species of this EBA that occur in Ghana have been recorded at this site; see Table 2.

A3 (A05) Guinea–Congo Forests biome: 76 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.

■ Other threatened/endemic wildlife

Cercopithecus diana roloway (CR) occurs and *Tragelaphus euryceros* (LR/nt) is thought to do so.

■ Conservation issues

Ownership of the forest lies with the paramount stools of Wassaw Fiase and Wassa Amenfi Traditional Areas. The site was designated a Forest Reserve under local bye-laws in 1940. The forest is rated Condition 3 with a GHI of up to 178. It has been proposed that parts of the reserve be protected as a Hill Sanctuary. Exploitation of forest products for local use is allowed under permit. Although heavily exploited, the site appears still to support a significant fauna that would benefit from improved protection.

■ Further reading

Hawthorne and Abu-Juam (1995), Holbech (1996).

Jema-Asemkrom Forest Reserve

GH013

Admin region Western

Coordinates 05°26'N 02°44'W

A1, A2 (084), A3 (A05)

Area 6,600 ha Altitude 50–80 m

Forest Reserve

■ Site description

The site is situated c.14 km south of Enchi town and is accessible from the Enchi–Boinso road. The western boundary of the reserve is formed by the international frontier with Côte d'Ivoire. There is a range of hills in the northern section with swamps and rivers in the central, low-lying area. The vegetation is wet evergreen forest. The area adjoining the Tano river in the south is heavily degraded, but large parts of the forest are still in excellent condition. The degraded parts include farmland which was inside the reserve at the time of its establishment and are largely dominated by pioneer tree species. There are several areas of good forest outside the reserve and it is also close to the Boin-Tano Forest Reserve (GH004), to the north-east. There has been no commercial logging in the reserve.

■ Birds

See Box and Tables 2 and 3 for key species.

Key species

A1	<i>Bleda eximia</i>	<i>Illadopsis rufescens</i>
	<i>Criniger olivaceus</i>	<i>Lamprotornis cupreocauda</i>

A2 (084) Upper Guinea forests EBA: Five of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.

A3 (A05) Guinea–Congo Forests biome: 71 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.

■ Other threatened/endemic wildlife

Mammals include *Cephalophus ogilbyi* (LR/nt), *C. dorsalis* (LR/nt), *Pan troglodytes* (EN) (10–15) and *Procolobus badius waldroni* (CR).

■ Conservation issues

The area was designated a Forest Reserve in 1981. It is rated a

Condition 2 forest with a GHI of 186 and it has been proposed that parts be given greater protection, including a Hill Sanctuary. Chewing-sticks are exploited.

Further reading

Hawthorne and Abu-Juam (1995), Holbech (1996).

Kakum National Park– Assin Attandaso Resource Reserve

GH014

Admin region Central A1, A2 (084), A3 (A05)
Coordinates 05°26'N 01°19'W National Park,
Area 36,600 ha Altitude 135–250 m Resource Reserve

Site description

Kakum National Park and the contiguous Assin Attandaso Resource Reserve are situated in the Central Region, about 30 minutes drive north of Cape Coast. Together, the two sites protect some 36,600 ha of moist evergreen forest (Kakum 21,200 ha, Assin Attandaso 15,400 ha). The terrain is generally flat with some hills in the south-western corner. The greater part of the site has been selectively logged. Kakum was logged from at least 1975 to 1989, while logging in Assin Attandaso was continuous from 1975 to 1988. The recently logged areas currently support a thick undergrowth, vine tangles and regenerating secondary forest, but good forest still remains in other areas, with a well-developed canopy and a comparatively open understory.

Birds

See Box and Tables 2 and 3 for key species. The site is one of the best-studied in Ghana with 266 species known to occur and a further 56 reported to do so, but requiring confirmation. The eight species of global conservation concern include *Agelastes meleagrides* which, however, occurs only in very low numbers due to past heavy hunting pressure. Nine species of hornbill have been recorded and *Psittacus erithacus* are commonly seen, mornings and evenings, flying overhead between roosting and feeding sites.

Key species

A1	<i>Agelastes meleagrides</i>	<i>Bleda eximia</i>
	<i>Ceratogymna cylindricus</i>	<i>Criniger olivaceus</i>
	<i>Ceratogymna elata</i>	<i>Illadopsis rufescens</i>
	<i>Melignomon eisentrauti</i>	<i>Lamprotornis cupreocauda</i>
A2 (084)	Upper Guinea forests EBA: Seven of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.	
A3 (A05)	Guinea–Congo Forests biome: 137 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.	

Other threatened/endemic wildlife

Oates *et al.* (1997) report more frequent encounters with monkeys at Kakum than at any other site surveyed in Ghana. Species present included *Colobus vellerosus* (VU), *Procolobus verus* (LR/nt) and, possibly, *Cercopithecus diana roloway* (CR). The site is also reported to have the highest density of *Loxodonta africana cyclotis* (EN) recorded nationally.

Conservation issues

Both Kakum and Assin Attandaso were originally Forest Reserves, designated in 1931 and 1937, respectively. Following recommendations dating back to the 1960s, Kakum Reserve was given National Park status and Assin Attandaso became a Resource Reserve, and the two were placed under the administration of the Wildlife Department. Under the direction of Conservation International and with funding support from USAID, Kakum is certainly the best-protected forest site in Ghana, and has been developed in recent years to become a major tourist attraction. Poaching continues to be a major problem, but it is hoped that levels will be reduced in the near future, as a result of moves to return some of the benefits of tourism from the park to local communities and involve them in its management.

Further reading

Byskov (1992), Coles (1994), Daramani (1990), Moyer (1995), Oates *et al.* (1997), Roell *et al.* (1993).

Mamiri Forest Reserve

GH015

Admin region Western A1, A2 (084), A3 (A05)
Coordinates 05°40'N 02°22'W Forest Reserve
Area 4,500 ha Altitude 60–260 m

Site description

The site lies to the north of the Fure River (GH012) and Fure Headwaters Forest Reserves, the three forming an almost continuous crescent-shaped block. The terrain is hilly, with the hills strongly dissected by steep-sided deep valleys. These valleys become flooded during the rainy season, creating swampy habitats. The reserve includes both moist evergreen and wet evergreen forest. Much of the forest, especially along the ridges which are inaccessible to logging, remains intact. The site includes c.2.3 ha of plantation and a few farms.

Birds

See Box and Tables 2 and 3 for key species.

Key species

A1	<i>Bleda eximia</i>	<i>Lamprotornis cupreocauda</i>
	<i>Illadopsis rufescens</i>	
A2 (084)	Upper Guinea forests EBA: Four of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.	
A3 (A05)	Guinea–Congo Forests biome: 78 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.	

Other threatened/endemic wildlife

None known to BirdLife International.

Conservation issues

The site was designated a Forest Reserve in 1943–1944. It has been rated a Condition 3 forest (GHI 72). Exploitation of minor forest products by local communities is allowed.

Further reading

Hawthorne and Abu-Juam (1995), Holbech (1996).

Mount Afadjato– Agumatsa Range forest

GH016

Admin region Volta A1, A2 (084), A3 (A05)
Coordinates 07°01'N 00°34'E Unprotected
Area c.2,000 ha Altitude 750–885 m

Site description

The site is located in the Hohoe District, south-east of the town of Hohoe. It is part of the Akwapim-Togo Range, which is aligned north-east to south-west between the Volta river and the international border with Togo. Afadjato (885 m) is the highest peak in Ghana. The site includes that part of the mountain range which falls within the four Traditional Areas of Gbledi, Fodome, Liatu and Wli, as well as the Afadjato and Hekpome caves. The precise boundaries of the site are yet to be defined, but the area included in the proposed reserve is estimated to cover c.2,000 ha. Mount Afadjato and the adjoining Agumatsa Ranges lie within the Dry Semi-Deciduous Forest zone, but include well-developed Guinea Savanna. The western slopes of the hills support semi-deciduous forest, parts of which are disturbed, but the steeper eastern sides are dominated by wooded savanna. Derived savanna grassland occurs in low-lying areas between settlements and on the lower slopes of the hills, but the presence of scattered, remnant forest trees, e.g. *Cola gigantea*, *Albizia adianthifolia*, *Morus mesozygia* and *Antiaris toxicaria*, suggest that the area once also supported semi-deciduous forest. Along the upper slopes of Afadjato, closed-canopy forest persists until within 20 m of the peak. Forest vegetation then quickly gives way to savanna at the summit. The site lies very close to Misahöhe Forest Reserve in Togo (IBA TG004).

Birds

See Box and Tables 2 and 3 for key species. The information available, to date, is based on a four-day survey which covered only the part of the forest on Afadjato mountain. A total of 88 species were recorded,

including 10 which are classified as rare or uncommon in Ghana amongst which were *Columba unicolor*, *Indicator exilis* and *Cercocoryx olivinus*. Five species of birds of prey were also seen, including *Circus cinereus*, of which there are few records for Ghana.

Key species

A1	<i>Bleda eximia</i>	<i>Illadopsis rufescens</i>
A2 (084)	Upper Guinea forests EBA: Three of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.	
A3 (A05)	Guinea–Congo Forests biome: 45 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.	

Other threatened/endemic wildlife

The mountain ranges in the Volta Region, including Agumatsa and Mt. Afadjato, have a rich butterfly fauna with a significant degree of endemism. Endemic butterfly species recorded include *Papilio maesseni*, *Bicyclus maesseni*, *Telipna maesseni*, *Paracleros maesseni*, *Fresna maesseni*, *Junonia hadrope* and *Caenides stoehri*. Mammalian species include *Cephalophus dorsalis* (LR/nt) and *Colobus polykomos* (LR/nt).

Conservation issues

The area is currently not protected and has only recently been proposed as a Community Nature Reserve, under a project funded by the Netherlands Development Administration and implemented by the Ghana Wildlife Society and the people of the Gbledi Traditional Area. The forests on the mid-slopes of the mountain have a GHI of 116. The distinctive vegetation and its high susceptibility to fire place the area on the national priority list of forest sites in need of protection. Until recently, the forest was used by the local communities for hunting and the collection of forest products including *Thaumatococcus daniellii*, a species of Marantaceae exported for the extraction of the sweetener thaumatin, the leaves of which are used locally as food wrappers.

Further reading

Ghana Wildlife Society (1998), Larsen (1994).

Nsuensa Forest Reserve

GH017

Admin region Eastern

Coordinates 06°09'N 00°59'W

A1, A2 (084), A3 (A05)

Area 6,300 ha Altitude 115–215 m

Forest Reserve

Site description

The reserve is situated close to Akokoaso village in the Birim North District, c.50 km from Akim Oda town. The name 'Nsuensa' in the Akan language means three rivers and the site encompasses the headwaters and catchment areas of the three streams, the Subin, the Aboabo and the Kadepon, which flow into the Birim river. The site includes the sacred groves of the people of Ajuafu and Akokoaso. The terrain is gently undulating and supports moist semi-deciduous forest. The areas around the streams become swampy in the rainy season. The reserve was logged between 1975 and 1991, but the sacred areas are not considered part of the productive reserve and here there has been little human influence.

Birds

See Box and Tables 2 and 3 for key species. The avifauna includes four species of hornbill, *Ceratogymna cylindricus*, *C. atrata*, *Tockus fasciatus* and *T. albocristatus*.

Key species

A1	<i>Ceratogymna cylindricus</i>	<i>Illadopsis rufescens</i>
	<i>Bleda eximia</i>	
A2 (084)	Upper Guinea forests EBA: Four of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.	
A3 (A05)	Guinea–Congo Forests biome: 62 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.	

Other threatened/endemic wildlife

None known to BirdLife International.

Conservation issues

The site was designated as a Forest Reserve in 1949. It is classified as

a Condition 3 reserve with a GHI of 46. Parts of the reserve were damaged by fire in 1983.

Pra-Sushien Forest Reserve

GH018

Admin region Central

Coordinates 05°16'N 01°32'W

A1, A2 (084), A3 (A05)

Area 8,200 ha Altitude 45–200 m

Forest Reserve

Site description

The Pra-Sushien Forest Reserve forms an irregular-shaped block stretching from south-west to north-east, from the Pra river near Hemang village to the Cape-Coast–Praso road near Abrafo Odumase, and is separated from Kakum National Park (GH014) by a road. The terrain of the reserve is very undulating with hilly slopes and narrow valleys, making access difficult. The area is drained by tributaries of the Pra river. The vegetation is moist evergreen forest, and areas of primary and mature secondary forest well represented. Records, however, show continuous logging between 1975 and 1991. Southern parts of the reserve, heavily disturbed, but good forest persists in the areas near Kakum.

Birds

See Box and Tables 2 and 3 for key species. This area yielded the highest species count of any site—120 species in 10 days. Species recorded include eight birds of prey and nine species of hornbill including the threatened *Ceratogymna elata* and *C. cylindricus* and the uncommon *C. subcylindricus*.

Key species

A1	<i>Ceratogymna cylindricus</i>	<i>Bleda eximia</i>
	<i>Ceratogymna elata</i>	<i>Illadopsis rufescens</i>
A2 (084)	Upper Guinea forests EBA: Four of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.	
A3 (A05)	Guinea–Congo Forests biome: 74 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.	

Other threatened/endemic wildlife

Mammals reported to occur at the site include *Procolobus verus* (LR/nt), *Cephalophus dorsalis* (LR/nt) and *Neotragus pygmaeus* (LR/nt).

Conservation issues

Although the site was designated a Forest Reserve in 1928, large areas have been degraded as a result of logging and farming activities. The forest is classified as Condition 2, with a GHI ranging from 86 to 112.

Further reading

Ghana Wildlife Society (1998), Hawthorne and Abu-Juam (1995).

Subri River Forest Reserve

GH019

Admin region Western

Coordinates 05°17'N 01°43'W

A1, A2 (084), A3 (A05)

Area 58,800 ha Altitude 60–300 m

Forest Reserve

Site description

Subri River Forest Reserve is located c.16 km south of the railway line linking the towns of Huni Valley–Twifo Praso and c. 21 km from Daboase village. The site is only some 3 km from the Pra-Sushien Reserve (GH018) and is the largest Forest Reserve in the country. The topography is generally undulating with altitudes in the range 60–125 m, but in the northern, south-eastern and central parts are steep-sided hills that reach 300 m. The reserve forms part of the watershed between the Bansa and Pra rivers and is traversed by tributaries of each, resulting in extensive areas of swampy vegetation which make access difficult even in the dry season. The vegetation is moist evergreen forest, but wet evergreen forest is reported to occur in some parts. Some areas of the reserve were subjected to salvage felling between 1966 and 1976, followed by selective logging since 1978. Some 12,372 ha have been converted to plantation.

Birds

See Box and Tables 2 and 3 for key species.

Key species

A1	<i>Ceratogymna cylindricus</i> <i>Ceratogymna elata</i> <i>Bleda eximia</i>	<i>Criniger olivaceus</i> <i>Illadopsis rufescens</i> <i>Lamprotornis cupreocauda</i>
A2 (084)	Upper Guinea forests EBA: Six of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.	
A3 (A05)	Guinea–Congo Forests biome: 74 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.	

Other threatened/endemic wildlife

Tragelaphus euryceros (LR/nt) is reported to be common; *Panthera pardus* and *Profelis aurata* have been sighted by hunters in recent times.

Conservation issues

The area was designated a Forest Reserve in 1950. It is rated a Condition 3 forest (though some areas are reported to be in good condition), with GHI of 107–207. Of the total area, 5,120 ha has been designated as a Globally Significant Biodiversity Area by the Forest Department. There is evidence of some gold mining. Local people have the right to collect deadwood for firewood.

Further reading

Hawthorne and Abu-Juam (1995), Holbech (1996).

Tano-Anwia Forest Reserve

GH020

Admin region Western

Coordinates 05°50'N 02°35'W

A1, A2 (084), A3 (A05)

Area 15,300 ha Altitude 46–244 m

Forest Reserve

Site description

The reserve is located some 3 km north of the village of Gyomoro and 20 km west of Asankragua town on the main Asankragua–Enchi road. It adjoins Tano-Ehuro Forest Reserve (GH021), which also shares a boundary with Yoyo Forest Reserve (GH024). The reserve covers part of the watershed of the Tano river. The vegetation is moist evergreen forest which is generally in good condition. The north-eastern portion has been logged and some parts around the south-eastern boundary are disturbed. Logging started in 1970 and was suspended in 1990, but some compartments in the more inaccessible parts of the reserve remain unexploited.

Birds

See Box and Tables 2 and 3 for key species. The avifauna includes *Agelastes meleagrides* (one adult was found in a snare in selectively logged forest in 1989), which was reported from only four other sites.

Key species

A1	<i>Agelastes meleagrides</i> <i>Bleda eximia</i> <i>Criniger olivaceus</i>	<i>Illadopsis rufescens</i> <i>Lamprotornis cupreocauda</i>
A2 (084)	Upper Guinea forests EBA: Six of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.	
A3 (A05)	Guinea–Congo Forests biome: 59 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.	

Other threatened/endemic wildlife

None known to BirdLife International.

Conservation issues

The site was gazetted a Forest Reserve in 1955. The reserve is proposed as a Hill Sanctuary with Condition 3 forest, GHI 100–123. Heavy hunting pressure is reported. The whole reserve was granted as a timber concession in 1947, which expired in 1997. Non-timber forest products harvested include oil-palm, raphia palm, chewing-sticks and canes.

Further reading

Dutson and Branscombe (1990).

Tano-Ehuro Forest Reserve

GH021

Admin region Western

Coordinates 05°58'N 02°37'W

A1, A2 (084), A3 (A05)

Area 17,600 ha Altitude 121–381 m

Forest Reserve

Site description

The reserve shares a common boundary with Tano-Anwia Forest Reserve (GH020). The area is drained by the Tano and Ehuro rivers, from which the reserve derives its name. Much of the terrain is rugged, with many steep-sided hills. The reserve was subjected to salvage felling in 1988, with the last logging recorded in 1991.

Birds

See Box and Tables 2 and 3 for key species.

Key species

A1	<i>Agelastes meleagrides</i> <i>Ceratogymna cylindricus</i> <i>Bleda eximia</i>	<i>Criniger olivaceus</i> <i>Illadopsis rufescens</i> <i>Lamprotornis cupreocauda</i>
A2 (084)	Upper Guinea forests EBA: Seven of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.	
A3 (A05)	Guinea–Congo Forests biome: 95 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.	

Other threatened/endemic wildlife

None known to BirdLife International.

Conservation issues

The site was designated a Forest Reserve in 1967. It is classified as a Condition 5 forest and is reported to have been mostly destroyed by illegal farming, such that only pockets of forest remain between a matrix of farms. Protection of the remnants have, however, been advocated since, taken together with the contiguous Tano-Anwia and Yoyo Forest Reserves (GH020, GH024), the whole constitutes a fairly large block of forest.

Further reading

Dutson and Branscombe (1990) Hawthorne and Abu-Juam (1995).

Tano-Nimiri Forest Reserve

GH022

Admin region Western

Coordinates 05°38'N 02°37'W

A1, A2 (084), A3 (A05)

Area 20,600 ha Altitude 46–244 m

Forest Reserve

Site description

The Tano-Nimiri Forest Reserve shares a common boundary with Boin-Tano (GH004) and is about 4 km from the Tano-Anwia Reserve (GH020). A number of streams and rivers, including the Nimiri river, flow through the reserve and drain into the Tano river, on which there is a waterfall, the Atangwen Falls. The terrain between the rivers is rugged, with steep slopes and valleys that flood during the rains. The reserve spans two vegetation-types: the southern section, approximately one-third, is wet evergreen forest, while the remainder is moist evergreen forest. The reserve has been subjected to intensive logging, starting from the mid-1950s and continuing to 1992. Approximately 10% of the reserve was planned for either enrichment or afforestation planting in the early 1980s. Under the taungya system, 975 ha (c.5% of the total) has been converted to *Cedrela* and *Triplochiton* plantation and there are also farms in the reserve.

Birds

See Box and Tables 2 and 3 for key species.

Key species

A1	<i>Ceratogymna cylindricus</i> <i>Bleda eximia</i> <i>Criniger olivaceus</i>	<i>Illadopsis rufescens</i> <i>Lamprotornis cupreocauda</i>
A2 (084)	Upper Guinea forests EBA: Six of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.	
A3 (A05)	Guinea–Congo Forests biome: 76 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.	

■ Other threatened/endemic wildlife

None known to BirdLife International.

■ Conservation issues

The area was gazetted a Forest Reserve in 1955. It is rated Condition 3 (GHI 70–157), with much of the forest heavily disturbed. More recently, 3,456 ha have been designated as a Globally Significant Biodiversity Area by the Forest Department. Non-timber forest produce exploited includes raphia palm, oil-palm, canes and poles. Evidence of past mining activities along the banks of the Tano river is still visible.

■ Further reading

Hawthorne and Abu-Juam (1995), Holbech (1996).

Tano-Offin Forest Reserve

GH023

Admin region Ashanti

Coordinates 06°40'N 02°10'W

A1, A2 (084), A3 (A05)

Area 40,200 ha Altitude 225–740 m

Forest Reserve

■ Site description

The Tano-Offin Forest Reserve falls within the Atwima District of the Ashanti Region and is situated between the Kumasi–Wiowso–Tepa and Kumasi–Bibiiani roads; the Kumasi–Wiowso–Tepa road forms the northern boundary of the reserve. The site comprises much of the Nynahin hills, which run north-east–south-west, with Aya Bepo (740 m) the highest point, and which serve as the catchment area for several streams, tributaries of the Tano and Offin rivers. The reserve falls within the moist semi-deciduous forest zone and includes 34,100 ha of upland evergreen forest. The reserve was partitioned into 16 timber concessions in the 1970s and 1980s, and the last official logging was recorded in 1991. Some 2% of the reserve has been converted, under the taungya system, into *Mansonia*, *Pterygota* and *Terminalia superba* plantation. Many of the slopes show signs of periodic burning.

■ Birds

See Box and Tables 2 and 3 for key species. Tano-Offin supports several nationally rare species such as *Columba unicincta*, *Cercococcyx olivinus* and *Tockus camurus*. A total of 110 bird species were recorded in a two-week survey.

Key species

A1	<i>Bleda eximia</i>	<i>Illadopsis rufescens</i>
	<i>Criniger olivaceus</i>	
A2 (084)	Upper Guinea forests EBA: Four of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.	
A3 (A05)	Guinea–Congo Forests biome: 70 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.	

■ Other threatened/endemic wildlife

None known to BirdLife International.

■ Conservation issues

The reserve was first created under the Ashanti Native Authority Rules in 1929 and, like most other Forest Reserves in the country, has more recently been protected under the Lands Administration Act (1962), the Forest Protection Decree (1974) and the Forest Protection Law (1986). Ownership of the reserve is vested in the Ashanti Golden Stool, with the Hia, Nynahin and Nkawie-Panin Stools acting as caretakers. It is classified as a Condition 3 reserve (GHI 70), and a greater degree of protection has been proposed, including a Hill Sanctuary. Some parts of the reserve have been degraded through logging and bush fires, resulting in patchy vegetation in places, but good forest is still predominant, although illegal logging continues.

The reserve contains the largest tract of remaining upland evergreen forest in Ghana, which is scattered and very limited in area, but which contains plant species not found elsewhere in the country (see also GH002). The reserve justifies better protection, which would necessitate greater control of bush fires and elimination of illegal mining and logging, as well as an appropriate management strategy involving, amongst other things, allowance of the sustainable exploitation of forest products from areas of secondary forest. The forest is currently exploited by local villagers for non-timber forest products such as poles, cane, palm trees and fruits, chew-sticks, pestles,

snails and bush-meat, as well as timber for housing and other development projects. The reserve has bauxite deposits and a number of bauxite concessions have been granted in the past.

■ Further reading

Hawthorne and Abu-Juam (1995), Ntiama-Baidu, Asamoah *et al.* (2000).

Yoyo River Forest Reserve

GH024

Admin region Western

Coordinates 05°55'N 02°48'W

A1, A2 (084), A3 (A05)

Area 23,600 ha Altitude 100–380 m

Forest Reserve

■ Site description

The reserve lies north of the town of Enchi, forming an approximately crescent-shaped block of forest with the contiguous Tano-Anwia and Tano-Ehuro Forest Reserves (GH020, GH021). Yoyo is also connected to the Boin River Forest Reserve (GH005) by a narrow strip of forest, the Disue Forest Reserve. The area is drained by the Yoyo river and several other streams whose valleys become swampy during the wet season. The central portion of the reserve is mostly primary forest, but there are a few farms. The reserve was formerly under two timber concessions and the eastern and western parts were logged between 1962 and 1979.

■ Birds

See Box and Tables 2 and 3 for key species.

Key species

A1	<i>Bleda eximia</i>	<i>Lamprolornis cupreocauda</i>
	<i>Illadopsis rufescens</i>	
A2 (084)	Upper Guinea forests EBA: Four of the 11 species of this EBA known from Ghana have been recorded at this site; see Table 2.	
A3 (A05)	Guinea–Congo Forests biome: 79 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.	

■ Other threatened/endemic wildlife

A few *Pan troglodytes* (EN) are reported to remain.

■ Conservation issues

The site was designated a Forest Reserve in 1932. A greater degree of protection for parts has been proposed, including a Hill Sanctuary. It is rated Condition 2 (GHI 87–162).

■ Further reading

Hawthorne and Abu-Juam (1995), Holbech (1996).

Bui National Park

GH025

Admin region Brong-Ahafo, Northern

Coordinates 08°15'N 02°15'W

A3 (A04)

Area 18,210 ha Altitude 120–500 m

National Park

■ Site description

Bui National Park is situated in the centre-west of the country, against the international frontier with Côte d'Ivoire, and is bisected by the Black Volta river which separates the northern third, in the Northern Region, from the southern sector, in the Brong-Ahafo Region. The southern section is accessible from the Wenchi–Menji–Bongase road, whilst the northern sector is reached from the Wenchi–Bamboi–Wa road. The vegetation of both sectors is predominantly savanna woodland, with areas of grassland and patches of riparian forest along the Black Volta river and other small rivers in the park. These riverine forests are the best-preserved such forests remaining along the Black Volta and, probably, the only such forest left in the entire Volta system. Common tree species include *Butyrospermum paradoxum*, *Parkia clappertoniana*, *Daniella oliveri* and *Isoberlina doka* with the last three species dominant in savanna woodland. The park is, perhaps, the least developed in Ghana, although it has been in existence for three decades.

■ Birds

See Box and Table 3 for key species. A total of 94 species were recorded in a two-week survey, including 10 species of the Guinea–Congo

Forests biome; see Table 3. *Bucorvus abyssinicus* and *Eupodotis senegalensis* occur in the Park.

Key species

A3 (A04) Sudan–Guinea Savanna biome: Nine of the 37 species of this biome that occur in Ghana have been recorded at this site; see Table 3.

Other threatened/endemic wildlife

Two threatened species of crocodile, *Osteolaemus tetraspis* (VU) and *Crocodylus cataphractus* (DD), occur in the Black Volta. The park is particularly noted for the resident population of *Hippopotamus amphibius* and contains the largest of the only two viable populations in Ghana.

Conservation issues

The park is sometimes used illegally by Fulani herdsmen bringing in cattle from the neighbouring countries to the north, particularly Burkina Faso. The proposed Bui Dam project is a serious potential threat, since it could result in flooding of most of the protected area and the entire riverine forest system.

Further reading

Bennet and Basuglo (1998).

Damongo Scarp Forest Reserve

GH026

Admin region Northern

Coordinates 09°05'N 01°48'W

Area 3,937 ha Altitude 120–220 m

A3 (A04)

Forest Reserve

Site description

The reserve is located 1 km east of the Damongo township in the north-west of the country, to the south of Mole National Park (GH028). The vegetation is Guinea Savanna woodland with a canopy at about 8 m. Damongo Scarp is a sheer rock-face rising up to about 80 m above the surrounding plain. At the top of the scarp is an undulating plateau, on which the vegetation is dominated by short tussock-grasses and a few trees. Farming activities are common and in some parts the effects of slash and burn cultivation are evident.

Birds

See Box and Table 3 for key species. A total of 73 species have been recorded at this site.

Key species

A3 (A04) Sudan–Guinea Savanna biome: Nine of the 37 species of this biome that occur in Ghana have been recorded at this site; see Table 3.

Other threatened/endemic wildlife

None known to BirdLife International.

Conservation issues

There is much illegal cattle-grazing in the reserve.

Gambaga Scarp (East) Forest Reserve

GH027

Admin region Upper East

Coordinates 10°32'N 00°30'W

Area 12,753 ha Altitude 150–450 m

A3 (A04)

Forest Reserve

Site description

The reserve is located in the far north-east of the country and is bisected by the Walewale–Gambaga–Nalerigu road. The topography is hilly with a sharp escarpment running north-eastwards for several kilometres, to the village of Nakpanduri and extending eastwards to the border with Togo. The vegetation is a mixture of open Guinea Savanna woodland intergrading to Sudan Savanna, with trees reaching 10–12 m. The soil is generally sandy interspersed with large boulders.

Birds

See Box and Table 3 for key species. A total of 48 species were recorded during surveys.

Key species

A3 (A04) Sudan–Guinea Savanna biome: Nine of the 37 species of this biome that occur in Ghana have been recorded at this site; see Table 3.

Other threatened/endemic wildlife

None known to BirdLife International.

Conservation issues

The reserve is heavily grazed by cattle and sheep.

Mole National Park

GH028

Admin region Northern

Coordinates 09°30'N 01°40'W

Area 484,000 ha Altitude 120–490 m

 A3 (A04)
National Park

Site description

Mole National Park lies c.146 km north-west of Tamale. The terrain is undulating with low scarps. The vegetation is predominantly open Guinea Savanna woodland with an average tree height of 11 m and individuals reaching up to 22 m. Common tree species include *Isoberlinia doka*, *Butyrospermum paradoxum*, *Burkea africana*, *Combretum* spp. and *Terminalia avicennioides*. Watercourses are lined with species-rich riparian forest, with a dense undergrowth and a closed canopy, from which emergents reach 38 m. There are also areas of grassland and swamps in the flood-plain of rivers and around water-holes.

Birds

See Box and Table 3 for key species. A total of 314 bird species have been reported to occur in Mole, the largest number of species reported for any site in the country.

Key species

A3 (A04) Sudan–Guinea Savanna biome: 29 of the 37 species of this biome that occur in Ghana have been recorded at this site; see Table 3.

Other threatened/endemic wildlife

Some 90 mammal species have been recorded, including *Loxodonta africana africana* (EN), *Panthera leo* (VU) and *Colobus polykomos* (LR/nt). Four plant taxa *Aneilema setiferum* var. *pallidiciliatum*, *Gongronema obscurum*, *Kyllinga echinata* and *Rhinopterys angustifolia* are considered endemic to the area.

Conservation issues

The park was established as a game reserve in 1958 and upgraded to a National Park in 1971. Poaching for bush-meat is a serious problem. Improper fire management is also an issue of concern: fires started by poachers inside the park and others originating from outside result in the almost complete burning of the park every dry season. These factors, coupled with the general lack of community support for the protection of the park, threaten the the future of at least the large mammal species.

Further reading

Greig-Smith (1976), Grimes (1987), Rijksen *et al.* (1998), Schmitt and Adu-Nsiah (1993), Taylor and Macdonald (1978).

Shai Hills Resource Reserve

GH029

Admin region Greater Accra

Coordinates 05°55'N 00°05'E

Area 4,900 ha Altitude 100–200 m

 A3 (A04)
Resource Reserve

Site description

The reserve is located in the Accra plains, c.45 minutes drive north-west of Accra, near the village of Doryum. It is dominated by granitic hills rising over 200 m and covered by dry evergreen forest. The vegetation of the plains is mostly short-grass savanna (dominated by *Vetiveria fulvibarbis*, *Brachiaria falciifera* and perennial grasses) with shrubs and trees. The hills support a mosaic of grassland, woodland thickets and low forest, while marshy and aquatic vegetation occur around small dams and depressions.

■ Birds

See Box and Table 3 for key species. The reserve is relatively rich in birdlife; 160 species have been recorded. Species of interest include *Bucorvus abyssinicus*, *Eupodotis melanogaster* and *Poicephalus senegalus*.

Key species

A3 (A04) Sudan–Guinea Savanna biome: 10 of the 39 species of this biome that occur in Ghana have been recorded at this site; see Table 3.

■ Other threatened/endemic wildlife

None known to BirdLife International.

■ Conservation issues

The vigorous invasion of the neem tree, *Azadirachta indica*, is an issue of concern. This plant, an unpalatable exotic, is believed to suppress the growth of grass. There have been various attempts at eradicating the species, but this has proved difficult as cut stems coppice and it also produces large quantities of fruits which are readily dispersed by baboons and birds. The site used to be the ancestral home of the Shai people and many of their artifacts may still be found.

■ Further reading

Grimes (1987), Schmitt and Adu-Nsiah (1993).

Tankwidi Forest Reserve

Admin region Upper East

Coordinates 10°44'N 00°57'W

Area 19,221 ha Altitude 130–150 m

GH030

A3 (A04)

Forest Reserve

■ Site description

The reserve is situated in the extreme north of the country, to the south of the road linking Bolgatanga and Navrongo. The topography is generally flat with an elevation of no more than 150 m. The Tankwidi river bisects the reserve and flows southwards to join the White Volta at the southern end of the reserve, on the border with the Northern Region. The site is characterized by Guinea Savanna woodland, with short trees, shrubs and grasses mainly of the tribe Andropogoneae. Dominant plant species include *Combretum*, *Terminalia* and *Butyrospermum* spp. There is a small plantation of teak *Tectona grandis*.

■ Birds

See Box and Table 3 for key species. Some 78 species have been recorded, including *Bucorvus abyssinicus* and *Eupodotis melanogaster*.

Key species

A3 (A04) Sudan–Guinea Savanna biome: Five of the 37 species of this biome that occur in Ghana have been recorded at this site; see Table 3.

■ Other threatened/endemic wildlife

None known to BirdLife International.

■ Conservation issues

Threats include the construction of an airstrip (suspended at the time of the survey) and heavy grazing by domestic stock. The decision to build an airstrip on the reserve needs to be reconsidered carefully. The reserve is also threatened by illegal gold mining, although this was under control at the time of the survey as a result of a military presence in the area.

Amansuri wetland

Admin region Western

Coordinates 04°55'N 02°15'W

Area 38,050 ha Altitude 0–30 m

GH031

A4i

Unprotected

■ Site description

The site lies c.360 km west of Accra, near the town of Axim. It includes the freshwater Amansuri lagoon (including the village of Nzulenso which is built on stilts in the lagoon), the flood-plains of the Amansuri river, the coastal Amansuri lagoon and estuary, and the sandy Esiam beach, between the Amansuri and Ankobra rivers. The site covers

c.40% of the total catchment of the Amansuri river. The wetland is a blackwater system. The vegetation in the catchment is Wet Evergreen Forest, with swamp-forest in wetter parts. The most common tree in the swamps is the Raffia Palm *Raphia vinifera*, which grows in almost pure stands. The large spiny aroid *Cyrtosperma senegalense* grows along the edge of the raffia while the drier patches support mainly sedges and grasses. The area is subject to seasonal flooding and the nature of the terrain is such that access is very difficult and, as a consequence, large areas are largely untouched.

■ Birds

See Box for key species. The coastal areas of the Amansuri catchment, including the coastal lagoon, estuary and Esiam beach, support appreciable numbers of waterbirds. Other common species occurring at the site include *Pluvialis squatarola*, *Charadrius hiaticula*, *Tringa hypoleucos* and *Arenaria interpres*. Up to 30 *Haematopus ostralegus* are regularly seen on the beach, the only site along the Ghana coast where the species is seen with any degree of frequency. In addition to *Sterna maxima*, small flocks of *S. sandvicensis*, *S. hirundo* and *Chlidonias niger* also regularly roost on sandbanks in the estuary. Species occurring in the inland freshwater lagoon and swamp areas include gallinules, crakes and jacanas. The avifauna of the rest of the catchment has not been studied.

Key species

A4i	Breeding (pairs)	Non-breeding
<i>Calidris alba</i>	—	4,250
<i>Sterna maxima</i>	—	700

■ Other threatened/endemic wildlife

None known to BirdLife International.

■ Conservation issues

Amansuri wetland is the largest stand of intact swamp-forest in Ghana and its value is further enhanced by the fact that large areas are still in a relatively pristine condition. The fauna of the site, as with most blackwater areas, is species-poor; however, the communities present are distinctive. With current rates of population growth and development, unless action is taken now to safeguard this unique area, it is likely to suffer the fate of numerous other coastal wetlands, which have become completely degraded. The area is being considered as a Community Nature Reserve, with the possibility of Ramsar designation, under a project being implemented by the Ghana Wildlife Society, with funding from the Netherlands Government. Because of the large size of the catchment and the high population density in some parts, a zonation system will be necessary to focus conservation action on the most biologically important and intact areas. The freshwater lagoon is fished by the Nzulenso community; the fishing is regulated by a wide range of well-enforced taboos, aimed at ensuring sustainability and preventing pollution of the lagoon waters.

■ Further reading

Ghana Wildlife Society (1998), Gordon (1986, 1988).

Densu Delta Ramsar Site

Admin region Greater Accra

Coordinates 05°31'N 00°20'W

Area 9,350 ha Altitude 0–10 m

GH032

A4i, A4iii

Ramsar Site (unprotected)

■ Site description

The Densu delta wetland lies c.11 km west of Accra in the river valley between the Aplaku-Takuse and Weija McCarthy hills. It comprises an open lagoon, salt pans, freshwater marsh and scrub and sand-dunes. The greater part of the land is owned by the Panbros Salt Company. The wetland is fed mainly by the Densu river, which is dammed upstream (Weija dam), to supply water to the city of Accra. The dam has had profound effects on the lagoon and general hydrology of the wetland, since freshwater inflow into the wetland is controlled by the management of Weija Water Works. The water depth in the wetland varies, and can be over 2 m in some parts, during the rainy season. There is no direct outlet channel to the sea, but the lagoon often overflows into the sea after heavy rains. In other years, the Salt Company has to create an opening through the dunes to let water out of the pans. There is little

vegetation on the dunes and in the salt pans; some coconut-palms *Cocos nucifera* fringe the dunes, while the banks of some of the pans are colonized by *Sesuvium portulacastrum*. Scattered stands of mangrove are found in some areas around the lagoon, while the freshwater parts of the wetland support stands of mainly *Imperata*, *Typha* and *Cyperus*. Scrub vegetation grows on other parts of the wetland

■ Birds

See Box for key species. Sixty species of waterbird have been recorded at this site, with estimated maximum numbers of c.35,000 birds. The site is particularly important for roosting terns and is the second most important site for the rare *Sterna dougallii*. In addition, the site supports large numbers of *Egretta garzetta*, *Charadrius hiaticula*, *Calidris ferruginea* and *C. minuta*. Three species, *Glareola pratincola*, *Himantopus himantopus* and *Sterna albifrons* breed regularly at the site. Its proximity to Accra and easy access around the site as result of the salt pan construction, make the site attractive for birdwatching.

Key species		
A4i	Breeding (pairs)	Non-breeding
<i>Egretta gularis</i>	—	540
<i>Tringa erythropus</i>	—	1,170
<i>Sterna maxima</i>	—	6,650
<i>Sterna sandvicensis</i>	—	6,570
<i>Sterna dougallii</i>	—	500
<i>Sterna hirundo</i>	—	9,240
<i>Sterna albifrons</i>	—	3,100
<i>Chlidonias niger</i>	—	12,700
A4iii	More than 20,000 waterbirds have been recorded at this site.	

■ Other threatened/endemic wildlife

Three species of marine turtle *Lepidochelys olivacea*, *Chelonia mydas* and *Dermochelys coriacea* (all EN) have been recorded nesting on parts of the beach.

■ Conservation issues

The site was designated a Ramsar Site in 1992. The main activities within the wetland are the large-scale commercial salt operation and lagoon fisheries, mainly for tilapia and lagoon crabs. There are human settlements all around the wetland and, indeed, the main threat is increasing urbanization, with uncontrolled and unauthorized housing development resulting in habitat destruction.

■ Further reading

Ntiamao-Baidu and Gordon (1991).

Keta Lagoon Ramsar Site	GH033
Admin region Volta	
Coordinates 05°55'N 00°59'E	A4i, A4iii
Area 53,000 ha Altitude 0–10 m	Ramsar Site (unprotected)

■ Site description

Keta Lagoon lies in the far south-east of the country, near the international frontier with Togo. The lagoon is an extensive, brackish water-body situated to the east of the Volta river estuary. The site comprises the open water of the lagoon and the surrounding flood-plains and mangrove swamps. Although considered to be an open lagoon, it is effectively closed for most of the year. The area of open water varies with the season, but is estimated to be c.30,000 ha, stretching for c.40 km along the coast and separated from the sea by a narrow ridge.

Inflow into the lagoon is from three main sources: from the Todzie river (which enters and fills the neighbouring Avu lagoon in wet years and overflows into Keta lagoon via several small tributaries), from the Aka and Belikpa streams (which enter Keta lagoon directly from the north) and, to a limited extent, from the Volta river itself. The construction of the Akosombo Dam, upstream on the Volta river, has been blamed for a number of ecological changes which have occurred within the wetland in the recent past, including silting and blockage of the channels that interconnect the numerous lagoons. This is believed to have affected the natural drainage pattern such that large areas of the lagoon and marshlands dry up in the dry season and serious flooding now occurs in the wet season. The lagoon is

bordered by numerous settlements and the surrounding flood-plain consists of marsh, scrub, farmland and substantial mangrove stands, which are heavily exploited for fuelwood. Occupational activities include lagoon fishing, salt extraction and crop farming.

■ Birds

See Box for key species. Keta lagoon is the most important wetland on the Ghanaian coast for waterbirds and, together with neighbouring Songor (GH036), constitutes the fourth most important waterbird site on the Gulf of Guinea coast. Some 76 waterbird species, with estimated maximum numbers well over 100,000 birds, have been recorded. Other species which occur in large numbers include *Dendrocygna viduata*, *Himantopus himantopus*, *Calidris ferruginea* and *C. minuta* as well as several heron and egret species. The most important parts of the lagoon for waterbirds are the Fiahor, Woe, Tegbi, Adina and Afiadenyigba sections.

Key species		
A4i	Breeding (pairs)	Non-breeding
<i>Egretta garzetta</i>	—	7,200
<i>Egretta gularis</i>	—	1,400
<i>Casmerodius albus</i>	—	1,650
<i>Dendrocygna bicolor</i>	—	7,200
<i>Dendrocygna viduata</i>	—	53,050
<i>Himantopus himantopus</i>	—	12,100
<i>Recurvirostra avosetta</i>	—	1,560
<i>Charadrius hiaticula</i>	—	5,950
<i>Charadrius pecuarius</i>	—	1,800
<i>Tringa erythropus</i>	—	12,600
<i>Tringa stagnatilis</i>	—	1,750
<i>Tringa nebularia</i>	—	6,900
<i>Calidris minuta</i>	—	18,400
<i>Calidris ferruginea</i>	—	28,800
<i>Sterna nilotica</i>	—	450
<i>Sterna caspia</i>	—	440
<i>Sterna maxima</i>	—	1,270
<i>Sterna sandvicensis</i>	—	1,900
<i>Sterna albifrons</i>	—	1,000
<i>Chlidonias hybridus</i>	—	1,000
<i>Chlidonias niger</i>	—	3,350
A4iii	More than 20,000 waterbird occur regularly at this site.	

■ Other threatened/endemic wildlife

Small numbers of three species of marine turtles, *Lepidochelys olivacea*, *Chelonia mydas* and *Dermochelys coriacea* (all EN), nest along the beach.

■ Conservation issues

Keta Lagoon was designated a Ramsar Site under the Ghana Coastal Wetlands Management Project, but this is not, as yet, backed up by any national legislation. The catchment is huge, the human population density in the area is one of the highest in the country, land for settlement in coastal areas is scarce and pollution from domestic waste in some of the villages is a major cause for concern. Another major threat is coastal erosion, which continues to eat away at Keta township and other villages on the coastal strip at an alarming rate. A sea defence project, aimed at reducing the rate of erosion, also proposes to reclaim parts of the lagoon for human settlement. Conservation efforts and management interventions should concentrate on those parts of the lagoon supporting important waterbird populations, in addition to addressing some of the anthropological issues in the larger catchment area.

■ Further reading

Ntiamao-Baidu and Gordon (1991), Ntiamao-Baidu *et al.* (1998), Piersma and Ntiamao-Baidu (1995).

Muni-Pomadze Ramsar Site	GH034
Admin region Central	
Coordinates 05°19'N 00°40'W	A3 (A05), A4i
Area 9,500 ha Altitude 0–290 m	Forest Reserve, Ramsar Site

■ Site description

The site is situated to the west of the coastal town of Winneba, approximately 55 km west of Accra. The northern part comprises two

protected areas, Yenku A and B Forest Reserves, covering 10% of the site, while the traditional hunting areas of the Efutu people make up another 15%. Also included is the catchment of three seasonal streams, the Pratu, the Boaku and the Muni, which drain into Muni lagoon. This lagoon, its surrounding flood-plains and the adjacent sandy beach, constitute the southern part of the site. It is a shallow, saline, semi-closed, coastal lagoon, with a surface area of c.300 ha. Reports indicate that during the rains the lagoon fills up completely and spills over to flood the surrounding area about once every 10 years. At such times, the villagers dig a canal to open the entrance to the sea and the excess water is released.

The catchment is a gentle undulating plain bordered to the north and the north-east by the Yenku Hills (290 m) and in the south-west by the Egyasimanku Hills (205 m). The hill-slopes facing the lagoon are fairly steep. The lagoon shoreline is covered with *Sesuvium portulacastrum*, *Paspalum vaginatum* and *Sporolobus virginicus*, successively, up the sides of the dunes. The dunes themselves are planted with coconut-palm *Cocos nucifera*. The vegetation in the northern part of the wetland includes mangroves, with *Typha australis*, *Ludwigia erecta* and other typical freshwater hydrophytes occurring further inland. The vegetation in the upland areas is dominated by grassland and thickets, a *Eucalyptus* plantation, as well as forest vegetation in various stages of maturity.

■ Birds

See Box for key species. Forty-eight species of waterbird have been recorded at the site, the most abundant of which are *Himantopus himantopus*, *Charadrius hiaticula*, *Tringa nebularia*, *Calidris ferruginea*, *Sterna hirundo*, *S. maxima*, *S. sandvicensis* and *Chlidonias niger*. The terrestrial avifauna of the site numbers at least 114 species and includes *Illadopsis puvelli*, the only site from which this species was recorded.

Key species

A3 (A05) Guinea–Congo Forests biome: 19 of the 180 species of this biome that occur in Ghana have been recorded at this site; see Table 3.

A4i	Breeding (pairs)	Non-breeding
<i>Sterna maxima</i>	—	3,200
<i>Sterna sandvicensis</i>	—	2,230
<i>Sterna hirundo</i>	—	8,210
<i>Chlidonias niger</i>	—	6,570

■ Other threatened/endemic wildlife

Three species of marine turtle *Lepidochelys olivacea*, *Chelonia mydas* and *Dermochelys coriacea* (all EN) are reported to nest on the beaches.

■ Conservation issues

The site was designated as a Ramsar Site in 1992 which includes the two Forest Reserves. The main threats in the upland area are hunting and habitat destruction through bush fires and extraction for fuelwood. The area is known as one of the most important sources of bush-meat in the country. The lagoon itself is heavily overfished.

■ Further reading

Ntiamao-Baidu (1991), Ntiamao-Baidu, Nyame and Nuoh (2000), Ntiamao-Baidu, Owusu and Daramani (2000), Ryan and Ntiamao-Baidu (2000).

Sakumo Lagoon Ramsar Site

Admin region Greater Accra
Coordinates 05°37'N 00°03'W
Area 3,900 ha Altitude 0–5 m

GH035

A4i, A4iii
Ramsar Site (unprotected)

■ Site description

The site is situated beside the coastal road linking Accra and Tema, c.3 km west of Tema township. The size of the open lagoon varies from 100–350 ha depending on the season. The lagoon is separated from the sea by a narrow sand-dune, on which the Accra–Tema road is built, and is connected to the sea by a small, non-functional (permanently open) sluice, constructed to prevent flooding of the coastal road. Large portions of the lagoon dry up in the dry season, resulting in hyper-saline conditions. The flood-plain is periodically inundated and the flooded areas are largely devoid of vegetation. There are also areas of freshwater marsh and coastal savanna grassland, the latter composed mainly of *Sesuvium portulacastrum* with various grass

species associations. Land-use in the catchment includes rice, cassava and vegetable cultivation. The lagoon has been heavily overfished.

■ Birds

See Box for key species. Seventy species of waterbird have been recorded at the site with estimated maximum numbers of some 30,000 birds. Other common species include *Egretta garzetta*, *E. gularis*, *Glareola pratincola*, *Charadrius hiaticula* and *Sterna hirundo*. Breeding waterbird include *G. pratincola*, *Charadrius pecuarius* and *Sterna albifrons*.

Key species

A4i	Breeding (pairs)	Non-breeding
<i>Tringa erythropus</i>	—	3,280
<i>Sterna sandvicensis</i>	—	2,600
<i>Chlidonias niger</i>	—	1,750
A4iii	More than 20,000 waterbirds have been recorded at this site.	

■ Other threatened/endemic wildlife

Three species of marine turtle *Lepidochelys olivacea*, *Chelonia mydas* and *Dermochelys coriacea* (all EN) have been recorded nesting on the beach.

■ Conservation issues

The site was proposed for Ramsar designation in 1987, but was not designated until 1992, by which time about a third of the area originally proposed for designation had been taken up by settlement development, involving a number of housing estates. The area has one of the highest urban growth-rates within the coastal zone, and sewage and domestic waste from the catchment seriously threaten the lagoon. The spread of urbanization continues and it is feared that if strict measures are not taken to control this, the entire catchment will be destroyed, with serious adverse effects on the lagoon. The area has high educational and recreational value, being one of the few 'green' areas left in the rapidly expanding Accra–Tema metropolitan area. The lagoon is regarded as a fetish by the indigenous people of Tema New Town and the Black Heron *Egretta ardesiaca* is considered sacred and protected by local taboos.

■ Further reading

Ntiamao-Baidu (1991), Ntiamao-Baidu and Gordon (1991).

Songor Ramsar Site

Admin region Greater Accra
Coordinates 05°49'N 00°28'E
Area 23,200 ha Altitude 0–10 m

GH036

A4i, A4iii
Ramsar Site (unprotected)

■ Site description

Songor Lagoon is, with Keta Lagoon (GH033), one of the two major lagoon systems associated with the Volta river estuary and is situated to the west of the estuary. The site comprises a brackish water lagoon with extensive mudflats and islands, salt pans, a broad sandy beach and flood-plains of a number of small streams, including the Sege and Zano, which drain directly into the lagoon. The open water area of the lagoon covers up to c.11,500 ha and extends c.20 km along the coast and c.8 km inland. It is separated from the sea by a narrow sand-dune on which small villages are situated. The lagoon is shallow, c.50 cm in the deepest parts, with most areas less than 10 cm. The land around the lagoon is low-lying, with the highest point less than 10 m above sea-level. Channels, which in the past provided direct connection with the Volta river, are effectively blocked. The lagoon has no direct access to the sea and seawater replenishment is from seepage through the sand-dunes.

The main wetland vegetation-type is saline marsh, with degraded mangroves (mainly *Avicennia* sp.) and waterlogged grassland along the margins of the lagoon, and riverine woodland, scattered thickets of shrubs, climbers and small trees on higher ground. Terrestrial vegetation away from the lagoon is largely degraded coastal savanna, characterized by farmland, secondary vegetation on abandoned farms, wastelands and eroded lands invaded by neem tree *Azadirachta indica*, and isolated trees such as fan palm *Borassus aethiopicum*, mango *Mangifera indica*, silk cotton tree *Ceiba pentandra* and baobab *Adansonia digitata*. Human activities in and around the lagoon comprise mainly farming, fishing and intensive salt extraction.

Birds

See Box for key species. The site is well known ornithologically; waterbirds have been monitored monthly by the Ghana Wildlife Society for more than 10 years. It is the second most important site, after Keta (GH033), for waterbirds on the Ghanaian coast, supporting estimated maximum numbers of over 100,000 birds. The site is particularly important as a roosting site for terns; roosts of over 50,000 may be seen regularly during the peak months of September and October. The site has the highest count of *Sterna dougallii* recorded at any site on the Ghanaian coast. The most important parts of the wetland for waterbirds are the Pute, Totope and Kablevu areas of the lagoon where spectacular flocks of terns, herons and egrets, *Recurvirostra avosetta*, stilts and several small wader species forage and roost together.

Key species

A4i	Breeding (pairs)	Non-breeding
<i>Egretta garzetta</i>	—	4,500
<i>Egretta gularis</i>	—	1,000
<i>Himantopus himantopus</i>	—	4,400
<i>Recurvirostra avosetta</i>	—	3,750
<i>Charadrius hiaticula</i>	—	3,000
<i>Tringa erythropus</i>	—	10,100
<i>Tringa nebularia</i>	—	5,100
<i>Calidris ferruginea</i>	—	6,900
<i>Sterna maxima</i>	—	2,600
<i>Sterna sandvicensis</i>	—	5,100
<i>Sterna dougallii</i>	—	650

A4i ... continued	Breeding (pairs)	Non-breeding
<i>Sterna hirundo</i>	—	11,900
<i>Sterna albifrons</i>	—	2,750
<i>Chlidonias niger</i>	—	18,100
A4iii	More than 20,000 waterbirds are recorded regularly at this site.	

Other threatened/endemic wildlife

Three species of threatened marine turtle *Lepidochelys olivacea*, *Dermochelys coriacea* and *Chelonia mydas* (all EN) nest along the Songor beach (the first two are the more common). There is one specimen from here of a fourth, *Eretmochelys imbricata* (CR), in the museum collections of the Zoology Department, University of Ghana, but no records of the species were found in recent surveys.

Conservation issues

The site was designated as a Ramsar Site under the Ghana Coastal Wetlands Management project in 1992. The upland areas surrounding the lagoon are heavily degraded, freshwater flow into the lagoon is limited and large portions dry up during the long dry season. The main threat is a proposal for industrial salt production which, if carried forward, would turn the entire lagoon into a salt reservoir. All species of nesting turtle are heavily hunted and their eggs collected.

Further reading

Kwei (1977), Ntiama-Baidu and Gordon (1991), Ntiama-Baidu *et al.* (1998), Piersma and Ntiama-Baidu (1995).

BIBLIOGRAPHY

- AHN, P. M. (1970) *West African agriculture. Volume 1: West African soils*. Oxford, UK: Oxford University Press.
- ASIBEY, E. O. A. (1971) The present status of wildlife conservation in Ghana. *Wildlife conservation in West Africa. Proceedings of the Symposium held at the University of Ibadan, Nigeria, during the 7th Biennial Conference of the West African Science Association*. Morges, Switzerland: IUCN.
- BENNETT, D. AND BASUGLO, B., EDS (1998) *Final report of the Aberdeen University Black Volta Expedition 1997*. Aberdeen, UK: Viper Press.
- BROWN, L. H., URBAN, E. K. AND NEWMAN, K. (1982) *The birds of Africa*, 1. London, UK: Academic Press.
- BYSKOV, J. O. (1992) Report on the Ornithological investigation in Kakum National Park and the Assin Attandanso Game Production Reserve—Central Region—Ghana. Ghana Wildlife Department. (Unpubl. report.)
- CANSDALE, G. S. (1964) The establishment of zoological gardens and wildlife conservation. Report to the Government of Ghana. FAO Report No. 1800. Rome, Italy: FAO.
- COLES, T. (1994) Guide to the birds of Kakum National Park, including Assin Attandanso Game Production Reserve, Asueso Forest Reserve, Prasuhein Forest Reserve. (Unpubl. report.)
- COLLAR, N. J., CROSBY, M. J., AND STATTERSFIELD, A. J. (1994) *Birds to Watch 2: the world list of threatened birds*. Cambridge, UK: BirdLife International (BirdLife Conservation Series 4).
- COLLINS, W. B. (1961) Wildlife conservation in Ghana. *African Wildlife* 15: 205–212.
- DARAMANI, D. T. (1990) Reconnaissance survey report on birds of Kakum National Park and Assin Attandanso Game Production Reserve. Ghana Game and Wildlife Department. (Unpubl. report.)
- DICKSON, K. S. AND BENNEH, B. A. (1988) *A modern geography of Ghana*. UK: Longman.
- DORM-ADZOBU, C. O., AMPADU-AGYEI, O. AND VEIGHT, P. A. (1991) *Religious beliefs and environmental protection: the Malshegu Sacred Grove in northern Ghana*. World Resources Research Institute/Acts Press.
- DUTSON, G. AND BRANSCOMBE, J. (1990) *Rainforest birds in south-west Ghana. Results of the ornithological work of the Cambridge-Ghana Rainforest Project 1988 and the Ghana Rainforest Expedition '89*. Cambridge, UK: ICBP (Study Report 46).
- FRY, C. H., KEITH, S. AND URBAN, E. K., EDS (1988) *The birds of Africa*, 3. London, UK: Academic Press.
- GHANA WILDLIFE SOCIETY (1998) *Ghana Wildlife Society Annual Report 1998–1999*. Accra: Ghana Wildlife Society.
- GORDON, C. (1986) The limnology of the Amansuri wetlands. University of Ghana, Legon, Accra. (Unpubl. MSc thesis.)
- GORDON, C. (1988) Some observations on the birds of the Amansuri wetlands, Ghana. In *Proceedings of the 7th Pan African Ornithological Congress, Nairobi, Kenya*.
- GORDON, C., NTIAMOA-BAIDU, Y. AND RYAN, J. M. (2000) The Muni Pomadze Ramsar site. *Biodiversity and Conservation* 9: 447–464.
- GRAINGER, J. (1994) *A protected area system plan to conserve biodiversity in Ghana*. Accra/Gland, Switzerland: Ghana Wildlife Department/IUCN (GWD/IUCN Project 9786, unpubl. report).
- GREIG-SMITH, P. W. (1976) The composition and habitat preferences of the avifauna of Mole National Park, Ghana. *Bulletin of the Nigerian Ornithologists Society* 12: 49–66.
- GRIMES, L. (1987) *The birds of Ghana*. London, UK: British Ornithologists' Union (Checklist 9).
- HALL, J. B. AND SWAINE, M. D. (1981) *Distribution and ecology of vascular plants in a tropical rain forest: forest vegetation in Ghana*. The Hague, Netherlands: Junk.
- HAWTHORNE, W. D. (1990) *Field guide to the forest trees of Ghana*. Chatham, UK: Natural Resources Institute.
- HAWTHORNE, W. D. AND ABU-JUAM, M. (1995) *Forest protection in Ghana with particular reference to vegetation and species*. Gland, Switzerland/Cambridge, UK: IUCN.
- HOLBECH, L. H. (1992) Effects of selective logging on a rainforest bird community in western Ghana. University of Copenhagen, Denmark. (Unpubl. MSc thesis.)
- HOLBECH, L. H. (1996) Faunistic diversity and game production *contra* human activities in the Ghana High Forest Zone, with reference to the Western Region. University of Copenhagen, Denmark. (Unpubl. PhD thesis.)
- INTERNATIONAL INSTITUTE FOR ENVIRONMENT AND DEVELOPMENT (IIED) (1992) *Environmental synopsis of Ghana*. London, UK: Overseas Development Administration.
- KEITH, S., URBAN, E. K. AND FRY, C. H., EDS (1992) *The birds of Africa*, 4. London, UK: Academic Press.
- KESSE, G. O. (1985) *The mineral and rock resources of Ghana*. Rotterdam, The Netherlands: A. A. Balkema.
- KWEI, E. A. (1977) Biological chemical and hydrological characters of coastal lagoons of Ghana, West Africa. *Hydrobiologia* 56: 157–174.
- LARSEN, T. B. (1994) The butterflies of Ghana—their implications for conservation and sustainable use. Ghana Wildlife Dept. (Unpubl. report.)
- MACDONALD, M. A. AND TAYLOR, I. R. (1977). Notes on some uncommon forest birds in Ghana. *Bull. Brit. Orn. Club*, 97: 116–120.
- MACKWORTH-PRAED, C. W. AND GRANT, C. H. B. (1970) *African handbook of birds. Series 3: Birds of West, Central and Eastern Africa*. Vol. 1. London, UK: Longmans.
- MACKWORTH-PRAED, C. W. AND GRANT, C. H. B. (1973) *African handbook of birds. Series 3: Birds of West, Central and Eastern Africa*. Vol. 2. London, UK: Longmans.
- MARTIN, C. (1976) Report on a survey of the Ankasa River Forest Reserve. Department of Game and Wildlife, Accra, Ghana. (Unpubl. report.)
- MARTIN, C. (1982) Management plan for the Bia Wildlife Conservation Areas. IUCN/WWF Project 1251 report prepared for the Wildlife and National Parks Division, Ghana Forestry Commission. (Unpubl. report.)

- MARTIN, C. (1991) *The rainforests of West Africa*. Berlin, Germany: Birkhauser Verlag.
- MOYER, D. C. (1995). Natural resource conservation for the Central Region, Ghana: bird survey work—Kakum National Park. Conservation International, USA and Wildlife Dept., Ghana. (Unpubl. report.)
- NTIAMOA-BAIDU, Y. (1991) Seasonal changes in the importance of coastal wetlands in Ghana for wading birds. *Biological Conservation* 57: 139–158.
- NTIAMOA-BAIDU, Y. (1995) *Indigenous versus introduced biodiversity conservation strategies: the case of protected area systems in Ghana*. Washington, D.C.: Biodiversity Support Program (Issues in African Biodiversity No. 1).
- NTIAMOA-BAIDU, Y. AND GORDON, C. (1991) Coastal wetlands management plans, Ghana. World Bank and the Environmental Protection Council, Ghana. (Unpubl. report.)
- NTIAMOA-BAIDU, Y., ASAMOAH, S. A., OWUSU, E. H. AND OWUSU-BOATENG, K. (2000) Avifauna of two upland evergreen forest reserves, the Atewa Range and Tano Offin, in Ghana. *Ostrich* 71: 277–281.
- NTIAMOA-BAIDU, Y., GYAMFI-FENTENG, L. J. AND ABBIW, D. (1992) Management strategy for sacred groves in Ghana. World Bank and the Environmental Protection Council. (Unpubl. report.)
- NTIAMOA-BAIDU, Y., NYAME, S. K. AND NUOH, A. A. (2000) Trends in the use of a small coastal lagoon by waterbirds: Muni Lagoon (Ghana). *Biodiversity and Conservation* 9: 527–539.
- NTIAMOA-BAIDU, Y., OWUSU, E. H., ASAMOAH, S. AND OWUSU-BOATENG, K. (2000) Distribution and abundance of forest birds in Ghana *Ostrich* 71: 262–268.
- NTIAMOA-BAIDU, Y., OWUSU, E. H. AND DARAMANI, D. T. (2000) Terrestrial birds of the Muni-Pomadze Ramsar site. *Biodiversity and Conservation* 9: 511–525.
- NTIAMOA-BAIDU, Y., PIERSMA, T., WIERSMA, P., POOT, M., BATTLE, P. AND GORDON, C. (1998) Water depth selection, daily feeding routines and diets of waterbirds in coastal lagoons in Ghana. *Ibis* 140: 89–103.
- OATES, J. F., STRUHSAKER, T. T. AND WHITESIDES, G. H. (1997) Extinction faces Ghana's Red Colobus monkey and other locally endemic subspecies. *Primate Conservation* 17: 138–144.
- PIERSMA, T. AND NTIAMOA-BAIDU, Y. (1995) *Waterbird ecology and the management of coastal wetlands in Ghana*. The Netherlands: NIOZ (Report 6).
- RIJKSEN, H. D., DANSO, E. Y., ARTHUR A., AND POSTHOUWER, R. H. M. (1998) Development Plan for Mole National Park, Ghana: Results of a formulation mission. Aid Environment. (Unpubl. report.)
- ROELL, M., HELSENS, T. AND NICOLET, G. (1993) *A field guide to the Kakum National Park and the Assin Attandanso Game Production reserve*. Accra, Ghana: The Adventist Press.
- ROSE, P. M. AND SCOTT, D. A. (1997) *Waterfowl population estimates*. Second edition. Wageningen, The Netherlands: Wetlands International (Publication No. 44).
- RYAN, J. M. AND NTIAMOA-BAIDU, Y. (2000) Biodiversity and ecology of coastal wetlands in Ghana. *Biodiversity and Conservation*. 9: 445–446.
- SCHMITT, K AND ADU-NSIAH, M. (1993). The vegetation of Mole National Park. Forest Resource Management Project, GWD/IUCN Project 9786. Accra, Ghana: GWD/IUCN. (Unpubl. report.)
- SERLE, W., MOREL, G. J. AND HARTWIG, W. (1992) *Birds of West Africa*. London: Collins.
- SMIT, C. J. AND PIERSMA, T. (1989) Numbers, midwinter distribution and migration of wader populations using the East Atlantic Flyway. Pp. 24–63 in H. Boyd and J.-Y. Pirot, eds. *Flyways and reserve networks for water birds*. Slimbridge, UK: IWRB (Spec. Publ. 9).
- TAYLOR, I. R. AND MACDONALD, M. A. (1978) The birds of Bia National Park, Ghana. *Bulletin of the Nigerian Ornithologists Society* 14: 36–41.
- URBAN, E. K., FRY, C. H. AND KEITH, S., EDS (1986). *The birds of Africa*, 2. London, UK: Academic Press.

