

KENYA

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Little Yellow Flycatcher *Erythrocerus holochlorus*. (ILLUSTRATION: NIK BORROW)

GENERAL INTRODUCTION

The Republic of Kenya (area 586,600 km²) lies astride the Equator on the eastern coast of Africa. It is bordered by Ethiopia and Sudan to the north, Uganda to the west, Tanzania to the south and the Indian Ocean and Somalia to the east. Inland water bodies cover some 10,700 km², the bulk of this in Lakes Victoria and Turkana. The coastline, about 550 km long, faces the Indian Ocean.

Kenya has tremendous topographical diversity, including glaciated mountains with snow-capped peaks, the Rift Valley with its scarps and volcanoes, ancient granitic mountains, flat desert landscapes and coral reefs and islets. However, the basic configuration is simple. Coastal plains give way to an inland plateau that rises gradually to the central highlands, the result of relatively recent volcanic activity associated with the formation of the rift valley. To the west the land drops again to the Nyanza plateau that surrounds the Kenyan sector of Lake Victoria.

The coastline is broken and composed of beaches, coral cliffs and reefs, creeks and numerous offshore coral islands. Inland, a mainly level but narrow coastal plain lies on sedimentary rocks, with some igneous intrusions such as Dzombo (IBA KE010) and Mrima (KE018). Beyond low rolling hills lies the Nyika plateau, mainly on sedimentary rocks. This is largely a thorn-bush plain with seasonal drainage lines and a few isolated rocky hills. This landscape covers almost the entire north-eastern sector of the country, on a very gradually sloping plain.

The Great Rift Valley, with its associated escarpments and mountains, is a major feature. It runs the length of the country from Lake Turkana in the north to Lake Natron on the southern border with Tanzania. The central portion of the rift is raised, with the Aberdare mountains (IBA KE001) and Mount Kenya (KE005) to the east and the Mau Escarpment (KE051 and KE052) and Cherangani Hills (KE043) to the west. The northern and southernmost sectors of the rift are low-lying, arid and rugged, with spectacular volcanic landforms.

The region west of the central highlands is characterized by Precambrian metamorphic rocks. Mount Elgon (IBA KE059), an old, eroded volcano, intrudes through the ancient shield on the Uganda border. The Lake Victoria basin generally has a gently sloping landscape and an eroded surface that exposes granitic outcrops.

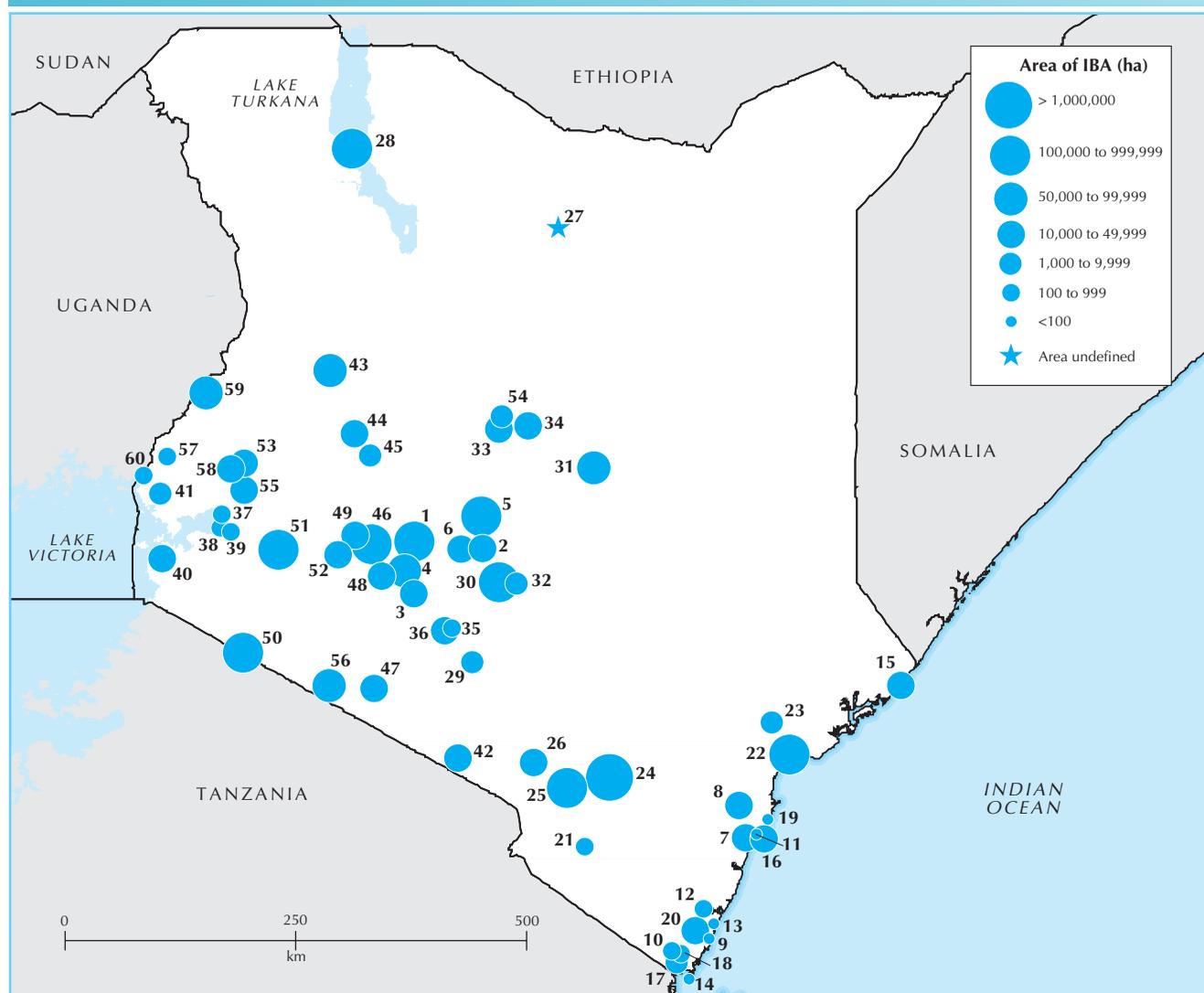
Isolated hills and mountains, such as Mount Kulal, Mount Nyiro and Mount Marsabit, are scattered to the north and east of the central highlands. The Taita Hills (IBA KE021), rising from the south-eastern plateau, are an ancient fault-block formation, the northernmost of a chain of isolated peaks (the 'eastern arc') that stretches south to Malaŵi through eastern and southern Tanzania. They sit almost cheek-by-jowl with one of the region's most recent volcanic ranges, the Chyulu Hills (KE026).

All Kenya's major rivers drain from the central highlands, divided by the rift into those flowing westwards into Lake Victoria and those flowing eastwards towards the Indian Ocean. There are five major drainage basins: Lake Victoria, the Rift Valley, the Athi-Galana-Sabaki river (and coastal areas to its south), the Tana river and the northern Ewaso Ngiro river. The Rift Valley contains several basins of internal drainage, forming a chain of endorheic lakes from Lake Natron on the Tanzanian border, through Lakes Magadi, Naivasha, Elmenteita, Nakuru, Bogoria, Baringo and Turkana (IBAs KE047, KE048, KE046, KE049, KE045, KE044 and KE028 respectively). These lakes vary in alkalinity, from freshwater Lake Naivasha to the intensely alkaline Lake Magadi. Lake Turkana is notable as a major volume of (more or less) fresh water in an otherwise arid and barren part of the country, while a number of rivers, including the Turkwel, Kerio, Athi-Galana, Tana and Northern and Southern Ewaso Ngiro, flow for long distances through dry parts of the country. Here they may often be the only permanent source of water.

Kenya is generally a dry country; over 75% of its area is classed as arid or semi-arid and only around 20% is viable for agriculture. Inland, rainfall and temperature are closely related to altitude changes, with variations induced by local topography. Generally

Important Bird Areas in Africa and associated islands – Kenya

Table 1. Summary of Important Bird Areas in Kenya.			60 IBAs covering c.54,330 km ²															
IBA code	Site name	Administrative region	Criteria (see p.11; for A2/A3 codes, see Tables 2/3)															
			A1	105	108	A2		s058	s061	A04	A05	A3			A4i	A4ii	A4iii	
KE001	Aberdare mountains	Central	✓			✓							✓					
KE002	Kianyaga valleys	Central	✓			✓												
KE003	Kikuyu Escarpment forest	Central, Rift Valley	✓			✓							✓					
KE004	Kinangop grasslands	Central, Rift Valley	✓			✓												
KE005	Mount Kenya	Central, Eastern	✓			✓							✓					
KE006	Mukurweini valleys	Central	✓			✓												
KE007	Arabuko-Sokoke forest	Coast	✓				✓										✓	
KE008	Dakatcha woodland	Coast	✓				✓										✓	
KE009	Diani forest	Coast	✓															
KE010	Dzombo hill forest	Coast	✓				✓											
KE011	Gede Ruins National Monument	Coast	✓				✓											
KE012	Kaya Gandini	Coast	✓				✓											
KE013	Kaya Waa	Coast	✓															
KE014	Kisite island	Coast																✓
KE015	Kiunga Marine National Reserve	Coast																✓
KE016	Mida Creek, Whale Island and the Malindi–Watamu coast	Coast																✓
KE017	Marenji forest	Coast	✓				✓										✓	
KE018	Mrima hill forest	Coast	✓														✓	
KE019	Sabaki river mouth	Coast																✓
KE020	Shimba Hills	Coast	✓				✓										✓	
KE021	Taita Hills forests	Coast	✓	✓														
KE022	Tana river delta	Coast	✓														✓	✓
KE023	Tana river forests	Coast	✓				✓										✓	
KE024	Tsavo East National Park	Coast, Eastern	✓														✓	
KE025	Tsavo West National Park	Coast, Eastern	✓														✓	
KE026	Chyulu Hills forests	Eastern, Rift Valley	✓			✓												
KE027	Dida Galgalu desert	Eastern	✓						✓								✓	
KE028	Lake Turkana	Eastern, Rift Valley																✓
KE029	Machakos valleys	Eastern	✓			✓												✓
KE030	Masinga reservoir	Eastern																✓
KE031	Meru National Park	Eastern	✓			✓											✓	
KE032	Mwea National Reserve	Eastern	✓			✓												✓
KE033	Samburu and Buffalo Springs National Reserves	Eastern, Rift Valley																✓
KE034	Shaba National Reserve	Eastern	✓						✓								✓	
KE035	Dandora ponds	Nairobi																✓
KE036	Nairobi National Park	Nairobi	✓			✓												✓
KE037	Dunga swamp	Nyanza	✓										✓					
KE038	Koguta swamp	Nyanza	✓										✓					
KE039	Kusa swamp	Nyanza	✓										✓					
KE040	Ruma National Park	Nyanza	✓															
KE041	Yala swamp complex	Nyanza, Western	✓										✓					
KE042	Amboseli National Park	Rift Valley																✓
KE043	Cherangani Hills	Rift Valley											✓					
KE044	Lake Baringo	Rift Valley																✓
KE045	Lake Bogoria National Reserve	Rift Valley	✓															✓
KE046	Lake Elmenteita	Rift Valley	✓		✓	✓												✓
KE047	Lake Magadi	Rift Valley																✓
KE048	Lake Naivasha	Rift Valley	✓		✓													✓
KE049	Lake Nakuru National Park	Rift Valley	✓		✓													✓
KE050	Masai Mara	Rift Valley	✓		✓	✓												✓
KE051	Mau forest complex	Rift Valley											✓					
KE052	Mau Narok–Molo grasslands	Rift Valley	✓			✓												
KE053	North Nandi forest	Rift Valley	✓					✓			✓							
KE054	Ol Donyo Sabache	Rift Valley	✓															
KE055	South Nandi forest	Rift Valley	✓								✓							
KE056	South Nguruman	Rift Valley	✓		✓	✓												
KE057	Busia grasslands	Western	✓						✓									
KE058	Kakamega forest	Western	✓					✓		✓								
KE059	Mount Elgon	Western, Rift Valley	✓			✓			✓				✓					
KE060	Sio Port swamp	Western	✓										✓					
Total number of IBAs qualifying:			47	1	5	16	7	2	2	2	3	5	6	8	7	13	1	8

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


the climate is warm and humid at the coast and in the Lake Victoria basin, cool and humid in the central highlands, and hot and dry in the north and east. Across most of the country, rainfall is strongly seasonal, although its pattern, timing and extent vary greatly from place to place and from year to year.

Except for the coast and the Lake Victoria region, altitude is the main determinant of precipitation. The high-altitude areas (over c.1,500 m) in the central Kenya highlands usually have substantial rainfall, reaching over 2,000 mm per year in parts of the Mau Escarpment. However, topography also has a major influence, with strong rain-shadow effects east of Mount Kenya and the Aberdare mountains. The highlands are thus surrounded by a set of semi-arid upland plateaus. To the north, the Laikipia plateau receives 400–800 mm of rain in indeterminate seasons. To the south, rainfall varies from 400–600 mm on the dry rift floor to as much as 1,000 mm in the Loita Hills, with varying seasonality. In the arid lowlands, rainfall averages less than 500 mm and varies greatly from year to year. Some 30% of this zone can be classed as semi-desert, with annual rainfall averaging less than 300 mm and evaporation often greater than 3,000 mm. The peaks of isolated mountains attract cloud and mist, however, and may support very different vegetation to the surrounding plains.

Differences in temperature vary predictably with altitude. Frost occurs regularly at 3,000 m and occasionally down to at least 2,400 m, and there is permanent snow and ice on top of Mount Kenya at 5,200 m. The hottest areas are in the arid north-east, and west of Lake Turkana (IBA KE028), where mean maximum temperatures average over 34°C.

Kenya's natural vegetation is as diverse as its climate and topography would suggest. Afro-alpine moorland (1.2% of total land area) occurs above c.3,000 m, on Mount Kenya (IBA KE005),

the Aberdare mountains (KE001), the Cherangani (KE043) and Mount Elgon (KE059). Highland grassland (0.05%), often with tussocks, is present above c.2,400 m on either side of the central Rift Valley (in the Kinangop and Mau Narok–Molo grasslands, KE004 and KE052). Other important grassland types include fire-induced grassland (3.1%, e.g. parts of the Masai Mara, KE050) and seasonal flood-plain and delta grassland (4.7%, e.g. the Tana river delta, KE022). Grassland also occurs on alkaline volcanic ash (0.2%), for example to the south of the Chyulu Hills (KE026).

Highland moist forest (2.0%) occurs between c.1,500 m and 3,000 m in areas that receive more than 1,200 mm of rain per year. At higher levels this is often a mosaic of forest and bamboo. Relicts of Guineo-Congolian rainforest (0.1%) persist in western Kenya, in and around Kakamega forest (IBA KE058). The North and South Nandi forests (KE053 and KE055) are transitional between the Guineo-Congolian and montane forest types. Several types of coastal forest and woodland (0.1%), characteristic of the Zanzibar-Inhambane Mosaic vegetation region, occur along the narrow coastal strip. These patches are mainly small and relictual, and the forest structure and composition vary greatly according to soil type and rainfall. Coastal evergreen bushland (0.4%) also occurs, in a mosaic with cultivated land; this is almost always a secondary vegetation type. Coastal palm-stands, often in tall grassland, are rare (0.1%), concentrated near the Ramisi river in the south and around the Tana river delta (KE022) in the north. Elsewhere, highland dry forests (0.4%) occur on hilltops that attract mist and rain (e.g. Mount Marsabit and the Taita Hills and Chyulu Hills, IBAs KE021 and KE026). Riverine forests (e.g. along the Mara river) and groundwater forests (e.g. Kitovu) together make up c.1.5% of the land area.

Thorn bushland and woodland are the most extensive vegetation types in Kenya (41.7%), running from Amboseli (IBA KE042) in

Table 2. The occurrence of restricted-range species at Important Bird Areas in Kenya. Sites that meet the A2 criterion are highlighted in bold . Species of global conservation concern are highlighted in bold blue .																														
105 – Tanzania–Malawi mountains Endemic Bird Area (three species in Kenya; one site meets the A2 criterion)																														
IBA code:																				021										
<i>Turdus helleri</i>																				✓										
<i>Apalis fuscigularis</i>																				✓										
<i>Zosterops silvanus</i>																				✓										
Number of species recorded																				3										
108 – Serengeti plains Endemic Bird Area (three species in Kenya; five sites meet the A2 criterion)																														
IBA code:																				046	048	049	050	056						
<i>Trachyphonus usambiro</i>																							✓							
<i>Prionops poliophus</i>																				✓	✓	✓	✓	✓						
<i>Histurgops ruficauda</i>																							✓							
Number of species recorded																				1	1	1	3	1						
109 – Kenyan mountains Endemic Bird Area (eight species in Kenya; 16 sites meet the A2 criterion)																														
IBA code:	001	002	003	004	005	006	026	029	031	032	036	043	046	050	051	052	054	056	059											
<i>Francolinus jacksoni</i>	✓		✓		✓										✓				✓											
<i>Macronyx sharpei</i>	✓			✓	✓											✓			✓											
<i>Turdoides hindei</i>		✓				✓		✓	✓	✓																				
<i>Cisticola hunteri</i>	✓		✓	✓	✓							✓			✓	✓	✓	✓	✓											
<i>Cisticola aberdare</i>	✓			✓												✓														
<i>Euplectes jacksoni</i>				✓	✓						✓		✓	✓		✓			✓											
<i>Poeoptera kenricki</i>					✓																									
<i>Cinnyricinclus femoralis</i>	✓		✓		✓		✓																							
Number of species recorded	5	1	3	4	6	1	1	1	1	1	1	1	1	1	2	4	1	2	3											
111 – East African coastal forests Endemic Bird Area (seven species in Kenya; seven sites meet the A2 criterion)																														
IBA code:																				007	008	009	010	011	012	013	017	018	020	023
<i>Tauraco fischeri</i>																				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Otus ireneae</i>																				✓										
<i>Anthus sokokensis</i>																				✓	✓		✓	✓	✓		✓		✓	
<i>Cisticola restrictus</i>																														(✓)
<i>Apalis chariessa</i>																														✓
<i>Anthreptes pallidigaster</i>																				✓										
<i>Ploceus golandii</i>																				✓	✓									
Number of species recorded																				5	3	1	2	2	2	1	2	1	2	2
113 – Jubba and Shabeelle valleys Endemic Bird Area (two species in Kenya; no sites meet the A2 criterion)																														
IBA code:																														
<i>Streptopelia reichenowi</i>																														
<i>Ploceus dichrocephalus</i>																														
s058 – Kakamega and Nandi forests Secondary Area (two sites meet the A2 criterion)																														
IBA code:																													053	058
<i>Muscicapa lendu</i>																													✓	✓
s061 – North Kenyan short-grass plains Secondary Area (two sites meet the A2 criterion)																														
IBA code:																													027	034
<i>Mirafra williamsi</i>																													✓	✓
s062 – Mount Kulal Secondary Area (no sites meet the A2 criterion)																														
IBA code:																														
<i>Zosterops kulalensis</i>																														

the south through the Tsavo parks (KE024 and KE025) to north-east and north-west Kenya. This vegetation grades into semi-arid wooded and bushed grassland (0.2%)

The north-central and north-western parts of the country are covered by semi-desert (16.8%). In places, such as the Dida Galgalu (IBA KE027) and Chalbi deserts and around Lake Turkana (KE028), areas of barren land (0.4%) occur, with very little vegetation. Marine beaches and dunes make up another 0.04% of the land area.

Wetlands are an important habitat. Strongly alkaline lakes (0.04%), mainly in the Rift Valley, lack macrophytes, except at river inflows, but may have large blooms of microscopic plants. Papyrus swamps are found patchily around the shores of Lake Victoria, mainly along river inflows. Elsewhere this habitat is widely scattered, with notable patches at Lake Naivasha (IBA KE048) and Lake Jipe. (Only Lake Victoria's papyrus holds the suite of bird species specialized on this habitat.) Swamps of other *Cyperus* species, *Typha* or *Phragmites* occur locally but are rarely of any great size. Permanent swamps make up 0.11% of the land area, while bodies of freshwater cover 2.1% of Kenya's surface area.

Mangrove swamps (0.2%) occur in sheltered creeks and estuaries along the coast. On sandy shorelines are often beds of seagrass, beyond the littoral zone or in deeper channels within it. Coral reefs and islands make up some 59,000 ha, or 0.1% of the land area.

Human-modified habitats, created at the expense of the natural vegetation, occur throughout the country but especially in the highlands. These include cultivated land under a wide variety of crops (18%), plantations of exotic trees, secondary thicket and scrub, eroded and de-vegetated woodland and bushland, and overgrazed pastureland.

As a nation, Kenya is ethnically and culturally diverse. This diversity was created by a series of migrations of various peoples from other parts of the continent, mainly Cushites, Nilotes and Bantu. During the 20th century this has been augmented by the arrival of Asians and Europeans.

Kenya's population has increased rapidly from 8.2 million in the early 1960s to 15.2 million people by 1979 and 22 million in 1987. Today the population is estimated at close to 30 million people, most of them concentrated in the high-rainfall areas. The

average annual population growth rate has fallen from a high of 4% (one of the highest rates in the world) to around 2.7%, and varies within the country. Rates of increase are especially high in the central Kenya highlands, western Kenya and urban areas. Human population densities are also high, with an average of c.50 people/km², but this again varies with region. In the north and east of the country just 20% of the total population occupies around 80% of the land area.

Kenya has a low-income economy. GNP per capita in 1997 was US\$330, and has been more or less static since 1992 (World Bank 1998). Income is very inequitably distributed, with the highest 20% of earners receiving more than 60% of the income (and 48% of income going to the top 10%), compared to just 3.4% for the lowest quintile (World Bank 1998). The economy is mainly agriculture-based with over 80% of the total labour force in this sector. Agriculture presently earns over 60% of Kenya's foreign exchange; the traditional export crops of tea and coffee have been joined by cut flowers and various horticultural crops in recent years. Tourism is the other key sector for foreign exchange earnings, with over 800,000 tourists visiting the country in some recent years. Major tourist attractions are the coast, with its beaches and coral reefs, and the variety of National Parks and reserves with their populations of large mammals. Bird tourism appears to have been increasing its share of the total steadily in recent years, although no detailed data are available, and there is substantial unrealized potential in this area.

Kenya's limited arable area supports all the major cash crops, 80% of the population and most of the indigenous forest estate. Rapid population growth has subjected this productive land to tremendous pressure. The population increase is now spilling over to marginal areas, accelerating land degradation. The increasing demand for agricultural land and fuelwood has led to high rates of deforestation (an estimated 1% loss of forest area per year). Savanna and montane grasslands, occupying some 80,000 km², are being converted to wheat fields and pasture, while many wetlands (especially swamps and marshes) are in danger from drainage for agriculture. The momentum of population growth is decreasing, but it will take a long time before its impacts diminish.

The overriding problem facing Kenya's IBAs is therefore degradation and loss of habitat. Despite the many essential ecological services that forests provide, Forest Reserves in many parts of the country are being eaten away by official degazettement, driven by political, not environmental, considerations. Wetlands are also vital for their environmental services, but many sites, such as Yala swamp, are under threat of conversion to agriculture. This generally makes little economic sense in the long term.

These threats, arising through official processes, represent failures of environmental policy. Conversion of habitat is also taking place in other ways. At many forest sites there has been substantial illegal encroachment in recent years. The economics of milk and crop production are driving the conversion of montane grassland, almost

Table 3. The occurrence of biome-restricted species at Important Bird Areas in Kenya. 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 (13 species in Kenya; two sites meet the A3 criterion)							
IBA code:	028	057			059		
<i>Falco alopex</i>		✓					
<i>Tauraco leucolophus</i>							
<i>Dendropicus poecilolaemus</i>		✓			✓		
<i>Corvinella corvina</i>							
<i>Cisticola ruficeps</i>							
<i>Cisticola troglodytes</i>							
<i>Lagonosticta rara</i>							
<i>Estrilda troglodytes</i>							
<i>Plocepasser superciliosus</i>							
<i>Ploceus heuglini</i>							
<i>Lamprotornis purpureus</i>							
<i>Lamprotornis chalcurus</i>							
<i>Ptilostomus afer</i>							
Number of species recorded:	1	5			5		
A05 – Guinea–Congo Forests biome ... continued (43 species in Kenya; three sites meet the A3 criterion)							
IBA code:	043	051	053	055	057	058	059
<i>Bleda syndactyla</i>			✓	✓		✓	✓
<i>Telophorus bocagei</i>			✓	✓		✓	
<i>Neocossyphus poensis</i>			✓	✓		✓	
<i>Cossypha cyanocampter</i>			✓	✓		✓	(✓)
<i>Illadopsis albipectus</i>			✓	✓		✓	
<i>Illadopsis fulvescens</i>						✓	
<i>Apalis rufogularis</i>			✓	✓		✓	✓
<i>Camaroptera chloronota</i>			✓	✓		✓	(✓)
<i>Eremomela turneri</i>				✓		✓	
<i>Sylvietta virens</i>							✓
<i>Hylia prasina</i>			✓	✓		✓	✓
<i>Phylloscopus budongoensis</i>			✓	✓		✓	
<i>Bias flammulatus</i>			✓	✓		✓	
<i>Platysteira castanea</i>				✓		✓	
<i>Platysteira jamesoni</i>			✓	✓		✓	
<i>Terpsiphone rufiventris</i>							✓
<i>Parus funereus</i>			✓	✓		✓	(✓)
<i>Anthreptes rectirostris</i>		✓	✓	✓		✓	(✓)
<i>Nectarinia rubescens</i>			✓	✓		✓	
<i>Nectarinia superba</i>						✓	
<i>Ploceus nigerimus</i>			✓	✓		✓	
<i>Malimbus rubricollis</i>						✓	
<i>Oriolus brachyrhynchus</i>				✓		✓	
Number of species recorded:	2	5	23	29	3	40	8
A06 – Lake Victoria Basin biome (nine species in Kenya; five sites meet the A3 criterion)							
IBA code:	037	038	039	041	059	060	
<i>Francolinus streptophorus</i>							✓
<i>Laniarius mufumbiri</i>	✓	✓	✓	✓	✓	✓	
<i>Turdoides sharpei</i>	✓	✓			✓	✓	✓
<i>Cisticola carruthersi</i>	✓	✓	✓	✓	✓	✓	
<i>Bradypterus carpalis</i>	✓	✓	✓	✓	✓	✓	
<i>Chloropeta gracilirostris</i>	✓	✓		✓			
<i>Serinus koliensis</i>	✓				✓		✓
<i>Nectarinia erythrocerca</i>	✓	✓	✓	✓	✓	✓	
<i>Ploceus castanops</i>	✓				✓		✓
Number of species recorded:	8	6	4	8	2	7	

Table 3 ... continued. The occurrence of biome-restricted species at Important Bird Areas in Kenya. 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.

A07 – Afrotropical Highlands biome (70 species in Kenya; six sites meet the A3 criterion)																							
IBA code:	001	002	003	004	005	006	021	026	029	036	043	046	048	049	050	051	052	053	054	055	056	058	059
<i>Buteo oreophilus</i>	✓		✓		✓		✓	✓			✓					✓	✓					✓	✓
<i>Fringilla psilolaemus</i>	✓				✓											✓	✓						✓
<i>Fringilla jacksoni</i>	✓		✓		✓											✓							✓
<i>Sarothrus affinis</i>	✓				✓																	✓	✓
<i>Tauraco hartlaubi</i>	✓		✓		✓		✓	✓		✓	✓					✓		✓		✓	✓	(✓)	✓
<i>Asio abyssinicus</i>					✓																		
<i>Caprimulgus poliocephalus</i>	✓		✓		✓			✓		✓	✓				(✓)	✓	✓					✓	✓
<i>Schoutedenapus myoptilus</i>	✓		✓		✓		✓				✓					✓	✓					✓	✓
<i>Apus niansae</i>	✓			✓	✓					✓	✓	✓	✓	✓	✓	✓	✓						
<i>Apaloderma vittatum</i>	✓		✓		✓						✓					✓					✓	✓	✓
<i>Merops oreobates</i>	✓	✓	✓		✓					✓	✓				✓	✓		✓		✓	✓	✓	✓
<i>Pogoniulus leucomystax</i>	✓		✓		✓		✓	✓		✓	✓					✓				✓	✓	✓	✓
<i>Campestris tullbergi</i>	✓		✓		✓						✓				✓	✓					✓	(✓)	✓
Macronyx sharpei	✓			✓	✓												✓						✓
<i>Coracina caesia</i>	✓		✓		✓		✓			✓	✓				✓	✓		✓		✓	✓	✓	✓
<i>Andropadus masukuensis</i>																✓		✓		✓	✓	✓	(✓)
<i>Andropadus tephrolaemus</i>	✓		✓		✓		(✓)				✓					✓					✓	✓	✓
<i>Chlorocichla laetissima</i>															✓	✓		✓		✓	✓	✓	✓
<i>Telophorus doherityi</i>	✓				✓						✓					✓		✓					✓
<i>Monticola rufocinerea</i>					✓						✓	✓	✓	✓					✓				
<i>Zoothera piaggiae</i>	✓		✓		✓						✓					✓		✓			✓	✓	✓
<i>Zoothera gurneyi</i>	✓		✓		✓		✓	✓								✓		✓			✓	✓	✓
Turdus helleri							✓																
<i>Pogonochila stellata</i>	✓		✓		✓		✓	✓		✓	✓					✓		✓			✓	✓	✓
<i>Sheppardia aequatorialis</i>											✓					✓		✓		✓	✓	✓	✓
<i>Cossypha semirufa</i>	✓	✓	✓		✓		✓	✓		✓													
<i>Cercomela sordida</i>	✓				✓						✓												✓
<i>Illadopsis pyrrhoptera</i>											✓					✓		✓		✓	✓	✓	✓
<i>Pseudoalcippe abyssinica</i>	✓		✓		✓		✓			✓	✓				(✓)	✓		✓		✓	✓	✓	✓
<i>Kakamega poliothorax</i>																			✓		✓	✓	(✓)
<i>Cisticola chubbi</i>											✓					✓		✓		✓	✓	✓	✓
<i>Cisticola hunteri</i>	✓		✓	✓	✓						✓					✓	✓		✓		✓	✓	✓
<i>Cisticola aberdare</i>	✓			✓												✓						✓	✓
<i>Apalis pulchra</i>	✓	✓	✓		✓					✓	✓					✓		✓		✓	✓	✓	✓
Apalis fuscicularis							✓																
<i>Apalis porphyrolaema</i>	✓		✓		✓						✓					✓				✓	✓	✓	✓
<i>Bradypterus cinnamomeus</i>	✓		✓		✓		✓				✓					✓		✓		✓	✓	(✓)	✓
<i>Chloropeta similis</i>	✓		✓		✓						✓					✓		✓		✓	✓	✓	✓
<i>Sylvietta leucophrys</i>	✓		✓		✓					✓	✓					✓		✓		✓	✓	✓	✓
<i>Phylloscopus umbrovirens</i>	✓		✓		✓		✓			✓	✓					✓		✓		✓	✓	✓	✓
<i>Sylvia lugens</i>				✓						✓	✓	✓	✓		✓		✓	✓			✓	✓	✓
<i>Dioptrornis fischeri</i>	✓	✓	✓		✓	✓		✓		✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
Muscicapa lendu																							✓
<i>Trochocercus albonotatus</i>	✓		✓		✓		(✓)				✓					✓		✓		✓	✓	(✓)	✓
<i>Nectarinia preussi</i>	✓		✓		✓					✓	✓					✓		✓		✓	✓	✓	✓
<i>Nectarinia mediocris</i>	✓		✓		✓		✓	✓			✓					✓					✓	✓	(✓)
<i>Nectarinia tacazze</i>	✓				✓						✓					✓	✓						✓
<i>Nectarinia kilimensis</i>	✓	✓	✓		✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
<i>Nectarinia reichenowi</i>	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	(✓)	✓	✓			✓	✓	✓	✓
<i>Nectarinia johnstoni</i>	✓				✓																		
Zosterops kulalensis																							
<i>Zosterops poliogaster</i>	✓		✓		✓			✓		✓	✓												
Zosterops silvanus							✓																
<i>Serinus frontalis</i>	✓	✓	✓		✓	✓				✓	✓	✓		✓		✓		✓		✓	✓	✓	✓
<i>Serinus hypostictus</i>								✓							✓							✓	✓
<i>Serinus striolatus</i>	✓	✓	✓		✓					✓	✓	✓	✓	✓	(✓)	✓	✓	✓		✓	✓	✓	✓
<i>Serinus burtoni</i>	✓		✓		✓					✓	✓				✓	✓		✓		✓	✓	✓	✓
<i>Linurgus olivaceus</i>	✓				✓						✓					✓		✓	✓			✓	✓
<i>Cryptospiza salvadorii</i>	✓		✓		✓		✓			✓	✓					✓					✓	✓	✓
<i>Ploceus baglafecht</i>	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
<i>Ploceus melanogaster</i>	✓										✓					✓	✓		✓		✓	✓	✓
<i>Ploceus insignis</i>	✓		✓		✓					✓	✓				✓	✓		✓		✓	✓	✓	✓
Euplectes jacksoni	✓			✓	✓					✓	✓	✓		✓	✓	(✓)	✓				✓	✓	✓

Table 3 ... continued. The occurrence of biome-restricted species at Important Bird Areas in Kenya. 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.

A07 – Afrotropical Highlands biome ... continued (70 species in Kenya; six sites meet the A3 criterion)																											
IBA code:	001	002	003	004	005	006	021	026	029	036	043	046	048	049	050	051	052	053	054	055	056	058	059				
<i>Poeoptera stuhlmanni</i>											✓					✓	✓	✓	✓	✓	✓	✓	✓	✓			
<i>Poeoptera kenricki</i>	✓																										
<i>Onychognathus walleri</i>	✓		✓		✓						✓					✓				✓	✓	✓	✓	✓			
<i>Onychognathus tenuirostris</i>	✓				✓						✓					✓								✓			
<i>Cinnyricinclus sharpii</i>	✓		✓		✓		✓	✓			✓				✓	✓		✓		✓	✓	✓	✓	✓			
<i>Cinnyricinclus femoralis</i>	✓		✓		✓		✓	✓																			
<i>Oriolus percivali</i>	✓		✓		✓						✓	✓				✓		✓		✓		✓	✓	✓			
Number of species recorded:	53	8	40	6	54	5	15	21	2	25	49	10	8	9	16	49	14	34	3	32	30	28	47				
A08 – Somali–Masai biome (94 species in Kenya; eight sites meet the A3 criterion)																											
IBA code:	002	006	022	023	024	025	026	027	028	029	030	031	032	033	034	036	042	044	045	046	047	048	049	050	054	056	059
<i>Melierax poliopterus</i>			✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓				✓				✓	✓	
<i>Francolinus leucoscepus</i>	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Acryllium vulturinum</i>			✓		✓	✓		✓	✓			✓		✓	✓										✓		
<i>Neotis heuglinii</i>					✓			✓	✓						✓												
<i>Pterocles decoratus</i>			✓		✓	✓	✓	✓			✓		✓	✓	✓	✓				✓				✓	✓	✓	
<i>Streptopelia reichenowi</i>																											
<i>Poicephalus rufiventris</i>					✓	✓					✓	✓	✓	✓		✓									✓		
<i>Corythaixoides leucogaster</i>			✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	
<i>Caprimulgus fraenatus</i>	✓				✓	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Caprimulgus donaldsoni</i>			✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓			✓	✓						✓		
<i>Caprimulgus stellatus</i>							✓	✓																			
<i>Apus berliozi</i>																											
<i>Colius leucocephalus</i>			✓			✓		✓						✓	✓		✓								✓		
<i>Merops revoilii</i>					✓	✓		✓	✓			✓		✓	✓												
<i>Rhinopomastus minor</i>			✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓
<i>Tockus flavirostris</i>			✓	✓	✓	✓		✓	✓			✓		✓	✓	✓	✓	✓	✓	✓	✓				✓		
<i>Tockus jacksoni</i>								✓												✓	✓						
<i>Tockus deckeni</i>	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
<i>Tockus hemprichii</i>																				✓	✓				✓		
<i>Tricholaema melanocephala</i>					✓	✓		✓	✓			✓		✓	✓		✓	✓	✓	✓	✓				✓		
<i>Trachyphonus erythrocephalus</i>			✓	✓	✓		✓		✓			✓		✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	
<i>Trachyphonus darnaudii</i>			✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
<i>Trachyphonus usambiro</i>																								✓			
<i>Mirafra williamsi</i>								✓				✓															
<i>Mirafra pulpa</i>					✓	✓																					
<i>Mirafra hypermetra</i>					✓	✓		✓			✓	✓	✓												✓		
<i>Mirafra collaris</i>																											
<i>Mirafra gilletti</i>																											
<i>Mirafra poecilosterna</i>					✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓		
<i>Eremopterix signata</i>	✓	✓	✓				✓	✓			✓	✓	✓														
<i>Calandrella somalica</i>												✓		✓													
<i>Spizocorys personata</i>								✓				✓															
<i>Pseudalaemon fremantlii</i>								✓							✓												
<i>Tmetothylacus tenellus</i>		✓	✓	✓	✓						✓		✓	✓						✓							
<i>Macronyx aurantiigula</i>		✓		✓	✓						✓																
<i>Lanius cabanisi</i>		✓		✓	✓						✓		✓	✓	✓	✓	✓			✓				✓		✓	
<i>Lanius dorsalis</i>				✓	✓		✓	✓			✓	✓	✓	(✓)	✓				✓				✓	✓	✓	✓	
<i>Lanius somalicus</i>							✓	✓																			
<i>Dryoscopus pringlii</i>					✓	✓					✓		✓	✓													
<i>Tchagra jamesi</i>		✓		✓	✓		✓				✓		✓	✓						✓	✓						
<i>Laniarius ruficeps</i>					✓	✓																					
<i>Rhodophoneus cruentus</i>					✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓		✓
<i>Turdus tephronotus</i>					✓	✓				✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓		
<i>Cercomela scotocerca</i>							✓					✓	✓						✓	✓							
<i>Prionops poliophopus</i>																				✓				✓	✓	✓	✓
<i>Turdoides aylmeri</i>			✓		✓	✓					✓										✓						
<i>Turdoides rubiginosus</i>			✓		✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
<i>Turdoides hypoleucus</i>	✓	✓						✓			✓	✓	✓		✓	✓											
<i>Turdoides hindei</i>	✓	✓						✓	(✓)	✓	✓																
<i>Cisticola bodessa</i>																											✓
<i>Cisticola cinereolus</i>				✓	✓	✓		✓			✓	✓	✓							✓					✓	✓	
<i>Cisticola nanus</i>				✓	✓						✓	✓	✓							✓						✓	

Table 3 ... continued. The occurrence of biome-restricted species at Important Bird Areas in Kenya. 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.

A08 – Somali–Masai biome ... continued (94 species in Kenya; eight sites meet the A3 criterion)																											
IBA code:	002	006	022	023	024	025	026	027	028	029	030	031	032	033	034	036	042	044	045	046	047	048	049	050	054	056	059
<i>Prinia somalica</i>					✓ (✓)			✓						✓	✓			✓									
<i>Calamonastes simplex</i>			✓	✓	✓	✓		✓	✓	✓		✓		✓	✓		✓	✓	✓		✓		✓	✓		✓	
<i>Eremomela flavicrissalis</i>					✓			✓	✓			✓		✓	✓												
<i>Sylvietta isabellina</i>					✓ (✓)							✓		✓	✓												
<i>Sylvia boehmi</i>					✓	✓	✓					✓		✓	✓	✓	✓				✓			✓		✓	✓
<i>Bradornis microrhynchus</i>			✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Anthoscopus musculus</i>					✓	✓		✓				✓		✓	✓					✓	✓						
<i>Parus fringillinus</i>																	✓	✓							✓		✓
<i>Parus thruppi</i>					✓	✓		✓				✓		✓	✓	✓		✓	✓	✓							
<i>Anthreptes orientalis</i>			✓	✓	✓	✓		✓				✓		✓	✓	✓	(✓)	✓	✓	✓		✓					✓
<i>Nectarinia hunteri</i>					✓	✓		✓	✓			✓		✓	✓	✓		✓	✓	✓							
<i>Nectarinia habessinica</i>									✓			✓		✓	✓												
<i>Nectarinia nectarinioides</i>			✓	✓	✓							✓		✓	✓		✓										
<i>Zosterops abyssinicus</i>			✓	✓	✓					✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Emberiza poliopleura</i>					✓	✓		✓	✓			✓		✓	✓					✓	✓						
<i>Serinus donaldsoni</i>								✓	✓											✓	✓						
<i>Serinus buchanani</i>						✓											✓	✓				✓					✓
<i>Serinus dorsostratus</i>					✓	✓									✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Uraeginthus cyanocephalus</i>					✓	✓		✓				✓		✓	✓	✓	(✓)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Uraeginthus ianthinogaster</i>			✓		✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Estrilda charmosyna</i>				✓					✓			✓		✓	✓					✓							
<i>Lonchura griseicapilla</i>					✓	✓						✓		✓	✓	✓		✓	✓	✓		✓			✓		✓
<i>Vidua hypocherina</i>					✓			✓				✓	✓	✓	✓		✓	✓	✓	✓		✓					
<i>Vidua fischeri</i>					✓	✓		✓	✓	✓		✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Dinemellia dinemelli</i>			✓	✓	✓	✓		✓	✓			✓		✓	✓	✓		✓	✓	✓					✓		
<i>Passer castanopterus</i>									✓																		
<i>Plocepasser donaldsoni</i>								✓	✓					✓	✓												
<i>Histurgops ruficauda</i>																											✓
<i>Pseudonigrita cabanisi</i>					✓	✓						✓		✓	✓												
<i>Ploceus bojeri</i>			✓	✓								✓		✓	✓												
<i>Ploceus castaneiceps</i>						✓												✓									
<i>Ploceus galbula</i>																											
<i>Ploceus spekei</i>			✓							✓							✓	✓									
<i>Ploceus dichrocephalus</i>																											
<i>Euplectes diadematus</i>					✓	✓						✓		✓	✓							✓	(✓)				
<i>Onychognathus salvadorii</i>								✓	✓					✓	✓					✓							
<i>Lamprotornis shelleyi</i>					✓							✓															
<i>Lamprotornis hildebrandti</i>					✓	✓						✓		✓	✓	✓	✓	✓						✓		✓	
<i>Speculipastor bicolor</i>					✓				✓					✓	✓					✓	✓						
<i>Spreo fischeri</i>			✓	✓	✓	✓						✓		✓	✓	✓		✓									
<i>Spreo albicapillus</i>								✓																			
<i>Cosmopsarus regius</i>			✓		✓	✓		✓				✓		✓	✓												
Number of species recorded:	5	3	22	17	61	55	8	44	35	18	4	59	14	62	64	23	42	36	31	4	28	2	10	19	19	27	2
A09 – East African Coast biome (29 species in Kenya; seven sites meet the A3 criterion)																											
IBA code:	007	008	009	010	011	012	013	015	016	017	018	019	020	021	022	023	024	025	033								
<i>Circaetus fasciolatus</i>		✓	✓	✓		✓	✓						✓	✓	✓	✓											
<i>Poicephalus cryptoxanthus</i>		✓	✓		✓		✓					✓		✓													
<i>Tauraco fischeri</i>		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓												✓		
<i>Otus ireneae</i>		✓																									
<i>Halcyon senegaloides</i>		✓	✓						✓				✓							✓	✓		✓	✓			
<i>Pogonius simplex</i>		✓				✓	✓	✓				✓	✓		✓												
<i>Lybius melanopterus</i>		✓	✓										✓	✓	✓	✓	✓	✓						✓	✓	✓	✓
<i>Campethera mombassica</i>		✓	✓	✓	✓		✓					✓	✓											✓	✓	✓	✓
<i>Anthus melindae</i>						✓																		✓	✓		
<i>Anthus sokokensis</i>		✓	✓		✓	(✓)	✓					✓											✓	✓			
<i>Phyllastrephus fischeri</i>		✓		✓	✓	✓						✓	✓		✓								✓	✓		✓	✓
<i>Phyllastrephus debilis</i>		✓		✓	✓							✓	✓		✓												
<i>Telophorus quadricolor</i>		✓					✓															✓	✓	✓	✓		✓
<i>Prionops scopifrons</i>		✓	✓		✓	(✓)	✓					✓	✓		✓	✓						✓			✓		
<i>Sheppardia gunningi</i>		✓																				✓			✓		
<i>Turdoides squamulatus</i>		✓	✓										✓	✓										✓	✓		
<i>Cisticola restrictus</i>																											(✓)

Table 3 ... continued. The occurrence of biome-restricted species at Important Bird Areas in Kenya. 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.

A09 – East African Coast biome ... continued (29 species in Kenya; seven sites meet the A3 criterion)																				
IBA code:	007	008	009	010	011	012	013	015	016	017	018	019	020	021	022	023	024	025	033	
<i>Apalis chariessa</i>																				✓
<i>Batis soror</i>	✓	✓														✓				✓
<i>Erythrocerus holochlorus</i>	✓		✓		✓					✓	✓		✓							✓
<i>Anthreptes reichenowi</i>	✓		✓	✓	✓	✓				✓	✓		✓							✓
<i>Anthreptes neglectus</i>			✓										✓							✓
<i>Anthreptes pallidigaster</i>	✓																			
<i>Nectarinia veroxii</i>	✓	✓			✓				✓							✓				✓
<i>Nectarinia chalcomelas</i>	✓								(✓)							✓				✓
<i>Ploceus golandi</i>	✓	✓																		
<i>Euplectes nigroventris</i>		✓										✓				✓				
<i>Lamprotornis corruscus</i>	✓	✓	✓	✓	✓	✓				✓	✓		✓			✓	✓			✓
<i>Oriolus chlorocephalus</i>	(✓)									✓	✓		✓							
Number of species recorded:	23	15	9	9	9	9	2	2	2	12	10	3	17	3	12	19	1	1	1	

all on private land, to cultivated fields. The remnant moist grassland in the west of the country is being turned into sugar cane fields for similar reasons. Economic forces are also leading to the loss of migration routes and buffer zones for protected areas such as Nairobi National Park and the Masai Mara National Reserve.

Where habitat is not being lost outright, degradation is often a problem. This takes many forms, ranging from overgrazing and soil erosion in semi-arid areas, to removal of tussock grass species in montane grasslands, excessive abstraction of water from wetlands and tree poaching and cattle-grazing in forests. Degradation is obviously less damaging than outright habitat loss; given time and protection, most habitats can recover, at least partially. However, it can also lead to the loss of both species and environmental benefits. Management is particularly poor in many Forest Reserves, and degradation due to uncontrolled use represents a serious threat.

Other threats are less widespread, but may create serious problems for particular sites. These include alien species, such as the fish *Lates niloticus* and water-hyacinth *Eichhornia crassipes* in Lake Victoria and the crayfish *Procambarus clarkei* in Lake Naivasha; pollution by agrochemicals or industrial wastes, a growing problem at many wetland sites; and illegal hunting, more of a problem for large mammals than birds, but with severe consequences for a few threatened species such as *Turdoides hindei*.

ORNITHOLOGICAL IMPORTANCE

Kenya has one of the richest avifaunas in Africa, with around 1,090 bird species recorded. At least eight of these (*Mirafra williamsi*, *Macronyx sharpei*, *Turdoides hindei*, *Turdus helleri*, *Apalis fuscicularis*, *Cisticola restrictus*, *Zosterops silvanus* and *Ploceus golandi*) are national endemics.

Around 170 of Kenya's bird species are Palearctic migrants (11 of them with a local breeding population too), mainly from eastern Europe, Russia, the Middle East and Siberia. Another 60 migrate regularly within the Afrotropics or from Madagascar. Some 335 of Kenya's bird species are found in forests; 230 are entirely forest-dependent, and 110 are 'forest specialists', requiring intact, undisturbed habitat.

Forty species of global conservation concern are known to occur in Kenya; see Table 4. Four of these are Critically Endangered, two Endangered and 16 Vulnerable. One, *Cisticola restrictus*, is classed as Data Deficient. However, *Macronyx sharpei*, classified as Near Threatened by Collar *et al.* (1994), and *Cisticola aberdare*, not listed by Collar *et al.* (1994), also meet the criteria for being considered globally threatened, and have been here treated as such in identifying IBAs (and are marked with an asterisk in the relevant site accounts).

Kenya holds all the restricted-range species (nine and seven, respectively) in the Kenya mountains and the East African coastal forests Endemic Bird Areas (EBAs 109 and 111). Kenya also includes smaller portions of three other EBAs: the Tanzania–Malawi mountains (EBA 105: three out of 37 species, all in the Taita Hills), the Serengeti plains (EBA 108: three out of six species), and the Jubba and Shabelle valleys (EBA 113: one out of five

species; this EBA barely touches Kenya in the extreme north-east of the country). The Taita Hills are geologically the northernmost representatives of the Eastern Arc mountains of Tanzania and Malawi, but have no restricted-range bird species in common with the rest of the EBA.

Table 4. The 40 species of global conservation concern that occur regularly in Kenya (Collar *et al.* 1994). The 24 globally threatened species are highlighted in **bold**.

Name	Global threat status
<i>Ardeola idae</i>	Near Threatened
<i>Phoenicopterus minor</i>	Near Threatened
<i>Circaetus fasciolatus</i>	Near Threatened
<i>Circus macrourus</i>	Near Threatened
<i>Aquila clanga</i>	Vulnerable
<i>Falco naumanni</i>	Vulnerable
<i>Falco fasciinucha</i>	Vulnerable
<i>Crex crex</i>	Vulnerable
<i>Gallinago media</i>	Near Threatened
<i>Streptopelia reichenowi</i>	Near Threatened
<i>Tauraco fischeri</i>	Near Threatened
<i>Otus ireneae</i>	Vulnerable
<i>Mirafra williamsi</i>	Near Threatened
<i>Mirafra pulpa</i>	Near Threatened
<i>Hirundo atrocaerulea</i>	Vulnerable
<i>Macronyx sharpei</i>*	Near Threatened
<i>Anthus melindae</i>	Near Threatened
<i>Anthus sokokensis</i>	Vulnerable
<i>Laniarius mufumbiri</i>	Near Threatened
<i>Prionops poliophopus</i>	Vulnerable
<i>Zoothera guttata</i>	Endangered
<i>Turdus helleri</i>	Critically Endangered
<i>Sheppardia gunningi</i>	Vulnerable
<i>Turdoides hindei</i>	Endangered
<i>Cisticola aberdare</i>*	
<i>Cisticola restrictus</i>	Data Deficient
<i>Apalis fuscicularis</i>	Critically Endangered
<i>Apalis chariessa</i>	Vulnerable
<i>Acrocephalus griseldis</i>	Near Threatened
<i>Chloropeta gracilirostris</i>	Vulnerable
<i>Eremomela turneri</i>	Vulnerable
<i>Muscicapa lendu</i>	Vulnerable
<i>Parus iringillinus</i>	Near Threatened
<i>Anthreptes reichenowi</i>	Near Threatened
<i>Anthreptes pallidigaster</i>	Vulnerable
<i>Zosterops kulalensis</i>	Critically Endangered
<i>Zosterops silvanus</i>	Critically Endangered
<i>Ploceus golandi</i>	Vulnerable
<i>Euplectes jacksoni</i>	Near Threatened
<i>Cinnyricinclus femoralis</i>	Vulnerable

* species treated here as globally threatened although not so classified by Collar *et al.* (1994)

Secondary Areas include the Kakamega and Nandi forests (s058, with *Muscicapa lendu*), the North Kenyan short-grass plains (s061: *Mirafra williamsi*) and Mount Kulal (s062: *Zosterops kulalensis*, though the taxonomic status of this species remains unclear).

The most significant biomes are the Somali–Masai (A08) (Kenya has 94 of its 129 species), the East African Coast (A09) (29 out of 38 species), the large Afrotropical Highlands (A07) (70 out of 226 species) and the small Lake Victoria Basin (A06) (nine out of 12 species). The easternmost outliers of the Guinea–Congo Forests biome (A05) also occur in Kenya (43 out of 277 species), along with a small portion of the Sudan–Guinea Savanna biome (A04) (13 out of 55 species).

Many sites in Kenya are important for congregatory birds. The coast, with its creeks, reefs and beaches, is a major flyway for migratory waterbirds from the Palearctic, as is the chain of lakes stretching along the rift valley from Turkana in the north to Magadi in the south. The rift's alkaline lakes also provide periodic feeding stations for enormous numbers of *Phoenicopterus minor*. Several small coral islands off the coast shelter important breeding colonies of *Sterna dougallii* and other seabirds.

CONSERVATION INFRASTRUCTURE AND PROTECTED-AREA SYSTEM

At least 38 government departments and organizations have partially overlapping responsibilities for planning, coordinating, implementing and monitoring government policies and legislation on the environment. Mandates are frequently changing and the limits of institutional responsibility are not always clear.

An Inter-Ministerial Committee on the Environment has responsibility for helping to coordinate institutional roles. However, this will be superseded by a National Environment Council under the recently enacted Environment Management and Co-ordination Act, 1999 (EMCA). Institutions and departments may also work together via Memoranda of Understanding (MoUs), the most significant example being that between the Forest Department and the Kenya Wildlife Services (recently joined by the National Museums of Kenya and Kenya Forestry Research Institute).

Many non-government organizations, both international and national, also play important roles in biodiversity conservation in Kenya.

Kenya's conservation legislation is piecemeal in nature, highly sectoral, substantially overlapping and sometimes inherently contradictory. At least 77 statutes bear on environmental issues, together with several presidential directives. The sectoral approach to natural resource management has many disadvantages and ignores the fact that ecosystems cannot easily be partitioned into independent units. Some integration should be provided by EMCA once it is implemented.

Kenya's environmental legislation, largely inherited from the colonial era, takes a 'command and control' approach. This makes it difficult to achieve environmental sustainability through public participation and cooperation. On the other hand, existing laws do give public agencies broad discretionary powers. New policies that have recently been drafted (though not implemented) for wildlife and forest resources take advantage of this to adopt a more participatory approach.

Despite the wide range of legislation for environmental management in Kenya, large-scale environmental degradation continues. This is more the result of institutional weaknesses and failures of coordination than of legislative inadequacies. The EMCA represents a substantial improvement on previous legislation but does not address the fundamental problems of scarcity of land, rapid population growth, highly skewed access to resources and lack of awareness among the rural population and politicians of the importance of environmental conservation.

Government land is owned by the Government of Kenya and includes, for example, gazetted National Parks and Forest Reserves. The President, through the Commissioner of Lands, can allocate unalienated government land to any individual. Such allocations have often been made without proper regard to social and environmental factors.

Trust land is held and administered by various local government authorities. National Reserves and local sanctuaries, as well as County Council Forest Reserves, fall on trust land.

Private land is land owned by private individuals. The Registered Land Act (Cap. 300) provides for absolute ownership on a freehold basis, though land use may be limited, at least in theory, by provisions made in other legislation.

Sites of archaeological or palaeontological interest may be protected as National Monuments managed by the National Museums of Kenya. This has allowed incidental conservation of biodiversity at some relatively small sites.

Wildlife is managed by a parastatal organization, the Kenya Wildlife Service (KWS), under the Wildlife Conservation and Management Act, which allows for the establishment of National Parks, National Reserves, local sanctuaries and sanctuaries on private land. Park boundaries can only be altered with explicit approval by the National Assembly, creating a safeguard against arbitrary or whimsical degazettement.

The act also provides for the partial or complete protection of particular animals, mainly mammals and birds. All bird species have full legal protection apart for a small number explicitly classified as either gamebirds or pests. Gamebird hunting takes place under licence, with strict controls. Although birds and mammals are given equal protected status in Kenya, mammals have formed the near-exclusive concern of the Kenya Wildlife Service and its predecessors.

The Forests Act, Cap. 385 (revised 1992), provides for the reservation, management and exploitation of forests and their resources. Through its Forest Department (FD), the Government has exclusive control over gazetted forest areas, where no activities may be undertaken except under licence.

The Forests Act has a number of major weaknesses. It provides no easy way of involving local communities in forest management, nor of ensuring appropriate management outside the gazetted Forest Reserves. Forest reserves can be degazetted at the discretion of the minister in charge. Under this provision large areas of the forest estate have been arbitrarily excised, causing the loss of significant biodiversity. The lack of local input to forest management under the present act also serves to increase political pressure for excisions. Because the Forest Department is a department within a particular ministry (rather than a parastatal corporation), any revenue it generates returns directly to the Treasury. This has led to huge underinvestment in forest management and conservation, with many sites becoming badly degraded.

These weaknesses are largely addressed in a new Forests Bill that is expected to be presented to Parliament in 2001. The bill implements an existing revision of forest policy that recognizes the central importance of biodiversity conservation and the need for participatory management.

There is no coherent policy for wetland management in Kenya. Without a clear controlling and coordinating authority, wetlands face threats from a number of different directions. These include poor agricultural practices and deforestation in catchment areas; direct drainage for cultivation (encouraged by the Ministry of Agriculture); unregulated use of increasingly scarce water for irrigation and industry; pollution and eutrophication; and the introduction of exotic species. The EMCA provides a mechanism through which some coordination may be possible. A National Wetlands Standing Committee (a subcommittee of the Inter-Ministerial Committee on Environment) now exists, and is drafting a wetlands policy.

Kenya has more than 50 National Parks, reserves and sanctuaries, both terrestrial and marine. These cover some 4.4 million ha, roughly 7.5% of the country's land area. A large part of this area (over 2 million ha) is accounted for by the two biggest National Parks, Tsavo East (IBA KE024) and Tsavo West (KE025). Kenya's National Parks and reserves are mainly in arid and semi-arid parts of the country, dominated by woodland, bushland and grassland habitats. Only about 6.2% of the country's approximately 1.24 million ha of indigenous forest (including mangroves) is protected in National Parks and reserves. By contrast, some 85% of indigenous forest is included in gazetted Forest Reserves, on both government and trust land. An additional 7% or so is ungazetted forest on trust land, some of it managed by the Forest Department on behalf of County Councils. Kenya also encourages private wildlife sanctuaries. The exact number of these is unclear; the IUCN protected areas database lists over 50, some of which seem likely to have no formal conservation management.

Nairobi National Park was the first National Park in Kenya, established in 1946. Today there are 22 terrestrial National Parks and four marine National Parks. The terrestrial parks cover an area of some 2.9 million ha, approximately 4.9% of Kenya's land area. National Parks vary in size from just 192 ha (Saiwa swamp) to more than 1,170,000 ha (Tsavo East National Park). All are administered by the Kenya Wildlife Service.

There are a total of 28 National Reserves (including marine sites) administered by the local authorities. Two additional reserves—Marsabit and Shimba Hills (IBA KE020)—are administered by the Kenya Wildlife Service. Terrestrial National Reserves occupy some 1.5 million ha, about 2.6% of Kenya's total land area.

About 2.6% of the country's total land area is forest cover, representing approximately 15% of the high-potential agricultural land. Around 1.6 million hectares of land are gazetted as Forest Reserves, a figure that includes 1.06 million hectares of indigenous closed-canopy forests and 0.16 million hectares of exotic plantations. Another 0.18 million ha of indigenous forest cover is found outside gazetted areas. There are some 255 separate Forest Reserves in Kenya, of which 52 are not yet gazetted. They range in size from less than 1 ha to almost 200,000 ha (in the case of Mount Kenya). Many Forest Reserves include plantations of exotic trees, primary or secondary grassland, scrub and cultivated areas, and cleared buffer zones (some planted with tea). Eleven nature reserves, within which no consumptive use is officially permitted, are listed within Forest Reserves, with a total area of some 53,000 ha.

A number of the sacred kaya forests at the Kenya coast are already gazetted as national monuments and more have been proposed. Though fairly small, these forests are important for biodiversity conservation as well as for their cultural values.

INTERNATIONAL MEASURES RELEVANT TO THE CONSERVATION OF SITES

Kenya is a party to the African Convention on the Conservation of Nature and Natural Resources. It has also acceded to the Convention on Biological Diversity, the Convention on Wetlands (the Ramsar Convention), the Convention on the Protection of the World Cultural and Natural Heritage, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on the Conservation of Migratory Species of Wild Animals (CMS) and (under the CMS) the African-Eurasian Waterbird Agreement. Kenya has not acceded to the Convention for the Protection, Management and Development of the Marine and Coastal Environment of the East African Region (the Nairobi Convention). Kenya has designated two Ramsar Sites: Lake Nakuru National Park (IBA KE049, 1990) and Lake Naivasha (KE048, 1996). Designation of Lake Bogoria National Reserve (KE045) is in progress. Many more sites would qualify for designation, including most of the country's wetland IBAs. Only Sibiloi National Park and Mount Kenya National Park have been designated as World Heritage sites, even though many more sites would qualify. There are five biosphere reserves in Kenya, with an area of over 1.3 million ha in total. The first sites to be designated were Mount Kenya (KE005) and Mount Kulal in 1978. These were followed by the Malindi-Watamu Biosphere Reserve (KE016) in 1979, Kiunga Marine National Reserve (KE015) in 1980 and Amboseli Biosphere Reserve (KE042) in 1991.

OVERVIEW OF THE INVENTORY

Kenya's 60 Important Bird Areas (IBAs) cover a total area of c.5.7 million ha (taking a notional area of 250,000 ha for the Dida Galgalu desert). This is about 10% of Kenya's land area. However, the size of sites varies over seven orders of magnitude, from as small as 1 ha to more than 1 million ha. The median size is 18,300 ha, while the mean size is 95,200 ha—showing the disproportionate effect of a few very large sites. Only 35 IBAs, slightly over half, are in protected areas (PAs), meaning that 25 have no official protection. In terms of total land area, however, 72.8% is already within PAs. Only around 1.5 million ha extra are required to protect the 25 sites that are not yet gazetted as some type of reserve. An additional 20 sites could be brought into the PA network by acquiring just 240,000 ha of land.

In practice, the chances of gazetted new protected areas in Kenya are usually likely to be poor. For the majority of unprotected sites other forms of conservation must thus be pursued.

Most of the forest and savanna sites already have some form of official protection. Wetlands and moist grasslands are less well taken care of, a reflection of past gazette policies that concentrated on importance for large mammals (especially in inhospitable areas), timber extraction and catchment protection. Two major habitat sub-types, montane grassland (IBAs KE004 and KE005) and papyrus swamps (IBAs KE037, KE038, KE039, KE041 and KE060) lie outside protected areas entirely.

Being in a protected area does not guarantee that a site is adequately protected, however. Almost all the forest IBAs are gazetted, but more than three-quarters (77%) are classed as severely or critically threatened. Moist grassland and other habitats (specifically, river valleys in central Kenya) are even more generally threatened. Very few savanna sites are under serious threat, and the majority (56%) of wetlands are also in the lower threat classes, despite a lack of official protection.

Kenya's IBAs are not uniformly distributed across the country. There are a few large sites in the semi-arid parts of the country, and many, often smaller sites in the higher rainfall areas—which, unsurprisingly, is where all of the forests and moist grassland and many of the wetlands occur. These parts of Kenya are also densely populated, generally with intense pressure on natural resources. This has obvious implications for the conservation of many IBAs.

Some 47 sites qualify for category A1. For category A2, one site qualifies for EBA 105, holding all three of the species known from Kenya, five qualify for EBA 108, between them holding the three species on the Kenya list, 16 do so for EBA 109 (all eight species included) and seven for EBA 111 (all seven species). Thirty sites qualify for category A3; two for biome A04 (eight of the 13 species known from Kenya), three for biome A05 (40 of the 43 species), five for A06 (eight of the nine species), six for A07 (65 of the 70 species), eight for A08 (83 of the 94 species) and seven for A09 (all 29 species). Finally, 13 sites qualify under category A4i and A4iii for congregatory waterbirds and one sites does so for congregatory terrestrial species (A4ii).

At least five additional sites in Kenya are thought likely to qualify as Important Bird Areas, but have not been included in the main inventory. This is because of lack of sufficient reliable information on their avifauna, or because the taxonomic status of key species is unresolved. These sites are Boni and Dodori forests, Kongelai Escarpment, Malkamari National Park, Mount Kasigau forest and Mount Kulal forest.

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SITE ACCOUNTS

Aberdare mountains

Admin region Central

Coordinates 0°25'S 36°40'E

Area 179,900 ha

Altitude 1,800–4,000 m

KE001

A1, A2 (109), A3 (A07)

National Park,
Forest Reserves

Site description

The Aberdare or Nyandarua mountains are an isolated volcanic range that form the easternmost wall of the Gregory Rift Valley, to the east of the high Kinangop/Laikipia plateau. They are c.100 km long from north to south (the northern end almost reaching the equator). There are two main peaks, Ol Donyo Lesatima (3,999 m) to the north and Kinangop (3,906 m) to the south, separated by a long 'saddle' of land above 3,000 m. The small peak of Kipipiri (3,349 m) flanks the main range to the west, linked to it by a formerly forested valley at around 2,700 m. Deep ravines cut through the forested eastern and western flanks, and there are many clear streams and waterfalls. Mist and rain occur throughout much of the year, with precipitation varying from c.1,000 mm on the drier north-western slopes to as much as 3,000 mm in the south-east. The vegetation varies with altitude. A rich alpine and subalpine flora, including species of *Senecio*, *Lobelia*, *Erica*, *Helichrysum* and tussock grasses, gives way at c.3,000 m to bamboo *Arundinaria alpina* and then montane rainforest (mainly *Juniperus procera*-*Podocarpus falcatus*-*Nuxia congesta* forest on the western and north-western slopes, *Ocotea* forest on the south-east, and mixed *Podocarpus latifolius* forest on the east and on Kipipiri). Pockets of *Hagenia* forest occur in sheltered patches on the rolling moorland. The National Park lies mainly above the tree line, with some forest and scrub at lower altitudes in the so-called 'salient' near Nyeri. The Aberdares Forest Reserve (103,300 ha) occupies the lower slopes, in three main blocks that almost surround the park, with Kipipiri Forest Reserve (5,100 ha) tacked on to the east. The southern boundary of the Aberdares Forest Reserve adjoins the Kikuyu Escarpment forest (KE003) to the south. The Aberdares are an extremely important water catchment for the Tana river system, for the northern Ewaso Nyiro river and for Lake Naivasha, and provide much of the water supply for Nairobi and adjoining Districts.

Birds

See Box and Tables 2 and 3 for key species. Over 200 species have been recorded, including *Aviceda cuculoides*, *Buteo oreophilus*, *Francolinus jacksoni*, *F. psilolaemus* and *Tauraco hartlaubi*. *Nectarinia johnstoni* is found on the high peaks, foraging largely on lobelias, while other montane sunbirds (including *Nectarinia tacaze*, *N. reichenowi*, *N. famosa* and *N. mediocris*) are common at slightly lower altitudes. *Macronyx sharpei* is an uncommon resident of the southern slope grasslands, although like *Cinnyricinclus femoralis* and *Euplectes jacksoni*, its current status is uncertain. The restricted-range *Cisticola aberdare* occurs locally in the tussock moorland, with densities of around 3.2 birds/ha in suitable habitat; more than 20,000 pairs are estimated to occur. Regionally threatened species known from this site include *Bostrychia olivacea* (few records), *Hieraetus ayresii* (scarce), *Stephanoaetus coronatus* (low density), *Sarothrura affinis* (rarely recorded), *Porzana pusilla* (uncommon), *Tyto capensis* (no recent records), *Bubo capensis* (local), and *Euplectes progne* (status uncertain).

Key species

A1	<i>Macronyx sharpei</i> *	<i>Cisticola aberdare</i> *
	<i>Cinnyricinclus femoralis</i>	<i>Euplectes jacksoni</i>
A2 (109)	Kenyan mountains EBA: Five of the eight species of this EBA that occur in Kenya have been recorded at this site; see Table 2.	
A3 (A07)	Afrotropical Highlands biome: 53 of the 70 species of this biome that occur in Kenya have been recorded at this site; see Table 3.	

Other threatened/endemic wildlife

Globally threatened mammals include *Diceros bicornis* (CR) and *Loxodonta africana* (EN) (some 1,500 are resident), *Tragelaphus eurycerus* (LR/nt) occurs in the forest but sightings are on the decline, and *Felis aurata*, a rare species in Kenya, is also present. Endemic small mammals include *Surdisorex norae* (VU) and *Tachyoryctes audax* (VU). The snake *Vipera hindii* occurs only here and on Mount Kenya

(IBA KE005), and the Aberdares hold several amphibians that are endemic to the central Kenyan highlands, including *Hyperolius montanus*, *H. cystocandicans*, *Rana wittei* and *Phrynobatrachus kinangopensis*. The butterfly *Neptis kikuyuensis* is endemic to forests in this IBA and on the Kikuyu Escarpment (KE003), and *Charaxes nandina*, endemic to central Kenya, has also been recorded. Notable plants include the Aberdare endemics *Lobelia deckenii sattimae* and *Helichrysum gloria-dei*, and the Aberdare/Mount Kenya endemics *Lobelia bambuseti*, *Senecio keniensis*, *Senecio johnstonii battiscombei* var. *battiscombei* and *Senecio keniodendron*. The Aberdares are rich in species of *Alchemilla*, including *A. hageniae* (endemic), *A. argyrophylla* (also on Mount Kenya), *A. cyclophylla* (also on Mount Kenya) and the rare *A. microbetula* (also on Mount Elgon).

Conservation issues

The Aberdare mountains IBA comprises 76,600 ha of National Park and 108,400 ha of Forest Reserve. The mountains are one of Kenya's major water catchment areas, surrounded for the most part by intensive, small-scale agriculture. The high moorland is well protected and appears relatively safe, though the impact of frequent wildfires on Aberdare *Cisticola* populations needs further study. Habitat on the lower slopes, however, has been severely damaged in recent years. Forest destruction and degradation is the major threat to the site, through agricultural encroachment, illegal *Cannabis sativa* gardens, poaching of valuable trees and forest grazing of livestock. Forest-fires, either accidental or deliberately set (especially by honey collectors), have destroyed or damaged large tracts of forest during recent dry periods. Human-wildlife conflict has long been intense around the borders of the National Park 'salient' and the Forest Reserves. Marauding animals regularly damage crops, and occasionally kill or injure people. Parts of the 'salient' are already fenced, and there are plans to continue fencing sections of the Forest Reserves where problems are most severe. As in many of Kenya's indigenous forests, management is presently inadequate, and is likely to remain so until an integrated management plan is supported by sufficient resources to put it into action. On the moorland, the status of *Macronyx sharpei* and *Cisticola aberdare* remains little known, and needs investigation. The unusual vegetation, rugged terrain, streams and waterfalls combine to create an area of great scenic beauty in the National Park, which has tremendous potential for ecotourism. This potential is only partially realised at present thanks to poor access roads and a lack of safe walking trails.

Further reading

Agnew (1985), Beentje (1990), Cheffings (1997), Hardy (1979), IUCN/UNEP (1987), Lindsay (1994), Watson (1980).

Kianyaga valleys

Admin region Central

Coordinates 0°30'S 37°20'E

Area at least 12,000 ha

Altitude 1,200–1,600 m

KE002

A1, A2 (109)

Unprotected

Site description

Kianyaga comprises a landscape of ridges and steep-sided valleys on the south-eastern slopes of Mount Kenya. These valleys often hold small, swampy streams, which drain into tributaries of the Tana river. The area is entirely settled and cultivated, predominantly with coffee and maize; arrowroot and other crops are grown in the valleys. The remaining small areas of natural wetland include plants such as *Triumfetta tomentosa*, *Croton macrostachyus* and *Cyperus rotundus*. Scattered indigenous trees, mainly *Prunus africana*, *Ficus natalensis* and *Millettia dura*, still remain. Thickets of the exotic *Lantana camara* occur at the edges of cultivation, in fallow farmland and untended coffee plantations, and in inaccessible parts of the valleys.

Birds

See Box and Table 2 for key species. The diversity of other birds is low: a six-month study carried out in 1993 recorded only 94 species, all characteristic of disturbed habitats in the central highlands. However, this is a centre of abundance for the threatened, restricted-range *Turdoides hindei*, a species endemic to central Kenya. Groups

of this babbler occupy many of the valleys and swamps, with an estimated total population size of 250 birds in 66 groups (3.1 birds/km of watercourse).

Key species

- A1 *Turdoides hindei*
 A2 (109) Kenyan mountains EBA: One of the eight species of this EBA that occur in Kenya have been recorded at this site; see Table 2.

■ Other threatened/endemic wildlife

Very little other wildlife of note occurs.

■ Conservation issues

This site is critically important for the conservation of *Turdoides hindei*. These babblers live in groups in the river valleys and swamps, and depend on small thickets of the exotic *Lantana camara* for shelter and nest sites. The fast-growing human population is intensifying pressure on the land. Almost all the natural wetland vegetation has been cleared for cultivation, and smaller and smaller areas are left fallow. Babbler breeding success is already low, apparently as a result of human disturbance, and the birds are also hunted for food. With adequate thicket cover, the babblers can persist in habitats severely modified by people. However, their conservation in this agricultural setting will require innovative approaches—perhaps the setting aside of a number of small sanctuaries centred on schools and other public institutions, as well as an extensive public education campaign.

■ Further reading

Njoroge (1994), Njoroge and Bennun (2000), Njoroge and Mutinda (1996), Njoroge *et al.* (1998), Plumb (1979), Turner (1992), Shaw *et al.* (2001).

Kikuyu Escarpment forest

KE003

Admin region Central, Rift Valley

Coordinates 0°56'S 36°40'E

A1, A2 (109), A3 (A07)

Area 37,600 ha Altitude 1,800–2,700 m

Forest Reserve

■ Site description

The Kikuyu Escarpment forest lies 30 km north-north-west of Nairobi, and covers the eastern slopes of the escarpment from about 2,700 m in the north-west (bordering grassland at the edge of the Kinangop Plateau, IBA KE004) to around 2,050 m in the east, where it borders agricultural land. The main block of forest (sometimes called Kieni) lies either side of the Kamae–Kieni–Thika road, and is bounded to the north by the Chania river; northwards it is continuous with the forest of the southern Aberdare mountains (KE001). On the south-west, a narrow strip extends along the wall of the Rift Valley, beyond Kijabe, down to c.1,800 m. To the south, the forest has been much fragmented, and there are only scattered remnants towards its limits (including the so-called Gatamaiyu forest, near Uplands). The topography is rugged, with many steep-sided valleys containing fast-flowing permanent streams. Mixed bamboo and forest in the higher north-west sector give way below 2,400 m to broadleaved forest, with species of *Ocotea*, *Podocarpus*, *Macaranga*, *Neoboutonia* and *Strombosia* prominent among the trees; tree-ferns, *Cyathea manniana*, are also conspicuous. The escarpment strip consists of remnant *Juniperus* forest. The forest was logged over extensively in the 1950s and 1960s, but many parts in the main block have regenerated well. As well as several roads, a major water pipeline passes through the forest from Sasumua Dam, which supplies Nairobi with water. Judging from aerial photography, slightly more than half of the gazetted area is now closed-canopy forest, most of it in a single block in the east-central part of the reserve. There are extensive areas of plantation and cleared land on the western perimeter of this main block, and the south-western strip and southern sections are a patchy mosaic of degraded forest remnants, scrub, cultivation and plantation.

■ Birds

See Box and Tables 2 and 3 for key species. This forest has a rich avifauna, characteristic of the central Kenyan highlands but with a composition different to that of the nearby Aberdare mountains (IBA KE001). The forest forms the eastern limit in Kenya for *Cercococcyx montanus*, *Ceratogymna bucinator*, *Zoothera gurneyi* and *Cinnyricinclus femoralis*, and the western limit for *Glaucidium*

tephronotum; none of these species is known to be present in the Aberdare mountains. The little-known *Cinnyricinclus femoralis* is most consistently found in the main block (Kieni), where it has been recorded almost year-round; it is also regularly recorded in the southern remnant forest patch, Gatamaiyu. Regionally threatened species known from the site include *Bostrychia olivacea* (regularly recorded and probably resident); *Hieraaetus ayresii* (a scarce resident); *Stephanoaetus coronatus* (resident in small numbers) and *Glaucidium tephronotum* (seemingly resident).

Key species

- A1 *Cinnyricinclus femoralis*
 A2 (109) Kenyan mountains EBA: Three of the eight species of this EBA that occur in Kenya have been recorded at this site; see Table 2.
 A3 (A07) Afrotropical Highlands biome: 40 of the 70 species of this biome that occur in Kenya have been recorded at this site; see Table 3.

■ Other threatened/endemic wildlife

The mammal *Loxodonta africana* (EN) is present in good numbers at times; this population appears to move back and forth between the Kikuyu Escarpment forest and the Aberdare mountains (IBA KE001). Three near-endemic butterflies occur, namely *Charaxes nandina*, *Neptis kikuyuensis* and *N. katama*. Little is known about the other biodiversity values of this site.

■ Conservation issues

The human pressure on this forest has been increasing steadily over time. Encroachment along the southern and western boundaries is intensifying, and at lower altitudes large parts have been destroyed. Tree poaching has become rampant in the forest bordering the main Kieni–Thika road, and in the southern remnants. It is evident that the Forest Department is able to exert very little control. The conservation value of the forest must be more widely recognized, and adequate effort put into policing and managing it—preferably as a joint operation between Forest Department and Kenya Wildlife Service under their Memorandum of Understanding. Closer involvement of the surrounding communities in forest conservation is also needed: some progress has been made in this regard by an active IBA Site Support Group, the Kijabe Environment Volunteers. This forest is close to Nairobi, easily accessible, scenically attractive, has a wide range of interesting and unusual birds, and is already a favourite site for local and foreign birdwatchers. It has excellent potential for ecotourism.

■ Further reading

Adel and Gachanja (1997), Beentje 1990, Blackett (1994e), Gardner (1996), Coe (1994), Taylor and Taylor (1988).

Kinangop grasslands

KE004

Admin region Central, Rift Valley

Coordinates 0°42'S 36°34'E

Area 77,000 ha Altitude 2,400–2,700 m

A1, A2 (109)

Unprotected

■ Site description

These montane grasslands lie on the Kinangop Plateau, a wide stretch of land bounded by the forests of the Aberdare mountains (IBA KE001) and Kikuyu Escarpment (KE004) to the east and south, and by a steep scarp dropping to the Rift Valley floor on the west. To the west and north, the IBA boundary follows the 2,400 m contour. Rainfall averages c.1,000 mm/year, but the southern part is wetter than the north, which lies in the rain shadow of the Aberdares. The landscape is generally flat, sloping gently upwards to the base of the Aberdare mountains, but dissected by valleys bearing streams that drain into the Malewa and Karati rivers (see Lake Naivasha, KE048). Originally, the entire plateau was covered with almost treeless, tussocky grassland, including many tussock bogs in the swampy valleys. Characteristic tussock grasses include *Andropogon amethystinus*, *Cymbopogon nardus*, *Digitaria diagonalis*, *Eleusine jaegeri*, *Eragrostis botruodes*, *Hyparrhenia hirta*, *H. tamba* and *Pennisetum hohenackeri*. Since the 1960s the area has been settled by the Kikuyu people, whose livelihood revolves around small-scale farming. Large areas of land have been ploughed for cultivation (mainly maize, wheat, cabbages and potatoes) or to remove the tussock grass species, which livestock

find unpalatable. Woodlots of introduced trees, such as *Eucalyptus globulus*, *Acacia mearnsii*, *Pinus radiata* and *Cupressus lusitanica*, now dot the landscape. Many of the wetlands have been drained, directly or by planting water-thirsty exotic trees.

■ Birds

See Box and Table 2 for key species. This is probably the world stronghold of *Macronyx sharpei*, a threatened Kenya endemic. The species is confined to grassland, preferring short-grass fields with tussocks, and in good habitat occurs at densities of 0.8 individuals/ha. *Cisticola aberdare* is thought to occur in the higher parts of the plateau, close to the Aberdare mountains, but its status is uncertain. *Circus macrourus* occurs on passage. The grasslands support a distinctive avifauna that includes localized species such as *Vanellus melanopterus*, *Cisticola ayresii*, *Euplectes jacksoni* (a seasonal visitor, nesting in tussock grassland and at times in wheat fields) and *E. progne* (a regionally threatened species). Large numbers of Palearctic migrants use the area on passage, notably *Falco subbuteo*, *Buteo buteo*, *Ciconia nigra*, *Apus apus*, *Merops apiaster*, *Motacilla flava* and *Oenanthe oenanthe*.

Key species

A1	<i>Circus macrourus</i> <i>Macronyx sharpei</i> *	<i>Cisticola aberdare</i> * <i>Euplectes jacksoni</i>
A2 (109)	Kenyan mountains EBA: Four of the eight species of this EBA that occur in Kenya have been recorded at this site; see Table 2.	

■ Other threatened/endemic wildlife

The fauna and flora of these grasslands have been little studied. Very few large wild mammals survive on the Kinangop, but many smaller species that are confined to highland grassland can be expected. The frogs *Hyperolius montanus* and *Phrynobatrachus kinangopensis* and the snake *Bitis worthingtonii* are recorded only in Kinangop and a few other sites in the Kenyan highlands. *Hyperolius montanus* was considered secure in 1980, but it is a montane grassland species and may now be under threat.

■ Conservation issues

Kenya's unique highland grasslands are not included in any protected areas, and are rapidly vanishing. The remaining grassland on the Kinangop Plateau is now mainly modified grazing land, sometimes in rotation with arable cropping. The ecological character of the plateau is changing remarkably fast. Destruction of indigenous forest on the Aberdare slopes, drainage of wetlands and afforestation with exotic trees has resulted in a warmer, drier climate, with less frequent frosts and less regular mist and rain. Less frequent frosts (and an unreliable milk market) has increased the attraction of crop cultivation rather than livestock rearing. A growing human population has put more pressure on the land, leading to smaller average land holdings (which tend to include proportionately less grassland) and higher stocking rates. In 2000, it was estimated that grassland covered just 50% of the plateau. In turn, only around 50% of this was tussock grassland, more than half of which occurred in patches too small to support territories of *Macronyx sharpei*. If present trends continue, it is estimated that within 10 years tussock grasslands will cover only about one-sixth of Kinangop, and all farms big enough to act as potential longclaw reserves will have been subdivided to smaller sizes. *Macronyx sharpei* seems able to coexist with livestock, provided that adequate tussock cover remains, but cannot survive in farmed fields: it requires grass tussocks for feeding, roosting and nesting. It is also severely affected by habitat fragmentation. Conservation of this IBA represents a major challenge. Further ecological and economic studies are urgently required to assess what land-use regimes are compatible with *Macronyx sharpei* conservation, and what economic opportunity costs these entail. Land should be purchased for a model *Macronyx sharpei* reserve that can fulfil an educational and demonstration function. Working with farmers' cooperatives to improve milk processing and marketing opportunities would help to increase the economic returns from dairy farming. Fortunately, environmental awareness is growing in the area. A local conservation action group, 'Friends of Kinangop Plateau', now has active branches in three parts of the plateau. Parts of this IBA have now been well surveyed, but additional survey work is needed in the northern sector. There are reports of *Macronyx sharpei* at around 2,300 m near Lake Ol' Bolossat (c.18 km north-north-west of Wanjohi, at the IBA's northern limit). If confirmed, these would

make it appropriate to extend the northern boundary of the IBA. The presence of *Cisticola aberdare* at the base of the Aberdare mountains also requires confirmation.

■ Further reading

Bennun and Njoroge (1996), Lens (1995), Lens *et al.* (2000, in press), Muchai (1997), Muchai *et al.* (in press a,b), Ndang'ang'a (2001), Rayment and Pisano (2000).

Mount Kenya

KE005

Admin region Central, Eastern

Coordinates 0°10'S 37°20'E

A1, A2 (109), A3 (A07)

Area 271,000 ha

National Reserve (former Forest Reserve),

Altitude 1,600–5,200 m

National Park

■ Site description

An imposing extinct volcano that dominates the landscape of the Kenyan highlands east of the Rift Valley, Mount Kenya lies c.140 km north-north-east of Nairobi, with its northern flanks across the equator. The mountain's sprawling slopes are cloaked in forest, bamboo, scrub and moorland, giving way on the high central peaks to rock, ice and snow. Mount Kenya is an extremely important water catchment area, supplying the Tana and Northern Ewaso Ngiro systems. The wet south-eastern slopes (with rainfall up to 2,500 mm/year) hold luxuriant rainforest up to 2,400 m, with valuable timber trees such as camphorwood *Ocotea usambarensis*. Five other main forest-types are recognized, including *Newtonia buchananii* forest (lower eastern slopes, up to 1,800 m); *Juniperus procera*–*Nuxia congesta*–*Podocarpus falcatus* forest (eastern slopes, to 2,300 m); forest dominated by *Croton megalocarpus*, *Brachylaena huillensis* and *Calodendrum capense* (south-western slopes, up to 1,900 m); more open *Juniperus procera*–*Olea europaea* forest (on the drier western and north-western slopes, to c.2,300 m); and mixed *Podocarpus latifolius* forest (north-western slopes, up to 2,600 m). From c.2,400 m altitude, the forest gives way to dense stands of bamboo *Arundinaria alpina*, with scattered trees. There is no forest on the dry northern slopes, which receive as little as 800 mm of rain/year and support only scrubby vegetation. Above about 2,850 m, the bamboo merges with an open woodland of *Hagenia abyssinica* trees and *Hypericum* shrubs. This in turn grades into *Erica* heathland above 3,000 m, where 'everlasting' flowers, *Helichrysum* spp., are conspicuous. Above this, the Afro-alpine moorlands are outstanding both scenically and floristically, with giant groundsels *Senecio keniiodendron* and *S. johnstonii battiscombei*, giant lobelias *Lobelia deckenii keniensis* and *L. telekii*, and various tussock grasses. The forest (originally 199,500 ha, of which c.2,520 ha was degazetted in 2001) was gazetted as a Forest Reserve in 1943 and until recently was administered from 15 forest stations in six administrative districts. In July 2000, this area (given in the gazette notice as 21,240 ha) was re-designated as Mount Kenya National Reserve and entrusted to the management of the Kenya Wildlife Service. It has been estimated that c.61,000 ha of the gazetted area was closed-canopy forest. Almost all of this lies between 2,000–2,900 m altitude, with only small fragments on the lowest slopes, down to 1,600 m. Bamboo and bamboo/forest mosaic make up another 63,000 ha, forest and scrub 20,000 ha, with c.20,500 ha of plantations and 35,000 ha of non-forest, including scrub, grassland and cultivation. The National Park covers 71,500 ha, almost entirely above the tree line; it includes all the land above 3,200 m, with two small 'salients' extending lower down along the Sirimon and Naro Moru tracks.

■ Birds

See Box and Tables 2 and 3 for key species. Mount Kenya has a rich montane bird fauna. It is undoubtedly a stronghold for the threatened and little-known *Cinnyricinclus femoralis*, even though there are few recent records (probably due to its nomadic nature whilst in search of fruiting trees). *Falco naumanni* is a passage migrant on the moorland. *Euplectes jacksoni* can be found in grassland up to 3,000 m, and *Macronyx sharpei* is known from the north-west slopes, although its present status is uncertain. Regionally threatened species include *Bostrychia olivacea* (a scarce resident); *Gypaetus barbatus* (no recent records, but formerly nested on moorland cliffs); *Hieraaetus ayresii* (a scarce resident); *Stephanoaetus coronatus*; *Tyto capensis* (no recent records); *Bubo capensis*; *Campephaga quiscalina* (uncommon in

montane forest); and *Euplectes progne* (status uncertain). The rare and little-known race *graueri* of *Asio abyssinicus* has been recorded from the high forest. *Nectarinia johnstoni* is particularly common on the high moorland. Apart from the nearby Nyambeni Hills, Mount Kenya is the only Kenyan site for *Poeyoptera kenricki*.

Key species

A1	<i>Falco naumanni</i> <i>Euplectes jacksoni</i>	<i>Macronyx sharpei</i> * <i>Cinnyricinclus femoralis</i>
A2 (109)	Kenyan mountains EBA: Six of the eight species of this EBA that occur in Kenya have been recorded at this site; see Table 2.	
A3 (A07)	Afrotropical Highlands biome: 54 of the 70 species of this biome that occur in Kenya have been recorded at this site; see Table 3.	

Other threatened/endemic wildlife

Mammals of global conservation concern include *Tragelaphus eurycerus* (LR/nt), *Diceros bicornis* (CR) and *Loxodonta africana* (EN), together with the uncommon central Kenya race of *Cephalophus nigrifrons hooki*. Levels of endemism among the small mammals depend on the classification adopted. Notable Mount Kenya taxa include *Surdisorex polulus* (VU), *Tachyoryctes rex* (EN), *Grammomys gigas* (EN), *Crocidura allex alpina* (VU) and *Procapia johnstoni mackinderi*. The reptiles *Atheris desaixi* and *Chameleo schubotzi* are notable endemics, while *Vipera hindii* is found only on Mount Kenya and the Aberdare mountains (IBA KE001). The butterfly *Capys meruensis* is restricted to the Mount Kenya area. Endemics or near-endemics among the alpine flora include *Senecio keniendendron* (also on the Aberdares), *Senecio keniensis keniensis*, *Lobelia deckenii keniensis* and *L. bambuseti* (also on the Aberdares), *Alchemilla argyrophylla* and *A. cyclophylla* (both also on the Aberdares). In the forest, endemics or near-endemics include the rare shrubs *Ixora scheffleri keniensis*, *Pavetta hymenophylla*, *Maytenus keniensis* and *Embelia keniensis* and the climber *Rubus keniensis*.

Conservation issues

Apart from its biodiversity importance, Mount Kenya (or Kirinyaga) has enormous traditional religious significance for the Kikuyu people who live around it. Numerous important traditional uses are made of the forest. The mountain is a vital water catchment for the Tana and Ewaso Ngiro rivers, while the moorland (with its extraordinary Afro-alpine vegetation) and the peaks attract a steady stream of tourists. Unfortunately, the former Forest Reserves on Mount Kenya appear to have suffered an almost complete breakdown of forest protection. Most of the forest has already been logged over for valuable trees such as *Ocotea usambarensis*, *Vitex keniensis* and *Podocarpus* species. Demand for indigenous timber continues to be extremely high despite a ban on extraction. The Forest Department, hampered by poor roads, a lack of transport and equipment, and underpaid and demotivated personnel, has proved unable to control the situation. The result is much continuing damage to the forest. Allied to this is the problem of encroachment and squatters in the forest. Population densities around the mountain are high, especially in the south-east, and encroachment has fragmented and destroyed the lower altitude forest over a number of years. Many former Forestry Department staff and sawmill workers (some of them made redundant when sawmilling of indigenous timber ceased) are living and farming within the reserves. The reinstatement in 1993 of the controversial ‘shamba’ system of plantation management, where small-scale farmers plant crops alongside saplings, has resulted in farms high on the mountainside. This has created enormous problems in policing forest use. Such ‘farming’ includes the cultivation of illegal but lucrative gardens of *Cannabis sativa*, which are widespread in forest clearings on the lower slopes. Forest grazing is a serious problem, although theoretically banned. The scale of the pressure on Mount Kenya was evident during recent droughts, when many thousands of hectares of precious forest were set ablaze and destroyed by land-hungry people, expecting to be able to move in and farm the area thereafter.

Management problems have only intensified since redesignation as a National Reserve. The Kenya Wildlife Service assumed responsibility at short notice and has been struggling to exert control, with inadequate staff of its own on the ground but disgruntled Forest Department employees still present. In 2001, despite countrywide protests at the likely environmental effects, forest in the Ragati, Hombe and Sirimon areas (totalling around 2,500 ha) was excised by the Government for ‘settlement’.

‘Problem animals’ are a major issue around Mount Kenya, where substantial populations of large forest mammals close to intensive agriculture create severe conflicts. Elephants *Loxodonta africana*, account for the bulk of both crop damage and human injuries and deaths. Electrical fencing of the Forest Reserves is an expensive solution with a number of attendant problems, but may become necessary in some areas. Illegal hunting of wildlife is also common, and *Tauraco hartlaubi* is hunted for its red flight feathers, which are in demand or manufacturing fishing flies. Elephant pressure on the indigenous forest is also high, now that their traditional migration routes outside the mountain are cut off, and debarking and uprooting of forest trees is a problem. In some areas the animals appear to have developed a particular taste for valuable trees such as camphorwood. Buffalo similarly damage the *Hagenia-Hypericum* ground community.

Threats within the National Park are much less severe, although there has been concern about damage to vegetation and littering by the many visitors following the standard walking routes to the peaks. Food and rubbish left by visitors has also caused a population boom of hyrax and rodents in the Teleki Valley, which is damaging vegetation. Although this is a very visible problem, it is localized and affects a small proportion of the moorland area. Poaching of wildlife in the park has been exacerbated by the reinstated ‘shamba’ system, allowing poachers easy access to the upper reaches of the forests and to the moorland. Mount Kenya urgently needs a coherent management plan to address the fundamental issues of forest policing, squatters and problem animals. The avifauna of Mount Kenya is reasonably well-known but there is very little information on the seasonality, distribution and habitat requirements of the threatened birds, particularly *Cinnyricinclus femoralis*. The status of *Macronyx sharpei* is also uncertain. Future research should target these species in particular.

Further reading

Allan (1981), Beentje (1990), Bennun (1994b), Bennun *et al.* (in press), Blackett (1994f), Coe (1967), Coe and Foster (1972), Davies and Vanden Berghe (1994), Fairweather (1993), KIFCON (1992), Kokwaro and Beck (1987), Lockwood (1995), Lubanga (1992), Milner *et al.* (1993), Rehder *et al.* (1981), Shah and Upadhyaya (1995), Young and Evans (1993).

Mukurweini valleys

Admin region Central

Coordinates 0°30'S 37°07'E

Area 30,000 ha Altitude 1,300–1,600 m

KE006

A1, A2 (109)

Unprotected

Site description

This IBA consists of often deep and broad-bottomed stream and river valleys with *Lantana* thickets, on the lower south-east slopes of the Aberdare mountains (IBA KE001), in the upper catchment of the Tana river. The area of the IBA cannot be precisely defined without further survey work, but it includes at least 20,000 ha in the catchments of the Ruarai, Tambaya, Thiha and Sagana rivers on either side of the Thangathi–Kanunga road near Mukurweini town. This is a zone of high agricultural potential and is intensively cultivated, the major crops including coffee, maize and arrowroot. Little natural vegetation remains in most places, apart from scattered indigenous trees such as *Newtonia buchananii* and *Ficus thoningii*. Thickets of the exotic *Lantana camara* occur at the edges of cultivation, in fallow farmland and unweeded coffee plantations, and in inaccessible river valleys.

Birds

See Box and Table 2 for key species. *Turdoides hindei*, a threatened Kenya endemic with a very restricted range, occurs at relatively high densities (4.7 birds/km of watercourse; population estimated at 380 birds in 88 groups). It is confined to the valleys, with group territories centred on patches of the exotic shrub *Lantana*, which the babblers depend on for shelter and nest sites. Other bird species are typical of forest edge and scrub habitats in the central Kenya highlands, but species diversity in this agricultural landscape is low.

Key species

A1	<i>Turdoides hindei</i>
A2 (109)	Kenyan mountains EBA: One of the eight species of this EBA that occur in Kenya has been recorded at this site; see Table 2.

■ Other threatened/endemic wildlife

None known to BirdLife International.

■ Conservation issues

This is one of the few areas where *Turdoides hindei* occurs in reasonable numbers. Further survey work is required to discover the limits of its distribution. Conservation issues are similar to those described for the Kianyaga valleys (IBA KE003): the babblers depend on small thickets of the exotic *Lantana camara* for shelter and nest sites, and fewer and fewer refuges are available as the human population grows and pressure on the land increases. Unlike Kianyaga, birds are not extensively hunted in Mukurweini, but the effect of human disturbance on nesting success may still be considerable. One privately owned bird sanctuary, Wajee Camp (10 ha), already exists, with *Turdoides hindei* a major visitor attraction.

■ Further reading

Njoroge (1994), Njoroge and Bennun (2000), Njoroge and Mutinda (1996), Njoroge *et al.* (1998), Shaw *et al.* (2001).

Arabuko-Sokoke forest

Admin region Coast

Coordinates 3°20'S 39°55'E

Area 41,600 ha Altitude 0–210 m

KE007

A1, A2 (I11), A3 (A09)

Forest Reserve

■ Site description

Arabuko-Sokoke lies a few kilometres inland on the Kenyan coast, between the towns of Kilifi and Malindi and some 110 km north of Mombasa. It is the largest extant fragment of the forests that once covered much of the East African coast, and whose remnants constitute the East African coastal forests Endemic Bird Area. Arabuko-Sokoke was proclaimed a Crown Forest in 1932 and gazetted in 1943, covering an area of 39,100 ha. The Kararacha extension (2,700 ha) to the south-east, which includes important tracts of key habitats, was added in 1968. Part of the forest, containing sections of the three main habitat types, was gazetted as a strict nature reserve (covering 4,300 ha) in the late 1960s. Average annual rainfall ranges from 900 mm (in the relatively dry and scrubby north-west) to 1,100 mm (in the east). The relatively flat eastern section lies on Pleistocene lagoonal sands and clays, separated by a wide band of apparently riverine sandy deposits from the ridge of red Magarini sands that forms the western part of the reserve. Three very distinctive forest types, each with its own special flora and fauna, correspond to these soil types:

Mixed forest (7,000 ha) in the east, on grey sands. This habitat is relatively dense, tall and undifferentiated, with a diversity of tree species. Characteristic trees include *Combretum schumannii*, *Drypetes reticulata*, *Azelia quanzensis*, *Dialium orientale*, *Hymenaea verrucosa* and *Manilkara sansibarensis*.

Brachystegia woodland (7,700 ha) runs in a strip through the approximate centre of the forest, on white, very infertile soil. This relatively open habitat is dominated by *Brachystegia spiciformis*.

In the west, on red Magarini sands, is *Cynometra* forest and thicket, dominated by *Cynometra webberi* with *Manilkara sulcata*, *Oldfieldia somalensis* and (formerly) *Brachylaena huillensis*. The transition between white and red soil is sudden, and marked by a chain of seasonal ponds. There are two areas of relatively tall *Cynometra* forest, with a canopy height of up to 20 m, in the north (3,300 ha) and the south (6,600 ha) of this zone. Between these is a lower, scrubrier formation of intermediate *Cynometra* (11,300 ha) with a canopy height of 7–8 m. The dry north-western part of the reserve is covered by a low, dense, and often almost impenetrable *Cynometra* thicket (2,300 ha), with the canopy no more than 5 m high. Altogether, the area of indigenous forest or thicket at this site totals c.38,200 ha.

■ Birds

See Box and Tables 2 and 3 for key species. Arabuko-Sokoke has been ranked by BirdLife International as the second most important forest for bird conservation on mainland Africa. More than 230 bird species are recorded including nine globally threatened species. *Ploceus golandi* is known only from Arabuko-Sokoke and the little-studied Dakatcha woodland (IBA KE009). It occurs mainly in *Brachystegia* woodland, although its numbers fluctuate. The species' nest is unknown. *Otus ireneae* is known only from this forest and one other site in north-east

Tanzania. It is confined to *Cynometra* forest and (at much lower densities) intermediate *Cynometra*. Arabuko-Sokoke holds by far the bulk of the world's population, with an estimated 850–1,200 pairs. Arabuko-Sokoke may also hold the world's largest population of *Sheppardia gunningi*, with as many as 9,000 pairs thought to be present, primarily in the *Cynometra* forest. It is also a world stronghold for *Anthus sokokensis*, with around 3,000 individuals estimated to occur in the *Brachystegia* woodland alone; its status in other habitat types is not well-known. *Zoothera guttata* is a scarce but regular intra-African migrant from March–October, and *Anthreptes pallidigaster* is very local, occurring principally in the *Brachystegia* woodland, with an estimated population of 2,800 birds. Regionally threatened species include: *Casmerodius albus*, *Thalassornis leuconotus* and *Podica senegalensis* (all recorded occasionally on forest pools); *Hieraetus ayresii* (a scarce resident); *Stephanoaetus coronatus*; *Pitta angolensis* (a scarce non-breeding visitor, with few recent records); *Turdoides squamulatus* (local and rarely recorded); and *Erythrocerus holochlorus*.

Key species

A1	<i>Circaetus fasciolatus</i>	<i>Sheppardia gunningi</i>
	<i>Tauraco fischeri</i>	<i>Anthreptes pallidigaster</i>
	<i>Otus ireneae</i>	<i>Anthreptes reichenowi</i>
	<i>Zoothera guttata</i>	<i>Ploceus golandi</i>
	<i>Anthus sokokensis</i>	
A2 (I11)	East African coastal forests EBA: Five of the seven species of this EBA that occur in Kenya have been recorded at this site; see Table 2.	
A3 (A09)	East African Coast biome: 23 of the 29 species of this biome that occur in Kenya have been recorded at this site; see Table 3.	

■ Other threatened/endemic wildlife

Arabuko-Sokoke is rich in rare and endemic wildlife, especially among the fauna. Six taxa of butterfly endemic to the East African coast are present, as well as three rare, near-endemic mammals: *Rhynchocyon chrysopygus* (EN), *Cephalophus adersi* (EN; found only in Sokoke and Zanzibar) and the distinctive small carnivore *Bdeogale crassicauda omnivora*. There is also a small population of *Loxodonta africana* (EN), and *Felis aurata*, rare in Kenya, may occur. Unusual reptiles include the lizard *Gastropholis prasina*, and the forest is exceptionally rich in amphibians, including coastal endemics such as *Mertensophryne micramotis*. Arabuko-Sokoke supports at least 50 globally or nationally rare plant taxa.

■ Conservation issues

Arabuko-Sokoke is rich in biodiversity, but of particular importance is the exceptionally high degree of endemism. This, together with the forest's large area of continuous woody vegetation (most remaining coastal forests cover only a few hundreds of hectares, sometimes much less) gives it a very high conservation value. The forest is managed jointly by the Forest Department and the Kenya Wildlife Service under a Memorandum of Agreement, through the Arabuko-Sokoke Forest Management Team (ASFMT) that brings together these two institutions with the Kenya Forestry Research Institute and the National Museums of Kenya. Extensive licensed logging has occurred in the past, with noticeable negative effects on bird communities in the degraded areas. Licensed selective logging continues on a smaller scale, along with licensed collection of dead wood for fuel. Both these practices have proven difficult to police, and regular poaching of valuable trees continues to be a major problem. *Brachylaena huillensis*, which is preferred for the carving industry and construction, has been severely affected, as have timber species such as *Pleurostyliya africana*. Illegal hunting, mainly of duiker and elephant shrews, is prevalent, although its impacts are somewhat unclear. Local people use forest products for many purposes, including fuelwood and medicinal plants, and collect water at the seasonal pools. The forest is surrounded by agriculture on all sides. The Mahaji settlement was excised from the eastern edge of the forest after Independence, and pressure remains high from some quarters for degazettement and settlement of the south-eastern Kararacha-Mpendakula section—despite the fact that the soils there are extremely infertile and quite unsuitable for agriculture. More profitable and sustainable uses are possible, including ecotourism, which is already growing in scale, and butterfly farming. These activities are being promoted by ASFMT through the European Union-funded Arabuko-Sokoke Forest Management and Conservation Project (to end in December 2001), implemented by the Forest Department, Kenya Wildlife Service and BirdLife International, and by the work of the Kipepeo butterfly farming initiative of the

National Museums and Nature Kenya. The latter assists people living close to the forest to produce butterfly pupae, using leaves from forest trees, for export to Europe and America. In 2000, more than US\$ 100,000 was earned from the forest in recorded revenues for tourism, honey, timber, fuelwood, seeds and butterflies. Almost 40% of this went to forest-adjacent communities, who have organized their own Forest Adjacent Dwellers Association to promote sustainable forest use. A management plan is currently being developed, which will include participatory forest management as a key component. These are promising signs for the future.

■ Further reading

Bennun (1995), Bennun and Waiyaki (1992d), Blackett (1994b), Britton and Zimmerman (1979), Collar and Stuart (1988), Drewes (1997), Fanshawe (1992, 1994, 1995), FitzGibbon *et al.* (1995), Gordon and Depew (1995), Kanga (1996), Kesley and Langton (1984), Mann (1976), Matiku *et al.* (2000), Mogaka (1991), Nemeth and Bennun (2000), Robertson and Luke (1993), Taylor (1984), Turner (1977), Virani (1993, 1994, 1995, 2000a,b), Wass (1994).

Dakatcha woodland

KE008

Admin region Coast

Coordinates 03°01'S 39°51'E

A1, A2 (111), A3 (A09)

Area c.32,000 ha Altitude 90–230 m

Unprotected

■ Site description

Dakatcha is an extensive tract of relatively intact coastal woodland, north of the Sabaki river and between 25 and 50 km inland from the coast. The vegetation is similar to that on the western boundary of Arabuko-Sokoke forest (IBA KE007). The landscape is gently undulating, with woodland dominated by *Brachystegia spiciformis* in the valleys and on the slopes, and *Brachylaena huillensis*–*Cynometra webberi* associations on top of the low hills, on red Magarini sands. Much of the useful *Brachylaena* has already been cut, since it is in great demand as a long-burning, smokeless fuelwood and for carving. There has also been extensive clearance of the hilltops for pineapple cultivation. The IBA covers two, nearly adjoining tracts of woodland: one of c.25,000 ha, north-west of Baricho town, up to and beyond the Galana Ranch boundary, and extending to the base of Dakabuko Hill; and the other of 7,000 ha, north and west of Marafa town. These (along with another tract, Adu, covering 15,000 ha north and west of Adu village, c.22 km north of Marafa), have been proposed as Forest Reserves in the Kilifi District Forestry Master Plan. Galana Ranch is the property of the Agricultural Development Corporation.

■ Birds

See Box and Tables 2 and 3 for key species. Dakatcha appears to hold substantial populations of *Anthus sokokensis* and *Ploceus golangi*. Both these species possibly breed here. This is the only site outside Arabuko-Sokoke where *P. golangi* is known to occur, although its breeding grounds are undiscovered. The remainder of the avifauna is typical of the northern East African coastal forests, with at least half of Kenya's East African Coast biome species, though lacking some forest-specialist species found in nearby Arabuko-Sokoke.

Key species

A1	<i>Circaetus fasciolatus</i>	<i>Anthus sokokensis</i>
	<i>Tauraco fischeri</i>	<i>Ploceus golangi</i>
A2 (111)	East African coastal forests EBA: Three of the seven species of this EBA that occur in Kenya have been recorded at this site; see Table 2.	
A3 (A09)	East African Coast biome: 15 of the 29 species of this biome that occur in Kenya have been recorded at this site; see Table 3.	

■ Other threatened/endemic wildlife

There is little information on other fauna: the mammal *Loxodonta africana* (EN) occurs, and *Rhynchocyon chrysopygus* (EN) is likely to. At least 11 plant taxa in this area are globally or nationally rare, including *Monadenium invenustum*, *Pavetta linearifolia* and *Eulophia serrata*.

■ Conservation issues

Despite its importance as one of the last patches of relatively intact coastal woodland, Dakatcha has no formal protected status. It has already suffered some damage from uncontrolled logging and clearing,

especially within the hilltop *Cynometra*–*Brachylaena* forest. A recent survey (in 2000) found evidence of destructive illegal tree-felling throughout the area, both of *Brachystegia spiciformis* and *Brachylaena huillensis*. Signs of illegal hunting and trapping were also evident. In the ongoing adjudication of land in the former Kilifi (now Malindi) District, this area should be gazetted as a Forest Reserve to protect its outstanding biological diversity, and allow sustainable use of its timber and other forest products. Without such protection, the woodland will continue to be degraded and eventually disappear. So far, insecurity has made the area inhospitable to settlers. When the proposed Dakatcha and Marafa reserves are gazetted, this should ideally be as one single forest, with a connecting corridor at least 1 km wide. If this corridor is not presently wooded, it can be allowed to regenerate gradually to a natural state. By permitting dispersal of birds and other animals between the blocks, a single site will be of considerably more conservation value than two separate ones.

■ Further reading

Forest Department (1992), Mlingwa *et al.* (in press), Robertson and Luke (1993), Jackson (2000).

Diani forest

KE009

Admin region Coast

Coordinates 04°19'S 39°33'E

A1

Area c.80 ha Altitude 5–20 m National Monument, Unprotected

■ Site description

This site consists of remnant deciduous coral rag forest (dominated by *Combretum schumannii*) along a 12-km strip of Diani Beach, near Ukunda on the south Kenya coast. The formerly continuous forest has been cleared and fragmented, so that a set of small patches, in various degrees of intactness, now remains. Kaya Ukunda (a National Monument gazetted in 1992) has been left isolated as a 20 ha fragment slightly inland from the others, behind the Two Fishes Hotel. Twenty-one hotels, among other developments, occupy the Diani strip, and a busy road runs through the centre of some of the forest patches. Kaya Diani itself, which lies between Mworoni and Leisure Lodge Hotel, is not within this IBA.

■ Birds

See Box for key species. *Zoothera guttata*, an intra-African migrant, was seen regularly here in the 1980s. Although there are no recent records, Diani may still be an important 'stepping stone' forest for this species. The current status of the other globally threatened species is similarly uncertain. At least 44 other forest-dependent species are recorded, most of them characteristic of East African coastal forests. *Tauraco fischeri* is also a restricted-range species. Regionally threatened species include *Campethera mombassica*, *Phyllastrephus debilis*, *P. fischeri*, *Erythrocerus holochlorus*, *Stephanoaetus coronatus*, *Pitta angolensis*, and *Anthreptes neglectus*.

Key species

A1	<i>Circaetus fasciolatus</i>	<i>Zoothera guttata</i>
	<i>Tauraco fischeri</i>	<i>Anthreptes reichenowi</i>

■ Other threatened/endemic wildlife

Diani was originally "one of the most diverse areas of forest along the Kenya coast with a rich coral rag flora". The threatened mammal *Rhynchocyon petersi* (EN) occurs, but its current status is unknown. Diani supports an unusually high density of the primate *Colobus angolensis*, and is an important site for the restricted subspecies *palliatius*.

■ Conservation issues

Diani is a sad example of the destructive effects of uncontrolled tourist development. Only small forest patches are now left, and rampant cutting of *Combretum schumannii* for tourist carvings has degraded much of what remains. Apart from the isolated Kaya Ukunda, the forest remnants are now contained on private land. Though many owners have destroyed their forest or permitted it to be degraded, others (notably the hotels Robinson Club Baobab and Nomads) have protected their holdings. The remaining forest, although fragmented, is still very valuable for biodiversity conservation. Recently, road kills

of colobus have focused local attention on the plight of this species and the forest as a whole, resulting in the registration of a local environmental group: Wakuluzu, Friends of the Colobus Trust. Wakuluzu's concern covers Diani in particular and other South Coast forests with colobus in general. At Diani, work to restore the habitat and the connections between forest patches is urgently needed. Local recognition of the value of the forests, for tourism as well as for biodiversity conservation, may help to bring this about.

■ Further reading

Bennun and Njoroge (1996), Irvine and Irvine (1970, 1977a,b, 1988, 1991), Kahumbu and Eley (1997), Mlingwa *et al.* (2000), Ng'weno (1980), Robertson and Luke (1993), Waiyaki and Bennun (2000).

Dzombo hill forest

Admin region Coast

Coordinates 04°26'S 39°12'E

Area 295 ha

Altitude 100–470 m

KE010

A1, A2 (111)

Forest Reserve,
National Monument

■ Site description

Dzombo hill, like Mrima (IBA KE018), is an igneous intrusion into the Triassic sandstone of the surrounding coastal plain. The hill rises abruptly to around 470 m, with a lower summit at 400 m to the west. The rainfall is 900–1,100 mm/year, with considerable additional mist and dew on the upper slopes. Dzombo is covered by undifferentiated coastal mixed forest, wettest on the south-eastern slopes. To the north and north-west, the forest grades into drier woodland and scrub. Large trees include *Combretum schumannii*, *Lannea welwitschii*, *Cola clavata*, *Ricinodendron heudelotii*, *Scorodophloeus fischeri*, *Tamarindus indica*, *Newtonia paucijuga*, *Sorindeia madagascariensis*, *Diospyros mespiliformis* and *Manilkara discolor*. Dzombo was designated as a Forest Reserve in 1941, and Kaya Dzombo as a National Monument, within the Forest Reserve, in 1992. The forest is considered sacred by the local community, with the grave of a Digo ruler, or Kubo, near the summit.

■ Birds

See Box and Table 2 for key species. The globally threatened and restricted-range *Anthus sokokensis* has recently been discovered, and is presumably resident. Dzombo has a rich avifauna, with 35 forest-dependent species recorded; more are likely to be listed with further surveys. Regionally threatened species include *Stephanoaetus coronatus*.

Key species

A1	<i>Tauraco fischeri</i>	<i>Anthreptes reichenowi</i>
	<i>Anthus sokokensis</i>	
A2 (111)	East African coastal forests EBA: Two of the seven species of this EBA that occur in Kenya have been recorded at this site; see Table 2.	

■ Other threatened/endemic wildlife

The threatened small mammal *Rhynchocyon petersi* (EN) occurs; it is restricted to a small number of East African coastal forests. Dzombo holds a number of rare plants, with 36 taxa listed as rare in Kenya, including the endemic *Ziziphus robertsoniana* and an undescribed species of *Uvariadendron*.

■ Conservation issues

Dzombo is designated as a National Monument and considered sacred by the local community. This affords it some protection. However, it is increasingly under threat from agricultural encroachment (which is already considerable), unsustainable timber and pole extraction, bark stripping of trees for binding materials, and firewood collection. At present, vehicle access into the forest is difficult and Forest Department control is minimal. The steep topography of this site probably discourages commercial loggers from exploiting it, although there has been heavy poaching of *Combretum* on the lower slopes for splitting into building poles. In the longer term, encroachment is likely to become the most serious threat as the demand for land increases. In the past, fire has been used to open up this site for easy clearing for agriculture; frequent fires on the south-western slopes have turned forest into grassland.

■ Further reading

Mlingwa *et al.* (2000), Mungai (1985), Robertson and Luke (1993), Waiyaki (1995), Waiyaki and Bennun (2000).

Gede Ruins National Monument

KE011

Admin region Coast

Coordinates 03°18'S 40°10'E

Area 44 ha Altitude 15 m

A1

National Monument

■ Site description

Gede lies some 94 km north of Mombasa on the Mombasa–Malindi road. A gazetted National Monument since 1927, now managed by the National Museums of Kenya, it protects the excavated ruins of an old Arab-African town, abandoned in the seventeenth century. Over the ruins, on the shallow coral rag soil, has grown a lowland semi-deciduous forest, maintained by a rainfall of around 1,100 mm/year. The 44 ha site, surrounded by farmland, is entirely fenced, and contains around 35 ha of coastal forest, traversed by narrow paths that wind between the excavated buildings. At least 50 indigenous tree species occur, including *Gyrocarpus americanus* and *Sterculia appendiculata*. The edge of Arabuko-Sokoke forest (IBA KE007) is c.3 km away to the west.

■ Birds

See Box for key species. Despite its small size, Gede is an important site for the globally threatened *Zoothera guttata*, a non-breeding visitor. As many as 110 birds may be present between March and October each year. The globally threatened and restricted-range *Anthus sokokensis* has also been recorded here (possibly as a visitor), though there are no recent records and the population, if still extant, must be tiny. Densities of most other birds are also low, although the listed avifauna is surprisingly diverse—42 forest-dependent species have been recorded, including 12 of Kenya's 29 East African Coast biome species and the restricted-range *Tauraco fischeri*, which is resident. Gede is not listed under the biome category, since many of these species may only be occasional visitors. *Gypohierax angolensis* regularly nest in the tall trees within the main excavation. Regionally threatened species include *Pitta angolensis*, *Turdoides squamulatus*, and *Erythrocerus holochlorus*.

Key species

A1	<i>Circaetus fasciolatus</i>	<i>Anthus sokokensis</i>
	<i>Tauraco fischeri</i>	<i>Anthreptes reichenowi</i>
	<i>Zoothera guttata</i>	

■ Other threatened/endemic wildlife

The small mammal *Rhynchocyon chrysopygus* (EN), endemic to the northern East African coast, occurs here, formerly at high densities. The plant *Phaulopsis gediensis* has recently been described from this site.

■ Conservation issues

This is one of the few examples of semi-deciduous forest on coral rag—a distinctive and threatened forest type—that is formally protected in Kenya. The ruined walls and buildings, overgrown with beautiful forest trees, are extremely attractive, and Gede is a popular destination with tourists at the coast. Some 40,000 visitors came here in 1989, though there has been a slight drop-off in the 1990s. The forest is now completely surrounded by farmed land, but up until around the early 1980s there were corridors to other forest patches in the Malindi-Watamu area. Small trees and undergrowth along some trails have been extensively cleared since 1990, which has made the habitat less suitable for *Zoothera guttata*; however, overall numbers of this species changed little between 1983 and 1992. Local use and disturbance of the forest, formerly a problem, has been controlled by fencing. A pack of guard-dogs now roams the site at night, but unfortunately they have eaten their way through much of the population of *Rhynchocyon chrysopygus*. The Kipepeo project, which encourages butterfly farming among local communities around Arabuko-Sokoke forest, is based at Gede, where there are butterfly flight and display cages. A 5-ha section of degraded land to the west of the main excavations is now being restored and growing up as forest, through the Gede National Monument Forest Restoration Project (originally the Gede Koningschool Forest Project).

Further reading

Bennun (1985, 1987, 1992c), Faden and Faden (1972), Fanshawe (1994), FitzGibbon (1994), Gerhardt and Steiner (1986), Kirkman (1975), Mlingwa *et al.* (2000), Nicoll and Rathbun (1990), Rathbun (1978, 1979a,b), Robertson (1994), Robertson and Luke (1993), Robertson and Ngonyo (1998).

Kaya Gandini

Admin region Coast

Coordinates 04°10'S 39°30'E

Area 150 ha Altitude 140–200 m

KE012

A1, A2 (111)

National Monument

Site description

The Kayas are small, relict patches of forest that once sheltered the fortified villages of the Mijikenda people on the Kenyan coast. They have spiritual and ceremonial significance and are customarily protected by a Council of Elders. Kaya Gandini (also known as Takawa or Duruma, and sacred to the Duruma people) lies c.15 km east-north-east of Mombasa, near the town of Gandini, and overlooking the Mambome river. It is dry deciduous *Cynometra-Terminalia* forest. Kaya Mtswakara (247 ha), which is similar floristically, is situated c.2 km away across the Mambome river, and is in turn adjacent to Mwache Forest Reserve (c.345 ha), a somewhat wetter forest across the Mwache river. The Kaya was gazetted as a National Monument under the care of the National Museums of Kenya in 1992.

Birds

See Box and Table 2 for key species. This is a potentially important site for the threatened *Zoothera guttata* (a non-breeding visitor from March to October) and the threatened and restricted-range *Anthus sokokensis* (recently recorded and presumably resident in small numbers). The avifauna is not well studied but is typical of East African coastal forests. Species of regional concern include *Pachycoccyx audeberti*, *Pogoniulus simplex*, *Campethera mombassica* and *Prionops scopifrons*.

Key species

A1	<i>Tauraco fischeri</i>	<i>Anthus sokokensis</i>
	<i>Zoothera guttata</i>	<i>Anthreptes reichenowi</i>
A2 (111)	East African coastal forests EBA: Two of the seven species of this EBA that occur in Kenya have been recorded at this site; see Table 2.	

Other threatened/endemic wildlife

The threatened small mammal *Rhynchocyon petersi* (EN) occurs here.

Conservation issues

As in other Kayas, an increasing disregard for traditional values has led to conservation problems in Gandini. The Kaya has recently been the subject of a land dispute, where certain elders marked out and cut parts of the forest for farming. They have now been requested to move out by the Council of Elders. There has been some cutting of building poles, especially *Terminalia*, but on the whole the forest is in fairly good condition. Gandini is relatively accessible from a main road, making it potentially attractive for timber extraction. However, these threats seem to be under control at present, and (with the support of the National Museums' Coast Forest Conservation Unit) the elders are taking a more active role in managing use of the forest. Trapping of animals (possibly unsustainable) and collection of fuelwood and poles (possibly sustainable) continue. Kaya Mtswakara (gazetted as a National Monument in 1997) is separated from Gandini by c.2 km of settled land along the Mambome river. Restoring a strip of natural vegetation along the river would form a dispersal corridor for birds and other animals. Surveys showed Mtswakara's avifauna to be similar to Gandini's but less diverse, and apparently lacking the two threatened species. Mwache Forest Reserve has not yet been surveyed for birds. It could form a third part of a single conservation area; it has panoramic views of the coast from its ridge-tops, and could be opened up for recreational tourism. Additional surveys are needed to determine whether the threatened birds do occur in Mtswakara and Mwache, in which case the sites should be considered together as a single IBA. Mtswakara is well conserved at present and local control over forest use appears to be effective, but there is considerable illegal pressure on poles and fuelwood in Mwache.

Further reading

Bennun and Njoroge (1996), Mlingwa *et al.* (2000), Robertson and Luke (1993), Waiyaki (1995), Waiyaki and Bennun (2000).

Kaya Waa

Admin region Coast

Coordinates 04°11'S 39°36'E

Area 20 ha Altitude 15 m

KE013

A1

National Monument

Site description

The Kayas are small, relict patches of forest that once sheltered the fortified villages of the Mijikenda people on the Kenyan coast. They have spiritual and ceremonial significance and are customarily protected by a Council of Elders. Kaya Waa (sacred to the Digo people) is *Cynometra-Drypetes* forest on coral rag that covers a level cliff-top just above the ocean, near Waa village. The forest is dense and low, practically a thicket in many places, and difficult to walk through. Under the coral cliffs there is reportedly a large cave, which is of religious significance to the local people. The site was gazetted as a National Monument under the care of the National Museums of Kenya in 1992.

Birds

See Box for key species. The habitat structure is very suitable for the threatened *Zoothera guttata*, which has been recorded here and is likely to occur at relatively high density. The remaining avifauna is impoverished, but *Tauraco fischeri* (Near Threatened and restricted-range) and *Pogoniulus simplex* (East African Coast biome) have been recorded.

Key species

A1	<i>Zoothera guttata</i>	<i>Tauraco fischeri</i>
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Other threatened/endemic wildlife

The threatened small mammal *Rhynchocyon petersi* (EN) probably occurs. There is a healthy population of the coastal forest tree *Cynometra greenwayi*, a rare Kenyan endemic known only from here and the Watamu area.

Conservation issues

The main threat to this sea-front Kaya is of the land being 'allocated' to private developers. This Kaya was the centre of a land allocation controversy in 1988, which led, eventually, to a successful Private Member's Motion in Parliament to gazette the Kayas as National Monuments. Twenty hectares of Kaya Waa was gazetted in 1992, but the forest remains divided into some 57 plots, for which title deeds have apparently been issued, and its fate is uncertain.

Pole-cutting for the hotel industry (to build traditional-style Mijikenda huts) has caused considerable damage, and many larger trees have also been removed, often for beehives. Continued degradation will greatly reduce the value of the site for *Zoothera guttata*, which avoids areas with an open canopy. Fires deliberately set to clear the surrounding agricultural land also pose a threat to the forest. Hunting pressure appears to be very high, with numerous traps and snares, apparently exacerbated by the settlement of Tharaka immigrants in the area during the mid-1980s.

Further reading

Bennun (1987), Mlingwa *et al.* (2000), Robertson and Luke (1993), Waiyaki (1994, 1995), Waiyaki and Bennun (2000).

Kisite island

Admin region Coast

Coordinates 4°43'S 39°22'E

Area c.1 ha Altitude 0–5 m

KE014

A4i

Marine National Park

Site description

Kisite is a small, waterless coral island 8 km offshore in the Kisite-Mpunguti Marine National Park. The park lies south of Wasini Island off Shimoni, on the south Kenyan coast near the Tanzanian border, and covers an area of 1,100 ha at low tide. Kisite itself is flat and treeless, covered in low grass and herbs. Coral platforms around the

raised central portion are exposed at low tide. There are three other coral islets in the park (Mpunguti ya Juu, Mpunguti ya Chini and Jiwe la Jahazi), but these lie closer to the larger Wasini Island, are scrub-covered, and support no significant numbers of nesting waterbirds.

■ Birds

See Box for key species. Between July and October, Kisite supports an assemblage of pelagic-feeding birds. In many (but not all) years this includes a significant breeding colony of *Sterna dougallii*. Up to 1,000 pairs have been recorded, but numbers fluctuate greatly from year to year. In October 1997, 400 adults and c.100 young birds were noted. *Sterna fuscata* also nest here regularly (50 pairs recorded in 1976, and c.20 in 1997), along with *Egretta dimorpha*.

Key species	Breeding	Non-breeding
A4i <i>Sterna dougallii</i>	up to 1,000 pairs	—

■ Other threatened/endemic wildlife

None known to BirdLife International.

■ Conservation issues

Kisite's relatively remote location and the lack of tall vegetation make it suitable for nesting seabirds. All along the Kenya coast, seabirds nest during the June–October period, when the south-east monsoon makes for rough seas and prevents human access to their nesting sites. Nonetheless, before this site was protected in 1978, egg collectors frequently disturbed the breeding colonies. The colonies now appear to be recovering. The number of tourists visiting Kisite is increasing, and careful management is needed to ensure that they do not disrupt the colonies.

■ Further reading

Brass (1994), Britton and Brown (1974), Britton (1977), IUCN/UNEP (1987).

Kiunga Marine National Reserve	KE015
Admin region Coast	A4i
Coordinates 1°50'S 41°26'E	National Reserve, Biosphere Reserve
Area 25,000 ha	
Altitude 0–30 m	

■ Site description

Kiunga Marine National Reserve (gazetted in 1979) incorporates a chain of about 50 calcareous offshore islands and coral reefs in the Lamu Archipelago, running for some 60 km parallel to the coastline off the northernmost coast of Kenya, north-east of Pate Island. Composed of old, eroded coral, the islands lie mainly c.2 km offshore, and inshore of the fringing reef; they vary in size from a few hundred square metres to 100 ha or more. Their walls rise sheer from the surrounding seabed and are usually deeply undercut on the landward side. The larger islands and the more sheltered inner islands are covered with low, tangled, thorny vegetation, including grass, aloes and creepers. The small outer islands, coral blocks up to 18 m high, provide nest sites for seabirds. They consist of bare, sharp-edged spikes and ridges of coral on the seaward side, with only a little straggling vegetation, such as *Salicornia* and the succulent *Sanseveria*. On the landward side there is more vegetation, including stunted, thorny bushes of *Commiphora* and *Salvadora persica*. The coast itself has sandy beaches, some with mangrove swamps, and mangroves often grow in the shelter of the larger islands. Rainfall is around 500 mm/year. Part of the mainland coastline is protected in the 87,700 ha Doodori National Reserve, gazetted in 1976. Kiunga Biosphere Reserve, covering an area of 60,000 ha and including the National Reserve, was designated in 1980.

■ Birds

See Box for key species. The small outer islands are rich in seabirds. Over 5,000 pairs of *Sterna dougallii* were recorded on Mlango wa Hindi in August 1970, with 1,195 pairs noted on islets near Kiunga in 1961. Other species nesting in the reserve include *Larus hemprichii*, *Sterna repressa*, *S. anaethetus* and *Anous stolidus*. The seabirds nest from June to September, when rough seas and strong winds make human access to the islands difficult. They do not use the larger or more vegetated

islands. Over 800 *Dromas ardeola* were noted at the southern end of Kiwayuu Island in November 1996, and other migrant waders frequent the more sheltered flats and creeks, mainly from August to April.

Key species	Breeding	Non-breeding
A4i <i>Dromas ardeola</i>	—	800+ 1996
<i>Sterna dougallii</i>	c.6,200 pairs 1970	—

■ Other threatened/endemic wildlife

Three globally threatened species of turtles—*Chelonia mydas* (EN), *Eretmochelys imbricata* (CR) and *Lepidochelys olivacea* (EN)—nest on the beaches. There are recent records of the globally threatened mammal *Dugong dugon* (VU). The reserve conserves valuable coral reefs, sea-grass meadows and extensive mangrove forests, with their attendant biodiversity.

■ Conservation issues

The human population around the reserve is low, and the poor security situation in recent years means that few people live permanently in the area. This, combined with difficult access, has also limited the development of ecotourism. Local fishermen traditionally collect seabirds' eggs when they can, usually taking the entire contents of a colony. The sheer, underhung walls of the islets and the rough seas during the south-east monsoon make access difficult, so egg collection is probably infrequent. Predation of *Sterna dougallii* eggs by *Larus hemprichii*, and by the storks, ibises and herons that roost on the islets at high tide and at night, may have a substantial impact even without human disturbance. There is some low-volume, high-cost tourism in the reserve. The luxurious Kiwayu Safari Camp is based at Stesheni on the mainland, and there are several camps on Kiwayu Island. A number of archaeological sites on the mainland and main islands have great tourist potential. A World Wide Fund for Nature (WWF) project is working at Kiunga, focusing on community conservation of coral reef fish, turtles and dugongs. There has been no recent survey of seabirds during the nesting season, so the current status of the seabird colonies is unclear. Additional work in this little-known site is needed.

■ Further reading

Britton and Brown (1971, 1974), Fogden (1964), IUCN/UNEP (1987), Nasirwa *et al.* (1998).

Mida Creek, Whale Island and the Malindi–Watamu coast	KE016
Coordinates 03°20'S 40°05'E	A4i
Admin region Coast	National Park, National Reserve, Forest Reserve, Biosphere Reserve
Area 26,100 ha	
Altitude 0–10 m	

■ Site description

This area comprises a complex of marine and tidal habitats on Kenya's north coast, stretching from just south of Malindi town southwards to beyond the entrance to Mida Creek. Habitats include inter-tidal rock, sand and mud; fringing reefs and coral gardens; beds of seagrass; coral cliffs, platforms and islets; sandy beaches; and mangrove forests. Mida Creek, a large, almost land-locked expanse of saline water, mangrove (1,600 ha) and intertidal mud (580 ha), is in the southern sector of the IBA near Watamu town and Mida village, and protected by the 3,200 ha Watamu Marine National Reserve (gazetted in 1968). Its extensive mangrove forests are also gazetted as Forest Reserves, and the extreme western tip of Mida Creek is part of the Arabuko-Sokoke Forest Reserve (IBA KE007). The remaining part of the IBA, along the open coast, is protected by the Malindi Marine National Reserve (21,300 ha), gazetted in 1976 and designated as a Biosphere Reserve in 1979. Enclosed within the reserve are the Watamu and Malindi Marine National Parks (1,000 and 600 ha respectively), which afford stricter protection. The IBA includes several coral islets, notably Whale Island at the entrance to Mida Creek and within the Watamu Marine National Park.

■ Birds

See Box for key species. Mida Creek is an important passage and wintering area for Palearctic migrant waders, the coastline supports important *Sterna saundersi* populations, and Whale Island is a significant nesting site for *Sterna dougallii*. The populations of

Charadrius leschenaultii, *C. mongolus* and *Dromas ardeola* at Mida Creek are internationally important, and many other species use the site: up to 6,000 waders may be present at any one time. The creek is also a significant feeding area for *Egretta gularis*, *Sterna bengalensis* and *S. dougallii*. Common migrant shorebirds include *Calidris alba*, *C. ferruginea*, *Numenius phaeopus*, *Pluvialis squatarola*, *Charadrius leschenaultii* and *C. mongolus*. *Sterna dougallii* and *S. anaethetus* nest on Whale Island between June and October in some years. *Sterna saundersi* occurs in internationally important numbers along the coastline, usually feeding close to shore. The regionally threatened *Casmerodius albus* occurs in small and variable numbers (maximum 15).

Key species		
A4i	Breeding	Non-breeding
<i>Dromas ardeola</i>	—	max. 800
<i>Charadrius mongolus</i>	—	max. 1,500
<i>Charadrius leschenaultii</i>	—	max. 1,250
<i>Sterna dougallii</i>	max. 1,500 pairs	—
<i>Sterna saundersi</i>	—	5,700

Other threatened/endemic wildlife

Mida Creek has important mangrove forests, with a high diversity of species including *Ceriops tagal*, *Rhizophora mucronata*, *Bruguiera gymnorhiza*, *Avicennia marina* and *Sonneratia alba*. It is a key spawning ground for many fish species. The Marine Reserve and National Parks are important for the conservation of the fringing reefs, the famous coral gardens within the lagoons, and the sea grass beds, all with their attendant, diverse marine fauna and flora.

Conservation issues

The Malindi–Watamu coast is a popular tourist destination, with coral reefs one of the major attractions. Consequently there are numerous beach hotels. Management of visitors has been inadequate in the past: delicate corals were trampled on by tourists, or smashed by boat anchors. The situation is improving through tourist education, provision of moorings, and better policing. Another, more insidious threat to the reefs comes from poor land-use in the catchment area of the Sabaki river. Soil erosion has greatly increased silt loads, resulting in silt deposition in the sea just north of Malindi, reducing the growth of, or even killing corals. Fishing and other use of marine resources is permitted, under license, within the reserves but not in the parks. Over-exploitation, illegal fishing and collection of coral and shells remain problems that are difficult to control. Disturbance by tourists visiting the tern colonies on Whale Island needs to be monitored and regulated, especially now that local hotels are advertising the nesting terns as an attraction. The integrity of Mida Creek depends on conserving the mangrove forests, whose destruction appears to be accelerating. As in other mangrove areas, cutting for building poles is rife and largely uncontrolled. The creek lacks a coherent management plan, and is threatened by allocation of land for a waterside hotel development that would have a major environmental impact. Mida needs to be incorporated into conservation planning for this entire complex of protected areas. A comprehensive and integrated plan for use and conservation could also promote the growth of relatively low-impact uses such as ecotourism and bee keeping.

Further reading

Britton and Brown (1971), Brown (1975), Gang and Agatsiva (1992), Hockey *et al.* (1996), IUCN/UNEP (1987), Koyo (1994), Nasirwa *et al.* (1995a,b), Seyes *et al.* (1995).

Marenji forest

Admin region Coast

Coordinates 04°29'S 39°14'E

Area 1,520 ha Altitude 30–160 m

KE017

A1, A2 (111), A3 (A09)

Forest Reserve

Site description

Marenji is a relatively large fragment of coastal forest (covering c.1,480 ha), gazetted as a Forest Reserve in 1967 and located near the Mombasa–Lungalunga road, c.1 km from Mrima trading centre. The forest is undifferentiated, on Magarini sands, with a mixture of grassland and scrubby woodland in the valleys. Farmland and

grassland surround it. Rainfall is around 1,100 mm/year. Some of the major tree species include *Scorodophloeus fischeri*, *Newtonia paucijuga*, *Combretum schumannii*, *Nesogordonia holtzii*, *Bombax rhodognapholon*, *Azelia quanzensis*, *Cordyla africana*, *Julbernardia magnistipulata*, *Albizia glaberrima* var. *glabrescens*, *Milicia excelsa*, *Diospyros mespiliformis*, *Manilkara discolor* and *M. sansibarensis*.

Birds

See Box and Tables 2 and 3 for key species. This forest holds healthy, and probably viable populations of East African coastal forest species, including the globally threatened and restricted-range *Anthus sokokensis*, the Near Threatened *Anthreptes reichenowi* and *Tauraco fischeri*. Regionally threatened species include *Erythrocerus holochlorus*.

Key species

A1 *Tauraco fischeri* *Anthreptes reichenowi*
Anthus sokokensis

A2 (111) East African coastal forests EBA: Two of the seven species of this EBA that occur in Kenya have been recorded at this site; see Table 2.

A3 (A09) East African Coast biome: 12 of the 29 species of this biome that occur in Kenya have been recorded at this site; see Table 3.

Other threatened/endemic wildlife

There is no information on other fauna. The threatened small mammal *Rhynchocyon petersi* (EN) probably occurs, as probably does the increasingly uncommon primate *Colobus angolensis palliatus*. Of 240 plant taxa, at least 12 plant species occurring in Marenji are considered globally or nationally rare.

Conservation issues

Marenji is threatened by commercial logging, mainly for *Scorodophloeus fischeri* and *Newtonia paucijuga*, which has been heavy and damaging to the structure of the forest. Tree poaching (especially of *Combretum schumannii*) for the carving trade, pole cutting and charcoal burning are also prevalent, especially along the eastern and south-eastern boundaries. Some level of use by local people is probably sustainable, but this should be controlled and based on a management plan that derives from a proper forest inventory. Commercial timber extraction should cease if the forest is to retain its biodiversity values.

Further reading

Mlingwa *et al.* (2000), Robertson and Luke (1993), Waiyaki (1995), Waiyaki and Bennun (2000).

Mrima hill forest

Coordinates 04°28'S 39°16'E

Admin region Coast

Area 250 ha

Altitude 100–300 m

KE018

A1, A3 (A09)

Forest Reserve, Nature Reserve,
National Monument

Site description

This IBA consists of wet coastal forest on a small hill rising from the coastal plain some 60 km south-west of Mombasa, just west of the main Mombasa–Lungalunga road. The hill itself is a part of the alkaline igneous complex centred on Dzombo Hill (IBA KE010) and is known to have significant deposits of ores containing manganese and niobium. Mrima has been prospected over several times by geologists and there are many deep test holes, although no large-scale mining has yet taken place. Rainfall is at least 1,100 mm/year, and probably greater, since precipitation is produced as cloud rises over the slopes during the south-east monsoon. The forest is undifferentiated, with exceptional plant species diversity. Large trees include *Combretum schumannii*, *Milicia excelsa*, *Terminalia sambesiaca*, *Nesogordonia holtzii*, *Sterculia appendiculata*, *Drypetes usambarica* var. *mrinae*, *Cordyla africana*, *Albizia glaberrima* var. *glabrescens*, *Newtonia paucijuga*, *Erythrina saculeuxii*, *Antiaris toxicaria*, *Lovoa swynnertonii*, *Zanha golungensis*, *Diospyros mespiliformis*, *Inhambanella henriquesii*, *Manilkara discolor*, *Mimusops aedificatoria* and *Synsepalum brevipes*. Mrima Forest Reserve was gazetted in 1961, and the site was made a strict nature reserve under the Forests Act in the early 1980s. Mrima Hill is also a Kaya, recognized by the site's gazette as Mrima Hill Sacred Grove National Monument in 1992.

The Kayas are relict patches of forest that once sheltered the fortified villages of the Mijikenda people (in Mrima's case, the Digo) on the Kenyan coast. They have spiritual and ceremonial significance and are customarily protected by a Council of Elders.

■ Birds

See Box and Table 3 for key species. Mrima holds non-breeding populations of the globally threatened *Zoothera guttata*, and supports a rich avifauna characteristic of the East African coastal forests. The globally threatened *Tauraco fischeri* (also a restricted-range species) and *Anthreptes reichenowi* are both fairly common here. Forty-seven forest bird species are recorded. *Pogonochila stellata* and *Zoothera gurneyi* are known from Mrima but no other Kenyan coastal forests. Both are probably altitudinal migrants. Regionally threatened species include *Erythrocerus holochlorus*.

Key species

A1	<i>Tauraco fischeri</i>	<i>Anthreptes reichenowi</i>
	<i>Zoothera guttata</i>	
A3 (A09)	East African Coast biome: 10 of the 29 species of this biome that occur in Kenya have been recorded at this site; see Table 3.	

■ Other threatened/endemic species

Mrima's vegetation is exceptionally diverse. A 1989 expedition recorded over 270 taxa, including 25 that are globally or nationally rare. Among others, the rare trees *Uvariadendron gorgonis* and *Gigasiphon macrosiphon* are known from this site, though the latter was not relocated in 1989. The rare butterfly *Eresinopsides bichroma* also occurs. Mammals include the threatened *Rhynchocyon petersi* (EN), *Galagoides zanzibaricus* (LR/nt) and *Colobus angolensis palliatus*. Bats occur in the mineshafts, including the rare and localised *Myonycteris relicta* (VU).

■ Conservation issues

Despite its status as a strict nature reserve, and now a National Monument, Mrima has suffered badly from selective logging and pole cutting. Numerous *Combretum schumannii* and *Milicia excelsa* were being illegally felled in 1989 and 1992. The forest is severely degraded in many places, with an open canopy and dense thicket-like undergrowth. The population density around the hill is high, and there has been some encroachment on the lower slopes to the west. Prospective mining, which has carried on irregularly since 1919, has also affected the forest's structure. Mrima is now littered with deep prospecting holes, each c.50 cm in diameter. Though some of these provide roost sites for bats, they act as effective pitfall traps for other vertebrates (including biologists!). The main threat to the forest remains the possibility of intensive mining for manganese or niobium. Given Mrima's biological importance and its significance as a Kaya (or 'sacred forest') to the Digo community, any mining proposal should be very carefully evaluated. Certainly no opencast mining should be countenanced, as this would be extremely destructive to the forest. In the meantime, the Forest Department should recognize fully the conservation importance of this site, and work with the National Museums' Coast Forest Conservation Unit and the Kaya Elders to maintain its integrity.

■ Further reading

Britton *et al.* (1980), Larson (1991), Mlingwa *et al.* (2000), Robertson and Luke (1993), Waiyaki and Bennun (2000).

Sabaki river mouth

Admin region Coast
Coordinates 03°09'S 40°08'E
Area c.20 ha Altitude 0–5 m

KE019

A4i

Unprotected

■ Site description

This area comprises the sandbanks, mudbanks, dunes and freshwater pools and marshes at the mouth of the Sabaki, Kenya's second-longest river, c.5 km north of Malindi town, between the Malindi–Mamburui road bridge and the sea. The state and size of the estuary vary seasonally, depending on river flows. Just north and south of the river mouth are grassy dunes that conceal permanent or temporary pools of freshwater.

■ Birds

See Box for key species. This site hosts large visiting flocks of *Glareola ocularis* (regularly up to 2,500, with a maximum of 9,000–10,000 in 1978), and is an important resting, roosting and feeding ground for gulls and terns. Good numbers of Palearctic shorebirds also occur, and *Limicola falcinellus*, a very uncommon bird in Kenya, winters here in flocks of up to 80. The Near Threatened, restricted-range *Anthus melindae* is resident in and around the grassy dunes. Regionally threatened species include *Casmerodius albus* (usually present in small numbers) and *Rynchops flavirostris* (a regular visitor, mainly August–March).

Key species

A4i	Breeding	Non-breeding
<i>Glareola ocularis</i>	—	max. 9,000–10,000 (1978)
<i>Larus hemprichii</i>	—	max. 410
<i>Sterna saundersi</i>	—	max. 900
<i>Sterna bengalensis</i>	—	max. 270

■ Other threatened/endemic wildlife

None known to BirdLife International.

■ Conservation issues

The estuary is unprotected, and heavily used and disturbed by people. Recently, off-road vehicles driven along the beach from Malindi have caused damage to dune vegetation and (often intentional) disturbance of roosting or foraging waterbirds. The livelihood of the local residents (and that of many of the waterbirds) depends on the fishery, but this resource appears to be over-exploited. Soil erosion in the river's catchment is increasing silt loads in the Sabaki, but the effect of this on the estuary's ecology is unknown. The river mouth is a great attraction to birdwatchers. There have been serious problems with security in the past, but it nonetheless could make an outstanding, locally managed bird sanctuary. Moi University has constructed a research centre on the south bank, between the road bridge and the river mouth.

■ Further reading

Britton and Britton (1973), Fanshawe (1994), Nasirwa *et al.* (1995b), Seys *et al.* (1995).

Shimba Hills

Admin region Coast
Coordinates 4°15'S 39°25'E
Area 21,740 ha
Altitude 120–450 m

KE020

A1, A2 (111), A3 (A09)
National Reserve,
Forest Reserve

■ Site description

The Shimba Hills are a dissected plateau that ascends steeply from the coastal plains, some 30-km south-west of Mombasa and just south of Kwale town. The surrounding escarpment rises from around 120 m elevation to c.300 m across the bulk of the plateau, and as high as 450 m at Marare and Pengo Hills. Rainfall ranges from 900–1,200 mm/year, and rivers flowing from the hills supply fresh water to Mombasa and to the Diani/Ukunda area, immediately to the east. The Shimba Hills were gazetted as National Forest as long ago as 1903, being one of the few large areas on the south coast that was still well forested. Grassland areas were incorporated in 1924, and several subsequent extensions took place to bring the reserves to their present size. In 1968, most of the area was double-gazetted as the Shimba Hills National Reserve. Two smaller areas to the west, adjoining the National Reserve and almost entirely forested, remained as Forest Reserves only: these are Mkongani North (1,110 ha) and Mkongani West (1,370 ha). The hills have a heterogeneous mosaic of vegetation, including grassland, scrub and exotic plantations as well as forest. Estimates from aerial photographs suggested that 44% (i.e. 9,500 ha) of the total area was forested, and a further 8,000 ha were forest/scrub formations. Grassland or grassland/scrub covered 3,400 ha, the remainder being plantations (600 ha) and other cover. The hills certainly hold one of the largest areas of coastal forest in East Africa after Arabuko-Sokoke (IBA KE007). At least six major forest types have been described, including tall *Milicia* forest on the deep soils on the plateau top (in Longomagandi and Makadara forests, and near

Kwale town), and on the western escarpment; *Azelia–Erythrophloeum* forest, covering much of the eastern and southern escarpment; *Paramacrolobium* forest on particularly steep scarp slopes to both east and west; and *Manilkara–Combretum* forest in the lower, western sector of the plateau. The biggest single patch of forest is in the south-western sector, including Mkongani North and West. Further east and north, the forest breaks up into a complex mosaic interspersed with scrub and grassland. Corridors of forest or forest/scrub formations connect most of the forest patches. At least two Kayas, Kwale and Longomwagandi, are situated within the National Reserve. The Kaya forests have spiritual and ceremonial significance to the Mijikenda people of the Kenya coast. A fenced elephant corridor connects the Shimba Hills with Mwaluganji Forest Reserve.

■ Birds

See Box and Tables 2 and 3 for key species. Shimba Hills has a rich coastal forest bird fauna, including three threatened and two restricted-range species. Both *Zoothera guttata* and *Anthus sokokensis* have been recorded in Mkongani. *Circaetus fasciolatus*, *Tauraco fischeri* and *Anthreptes reichenowi* are common to fairly common. *Sheppardia gunningi* is patchily distributed in tall closed-canopy forest, with records from Mkongani (densities estimated as 0.4 territories/ha); Longomwagandi, where it was fairly common in 1992 but not relocated in 1996; and from Makadara. The relatively large area of forest means that populations of most of these species are likely to be viable. In late March and early April, spectacular concentrations of certain Palearctic migrants such as *Cuculus canorus* and *Oriolus oriolus* move through on passage. The grasslands hold localized species such as *Francolinus afer*, *Cisticola natalensis* and *Euplectes nigroventris*. These are not species of immediate conservation concern, but grassland is vanishing everywhere in Kenya and the habitat protected in the Shimba Hills is valuable. Regionally threatened species include *Hieraetus ayresii* (status unknown); *Stephanoaetus coronatus* (several pairs probably resident); *Erythrocerus holochlorus* (fairly common); *Pitta angolensis* (rarely recorded non-breeding visitor); and *Anthreptes neglectus* (probably the Kenyan stronghold of this little-known species).

Key species

A1	<i>Circaetus fasciolatus</i>	<i>Anthus sokokensis</i>
	<i>Tauraco fischeri</i>	<i>Sheppardia gunningi</i>
	<i>Zoothera guttata</i>	<i>Anthreptes reichenowi</i>
A2 (111)	East African coastal forests EBA: Two of the seven species of this EBA that occur in Kenya have been recorded at this site; see Table 2.	
A3 (A09)	East African Coast biome: 17 of the 29 species of this biome that occur in Kenya have been recorded at this site; see Table 3.	

■ Other threatened/endemic wildlife

Kenya's only population of the ungulate *Hippotragus niger* occurs in the Shimba hills, which was the major reason for incorporating grassland areas into the National Reserve. The restricted small mammal *Rhynchocyon petersi* (EN) also occurs here, together with the distinctive *Bdeogale crassicauda omnivora*. The forest also holds substantial numbers (c.550 in 1997) of *Loxodonta africana* (EN). The rare bat *Myonycteris relicta* (VU) has been collected here. Two frog species, *Africalus sylvaticus* and *Hyperolius rubrovermiculatus*, are endemic to the Shimba Hills forests and believed to be endangered; the little known and range-restricted *Africalus changamwensis* also occurs. The butterfly fauna is very diverse, with some 295 species (35% of Kenya's total), including the rare *Acraea aubyni* and *Neptis rogersi*, and the endemic *Charaxes acuminatus shimbaensis*. The flora of the hills is exceptionally rich and important. A total of 1,100 plant taxa are recorded, c.280 of which are endemic to the Shimba Hills area and nearly 20% considered rare globally or in Kenya. This qualifies Shimba as a Centre of Plant Diversity, according to the criteria of the Association pour l'Etude Taxonomique de la Flore d'Afrique. Notable tree species include *Diospyros shimbaensis*, *Cephalosphaera usambarensis*, *Pavetta tarenoides*, *Synsepalum kassneri*, *Bauhinia mombassae*, *Phyllanthus sacleuxii* and undescribed species of *Polyceratocarpus* and *Uvariadendron*.

■ Conservation issues

Like other coastal forests, Shimba Hills has suffered drastic habitat modification over many years from commercial extraction of timber. *Milicia excelsa* has been a particular target, while *Combretum*

schumannii and *Azelia quanzensis* have been heavily exploited in the drier forest to the west. Commercial exploitation has now largely stopped, but some licenses were (controversially) issued in 1997. A timber inventory in 1992 concluded that the forest had no further potential for timber production and that no logging should be countenanced in any part. The soils on the hills are generally marginal for plantation forestry (or indeed agriculture), and existing plantations have performed very poorly. Demand for timber at the coast is high and growing, so alternative approaches need to be found: two possibilities are plantations on more suitable, disused land, and making better use of existing resources such as coconut trees.

Regeneration of some of the logged-over forests seems to be prevented by the large, increasingly confined elephant population. Elephants use the forests for cover and forage during the day, emerging at night to feed in the grasslands and to raid farms outside the reserves. Some forest areas, such as the *Milicia* forest in Longomwagandi and *Combretum* forest on the southern edge of the hills, have been severely damaged, as seedlings are eaten and adult trees ring-barked. Chronic elephant damage, causing substantial changes in forest structure, may be the reason that the *Sheppardia gunningi* (once relatively abundant) appears to have vanished from Longomwagandi. The Shimba elephant herd has also inflicted serious damage on adjacent forests such as Kaya Lunguma and Mwaluganji Forest Reserve. Rather than increasing plant diversity, as has been claimed, elephant browsing appears to alter the natural process of succession and promote nearly mono-dominant stands of non-forest, elephant-friendly species. Elephant raids on the surrounding farms have become a serious menace, and in recent years a number of people have been killed in elephant attacks. Elephants also inflict considerable damage on the *Pinus caribaea* plantations (which are poorly performing, but nowadays tapped for resin). Fencing off the reserve and/or the plantations would reduce the elephant problem externally, but increase the internal pressure on the forests from a confined and hungry herd. The diversification of ecotourism to include forest-walks, birdwatching and so on, to which Shimba is well-suited, is presently impossible because of the elephant presence. Local use of forest resources is highest on the densely settled eastern fringe. In 1992, removal of *Paramacrolobium* bark for fibre was causing the death of perhaps 10% of the trees in this area, with c.84% damaged. Hunting pressure is also substantial on this side of the forest. The continued early burning of the plateau grasslands is important to provide grazing for the Sable Antelope and other large herbivores. Burning may also help to check the advance of the exotic weed *Lantana camara*, which has invaded many of the clearings. However, burning can damage forest if not carefully controlled, and may inhibit forest regeneration. The threats facing Shimba point to the need for a genuinely integrated management programme that deals with forest conservation, grassland management, problem animal control and local use of forest products. The Forestry Department and Kenya Wildlife Service are already joint managers of the reserve, but do not always work effectively together.

■ Further reading

Bennun and Waiyaki (1992e), Bergmans (1980), Blackett (1994d), Davies (1993a, 1994), Duff-MacKay (1980), Glover (1969), Luke (in press), Mlingwa *et al.* (2000), Nemeth (1996), Robertson and Luke (1993), Rose (1981), Schmidt (1991), Waiyaki and Bennun (2000).

Taita Hills forests

Admin region Coast

Coordinates 3°25'S 38°20'E

Area c.400 ha Altitude 1,350–2,228 m

KE021

A1, A2 (105)

Forest Reserve

■ Site description

The Taita Hills lie in south-eastern Kenya, south and west of Voi town, and rise abruptly above the semi-arid plains of Tsavo West National Park (IBA KE025). These plains, at c.600–700 m altitude, isolate the hills from other mountains and highland blocks. The closest of these are the Chyulu Hills (KE028) and North Pares, c.70 km away, and Mount Kilimanjaro, c.80 km away. The West Usambara mountains, with which the Taita Hills share some botanical affinities, are c.120 km distant. The Taita Hills are divided into three main blocks. Sagalla Hill (peak 1,450 m), directly south of Voi, is separated

from the rest of the hills by the Voi river on the plains. The main body of the hills, Dabida, lies 25 km north-west of Voi, including the high peaks of Ngangao (2,149 m) and Vuria (2,228 m). To the north-east of this range lies the massif of Mbololo (2,209 m), separated from the main block by a valley at c.900 m. Some 50 km to the south-east, and not included within this IBA, lies Mount Kasigau. The forest on this isolated peak has biogeographical affinities with the Taita Hills, but its fauna and flora are as yet little studied. Geologically, the hills are the northernmost outpost of the ancient Eastern Arc mountains of Tanzania and Malaŵi. At the base of the hills, rainfall is only c.600 mm/year. This rises to c.1,300 mm on the top, with local variation. Dry bushland runs up the flanks of the hills, giving way rather abruptly near the top to smallholder cultivation and remnant patches of moist forest. The area is heavily settled. The total population is around 250,000, and densities reach 1,400 people/km² in places. Cultivation is intensive, with maize the most conspicuous crop. As a result of the high human pressure on land, forest remains only as scattered fragments on the hilltops and ridges. Sagalla retains only c.3 ha of moist forest and Mbololo c.220 ha along the hill crest, while the main block has a number of tiny remnants, including Fururu (12 ha), Mwachora (4 ha), Macha (3 ha), Ngerenyi (3 ha), Kichuchenyi (2 ha), Yale (2 ha) and Vuria (1 ha), and two larger patches: Chawia (c.50 ha) and Ngangao (c.92 ha) (areas based on mapping carried out in 1997). Wundanyi County Council has approved the gazettement of all these sites as Forest Reserves for many years. However, while a number of smaller patches (including plantation forest) have been gazetted, the main blocks of Sagalla, Chawia, Ngangao and Mbololo (though managed by the Forest Department) still have not. All the forests have been logged over for valuable timber trees, and substantial portions have been planted with exotic conifers. *Ocotea* spp. were once common in the forests, but have been almost entirely logged out. Other characteristic trees are *Tabernaemontana stapfiana* and *Maesa lanceolata* (growing especially where the forest has been heavily disturbed), *Albizia gummifera*, *Chrysophyllum gorungosanum*, *Cola greenwayi*, *Macaranga conglomerata*, *Newtonia buchananii*, *Syzygium sclerophyllum*, *Xymalos monospora* and the palm *Phoenix reclinata*. The Taita Hills forests have been isolated for a long time from other moist forests, and have themselves been fragmented for at least a century. Forest loss since the 1960s has been very substantial, with estimates of 99% for Vuria, 95% for Sagalla, 85% for Chawia, 50% for Ngangao and under 50% for Mbololo. Despite their small size, the forests are important for water catchment (supplying the Voi river and various local streams) and for soil conservation.

■ Birds

See Box and Table 2 for key species. The Taita Hills are treated as part of the Tanzania–Malaŵi mountains Endemic Bird Area, but they share no restricted-range bird species with the other sites in this EBA. In fact, their avifauna is generally more closely related to that of the Kenyan mountains EBA (109), with which they share the restricted-range *Cinnyricinclus femoralis*. The birds include an element from the northern Tanzanian highlands, for instance through the presence of *Andropadus milanjensis* (also on the Chyulu Hills), the race *helleri* of *Pogonochila stellata*, the race *otomitra* of *Zoothera gurneyi*, and *Phylloscopus ruficapilla*. There is also a coastal element (mainly at the lower-elevation Sagalla), with four of Kenya's 29 East African Coast biome species present. The avifauna is generally impoverished compared to larger, less isolated blocks of forest: only 14 out of the 70 Afrotropical Highlands biome species regularly occur. However the forests are important for a number of globally threatened species, namely *Falco fasciinucha* (known only from early specimens collected at the base of these hills); *Turdus helleri* (a Taita forests endemic and forest-specialist presently known from Mbololo, Ngangao, Chawia and Yale; total population estimated as c.1,350 birds, of which 78% are in Mbololo); *Zosterops silvanus* (a Taita forests endemic, but the most adaptable of the three, recorded at most forest patches apart from Sagalla; total population in the Taita Hills estimated as 1,500 birds, with an additional 5,600 on nearby Mount Kasigau); *Apalis fuscigularis* (a Taita forests endemic, but only recorded on the main massif, in Ngangao, Chawia, Fururu and Vuria, and scarce everywhere); *Cinnyricinclus femoralis* (up to 20 recorded at Chawia; may be an overlooked seasonal visitor); and *Circaetus fasciolatus* (one record from Chawia). Regionally threatened species include *Hieraaetus ayresii* and *Stephanoaetus coronatus*, although their current status is unknown.

Key species

A1	<i>Falco fasciinucha</i>	<i>Apalis fuscigularis</i>
	<i>Turdus helleri</i>	<i>Cinnyricinclus femoralis</i>
	<i>Zosterops silvanus</i>	<i>Circaetus fasciolatus</i>
A2 (105)	Tanzania–Malawi mountains EBA: All three species of this EBA that occur in Kenya have been recorded at this site; see Table 2.	

■ Other threatened/endemic wildlife

Levels of endemism in the Taita Hills are generally very high, reflecting the forests' long isolation. There is an endemic snake *Amblyodipsas teitana*, an endemic caecilian *Afrocaecilia taitana*, an endemic toad *Bufo teitensis*, and two frogs that are otherwise confined to the Usambaras (in the Eastern Arc mountains of Tanzania). Three butterflies, *Cymothoe teita*, *Charaxes xiphares desmondi* and *Papilio desmondi teita*, are endemic to these forests and their fringes. At least nine plant species are endemic, including the trees *Coffea fadenii*, *Psychotria crassipetala*, *Memecylon teitense* and *Zimmermania ovata*; an undescribed *Psychotria* may already be extinct. The plant *Saintpaulia taitensis* has a global range of about 0.5 ha on Mbololo. Another 26 plant species are endemic to the Eastern Arc forests.

■ Conservation issues

The tiny size of the Taita Hills forests, and the dense human population surrounding them, makes them extremely vulnerable. Most of the fragments are already heavily disturbed. The largest and least accessible, Mbololo, is also the most intact; Ngangao has suffered substantial damage; and in the small fragments, almost all the large-circumference trees have been cut. Chawia is still losing its small and easily cut trees. This disturbance is having a particularly negative effect on *Turdus helleri*. It is already absent from all but one of the small fragments, and its population density in Chawia is only a quarter, and in Ngangao a half, that in Mbololo. The population in Chawia is heavily male-biased, has high levels of fluctuating asymmetry and shows evidence of a recent genetic bottleneck. The biodiversity importance of the forests is still little appreciated by their custodians. Conservation of these unique forests will require integrated planning and action. Several initial steps are obvious. Those forests that have not yet been gazetted, should be, as strict nature reserves under the Forests Act. Even this status may not afford adequate protection. Kenyan law presently lacks provision for small nature reserves to be designated for their biodiversity importance. The draft new Museums Bill, yet to be presented to Parliament, allows such sites to be gazetted as National Monuments. If this legislation comes into force, the Taita Hills forests would be an obvious place to apply it. Plantations of exotic trees, mainly conifers, make up a substantial area of all the major fragments. These plantations appear to be performing poorly. However, indigenous vegetation is regenerating underneath the canopy. Controlled felling that allows gradual natural forest regrowth could eventually increase the indigenous forest area substantially. However, it is clear that the increasing demand from the surrounding population for fuelwood, poles and other forest products simply cannot be met sustainably from the natural forests. Strict control of forest use is needed, combined with agro-forestry extension programmes to help people meet these needs on-farm. Extraction of medicinal plants and bark might still be possible under a careful license system. Some compensation for the loss of forest products might come from the development of ecotourism in the Taita Hills. The hills are accessible and conveniently located near the main Nairobi–Mombasa road. They are scenic, and offer spectacular views from many places, the forests have much to interest any naturalist (and certainly any birdwatcher), and are easy and safe to walk in. Sites like Ngangao and Chawia could be sensitively developed for visitors, with walking trails, information boards, trained local guides and accommodation at campsites or in local guesthouses. Such an approach has been successful elsewhere in the world. The East African Wildlife Society is running a community-based conservation project that should eventually give rise to an integrated conservation plan. This links with a regional GEF project focusing on cross-border biodiversity: the Taita Hills is one of its focal sites. A programme of research into the forest's biodiversity and the effects of fragmentation, run jointly by the National Museums of Kenya, Kenyatta University and the University of Antwerp, was completed in 2000 and has produced a number of management recommendations. However, nothing may happen with the necessary urgency unless decision-makers at all levels are convinced of the exceptional importance of these sites.

Further reading

Beentje (1988), Beentje *et al.* (1987), Brooks *et al.* (1997, 1998a,b), Collins and Clifton (1984), Gachanja (1997), Lens *et al.* (1998, 1999a,b), Lens and van Dongen (1999), Stattersfield *et al.* (1998), Stuart *et al.* (1993), Tetlow (1987), Wilder *et al.* (1998, in press).

Tana river delta

Admin region Coast

Coordinates 02°30'S 40°20'E

Area 130,000 ha Altitude 0–37 m

KE022

A1, A3 (A09), A4i, A4iii

Unprotected

Site description

The Tana delta is the name loosely given to the flood-plain ecosystem of the lower Tana river, a vast wetland complex on the Kenyan coast. The delta is roughly triangular in shape, with its apex at Lake Bilisa (north of Garsen) and its base a 50 km stretch of beach along Ungwana (or Formosa) Bay, stretching from Kipini in the north-east to Mto Kilifi in the south-west. This low-lying area is bounded by higher land to the east and west, and to the south by a dune system bordering the Indian Ocean. It forms the interface between the river and the ocean, with fresh and brackish lakes and streams, freshwater and saline grasslands and wetlands, and successional stages of forest and woodland on the riverbanks and the dune ridges parallel to the shore. The mouth of the river has shifted many times. Today, the main stream of the Tana follows an artificial course, directly into an estuary at Kipini, rather than into the complex system of channels and distributaries leading to its old mouth at Mto Tana. Until recently, some fresh water still flowed into the 'old' delta through one of these channels, the Kalota Brook. However, since 1988 a small dam has blocked this, built by Pokomo farmers, who use the tidal bore to push fresh water into their fields and irrigate their crops. Alluvial sediments cover the entire flood-plain in the lower parts. Flooding happens as a result of rain in the river's catchment on Mount Kenya (IBA KE005) and the Aberdare mountains (KE001). Normally, the major floods occur in April–May, with a smaller, short-rains flooding in October–November. The timing, extent and duration of the flooding vary greatly from year to year. The Tana river delta contains a very wide variety of habitats, including riverine forest, grassland, woodland, bushland, lakes, mangroves, dunes, beaches, estuaries and coastal waters. Small fragments of riverine forest, not nearly as extensive as the forests north of Garsen (see KE023), occur along the present or former river courses. Seasonally flooded flood-plain grasslands cover c.67,000 ha of the delta. West of the flood-plain is a diverse bushland. Wooded bushland or grassland, with fire-resistant tree species, occupies a broad swathe east of the flood-plain, merging into the Boni forest vegetation to the north. Other bushland associations form a complex mosaic with the flood-plain grasslands. Parallel to the coast along Ungwana Bay run lines of high dunes, some as much as 37 m above the sea. These are covered by their own distinctive vegetation, a dense thicket dominated by *Dombeya* sp. and *Grewia similis*. In the valleys the thicket mingles with taller trees, including various palms. Palms are prominent in many places. In some areas, especially those cleared and burned in the past, these form substantial tracts of palm-bushed grassland. Tall mangrove forest grows at Kipini in the Tana estuary and along the network of channels further south. As well as seasonal wetlands in the oxbows and flood-plain depressions, the delta contains a number of near-permanent lakes and marshes. Some of these may dry out in certain years, but others, like Lake Shakababo and Bilisa, maintain true aquatic plants and good populations of several species of fish. Luo and Luhya immigrants to the area are responsible for an active and thriving fishery, while Orma pastoralists use the wetlands as dry-season grazing areas for their livestock. Fishermen also camp for days or weeks, while catching, salting and drying fish, on the coral outcrops of Mwamba Ziwayuu, c.10 km offshore from Kipini. The other main ethnic group in the area, the Pokomo, are agriculturalists who cultivate a narrow strip on either side of the river, and around the seasonal and permanent wetlands. As the floods start to recede, rice is planted in the shallow water. Several crops of rice follow the water as its level drops, and other crops, such as maize and sweet potatoes, are planted on the drying mud. There is also an irrigation scheme growing rice in traditional style at Ozi, near Kipini, and a much larger, mechanized one upstream, east of Garsen, that is eventually intended to cover as much as 16,000 ha.

Birds

See Box and Table 3 for key species. The Tana river delta is a stronghold for two Near Threatened, restricted-range species, *Anthus melindae* and *Acrocephalus griseldis* (probably its main wintering ground). *Circaetus fasciolatus* is uncommon in riverine forest, but has not been recorded in recent surveys. The wetlands, including the coastline and offshore islets, at times hold exceptional concentrations of waterbirds. Internationally important populations have been recorded here for no fewer than 22 species, making the delta one of the key sites in the country for waterbird conservation. The Tana delta also supports one of the very few breeding sites for colonial waterbirds in Kenya. This heronry is near Idsowe, south of Garsen, on Ziwa la Matomba, a seasonally-flooded lagoon where the birds nest in a thicket of *Terminalia brevipes*, usually between May and September but also at other times if the lagoon is flooded. Up to 5,000 colonial waterbirds of at least 13 species have been recorded nesting here, including *Anhinga rufa* (up to 100 pairs), *Ardea cinerea*, *A. purpurea*, *Egretta ardesiaca*, *Ardeola ralloides* and *Nycticorax nycticorax*, *Casmerodius albus*, *Mesophoyx intermedia* and *Egretta garzetta*, *Anastomus lamelligerus*, *Threskiornis aethiopicus* and *Plegadis falcinellus*, and *Platalea alba*. Mwamba Ziwayuu, a small coral platform offshore from the Tana estuary, is a resting site for significant numbers of *Sterna saundersi* and *S. bengalensis* that feed in Ungwana Bay. Regionally threatened species include *Casmerodius albus*; *Ephippiorhynchus senegalensis* (a regular visitor in small numbers, May to September) and *Turdoides squamulatus* (local and uncommon).

Key species

A1	<i>Circaetus fasciolatus</i>	<i>Anthus melindae</i>
	<i>Acrocephalus griseldis</i>	
A3 (A09)	East African Coast biome: 12 of the 29 species of this biome that occur in Kenya have been recorded at this site; see Table 3.	
A4i	Non-breeding (max.)	Year
	<i>Pelecanus onocrotalus</i>	2,070 1993–1994
	<i>Pelecanus rufescens</i>	2,500 1993–1994
	<i>Bubulcus ibis</i>	11,270 1993–1994
	<i>Mesophoyx intermedia</i>	2,000 1993–1994
	<i>Casmerodius albus</i>	2,560 1993–1994
	<i>Anastomus lamelligerus</i>	3,530 1993–1994
	<i>Mycteria ibis</i>	970 1993–1994
	<i>Platalea alba</i>	3,680 1993–1994
	<i>Phoenicopterus ruber</i>	2,240 1993–1994
	<i>Plectropterus gambensis</i>	5,400 1993–1994
	<i>Charadrius marginatus</i>	1,070 1993–1994
	<i>Charadrius mongolus</i>	2,340 1993–1994
	<i>Calidris minuta</i>	15,310 1993–1994
	<i>Calidris ferruginea</i>	12,960 1993–1994
	<i>Tringa stagnatilis</i>	1,690 1993–1994
	<i>Larus hemprichii</i>	830 1993–1994
	<i>Larus genei</i>	490 1993–1994
	<i>Sterna nilotica</i>	1,450 1993–1994
	<i>Sterna caspia</i>	1,340 1993–1994
	<i>Sterna bengalensis</i>	1,670 1993–1994
	<i>Sterna saundersi</i>	3,610 1993–1994
	<i>Chlidonias hybridus</i>	1,450 1993–1994
A4iii	Up to 75,000 waterbirds have been recorded at this site.	

Other threatened/endemic wildlife

The importance of the Tana river delta lies in the expanse, intactness, variety and productivity of its habitats. The flood-plain is grazed by a number of ungulates, including the restricted East African coast subspecies of the ungulate *Damaliscus lunatus topi*, with some 30,000 or so in the area. The rivers and channels support large numbers of *Hippopotamus amphibius* (estimated at 400–450) and *Crocodylus niloticus*. Ungwana Bay is one of the few places where *Dugong dugon* (VU), critically endangered in the region, has been recorded recently. The turtles *Chelonia mydas* (EN), *Eretmochelys imbricata* (CR) and *Lepidochelys olivacea* (EN) nest on the sandy beaches. Twenty-two freshwater fish species are recorded from the lower Tana, including three eels *Anguilla* spp. and a distinct subspecies of *Petrocephalus catostoma*. The mangroves provide vitally important spawning and nursery grounds for many species of fish and crustaceans. The extensive mangrove forests include the only significant stands in Kenya of the plant *Heritiera littoralis*, and two other plant species that are considered threatened *Xylocarpus granatum* and *Bruguiera*

gymnorhiza. At least 280 plant taxa are recorded for the delta, and many more undoubtedly occur as there has been no thorough botanical survey; of these, 18 are considered rare in Kenya or globally.

■ Conservation issues

Disputes over the rights to water and land are at the heart of the complex conservation problems facing the Tana river delta. The importance of the area for conservation is widely recognized, but there is little agreement on the appropriate steps forward, and the site remains without any formal protection. The numerous patches of riverine habitat in the delta are edaphic in origin, and their continued existence depends on critical minimum levels of flooding. The flood regime has already been disrupted by five large water impoundments upstream (including Masinga Reservoir, IBA KE030). A proposed new pair of dams to be built by the Mutonga-Grand Falls Hydropower Project has the potential for even more serious impacts. Environmental impact assessment suggested that the new dams would greatly reduce river discharge, silt deposition and the level of groundwater. However, the present design of the Low Grand Falls dam incorporates an artificial flood and sediment release facility. This is intended to release sediments and artificial floods twice a year. Mutonga Dam will also have sand-flushing facilities. It remains to be seen how effective these measures will be. The Tana and Athi Rivers Development Authority have initiated a major rice irrigation scheme in the Tana delta, with funding from the Japanese Government. Four thousand hectares are presently under production near Garsen, and the scheme is creating considerable employment. It has also damaged riverine forest and, if expanded to the planned 16,000 ha, will convert a large swathe of traditional dry-season grazing land relied upon by pastoralists. The ecological impact study by Ecosystems Ltd. (1985) strongly recommended reassessment of the whole project concept, pointing out that there were more efficient ways of producing rice and much more appropriate ways of using the delta's resources than monopolising them for a single agricultural activity. Other smaller projects have similarly severely impacted the natural flooding patterns. There has been a long-running debate over land ownership and tenure within the delta that has had knock-on effects for conservation and development initiatives in the area. In the continuing state of confusion, environmental degradation in this (until recently) pristine habitat continues apace. Destruction of woodland and mangroves, slash-and-burn agriculture, illegal hunting of wildlife and unregulated offshore trawling are all diminishing the delta's resources. More disturbingly, there are reports of allocations of large chunks of land to senior government officials and civic leaders from the district. The local communities remain hostile to ideas of their ancestral land being hived off as a wildlife reserve (as has been proposed by the Kenya Wildlife Service). Ironically, protection under the Ramsar Convention means something quite different to this. The Convention enshrines the idea of wise use—and central to this is that the needs of the local people must be met, in a sustainable way. The resources of the delta are bountiful enough that it can be managed in the interests of those who live there, while ensuring the long-term conservation of its birds and other biodiversity. The sooner the planning process begins the better.

■ Further reading

Andrews *et al.* (1975), Becha (1997), Britton (1974), Butynski (1995), Cheffings (1987), Coastal ASAL Development Project (1991), Coverdale *et al.* (1983), Ecosystems Ltd. (1985), Ng'weno (1993), Njuguna (1992), (1993), Nkako (1992), North (1959), Opala (1993), Pearson *et al.* (1978), Robertson and Luke (1993), Survey of Kenya (1984), Wass (1995), Whitehead (1959).

Tana river forests

Admin region Coast

Coordinates 2°10'S 40°10'E

Area c.3,700 ha Altitude 40–70 m

KE023

A1, A2 (111), A3 (A09)
National Reserve (in part)

■ Site description

These are riparian forests along the meandering course of the lower Tana river, some 350-km east of Nairobi and 240 km north of Mombasa. Along the last 65 km of its course, the Tana has a broad flood-plain, 1–6 km wide, that is covered by alluvial sediment deposited during floods. Such flooding takes place in response to heavy rains on the Aberdare mountains (IBA KE001) and Mount Kenya (KE005) watersheds rather than local rainfall in this hot, arid region. The lowland evergreen forests

are patchy, of different successional stages, and are dependent on groundwater supplied by the river. Characteristic trees include *Ficus* spp., *Phoenix reclinata*, *Acacia robusta*, *Populus ilicifolia*, *Blighia unijugata*, *Sorindeia madagascariensis*, *Diospyros mespiliformis* and *Mimusops obtusifolia*. There are about 71 distinct forests, ranging in size from 1–1,100 ha and covering c.3,700 ha in total. They form part of a mosaic of habitats that includes grassland, wooded grassland, bushland and deciduous woodland. The forests lie on both banks of the Tana. Of the 71 patches, 16 (covering 1,000 ha) fall within the 17,100 ha Tana River Primate National Reserve (which extends for about 36 km along the river's present course), around 14 in the area managed by the Tana Delta Irrigation Project, and the remainder on Trust land

■ Birds

See Box and Tables 2 and 3 for key species. *Circaetus fasciolatus*, *Tauraco fischeri* and *Antheptes reichenowi* are fairly common in this area. This is the only known site for *Apalis chariessa chariessa*, which however may now be extinct as the last record was in 1961. The status of *Sheppardia gunningi* is unclear: recent surveys of eleven forest patches found this species only in the largest, Wenje East. The enigmatic *Cisticola restrictus* is also poorly known, but may occur in bushland in the National Reserve. *Acrocephalus griseldis* is a non-breeding visitor from November to April, and may be numerous on the lower Tana, in riverine thickets. The threatened *Zoothera guttata* has been recorded from Kipini, near the river's mouth, but it is not known if it occurs in forests upstream. The avifauna holds some unusual species for coastal forest (notably *Apalis chariessa*, possibly extinct now, which is disjunct from the next known population in the Uluguru mountains of Tanzania). Birdlife is abundant in the variety of habitats at the site, and the oxbow lakes and riverbanks harbour a variety of waterbirds. The area is a stronghold for *Scotopelia peli*, a species of regional concern. Other regionally threatened species include *Anhinga rufa*, *Ephippiorhynchus senegalensis*; *Hieraaetus ayresii* (uncommon); *Stephanoaetus coronatus* (uncommon); *Podica senegalensis*; *Phoeniculus granti*; *Turdoides squamulatus*; *Erythrocerus holochlorus* (moderately abundant in less disturbed fragments: recorded in 8 out of 11 recently surveyed); and *Antheptes neglectus* (recent records from Kitere forest).

Key species

A1	<i>Circaetus fasciolatus</i>	[<i>Cisticola restrictus</i>]
	<i>Tauraco fischeri</i>	<i>Acrocephalus griseldis</i>
	<i>Sheppardia gunningi</i>	<i>Antheptes reichenowi</i>
	<i>Apalis chariessa</i>	
A2 (111)	East African coastal forests EBA: at least two of the seven species of this EBA that occur in Kenya have been recorded at this site; see Table 2.	
A3 (A09)	East African Coast biome: 19 of the 29 species of this biome that occur in Kenya have been recorded at this site; see Table 3.	

■ Other threatened/endemic wildlife

The fauna of these unique, remnant forests bears traces of ancient links to the Congo basin forests, during the Miocene period. They are the only home of two distinctive primates, *Colobus badius rufomitratu*s (LR/nt) and *Cercocebus galeritus galeritus* (LR/nt). The populations of these species have decreased considerably in recent years and both are seriously threatened. The highly threatened and restricted ungulate *Damaliscus (lunatus) hunteri* occurs in the bushland nearby. At least 61 plants are globally or nationally rare, and notable species include *Anisocycla blepharosepala*, an undescribed *Dichapetalum* sp., *Cynometra lukei*, *Cyphostemma ternatum*, *Synsepalum msolo*, *Tylophora stenoloba*, *Pavetta sphaerobotrys* ssp. *tanaica* and *Uncaria africana*. On sandy bars and banks in the river grows a poplar tree, *Populus ilicifolia*, endemic to the Northern Ewaso Ng'iro, Tana and Athi/Sabaki rivers.

■ Conservation issues

The riverine forests are also home to the Pokomo people, who farm the riverbanks. They use mainly the oxbows, growing rice next to the water and maize further back. They exploit the forest for fuelwood, timber and traditional medicines. High rates of population growth have increased pressure on resources, and large areas of forest have been felled to make way for cultivation. Generally, forest use is thought to be unsustainable, with fire, pole-cutting and felling of large trees for canoes particular threats. Insecurity on the eastern bank of the river has helped protect the forests there, which are generally in better condition. Many important forests, and an estimated 63% of the colobus and 44% of the mangabey populations, occur outside the reserve. These

patches are generally under more immediate pressure than those within it. A major GEF-funded project, which began in 1997, is addressing the issue of community use of the forests and their management for biodiversity conservation. It has, however, been plagued with implementation problems, mainly connected with the controversial issue of resettling people who are currently living in the National Reserve. The project will also not tackle the other major potential threat to the forests: dams on the upper reaches of the Tana river. Five major dams—Kindaruma, Gitaru, Kiambere, Kamburu and Masinga (IBA KE030)—already provide hydro-power and irrigation water. These impoundments substantially alter the natural flooding regime of the river, on which continued survival of the forests depends. Recent concern has focused on the planned Mutonga–Grand Falls Hydropower Project. An environmental impact assessment of the original proposal suggested that the new dams at Mutonga and Grand Falls would greatly reduce river discharge, silt deposition and the level of groundwater. This would lead directly to the loss of the riverine forest and the species that it holds. However, following further debate, the present design of the Low Grand Falls dam incorporates an artificial flood and sediment release facility. This is intended to release sediments and artificial floods twice a year, around April and November. Mutonga Dam will also have sand-flushing facilities. Although this increases the costs, these costs will be offset by the environmental value. Construction is to begin in 2003, for commissioning in 2008. Before detailed design and tendering begins, an additional environmental assessment will measure flood patterns for at least two rainy seasons. At least in theory, the new dams will have the potential to mitigate not only their own impact but that of the five existing dams as well. However, who decides whether, when and how the artificial floods are released remains a contentious issue.

Further reading

Amutete and Eshiamwata (2000), Amutete and Owino (2001), Andrews *et al.* (1975), Butynski (1994, 1995), Butynski and Mwangi (1995), Davies and Kahumbu (1993), Decker (1987), Hughes (1982, 1987, 1990), Kahumbu (1993), Kiss (1993), Marsh (1986), Marsh *et al.* (1975), Mbora (2000), Medley (1990, 1993, 1995, 2000), Medley *et al.* (1989), Mlingwa *et al.* (2000), Njue (1992), Oyugi and Amutete (1999), Pearson *et al.* (1978), Robertson and Luke (1993), Seal *et al.* (1991), Wahungu (1998).

Tsavo East National Park

Admin region Coast, Eastern

Coordinates 2°45'S 38°35'E

Area 1,175,000 ha Altitude 300–910 m

KE024

A1, A3 (A08)
National Park

Site description

This vast savanna National Park lies in low, semi-arid country at the eastern edge of the inland plateau, north of the main Mombasa–Nairobi road and railway. Much of the park is level, open country, with scattered rocky outcrops. The Yatta Plateau, a long, flat-topped lava ridge, runs along the western boundary, and beneath it flows the Athi river; this joins the Tsavo river to become the Galana river, a permanent stream that cuts right across the park. The seasonal Tiva and Voi rivers are important features of the northern and southern sectors, respectively. Along the rivers is a narrow fringe of woodland and thicket, dominated by *Acacia elatior*, the Doum palm *Hyphaene compressa* and the shrub *Suaeda monoica*. The northern part of the park is predominantly more-or-less dense *Acacia-Commiphora* woodland. South of the Galana, this has been opened out over the years by fire and elephants to form open bushed grassland. Common shrubs here include species of *Premna*, *Bauhinia* and *Sericocomaopsis*, and scattered trees such as *Delonix elata* and *Melia volkensii*. The Yatta Plateau has a cover of dense bushland, with stands of baobab *Adansonia digitata*. There are scattered seasonal pools, swamps and dams, but relatively few sources of permanent water. The vegetation is generally denser in the west, where rainfall is c.450 mm/year, than in the drier east, which may receive only c.250 mm.

Birds

See Box and Table 3 for key species. The enigmatic, Near Threatened *Mirafra pulpa* probably nests here, with birds recorded singing and displaying in open bushed grassland near Voi Safari Lodge in 1976–1977. The park's huge area of natural habitat supports important populations of resident species, and is also a very significant stopover

and wintering ground for Palearctic migrants. *Falco naumanni* is one such (regular but uncommon) visitor from December–March. There is likely to be a substantial passage of *Acrocephalus griseldis* from the Middle East, judging from birds ringed further south in Tsavo West National Park (IBA KE025); some birds overwinter. Regionally threatened species in Tsavo East include *Anhinga rufa* (occasional visitor); *Casmerodius albus* (regular visitor); *Ephippiorhynchus senegalensis* (regular); *Trigonoceps occipitalis* (resident in small numbers); *Polemaetus bellicosus* (a stronghold, although the total numbers may be small as home ranges cover a great area); *Podica senegalensis*; and *Phoeniculus granti* (uncommon).

Key species

A1	<i>Falco naumanni</i>	<i>Acrocephalus griseldis</i>
	<i>Mirafra pulpa</i>	
A3 (A08)	Somali–Masai biome: 61 of the 94 species of this biome that occur in Kenya have been recorded at this site; see Table 3.	

Other threatened/endemic wildlife

The park holds substantial populations of a diversity of large mammals. Threatened species include *Loxodonta africana* (EN) and *Acinonyx jubatus* (VU). Small herds of the ungulate *Damaliscus (lunatus) hunteri* were translocated in the 1960s and again in 1996, from Arawale National Reserve, and are managing to sustain their numbers. Two amphibian taxa, *Afrixalus pygmaeus septentrionalis* and *Hyperolius sheldricki*, are endemic to the Tsavo area.

Conservation issues

Wildlife poaching was a serious problem during the 1980s, when *Diceros bicornis* were eliminated, but now appears to be under control. Tsavo East is large enough to form a fairly self-contained ecosystem. So long as it remains a National Park managed for wildlife, threats to its biodiversity are minimal.

Further reading

Bax (1963), Lack (1977, 1983a,b, 1985), Lack *et al.* (1980), Leuthold and Leuthold (1976), Pearson (1997), Smeenk (1974).

Tsavo West National Park

Admin region Coast, Eastern

Coordinates 2°50'S 38°10'E

Area 906,500 ha Altitude 600–1,800 m

KE025

A1, A3 (A08)
National Park

Site description

Tsavo West National Park is a vast expanse of savanna stretching from the Athi river, north of the Mombasa–Nairobi road, south to the Tanzanian border. The north-east boundary along the Athi adjoins Tsavo East National Park (IBA KE024), but Tsavo West has a more varied topography and a more diverse array of habitats than its neighbour. Most of the northern sector is *Acacia-Commiphora* bushland, with scattered trees such as baobabs *Adansonia digitata* and *Delonix elata*. There are numerous rocky outcrops and ridges, and, towards the Chyulu Hills, ash cones and lava flows—some of them very recent. In the Ngulia area, a range of craggy hills reaches c.1,800 m and is heavily wooded. The southern sector consists of open grassy plains. The permanent Tsavo river runs through the northern part of the park, with a fringe of riverine *Acacia elatior* and *Hyphaene compressa* woodland. In the far south-west corner on the Kenya–Tanzania border is Lake Jipe, part of which is in the park. Run-off from Mount Kilimanjaro and the North Pare mountains feed this very attractive lake. It is bordered by extensive beds of *Typha* and has large permanent swamps at its eastern and western ends. At Mzima Springs, in the north of the park, water that has filtered underground from the Chyulu Hills gushes into a series of clear pools, rich in fishes and fringed by *Raphia farinifera* and *Phoenix reclinata* palms. Tsavo West houses one of Africa's premier bird ringing stations, Ngulia Safari Lodge, which is located on the edge of a dramatic escarpment at the foot of Mount Ngulia.

Birds

See Box and Table 3 for key species. Tsavo West has a rich avifauna. The enigmatic, Near Threatened *Mirafra pulpa* has been recorded singing and displaying in years of good rains, and presumably nests here. Tsavo West forms part of a corridor of natural habitat in eastern

Kenya through which vast numbers of Palearctic birds migrate, especially in November/December. These include the globally threatened *Crex crex* (regularly caught at Ngulia Lodge) and Near Threatened *Acrocephalus griseldis* (regularly ringed at Ngulia; a number of birds may overwinter). Local weather conditions at Ngulia Safari Lodge are often such that thousands of migrating birds are attracted to the lodge's lights at night, and around 220,000 individuals have been ringed here since 1969. Lake Jipe supports an important heronry, where the regionally threatened *Anhinga rufa* nests (in small numbers), among other species; this is situated a few kilometres outside the park. Other regionally threatened species include *Struthio camelus* (common); *Casmerodius albus* (small numbers at Lake Jipe and Mzima Springs); *Trigonoceps occipitalis* (resident in small numbers); *Polemaetus bellicosus* (resident in small numbers); *Coturnix adansonii* (uncommon); *Podica senegalensis* (uncommon on Tsavo river); *Phoeniculus granti* (local and uncommon); and *Buphagus africanus* (fairly common in extreme south).

Key species

A1	<i>Crex crex</i>	<i>Mirafrapa pulpa</i>
	<i>Acrocephalus griseldis</i>	
A3 (A08)	Somali–Masai biome: 55 of the 94 species of this biome that occur in Kenya have been recorded at this site; see Table 3.	

Other threatened/endemic wildlife

Tsavo West is well known for its populations of large savanna mammals, particularly *Loxodonta africana* (EN). The Ngulia Rhino Sanctuary holds a number of *Diceros bicornis* (CR), and other threatened mammals include *Acinonyx jubatus* (VU). The frog *Afrixalus pygmaeus septentrionalis* is known only from the area between Mtito Andei and Voi, but is not considered under threat.

Conservation issues

The park faces no major threats at present. The remarkable phenomenon of night-time bird migration over Ngulia Safari Lodge is an ecotourist attraction that is presently little appreciated. This long-term ringing programme has enormous scientific value, and its importance should be better recognized by the park administration.

Further reading

Backhurst (1996), Backhurst and Pearson (1977a,b, 1979, 1980, 1981, 1983a,b, 1984), Jensen and Belsky (1989), Pearson (1996, 1997), Pearson and Backhurst (1976), Pearson *et al.* (1992), Richards (1996).

Chyulu Hills forests

Admin region Eastern, Rift Valley

Coordinates 2°35'S 37°50'E

Area 18,000 ha

Altitude c.1,800–2,160 m

KE026

A1, A2 (109)

National Park,

Game Conservation Area

Site description

The Chyulu Hills are situated 190 km south-east of Nairobi and 30 km south-west of Kibwezi. They are of relatively recent volcanic origin, and the range is composed of ash cones and craters. The hills hold no permanent surface water, but rainfall percolating through the porous rock feeds many permanent fresh water sources in the surrounding plains, notably Mzima Springs and the Tsavo and Galana rivers. The hills are relatively undisturbed and still shelter indigenous vegetation and wildlife. Rough grassland and thicket give way to patches of montane forest along the spine of the hills, mainly above the 1,800 m contour; the largest tract of forest is around the highest peaks in the central-southern portion. Characteristic trees include *Ficus* spp, *Neoboutonia macrocalyx*, *Tabernaemontana stapfiana*, *Prunus africana*, *Strombosia scheffleri*, *Cassipourea malosana*, *Olea capensis* and *Ilex mitis*, with islands guarded by *Erythrina abyssinica*. Lower down, there are areas of *Juniperus procera* forest and, particularly on lava flows, forest dominated by the blue-stemmed *Commiphora baluensis*. The eastern flank of the hills, including about half the forested area, is in the 47,100 ha Chyulu East National Park, administered by Kenya Wildlife Service. The park boundary runs down the centre of the hills along the line of the peaks. The western half is part of the ungazetted West Chyulu Game Conservation Area, owned by several Maasai group ranches. At present, this area has no formal conservation status. The notional boundary of the IBA follows the 1,500 m contour,

including an area of some 18,000 ha of which around half is included in the park and slightly under half (c.7,900 ha) is forested.

Birds

See Box and Table 2 for key species. The Chyulu Hills may be an important stopping-point (when forest trees are in fruit) for *Cinnyricinclus femoralis* as they move between forests on Mount Kilimanjaro and the central Kenyan highlands. The hills hold endemic races of *Francolinus shelleyi* (*macarthuri*), *Pogonochla stellata* (*macarthuri*) and *Zoothera gurneyi* (*chyulu*). The race *chyulu* of the *Bradypterus cinnamomeus* is now generally merged with the race *rufiflavus* of northern Tanzania, but Chyulu birds are darker. Van Someren (1939) named 22 further Chyulu Hills subspecies, and although most are no longer considered valid, definitive taxonomic work remains to be done. Regionally threatened species include *Hieraaetus ayresii* (status unknown); *Stephanoaetus coronatus* (status unknown) and *Polemaetus bellicosus*.

Key species

A1	<i>Cinnyricinclus femoralis</i>
A2 (109)	Kenyan mountains EBA: One of the eight species of this EBA that occur in Kenya has been recorded at this site; see Table 2.

Other threatened/endemic wildlife

A variety of large mammals occurs on Chyulu, including, at times, *Loxodonta africana* (EN). The rich butterfly life includes the endemics *Pentila tropicalis chyulu*, *Acraea anacreon chyulu*, *Papilio desmondi desmondi* and the near-endemic *Amauris echeria chyuluensis*. Ongoing research on the vegetation gives some 550 plant taxa, excluding the numerous grasses. Amongst these are 37 species of orchid, mostly epiphytes supported by the heavy mists and the rare saprophyte *Epipogium roseum*. Notable trees are *Chionanthus mildbraedii* and the most northerly population of *Podocarpus usambarensis*.

Conservation issues

Agricultural settlers, who were displaced in 1988 to make way for the National Park, occupied the lower eastern slopes of the hills in the past. This has led to lingering resentment among those evicted, and difficulties in policing use of the park. There have been particular problems with forest burning and cutting to encourage sprouting of 'miraa', *Catha edulis*, a valuable tree whose young shoots are used as a stimulant in parts of Kenya and Somalia. 'Miraa' harvesting could well be sustainable if properly managed, but National Park regulations do not allow for it to be extracted legally. The hills provide wet-season grazing for Maasai pastoralists from the nearby group ranches. Regular burning of the grassland is also caused by meat poachers either driving game into snare lines or using the resultant new grass as bait. It is debatable how destructive these annual grass fires are to the forests, quite possibly protecting them in the long run by ensuring that flammable brush and litter do not build up to dangerous levels. The hills have great potential for ecotourism, but difficulties of access and the lack of surface water have kept this to a limited scale so far. Chyulu Lodge, on the north-west slopes, caters for visitors interested in walking or horse-riding in the hills, or bird-shooting on the plains below. There has been little ornithological work in Chyulu since an East Africa Natural History Society expedition in the 1930s. A bird conservation survey of the forests is overdue. It should focus on the status and requirements of *Cinnyricinclus femoralis* and the endemic subspecies of forest robin and thrush.

Further reading

OS-c (1983a), van Someren (1939), Turner (1977).

Dida Galgalu desert

Admin region Eastern

Coordinates 2°40'N 38°05'E

Area Undefined Altitude 600–800 m

KE027

A1, A2 (s061), A3 (A08)

Unprotected

Site description

This area comprises a vast expanse of arid, inhospitable black lava desert, stretching from c.20 km north of Marsabit town for at least 60 km on either side of the main Marsabit–Moyale road. The distributional limits of the special birds, and therefore the limits of the IBA, are unknown. Rainfall is erratic and unpredictable, averaging

less than 200 mm/year. The nomadic Gabbra people inhabit the area, but there are no permanent settlements in this harsh, waterless terrain. The desert's southern fringe is just within the Marsabit National Reserve, but it is otherwise unprotected.

■ Birds

See Box and Table 3 for key species. This appears to be the stronghold of the enigmatic, Near Threatened, restricted-range *Mirafra williamsi*, and most recent records have been from this area. The species is locally common but inconspicuous in rocky lava desert with sparse grass and low *Barleria* shrubs. Other notable species include *Neotis heuglinii*, *Merops revouillii*, *Spizocorys personata* (probably the largest population in Kenya), *Galerida theklae*, *Eremopterix signata* and (on the northern fringes) *Spreo albigapillus*. Many Somali–Masai biome species occur in the general area of Marsabit, but it is not known how many are present in the desert itself.

Key species

- A1 *Mirafra williamsi*
- A2 (s061) North Kenyan short-grass plains Secondary Area: *Mirafra williamsi* has been recorded at this site.
- A3 (A08) Somali–Masai biome: 44 of the 94 species of this biome that occur in Kenya have been recorded from (or near) this site; see Table 3.

■ Other threatened/endemic wildlife

None known to BirdLife International.

■ Conservation issues

Little information is available, but this habitat is unlikely to be under threat. Very little is known about *Mirafra williamsi*, and an ecological survey of this species would yield useful information. The lark should also be looked for on the slopes of Mount Marsabit, the type locality; if a viable population is present there, the National Park could be incorporated into the IBA.

■ Further reading

Turner (1997).

Lake Turkana

Admin region Eastern, Rift Valley

Coordinates 3°27'N 36°40'E

Area 756,000 ha Altitude 355 m

KE028

A4i, A4iii

Unprotected, National Parks

■ Site description

A very large, isolated, chloro-carbonate alkaline lake, the northernmost and by far the largest of the chain of Rift Valley lakes in Kenya. The Omo river delta at the extreme northern end of the lake lies within Ethiopia (IBA ET069). Turkana's water is brackish, but drinkable, and the lake holds freshwater fish. The c.600 km of lake shore vary greatly in substrate, from rock (most of the southern sector, the central eastern shore, and North, Central and South Islands) to pebble, sand (most of the north-western shore, and patches elsewhere) and mud (at Loiyengalani, El Molo and Allia Bays, the Omo delta and the inlets of the Turkwel and Kerio rivers). Beds of the submerged plant *Potamogeton pectinatus* occur in the most sheltered muddy bays. The country surrounding the lake is semi-desert with sparse vegetation: annual rainfall averages less than 250 mm (substantially less in some places), and it may not rain for several years at a stretch. South and Central Islands are National Parks and, in the north-east, c.13% of the shoreline is protected within Sibilo National Park.

■ Birds

See Box for key species. Turkana is an extremely important waterbird site: 84 waterbird species, including 34 Palearctic migrants, have been recorded here. Over 100,000 *Calidris minuta* may winter, representing more than 10% of the entire East African/South East Asian wintering population (cf. Rose and Scott 1997). As well as supporting many wintering Palearctic migrants, the lake is a key stop-over site for birds on passage. Waterbirds are distributed all around the lake, but the highest densities are on mud and pebble shores; particular concentrations occur in sheltered muddy bays and the Omo delta. At least 23 species breed here, including *Ardea goliath*, and up to 50 pairs of the regionally threatened *Rynchops flavirostris* have bred on Central

Island (but have now shifted to less disturbed localities). Other regionally threatened species include *Casmerodius albus* (occurs in small numbers, with 60 estimated in February 1992); *Ephippiorhynchus senegalensis* (nine estimated in February 1992) and *Circus cinerascens*.

Key species

A4i	Non-breeding	Year
<i>Pelecanus rufescens</i>	1,060	1992
<i>Phoenicopterus ruber</i>	2,580	1992
<i>Vanellus spinosus</i>	6,930	1992
<i>Charadrius hiaticula</i>	13,600	1992
<i>Charadrius asiaticus</i>	500	1992
<i>Charadrius pecuarius</i>	8,600	1992
<i>Calidris minuta</i>	113,000	1992

A4iii Up to 220,000 waterbirds have been recorded at this site.

■ Other threatened/endemic wildlife

Lake Turkana is rich in fish, with 47 species, seven of which are endemic. The sheltered muddy bays with beds of waterweed *Potamogeton* are important for fish spawning. The fish in turn support a large population (estimated at some 14,000 in 1968) of *Crocodylus niloticus*.

■ Conservation issues

Most of the lake has no formal protection, and in this wild and remote area the protection given by National Park status is largely nominal. Fortunately, direct human pressure on the lake is relatively low. Turkana's water level has been dropping steadily for many years (a decrease of 10 m was recorded between 1975 and 1992), mainly due to reduced inflow from the Omo river that supplies 90% of the lake's water. The Omo flows from the Ethiopian Highlands, where irrigation projects and the effects of prolonged drought have diminished its flow. Important Kenyan inflows, such as the Turkwel, have also been substantially reduced in recent years by hydro-power and irrigation schemes. Some islands that supported nesting waterbirds are now joined to the mainland and have been overrun by goats. Disturbance by fishermen seems to be a general problem for the island-nesting birds: in particular, fishermen's camps on Central Island have forced the *Rynchops flavirostris* that nested there to shift elsewhere, and the present status of this breeding colony is unclear. Pressure on the fish populations is increasing, although attempts to institute industrial-scale-fishing projects have failed. Some bird species, particularly gulls, may benefit from the upsurge in fishing and fish drying. Human populations around the lake are becoming more sedentary; consequent overgrazing by livestock causes deterioration of the lakeshore vegetation, and erosion of soils in the very strong winds that characterize this area.

■ Further reading

Bennun and Fasola (1996), Davey (1982), Fasola *et al.* (1993a,b), Hopson (1982), Schekkerman and van Wetten (1987).

Machakos valleys

Admin region Eastern

Coordinates 1°35'S 37°14'E

Area at least 5,000 ha Altitude 1,300–1,600 m

KE029

A1, A2 (109)

Unprotected

■ Site description

This area comprises river and stream valleys in the catchment of the Ikiwe and Ngwani rivers, south of Machakos town, draining eastwards into the Athi river system. The land slopes gradually down from the Athi-Kapiti plains in the west, with an intricate system of river valleys draining between small hills. The area is semi-arid rangeland, with rainfall around 500–700 mm/year, and with low potential for agriculture. Most of the streams and rivers are seasonal, with shallow valleys. The riverbeds consist of sand and rock, with a dense band of bush and thicket (dominated by *Grewia trichocarpa* with *Teclea* and *Aspilia* species) for about 10 m on either side, grading into open *Acacia hockii* and *A. xanthophloea* woodland. The land is owned by a number of large ranches, including Potha, Kilima and Kimutwa, some of which have been divided up into small agricultural plots. The boundaries of the IBA are presently undefined, requiring further survey work; it

includes sections of the Ikiwe, Kimutwa, Love, Makilu, Mwania, Potha, Syuuni, Wamua and Wamui rivers.

■ Birds

See Box and Table 2 for key species. The riverine thickets and woodland shelter the globally threatened *Turdoides hindei*, which has a very restricted range in central Kenya. This is one of the few sites where it is known to occur in natural habitat, although at relatively low densities (c.2 birds/km of watercourse; a total of around 60 birds in 14 groups estimated for the IBA during 2000). The babblers are commonest in the higher parts of the IBA, and are likely to occur in river valleys immediately to the south as well. The rest of the avifauna is characteristic of semi-arid areas in Kenya, with 18 species from the Somali–Masai biome, see Table 3.

Key species

A1	<i>Turdoides hindei</i>
A2 (109)	Kenyan mountains EBA: One of the eight species of this EBA that occur in Kenya has been recorded at this site; see Table 2.

■ Other threatened/endemic wildlife

None known to BirdLife International.

■ Conservation issues

The area is mainly ranchland, but (as in other marginal land in Kenya) agriculture is increasing, with attendant destruction of habitat. Of particular concern is the subdivision of large ranches into small parcels of land that are then cleared of all natural vegetation. The riverine woodland and thickets, which provide suitable habitat for *Turdoides hindei*, are particularly vulnerable. Because of the babblers' low densities, which imply large home ranges (mean territory length estimated as 1.25 km of watercourse), even moderate habitat loss might lead to serious population declines (contrast the situation in the higher rainfall areas of Kianyaga and Mukurweini, IBAs KE002 and KE006). A 2000 survey found signs of recent bush clearing and tree felling along all the watercourses surveyed. Subsistence hunting is also likely to be a threat to the babblers in this area. More survey work is needed to establish the extent of distribution of the babblers in this area, to investigate land holdings and land tenure, and to establish what conservation measures may be feasible.

■ Further reading

Njoroge and Bennun (2000), Shaw *et al.* (2001).

Masinga reservoir

Admin region Eastern
Coordinates 0°49'S 37°30'E
Area c.100,000 ha Altitude 1,050 m

KE030

A4i, A4iii
Unprotected

■ Site description

This is by far the largest reservoir of the five impoundments along the upper Tana river, and abuts on the eastern side with Mwea National Reserve (IBA KE032). Masinga dam, which is managed by the Tana and Athi Rivers Development Authority, was completed in 1981. The valley that it drowned has a highly convoluted shoreline and contains a number of sizeable islands. The maximum depth is c.50 m, near the dam wall. Because of periodic draw-down and flooding, the shoreline is bare ground with a mosaic of deposited silt, pebbles and mud. Further from the water, a narrow strip of grass gives way to open *Acacia-Commiphora* bushland. The area is semi-arid with an annual rainfall of between 250 and 500 mm.

■ Birds

See Box for key species. Masinga is notable mainly for its waterbirds, with breeding colonies of cormorants and *Anhinga rufa*. The terrestrial avifauna is not particularly diverse, but the threatened and restricted-range *Turdoides hindei* has been recorded in *Acacia* thickets 100–200 m from the eastern shores of the reservoir (and see Mwea National Reserve, IBA KE032). Regionally threatened species include *Anhinga rufa* (Masinga is one of the few known Kenyan nesting sites; 94 birds were counted in February 1999, with 228 altogether on the five Upper Tana dams); *Casmerodius albus* (260 in March 1995); and *Polemaetus bellicosus* (status unknown).

Key species

A4i		Non-breeding	Year
	<i>Phalacrocorax carbo</i>	2,150	1995
	<i>Chlidonias leucopterus</i>	2,120	1995
A4iii	Up to 31,900 waterbirds have been recorded at this site.		

■ Other threatened/endemic wildlife

The dam supports substantial populations of *Hippopotamus amphibius* and *Crocodylus niloticus*. There is no information on other fauna or flora.

■ Conservation issues

Subsistence fishing is widespread in the dam, and poorly regulated. Gill-net fishing is a major threat to diving birds, particularly *Anhinga rufa*—the 1995 survey found three that had been entangled in fishermen's nets. The dam was built in part to provide irrigation water for agriculture, but poor land-use in cultivated areas nearby is leading to siltation and eutrophication from fertilizer run-off. The waterbird nesting colonies need regular monitoring, and any conservation plan for *Anhinga rufa* should focus on Masinga as a key site.

■ Further reading

Nasirwa (1997), Nasirwa *et al.* (1995a,b), Oyugi and Owino (1998a,b, 1999).

Meru National Park

Admin region Eastern
Coordinates 0°18'S 38°25'E
Area 87,000 ha Altitude 370–910 m

KE031

A1, A2 (109), A3 (A08)
National Park

■ Site description

Meru is a savanna National Park, 85 km east of Meru town in the north-eastern lowlands below the Nyambeni hills. The wetter north-western sector (rainfall c.700 mm/year) is hilly, with rich volcanic soils. The land flattens towards the east, where grey alluvial volcanic soils appear. This area is crossed by numerous permanent streams, draining from the Nyambenis and flowing in parallel between tongues of lava, south-eastwards towards the Tana river. There are several prominent inselbergs of basement rock, notably Mughwango and Leopard Rock. The vegetation on the ridges is *Combretum*-wooded grassland, dominated by *Combretum apiculatum*. This grades into *Acacia* wooded grassland to the east, with *Acacia tortilis* and *A. senegal* on the rocky ridges, in riverine thickets and dotted over open country, and Doum palms *Hyphaene coriacea* in the numerous swampy areas near the rivers. *Chloris gayana* is the dominant grass in many places, with *Cyperus* species in the swamps. The south and south-east (rainfall c.300 mm/year) is an open, semi-arid plain with red lateritic soil. This area is covered with rather uniform *Acacia-Commiphora* bushland, a hot, dense, thorny and inhospitable habitat. As well as the many streams that cross it, the park is bounded by three large rivers: the Tana to the south, the Ura to the south-west and the Rojeweru to the east. Riverine trees include the palms *Raphia farinifera* and *Phoenix reclinata*, *Ficus sycomorus*, *Newtonia hildebrandtii*, *Acacia elatior* and *A. robusta*. Along the Tana river is found the Tana River Poplar *Populus ilicifolia*. Meru is part of a complex of protected areas along the Tana river that includes the adjacent Bisanadi and North Kitui National Reserves (to the east and south, respectively), Kora National Park and Rahole National Reserve. These areas are better protected on paper than on the ground, however, and their birdlife (though generally little known) appears less rich than Meru's.

■ Birds

See Box and Tables 2 and 3 for key species. The park's avifauna is generally diverse, with around 280 species recorded. The threatened *Turdoides hindei*, which has a very restricted range in central Kenya, has recently been recorded, near Kindani and Nyati Camps in the south-west part of the park. Regionally threatened species include *Ephippiorhynchus senegalensis* (known to breed), *Polemaetus bellicosus* (status unknown), *Podica senegalensis*, *Scotopelia peli* and *Phoeniculus granti*.

Key species

A1	<i>Turdoides hindei</i>
A2 (109)	Kenyan mountains EBA: One of the eight species of this EBA that occur in Kenya has been recorded at this site; see Table 2.

A3 (A08) Somali–Masai biome: 59 of the 94 species of this biome that occur in Kenya have been recorded at this site; see Table 3.

■ Other threatened/endemic wildlife

The park holds good populations of large mammals, including *Loxodonta africana* (EN), *Acinonyx jubatus* (VU) and *Equus grevyi* (EN; now practically confined to Kenya). Poachers have eliminated *Diceros bicornis* (CR) and the introduced *Ceratotherium simum* (LR/cd).

■ Conservation issues

Like other National Parks, the Kenya Wildlife Service protects Meru. An electric fence has been erected along part of the western boundary, to prevent animals moving into farmland. One section of the park has been designated a wilderness area with no developed access roads. Meru has much to attract the visitor, and was a popular tourist destination in the past, but insecurity and poaching (now both under control), poor access roads and dilapidation of facilities has caused visitor numbers to decline. Encroachment by pastoralists remains a problem, but in general this site is under few immediate conservation threats.

■ Further reading

Ament (1975), Dougherty (1994), Maina and Eshiamwata (2000).

Mwea National Reserve

Admin region Eastern

Coordinates 0°50'S 37°40'E

Area 4,200 ha Altitude 1,000–1,100 m

KE032

A1, A2 (109)
National Reserve

■ Site description

Mwea National Reserve contains gently rolling *Acacia–Commiphora* bushland on the north shore of the Kamburu Reservoir, at the confluence of the Tana and Thiba rivers, 100 km north-west of Nairobi. This small reserve lies just east of Masinga Reservoir (IBA KE032). Within its borders are 700 ha (including two small islands) of the 1,500 ha Kamburu Dam. The reserve was created in 1975 as a wildlife sanctuary, and is owned by the Mbeere County Council (pending District confirmation) and managed by the Kenya Wildlife Service. The area is semi-arid with an annual rainfall of between 250 and 500 mm. Thick bush (dominated by *Acacia mellifera*, with *Grewia*, *Sesbania*, *Cassia* and *A. brevispica*, as well as some *Lantana*) and scattered trees, including baobab *Adansonia digitata*, line the waterfront. This thins out further up the slope, with a mixture of *A. mellifera* and *Commiphora* species and some open glades. Richer scrub and woodland line seasonal rivers and streams. *Sesbania* forms a broad, fairly dense cover on flood-plains, especially the northern part of the Thiba. The reserve is essentially undeveloped. There is a campsite and c.95 km of rough roads, but no accommodation.

■ Birds

See Box and Table 2 for key species. This is one of only two protected areas in which the globally threatened *Turdoides hindei*, a restricted-range Kenya endemic, is known to occur. The babblers occur only in the denser bushland along watercourses, and at relatively low densities (1.3 birds/km of watercourse; estimated total population c.50 birds in 15 groups). This is also a rich locality for birds generally, especially birds of prey, and is close to the Mwea rice growing area which attracts a large number of waterbirds and shorebirds. *Ardeola idae* is an uncommon non-breeding visitor from May to October. Mwea holds at least 14 of Kenya's 94 Somali–Masai biome species, and more are likely to be added in future. Two species rarely recorded in Kenya, *Scotopelia peli* (regionally threatened) and *Gorsachius leuconotus*, occur here in riverine woodland. Other regionally threatened species include *Anhinga rufa*, which nests on Masinga Reservoir to the west, and *Polemaetus bellicosus*, the status of which is unknown.

Key species

A1 *Turdoides hindei* *Ardeola idae*

A2 (109) Kenyan mountains EBA: One of the eight species of this EBA that occur in Kenya has been recorded at this site; see Table 2.

■ Other threatened/endemic wildlife

Large and small herbivores are numerous, including *Loxodonta*

africana (EN). *Crocodylus niloticus* and *Hippopotamus amphibius* occur in the dam.

■ Conservation issues

Conservation problems in Mwea centre on human–wildlife conflict. Animals, especially *Loxodonta africana* and *Syncerus caffer*, move out of the reserve to destroy crops in the settled areas nearby. The Kenya Wildlife Service is in the process of preparing a Management Plan for the reserve, following on from a planning workshop held in June 1996. One of the steps then agreed was to construct an electric fence around the land boundary, both to prevent crop damage by animals and to prevent unauthorized access, destruction of trees and poaching by people. Work on the fence, and on a new Park Headquarters building and staff quarters, has now begun. The elephant population, which numbered about 45 in 1995, is in any case felt to be too large for the size of the reserve. Translocation of elephants began in late 1995, when a family group of five and a single bull were successfully immobilized and moved to Tsavo East National Park, and the programme is ongoing. Questions of problem animals aside, Mwea's future as a Protected Area depends on attracting sufficient paying visitors to make it economically viable. This will require improving access roads, rehabilitating the internal roads, constructing offices, a gatehouse and staff housing, and developing campsites. There is also need to rehabilitate the nearby Masinga Tourist Lodge, owned by the Tana and Athi Rivers Development Authority. This provided a convenient base for visits to the reserve but is presently closed. Given the importance of Mwea's birds, especially *Turdoides hindei*, as an attraction, visitors should be given as much opportunity as possible to move about on foot, without being constantly confined to their vehicles.

Pollution of the Tana river by agricultural industries upstream is a problem, causing concern for the aquatic life in Kamburu Dam and limiting the possibilities of developing water-based recreation for visitors. The density, distribution and habitat selection of *Turdoides hindei* in the reserve are presently unknown, and survey work is needed to feed into the management process. Mwea is fortunate in that a conservation charity, the Mwea National Reserve Trust, has been working since 1990 to facilitate the reserve's development. So far they have purchased a boat for the Warden and staff, to use for patrols and for waterfront tours by visitors; supplied local communities with fuel-efficient stoves, to reduce pressure on fuelwood in the reserve; and carried out road construction to improve access. Further input from the Trust must await finalization of the management planning process.

Mwea appears to support fewer than 20 groups of *Turdoides hindei*, at low population densities. The long-term viability of this population might be in question were it to become isolated from others by destruction of habitat corridors along connecting watercourses.

■ Further reading

Birnie (1992), Campbell (1992), Le Pelley (1992), Loeffler (1989), Njau-ini (1996), Shaw *et al.* (2001), Zimmerman *et al.* (1996).

Samburu and Buffalo Springs National Reserves

KE033

Admin region Eastern, Rift Valley

Coordinates 0°40'N 37°30'E

Area 29,600 ha Altitude 850–1,250 m

A3 (A08)
National Reserves

■ Site description

These small, adjoining savanna National Reserves lie either side of the Northern Ewaso Ngiro river, some 340 km north-east of Nairobi. They were established in 1948 as the Samburu-Isiolo Game Reserve, part of the once extensive Marsabit National Reserve. Now their respective County Councils, Samburu and Isiolo manage them. Buffalo Springs consists of gently rolling plains of volcanic origin, while Samburu is more rugged, with outcrops of ancient basement rocks forming isolated inselbergs. The soils are mainly sandy or gravelly; rainfall is c.350 mm/year. Despite their relatively small size, the reserves contain contrasting habitats: rocky cliffs and scarps; pools, swamps and riverine sandbanks; arid open bush and grassland; tracts of *Acacia tortilis* woodland; and, along the banks of the Ewaso Ngiro and its tributaries (the Isiolo and Ngare Mara), a narrow band of riverine forest with magnificent *Acacia elatior*, Tana River poplar *Populus ilicifolia* and doum palm *Hyphaene compressa*. The Buffalo

Springs themselves, with their pools and streams of clear, fresh water, are a magnet for thirsty wildlife in the dry season.

■ Birds

See Box and Table 3 for key species. Over 380 species have been recorded from the reserves, and the birdlife is generally abundant and colourful. Birds of the arid northern bush country are augmented by a number of riverine forest species. Numerous raptors nest on the cliffs of Samburu's inselbergs. Several arid-country birds reach their southern limit here, including *Plocepasser donaldsoni*, *Nectarinia habessinica* and *Onychognathus salvadori*. Two globally threatened species are recorded, *Falco naumanni* (a passage migrant) and *Falco fasciinucha* (status unclear, probably resident). Regionally threatened species include *Anhinga rufa* (sporadic visitor); *Casmerodius albus* (sporadic visitor); *Trigonoceps occipitalis* (resident in small numbers); *Polemaetus bellicosus* (resident in small numbers); and *Buphagus africanus* (fairly common resident).

Key species

A3 (A08) Somali–Masai biome: 62 of the 94 species of this biome that occur in Kenya have been recorded at this site; see Table 3.

■ Other threatened/endemic wildlife

The reserves hold populations of several threatened mammal species, including *Equus grevyi* (EN), *Loxodonta africana* (EN) and *Acinonyx jubatus* (VU). The increasingly uncommon *Giraffa camelopardalis reticulata* occurs in good numbers. The tree *Populus ilicifolia*, which grows along the Northern Ewaso Ngiro river, is restricted to just three Kenyan river systems.

■ Conservation issues

The Samburu and Buffalo Springs National Reserves (16,500 ha and 13,100 ha respectively) are a popular tourist destination, the main attractions being their scenic beauty, remoteness and concentrations of photogenic wildlife. The surrounding areas are under increasing pressure from an expanding human population. Overstocking and unsustainable cutting of trees and shrubs for fuelwood and building are causing substantial environmental changes. The reserves themselves remain well protected, and there are few immediate threats to the birds that they contain.

■ Further reading

Finch *et al.* (1989), Richards (in press), Wilson (1989).

Shaba National Reserve

KE034

Admin region Eastern

Coordinates 0°42'N 37°47'E

A1, A2 (s061), A3 (A08)

Area 23,900 ha Altitude 700–1,500 m

National Reserve

■ Site description

Shaba National Reserve consists of a low-lying, semi-arid plain on the southern bank of the Northern Ewaso Ngiro river. It lies 9 km east of Buffalo Springs National Reserve (IBA KE033), from which it is separated by the main Isiolo–Marsabit road. Shaba's northern section includes a 34-km stretch of the Ewaso Ngiro river; here and elsewhere in the reserve are numerous springs and swampy areas, although some have bitter-tasting water. The starkly beautiful landscape is dominated to the south by Shaba Hill, at the foot of which is a rugged area with steep ravines. The sandy soils are volcanic in origin and rainfall is c.250–500 mm/year. Habitats in the reserve include riverine woodland and thicket with patches of *Acacia elatior* and doum palm *Hyphaene compressa*, *Acacia tortilis* woodland, *Commiphora*-dominated bushland, open areas of lava rock with scattered grass and shrubs, alkaline grasslands (dotted with springs) and swamps.

■ Birds

See Box and Tables 2 and 3 for key species. This is the only protected area from which the enigmatic Near Threatened, restricted-range *Mirafra williamsi* is known. It occurs locally in rocky lava semi-desert with low *Barleria* shrubs. The avifauna is generally similar to that of the nearby Samburu–Buffalo Springs National Reserves (IBA KE035). Small numbers of the globally threatened *Falco naumanni* pass through Shaba on migration each year from the Palearctic. Regionally threatened species include *Anhinga rufa* (sporadic visitor), *Casmerodius albus* (sporadic

visitor), *Trigonoceps occipitalis* (resident in small numbers), *Polemaetus bellicosus* (resident in small numbers) and *Buphagus africanus* (fairly common resident).

Key species

A1 *Mirafra williamsi*

A2 (s061) North Kenyan short-grass plains Secondary Area: *Mirafra williamsi* has been recorded at this site.

A3 (A08) Somali–Masai biome: 64 of the 94 species of this biome that occur in Kenya have been recorded at this site; see Table 3.

■ Other threatened/endemic wildlife

Some 17 large mammal species have been recorded, including the threatened *Lycaon pictus* (EN), *Acinonyx jubatus* (VU), *Equus grevyi* (EN) and *Loxodonta africana* (EN). *Giraffa camelopardalis reticulata* also occurs.

■ Conservation issues

Shaba was gazetted in 1974 and is administered by the Isiolo County Council. Apart from its diversity of Somali–Masai biome species, Shaba's chief importance as an IBA is the presence of *Mirafra williamsi*. Very little is known about this bird, and its habitat selection, numbers and movements need to be studied. However, Shaba and the lark's habitat are not in any immediate danger. The area north of the reserve is used for military training, causing considerable environmental disruption. Intensification of grazing and firewood collection around the reserve are also degrading habitat, and hunting for meat is rampant. These problems at times spill over into the reserve itself, but their impact on the birds is unclear. Shaba is a popular tourist destination, and is world famous as the location of Joy Adamson's last adventure, the release of a young *Panthera pardus*. It is unclear what amount of visitor pressure the reserve can sustain and, in the absence of a management plan, increasing tourist numbers may become a problem in the future.

■ Further reading

Finch *et al.* (1989), Richards (1997), Turner (1997), Wilson (1989).

Dandora ponds

KE035

Admin region Nairobi

Coordinates 1°16'S 37°02'E

A4i

Area c.300 ha Altitude 1,500 m

Council owned/managed

■ Site description

The Dandora Oxygenation Ponds are situated 20 km due east of Nairobi City centre, just off the Nairobi–Kangundo road but within the city limits. The main sewage treatment works for Nairobi City, they comprise three experimental ponds, eight facultation ponds and 24 maturation ponds, all bounded by embankments. The first phase of eight ponds was commissioned in 1980, followed by the much larger second phase in 1992. The older set has mud banks, with associated growth of aquatic and emergent macrophytes such as species of *Cyperus* and *Typha*; the newer ponds have gently sloping concrete banks. Water quality and the microflora and fauna change as water progresses through the ponds. The treatment is entirely natural and considered environmentally friendly. Processed water from the ponds is discharged into the Nairobi river.

■ Birds

See Box for key species. Dandora holds internationally important populations of *Netta erythrophthalma* (maximum 3,200 in 1994) and (in the northern winter, November–February) *Anas clypeata*. Duck are generally numerous, and there are often large flocks of *Dendrocygna viduata* and *D. bicolor*, *Anas undulata*, *A. erythrorhyncha*, *A. hottentota* and (among the Palearctic migrants) *A. acuta* and *A. querquedula*. January waterbird counts over the eight years 1994–2001 have recorded up to 65 species and a maximum of 22,450 waterbirds (mean, 11,900), duck usually being the most abundant single group. Over 1,000 *Chlidonias leucopterus* are frequently present. Other conspicuous waterbirds include ibises, herons, geese and a variety of migrant shorebirds. Migrant *Motacilla flava* and *Anthus cervinus* are attracted to the pond edges, and seasonal flocks of bishops and queleas occur in the rank vegetation surrounding the complex. The regionally threatened *Casmerodius albus* is a sporadic visitor, in small numbers.

Key species		
A4i	Non-breeding	Year
<i>Netta erythrophthalma</i>	mean 1,480	1994–1997
<i>Anas clypeata</i>	2,300	1996

Other threatened/endemic wildlife

None known to BirdLife International.

Conservation issues

The ponds support not just birds but other aquatic animals such as *Hippopotamus amphibius*, *Crocodylus niloticus*, and unknown species of fish. Mass die-offs of waterbirds have occurred at least twice at Dandora, apparently from bacterial toxins produced under unusual weather conditions, but these have been short-lived phenomena. The ponds have considerable potential for environmental education, especially for school children. However, although they are close to Nairobi and easily reached by public transport, access requires special permission and is generally discouraged. Management as a sewage treatment works, which is obviously the primary objective, is not necessarily incompatible with bird conservation or education, but the value of the site for wildlife is not yet fully recognized by the City Council.

Further reading

Nasirwa (1998), Nasirwa and Bennun (1994, 1995), Nasirwa and Owino (2000), Owino and Nasirwa (2001), Oyugi and Owino (1998a,b, 1999), Waiyaki (1992), Waiyaki and Bennun (1993a).

Nairobi National Park	KE036
Admin region Nairobi	
Coordinates 1°18'S 36°58'E	A1, A2 (109), A4ii
Area 11,700 ha Altitude 1,540–1,780 m	National Park

Site description

An area of natural landscape at the grassland-forest boundary, only 7 km from the centre of Kenya's capital city, Nairobi. The park's varied habitats include open, rolling grass plains, riverine woodland, valley thicket and bush, artificial dams and ponds, rocky gorges and upland dry forest. The park is fenced along three sides, where it is adjacent to urban housing, industry, roads and airports; only the southern border, along the Embakasi and Athi rivers, is open for animal dispersal. Ecologically, the park is intimately linked to the Kitengela and Athi-Kapiti plains, which adjoin it to the south, forming a single ecological unit. Being close to the city centre and supporting a variety of large mammals, this park is a popular destination and a substantial money-earner for the Kenya Wildlife Service.

Birds

See Box and Table 2 for key species. Nairobi National Park is an important roosting site for *Falco naumanni* flocks on passage (up to 5,000 have been recorded), although numbers have declined markedly in recent years. The substantial area of undisturbed grassland is of great importance for species such as the restricted-range *Euplectes jacksoni*, which breeds here regularly after good rains. The avifauna is diverse, with a remarkable 516 species recorded, including 27 of Kenya's 94 Somali–Masai biome species (23 of which are regular), and 25 of Kenya's 67 African Highland biome species. The globally threatened *Crex crex* is a scarce visitor from the Palearctic, and the Near Threatened *Balaeniceps rex* and *Acrocephalus griseldis* have both been recorded once. *Ardeola idae* is a regular non-breeding visitor (May–October) in small numbers, and *Parus fringillinus* is fairly common in riverine *Acacia* woodland. Regionally threatened species include *Struthio camelus* (common); *Anhinga rufa* (scarce visitor); *Casmerodius albus* (regular visitor to dams and ponds); *Ephippiorhynchus senegalensis* (resident in small numbers); *Hieraaetus ayresii* (scarce resident in the forest); *Stephanoaetus coronatus* (at least one pair nests in the forest); *Polemaetus bellicosus* (several pairs have home ranges that include the park); *Podica senegalensis* (resident in small numbers on thickly-fringed sections of the rivers); and *Buphagus africanus* (moderately common).

Key species		
A1		
<i>Ardeola idae</i>		<i>Parus fringillinus</i>
<i>Falco naumanni</i>		<i>Euplectes jacksoni</i>

A2 (109)	Kenyan mountains EBA: One of the eight species of this EBA that occur in Kenya has been recorded at this site; see Table 2.		
A4ii	Breeding	Non-breeding	
<i>Falco naumanni</i>	—	up to 5,000	

Other threatened/endemic wildlife

Nairobi National Park has healthy populations of an array of large mammals. The park is a rhino sanctuary and numbers of *Diceros bicornis* (CR) are steadily increasing. *Acinonyx jubatus* (VU) also occur in good numbers. Several plants growing on the rocky hillsides are unique to the Nairobi area, including *Euphorbia brevitoria*, *Drimia calcarata*, *Murdannia clarkeana* and an undescribed *Crassula* sp. The park protects an important area of *Croton–Brachylaena–Calodendron* upland dry forest. This distinctive Nairobi forest-type exists now only as small, ever diminishing fragments.

Conservation issues

The park is a dry season sanctuary for plains game, particularly *Connochaetes taurinus*, *Equus quagga*, and *Taurotragus oryx*. In the wet season, these animals disperse out of the park onto the open plains of Kajiado District to the south. This migratory movement is becoming increasingly constrained by sprawling settlements and industrial development on the Kitengela and Athi-Kapiti plains. The Kitengela was originally set aside as a game conservation area, but in the 1970s land hunger around Nairobi became acute and people were allowed to settle there. As a result, ranches were fenced off, farms and vegetable plots sprang into being, and human–wildlife conflict became intense. Meanwhile, industrial development around Athi river township, in particular an export processing zone, has cut off migration from the other direction. Only a narrow corridor is now available for animals to move through, much of this depending on the so-called Sheep and Goat Land. This agricultural research area has now allegedly been allocated to influential individuals. There are additional, though limited, options, such as purchase of land along the Mbagathi-Athi river frontage, and encouraging conservation-minded landowners to place easements on their land that restrict the uses to which it can be put. It is also important to ensure that wildlife within the dispersal areas has economic value to the landowners there, so that these areas remain suitable wildlife habitats. A local conservation group, the Friends of Nairobi National Park, is working with the Kenya Wildlife Service to explore these issues, and has begun an experimental Wildlife Conservation Lease programme. It is likely that the end result will be a 'truncated ecosystem', with some, but scaled-down, buffer areas remaining open for herbivore migrations. If this is not possible, and all the land around the park is fenced and developed, the park may effectively be strangled. Maintenance of the migration is important not just for the plains game and their predators, but for the ecosystem as a whole. Increased, year-round grazing pressure would greatly change the character of the grasslands and their bird communities. Species like *Euplectes jacksoni*, which have few areas of natural grassland left to nest in, could well be lost from the area as a result. Being very close to (and increasingly, surrounded by) the city, Nairobi National Park faces some obvious additional problems. Waste from some industries drains directly into the park and this has been difficult to control. Part of the park will be hived off for a major bypass road in the near future, and increased pressure on land puts the entire site at potential risk. On the other hand, its proximity to the city makes Nairobi National Park an unparalleled facility for public education about wildlife and conservation.

Further reading

Agnew and Agnew (1994), Beentje (1990), Harvey (1997), Loeffler (1987), Mondolfi and Mondolfi (1993), Round-Turner (1996), Smalley (1983), Western (1996).

Dunga swamp	KE037
Admin region Nyanza	
Coordinates 0°10'S 34°47'E	A1, A3 (A06)
Area c.100 ha Altitude 1,130 m	Unprotected

Site description

Dunga (or Tako river mouth) is a wetland situated about 10 km south of Kisumu town on the shores of Winam Gulf, Lake Victoria. At the

western limit is a beach, used as a major fish landing point. Papyrus *Cyperus papyrus* stands stretch south-eastwards along the shore from here for c.1.5 km, in a strip that varies in width from about 50 to 800 m. A number of streams drain into the lake through the swamp, the main one being Tako river.

■ Birds

See Box and Table 3 for key species. This is one of the most reliable sites in Kenya for the scarce and threatened *Chloropeta gracilirostris*, which is often seen along the lakeward side of the swamp. All but one of Kenya's nine Lake Victoria Basin biome species have been recorded here, and it is especially important for *Laniarius mufumbiri* (relatively common), *Bradypterus carpalis* and *Serinus koliensis*, all papyrus endemics.

Key species

A1	<i>Laniarius mufumbiri</i>	<i>Chloropeta gracilirostris</i>
A3 (A06)	Lake Victoria Basin biome: Eight of the nine species of this biome that occur in Kenya have been recorded at this site; see Table 3.	

■ Other threatened/endemic wildlife

No information is available. Wetlands around the shores of Lake Victoria are known to be important refuges for a number of the lake's endemic haplochromine fish species.

■ Conservation issues

Dunga is close to a major town, and this puts particular strain on the wetland. Papyrus harvesting is often excessive and unsustainable. The incoming streams bring pollution in the form of sewage and solid wastes from nearby residential estates. Lake Victoria's papyrus swamps are under increasing pressure in general. Water-hyacinth *Eichhornia crassipes* has infested much of the Winam Gulf. By preventing fishermen from fishing, it forces them to seek other forms of livelihood. Often, the only alternative available is to harvest papyrus, or to clear it in order to cultivate crops. Dunga urgently requires formal protection, as it has no conservation status at present. The site is already a popular area for recreation. Its proximity to Kisumu gives it potential for environmental education and bird tourism focused on the papyrus endemics.

■ Further reading

Johnstone and Githongo (1997), Nasirwa and Njoroge (1997).

Koguta swamp

Admin region Nyanza
Coordinates 0°17'S 34°46'E
Area c.200 ha Altitude 1,130 m

KE038

A1, A3 (A06)
Unprotected

■ Site description

Koguta swamp is a wetland at the mouth of the Sondu-Miriu river, a few kilometres south-west of the Nyando river mouth on the shores of Lake Victoria. The vegetation consists mainly of reeds *Phragmites* spp. interspersed with patches of papyrus *Cyperus papyrus* and *Vossia cuspidata*. Koguta is flooded during the wet season, while during the dry season the area is heavily grazed and trampled by cattle and hippopotamus *Hippopotamus amphibius*.

■ Birds

See Box and Table 3 for key species. *Chloropeta gracilirostris* has been recorded here (but appears to be uncommon), one of six Lake Victoria Basin biome species that are known to occur, including the papyrus endemics *Laniarius mufumbiri* (relatively abundant), *Bradypterus carpalis* and *Cisticola carruthersi*.

Key species

A1	<i>Chloropeta gracilirostris</i>	<i>Laniarius mufumbiri</i>
A3 (A06)	Lake Victoria Basin biome: Six of the nine species of this biome that occur in Kenya have been recorded at this site; see Table 3.	

■ Other threatened/endemic wildlife

Little information is available. The ungulate *Tragelaphus spekii* (LR/nt) and the snake *Python sebae* occur, but their status is unknown. Like other wetlands around the shores of Lake Victoria, Koguta is probably an important refuge for a number of the lake's endemic haplochromine fish species.

■ Conservation issues

The site is almost inaccessible from the lakeward side due to dense mats of water-hyacinth *Eichhornia crassipes*. As in many part of Lake Victoria, infestation by this exotic weed has prevented fishermen from fishing, forcing them to seek alternative forms of livelihood. This adds greatly to the human pressure on papyrus swamps and other wetlands. Unsustainable cutting of papyrus, and overgrazing by cattle during the dry season when the water level recedes threatens Koguta. It requires formal protection, and a community conservation programme that will work towards controlled, sustainable use of the wetland.

■ Further reading

Johnstone and Githongo (1997), Nasirwa and Njoroge (1997).

Kusa swamp

Admin region Nyanza
Coordinates 0°19'S 34°51'E
Area c.350 ha Altitude 1,130 m

KE039

A1, A3 (A06)
Unprotected

■ Site description

Kusa swamp, at the mouth of River Nyando, is a wetland at the easternmost end of Lake Victoria's Winam Gulf. Dense stands of papyrus *Cyperus papyrus* are fringed on the lakeward side by the water grass *Vossia cuspidata* and along the shore by reeds *Phragmites* spp.

■ Birds

See Box and Table 3 for key species. Kusa includes a substantial stand of papyrus, and the Near Threatened *Laniarius mufumbiri* is fairly abundant here. Other Lake Victoria Basin biome species include the papyrus endemics *Bradypterus carpalis* and *Cisticola carruthersi*, and it is suspected that *Serinus koliensis* and the globally threatened *Chloropeta gracilirostris* are likely to occur.

Key species

A1	<i>Laniarius mufumbiri</i>
A3 (A06)	Lake Victoria Basin biome: Four of the nine species of this biome that occur in Kenya have been recorded at this site; see Table 3.

■ Other threatened/endemic wildlife

Little information is available. The ungulate *Tragelaphus spekii* (LR/nt) occurs but is uncommon, and the snake *Python sebae* has been recorded. Like other wetlands around the shores of Lake Victoria, Kusa is probably an important refuge for a number of the lake's endemic haplochromine fish species.

■ Conservation issues

Kusa remains a sizeable enough papyrus swamp to be of conservation importance. However, uncontrolled cutting of papyrus by local residents and pollution and siltation from the Nyando river are serious threats. Though papyrus shows remarkable powers of regeneration, unsustainable cutting for the local mat-making industry has the potential to destroy the wetland. Local residents are also opening up the swamp for rice farming. *Tragelaphus spekii*, though already rare, are hunted. The lakeward side is almost choked by water-hyacinth *Eichhornia crassipes*. As in many parts of Lake Victoria, infestation by this exotic weed has prevented fishermen from fishing, forcing them to seek alternative forms of livelihood and adding greatly to the human pressure on wetlands.

■ Further reading

Johnstone and Githongo (1997), Nasirwa and Njoroge (1997).

Ruma National Park

Admin region Nyanza
Coordinates 0°35'S 34°12'E
Area 12,000 ha Altitude 1,200–1,600 m

KE040

A1
National Park

■ Site description

Ruma National Park was first gazetted in 1966, as Lambwe Valley Game Reserve, and acquired National Park status in 1983. It is situated 10 km east of Lake Victoria in western Kenya, south-west of Homa Bay and east of the Gembe and Gwasi Hills. It lies on the flat floor of

the Lambwe valley, bordered by the Kanyamaa escarpment to the south-east. The terrain is mainly rolling grassland, with tracts of open woodland and thickets dominated by species of *Acacia* and *Balanites*. The soils are largely ‘black cotton’ clay. The surrounding area is settled, with a mix of small-scale cultivation and grassy pastureland.

■ Birds

Ruma is the only protected area in Kenya where *Hirundo atrocaerulea*, a scarce intra-African migrant, is regularly recorded. *Hirundo atrocaerulea* arrive in Kenya from the breeding grounds in southern Tanzania around April and depart in September. They depend on moist grassland for feeding and roosting (see also IBA KE057). There have been several recent records of this swallow within the park, but its status is uncertain. *Cisticola eximius*, a species thought to be extinct in Kenya, has also recently been rediscovered in Ruma.

Key species

A1 *Hirundo atrocaerulea*

■ Other threatened/endemic wildlife

Little is known about the fauna and flora.

■ Conservation issues

Ruma represents a valuable island of natural habitat in a sea of human settlement. The surrounding population density is high, but people and their livestock avoid the Ruma area because of the presence of tsetse fly. Wildlife poaching along the boundaries has been reported in the past. A recent (1996), brief survey found no *Hirundo atrocaerulea* at the site, but more recent records show that the species still uses this site. More intensive work is needed to determine the status of *H. atrocaerulea*, and a proper ecological study should be made of the birds and their behaviour.

■ Further reading

Nasirwa and Njoroge (1997).

Yala swamp complex

Admin region Nyanza, Western

Coordinates 0°05'N 34°11'E

Area c.8,000 ha Altitude 1,130–1,160 m

KE041

A1, A3 (A06)

Unprotected

■ Site description

This is a complex of wetlands in the delta of the Yala river, on the north-east shore of Lake Victoria. The site has three main components: the Yala swamp itself (currently c.6,500 ha after drainage of the eastern 20%); Lake Kanyaboli in the north-eastern corner, a 3-m deep lake of c.1,000 ha; and Lake Sare, the most southerly of several outlets of the Yala river into Lake Victoria, c.5 m deep and 500 ha in area. Formerly, the Yala river flowed through the eastern swamp (now ‘reclaimed’) into Lake Kanyaboli, then into the main swamp, and finally into Lake Victoria via a small gulf. The Yala flow is now diverted directly into the main swamp, and a silt-clay dike cuts off Lake Kanyaboli, which receives its water from the surrounding catchment and through back-seepage from the swamp. A culvert across the mouth of the Yala, some metres above the level of Lake Victoria, has cut off the gulf on the lake and, through back-flooding, created Lake Sare. Water in the main channels and lakes is well oxygenated, but oxygen levels in the stagnant parts of the swamp are low. The predominant vegetation is papyrus *Cyperus papyrus*, with *Phragmites mauritianus* in shallower areas and swamp grasses around the periphery. A thick fringe of papyrus surrounds both Lake Kanyaboli and Lake Sare; in the case of Lake Sare, this merges with the main swamp. The Yala swamp complex is by far the largest papyrus swamp in the Kenyan sector of Lake Victoria, making up more than 90% of the total area of papyrus. The swamp acts as a natural filter for a variety of biocides and other agricultural pollutants from the surrounding catchment, and also effectively removes silt before the water enters Lake Victoria. The site supports an important local fishery for the Luo and Luhya people who live to its south and north, respectively.

■ Birds

See Box and Table 3 for key species. Yala swamp supports sizeable populations of *Chloropeta gracilirostris* (common in tall, undisturbed stands of fringing papyrus, especially at Lake Kanyaboli) and *Laniarius mufumbiri*. The Near Threatened *Gallinago media*, a Palearctic migrant,

probably also occurs. Because of its size and the generally good condition of the papyrus, the Yala swamp complex is an important site for East Africa’s papyrus endemics. These include *Chloropeta gracilirostris*, *Cisticola carruthersi*, *Bradypterus carpalis* and *Serinus koliensis*. Many other wetland birds also occur. Reports of occasional sightings of *Balaeniceps rex* by the local residents have not been confirmed. Regionally threatened species include *Casmerodius albus* (present in small numbers) and *Porzana pusilla* (recorded from Lake Kanyaboli, but may not be resident).

Key species

A1 *Laniarius mufumbiri*

Chloropeta gracilirostris

A3 (A06) Lake Victoria Basin biome: Eight of the nine species of this biome that occur in Kenya have been recorded at this site; see Table 3.

■ Other threatened/endemic wildlife

Lake Kanyaboli is an important refuge for Lake Victoria cichlid fish, many of which have been exterminated in the main lake by the introduction of the non-native predatory fish *Lates niloticus*. These include economically important species such as *Oreochromis esculentus* (VU), as well as a number of *Haplochromis* species. *Lates niloticus* is present in Lake Sare, which has an impoverished fish fauna compared to Kanyaboli.

■ Conservation issues

Drainage of the Yala swamp began as early as 1956, and there are still plans to extend the ‘reclaimed’ area over much of the present swamp. This is despite the fact that the ‘reclaimed’ land has not proved productive (and a substantial part has reverted to swamp thanks to breaches in the barrier dyke along the Yala). This is an intensely controversial issue, pitting the obvious needs of a swelling population for agricultural land against the less conspicuous values of wetlands—for instance, water filtration, flood control, and protection of fish stocks. In the case of Yala, biodiversity conservation must be added high on the list of values. This is a very important site for protecting the increasingly threatened suite of papyrus birds, as well as one of the last remnants of Lake Victoria’s extraordinary cichlid radiation. The area around the swamps is densely populated, and most people make a living from agriculture and fishing. Apart from drainage, major threats include water offtake for irrigation upriver, intensification of fertilizer and biocide inputs, and unsustainable exploitation of papyrus. Large-scale cutting, mainly for the mat-making industry, and extensive burning to open up land for cultivation are taking their toll on the swamp, despite the remarkable regenerative abilities of papyrus. Study of the papyrus-endemic birds shows that several species, including *Chloropeta gracilirostris*, are negatively affected by disturbance and fragmentation of the habitat. Many questions remain, however, regarding population sizes, movements, and habitat requirements, and further study is needed. Rehabilitation of the feeder canal to Lake Kanyaboli should be a high priority, as the lack of regular inflows from the river are changing its water chemistry and may interfere with its functions as a fish refuge and nursery. A weir to divert water into Kanyaboli was under construction in 1999, but has not been completed. This also formed the first phase of a controversial project to expand the reclaimed area by extending the existing dyke along the Yala river. Lake Kanyaboli shows considerable potential for ecotourism, which could potentially be developed through a local site-support group as at other sites. The biodiversity value of Yala swamp should be recognized by affording the site some formal protection, such as listing as a wetland of international importance under the Ramsar Convention. Yala would comfortably qualify for this, as it is both an outstanding example of a specific type of wetland and supports an appreciable assemblage of threatened and endemic species.

■ Further reading

Bennun (2000), Britton (1978), Mavuti (1992), Nasirwa and Njoroge (1997),

Amboseli National Park

Admin region Rift Valley

Coordinates 2°33'S 37°06'E

Area 39,200 ha Altitude 1,100–1,200 m

KE042

A3 (A08)

National Park

■ Site description

Amboseli National Park lies immediately north-west of Mount

Kilimanjaro, on the border with Tanzania. Amboseli was established as a nature reserve in 1968, and gazetted as a National Park in 1974. It is surrounded by six communally-owned group ranches that are wet-season dispersal areas for wildlife, and whose management has direct influence on the ecological stability of the park. The park covers part of a Pleistocene lake basin, now dry. Within this basin is a temporary lake, 'Lake' Amboseli, that floods during years of heavy rainfall. The Amboseli area is in the rain-shadow of Mount Kilimanjaro and receives only c.300 mm of rain/year on average. However, water flowing underground from Mount Kilimanjaro wells up here in a series of lush papyrus *Cyperus papyrus* swamps that provide dry-season water and forage for wildlife. Tracts of attractive *Acacia xanthophloea* woodland flank these. Open *Acacia tortilis* woodland also occurs on drainage lines in the southern part of the park. *Acacia-Commiphora* bushland surrounds the basin, while the level floor, with alkaline soils, supports thickets of *Salvadora persica* and *Suaeda monoica*. Large concentrations of wildlife occur here in the dry season. This, with the picturesque surroundings (dominated by the imposing Mount Kilimanjaro), has made Amboseli a major tourist destination, attracting over 200,000 visitors each year.

■ Birds

See Box and Table 3 for key species. The park has a rich bird fauna, with over 400 bird species recorded, including over 40 birds of prey. Many wetland birds use, and at times nest in, the swamps. Several species of global conservation concern occur, including *Falco naumanni* (on passage), small numbers of non-breeding *Ardeola idae* (mainly May–October) and *Phoenicopterus minor* (present in variable numbers, up to a few thousand). *Balaeniceps rex* has been recorded once. Regionally threatened species include *Anhinga rufa* (scarce non-breeding visitor); *Casmerodius albus* (usually present in small numbers); *Thalassornis leucotis* (occasional visitor); *Trigonoceps occipitalis* (uncommon resident); and *Polemaetus bellicosus* (resident in small numbers).

Key species

A3 (A08) Somali–Masai biome: 42 of the 94 species of this biome that occur in Kenya have been recorded at this site; see Table 3.

■ Other threatened/endemic wildlife

Amboseli is well known for its populations of large mammals. The park's population of *Loxodonta africana* (EN), numbering c.1,000, is the subject of a long-term behavioural and ecological study. The park's population of *Diceros bicornis* (CR) has been exterminated.

■ Conservation issues

When Amboseli was first established as a nature reserve in 1968, the boundaries were largely arbitrary and failed to cover the wet-season wildlife dispersal areas. The later upgrading to National Park status was in part an attempt to arrest the ongoing conflict between wildlife and the pastoral Maasai and their livestock. Unfortunately, this problem continues to bedevil Amboseli, which remains an ecosystem in flux. The park depends heavily on subterranean water from Mount Kilimanjaro: any change of climate or land-use on the mountain affects the water table, the swamps and the general distribution of vegetation. In fact, the swamp area has expanded greatly in recent years, leading to a general increase in numbers of waterbirds. On the other hand, the *Acacia xanthophloea* woodlands and other woody vegetation have declined markedly over the last 20 years. Due in part to soil salinization following a natural shift in the water table, this decline has been hastened by heavy browsing pressure from elephants. Through fear of the Maasai in the group ranches outside the park, the Amboseli elephants have confined themselves to the park boundaries, not moving out to feed as they used to at certain times of the year. This is one example of the park's major problem: human–wildlife conflict. During the dry season, the Maasai need to graze their cattle around the swamps; during the wet season, the wildlife moves out of the park onto their land in search of pasture. This problem appears to have been at least partially resolved in recent years: artificial water points around the park now provide a reliable water supply for Maasai livestock; group ranches are compensated for the presence of wildlife on their land; and the group ranches, recognizing the economic value of wildlife, have begun to set up wildlife sanctuaries of their own. The large number of tourists visiting Amboseli, mainly in the dry season, also exert considerable pressure on the ecosystem. Off-road driving kills vegetation and encourages wind erosion of the fragile soils, and

also contributes to harassment of sensitive species such as *Acinonyx jubatus*. Recent road rehabilitation has helped to reduce this and to spread visitor pressure to less-frequented parts of the park. Accommodation for visitors is concentrated in the OI Tukai area, which is under the jurisdiction of the Kajiado County Council rather than Kenya Wildlife Service and uncontrolled development here has created local environmental problems.

■ Further reading

Davidson *et al.* (1994), Kent (1994), Okwaro (1996), Shorter (1982), Smith (1996), Waiyaki and Bennun (1993b), Western (1982).

Cherangani Hills

Admin region Rift Valley

Coordinates 1°16'N 35°51'E

Area c.95,600 ha Altitude 2,000–3,365 m

KE043

A3 (A07)

Forest Reserves

■ Site description

The Cherangani Hills, an old fault-block formation of non-volcanic origin, form an undulating upland plateau on the western edge of the Rift Valley. To the east, the Elgeyo Escarpment drops abruptly to floor of the Kerio Valley, while westwards the land falls away gently to the plains of Trans-Nzoia District. The hills reach 3,365 m at Cheptoket Peak in the north-central section. The hills are largely covered by a series of Forest Reserves. These are made up of 13 administrative blocks, totalling 95,600 ha in gazetted area. Of this, c.60,500 ha is closed-canopy forest, the remainder being formations of bamboo, scrub, rock, grassland, moorland or heath, with c.4,000 ha of cultivation and plantations. Kapkanyar, Kapolet and Kiptaberr Forest Reserves together form a large western block of forest, totalling c.20,000 ha. To the east, the Forest Reserves of Lelan, Embotut, Kerrer, Kaisungor, Toropket, Chemurokoi, Kupkunurr, Cheboit, Sogotio and Kapchemutwa are less well connected. Apart from a large south-eastern block along the escarpment crest, the forests here are fragmented and separated by extensive natural grasslands, scrub and (especially in the central part) farmland. The hills are composed of metamorphic rocks, with conspicuous quartzite ridges and occasional veins of marble. The soils are well drained and moderately fertile, and annual rainfall varies from c.1,200 mm in the east to at least 1,500 mm in the wetter west, which catches the moist prevailing winds from Lake Victoria. The forests are of several different types. The lower western parts of Kiptaberr-Kapkanyar are clothed in *Anigeria-Strombosia-Drypetes* forest, with a large area of mixed *Podocarpus latifolius* forest on the higher slopes. The southern slopes hold *Juniperus-Nuxia-Podocarpus falcatus* forest, with heavily disturbed *Podocarpus falcatus* forest on the eastern slopes. Valleys in the upper peaks area shelter sizeable remnants of *Juniperus-Maytenus undata-Rapanea-Hagenia* forest. Tree ferns *Cyathea manniana* occur in stream valleys, and there are patches of bamboo *Arundinaria alpina*, though no bamboo zone as such. In clearings, *Acacia abyssinica* occurs among scrubby grassland with a diversity of flowering plants. At higher altitudes, the forest is interspersed with a mixture of heath vegetation and swamps, the latter with *Lobelia aberdarica* and *Senecio johnstonii*. Much of this heathland may be maintained by burning and grazing. Relict *Juniperus* and *Hagenia* trees occur here and there. Especially in the east, there is a mosaic of vegetation types with little obvious altitudinal zonation, possibly a result of the hills' varied topography and the long history of cultivation, grazing and fire. The Cherangani forests are important for water catchment, and sit astride the watershed between the Lake Victoria and Lake Turkana basins. Streams to the west of the watershed feed the Nzoia river system, which flows into Lake Victoria; streams to the east flow into the Kerio river system.

■ Birds

See Box and Table 3 for key species. The avifauna of the Cheranganis is characteristic of the highland forests of Kenya west of the Rift Valley, comprising both central highland species and western species. Ecological surveys have recorded over 73 forest-dependent species, none of which is presently globally threatened. Regionally threatened species include *Gypaetus barbatus* (one of the last breeding populations in Kenya, nesting on the high peaks), *Stephanoaetus coronatus* (widespread in small numbers), *Glaucidium tephronotum* (recently recorded in Kapkanyar), *Campephaga quiscalina* (uncommon and

local; recent records from Kapkanyar) and *Indicator conirostris* (uncommon).

Key species

A3 (A07) Afrotropical Highlands biome: 49 of the 70 species of this biome that occur in Kenya have been recorded at this site; see Table 3.

Other endemic/threatened species

The ungulate *Tragelaphus eurycerus* (LR/nt) has been recorded here in the past, but its current status is unknown. The butterfly *Capys juliae* is endemic to the Cherangani Hills. Two giant senecio taxa, *Senecio johnstonii battiscombei* var. *cheranganiensis* and *S. johnstonii battiscombei* var. *dalei*, are endemic to the Cheranganis. Two notable lobelias, *Lobelia deckenii elgonensis* and *Lobelia cheranganiensis*, are shared with Mount Elgon, as is *Alchemilla elgonensis*.

Conservation issues

The condition of many of the remaining forest blocks in the Cherangani Hills is relatively good, as indicated by the presence of many forest-dependent bird species. The wetter, western block is especially intact. Nonetheless, there are a number of serious conservation problems. These include encroachment, degazettement for settlement, poaching of trees for building or charcoal burning, livestock grazing, and tree-felling by honey gatherers (for honey, or for manufacturing bee hives). Occasional fires, possibly started by honey gatherers, also occur—one destroyed hundreds of hectares in Kapkanyar forest in 1986. Most of the lower slopes of Kapolet forest have been converted to farmland in the last 20 years, and similar threats face most of the forest blocks: subdivision and clearance of Kiptaberr forest, facilitated by an unscrupulous Forest Department employee, was recently halted just before clear-felling began. Grazing is a major concern, especially in Kapkanyar, which borders land occupied by the pastoralist subgroup of the Pokot people. Hundreds of cattle are left to roam in the forest for the entire dry season period, causing enormous damage. As the population outside the forest increases, pastureland diminishes and pressure on the forest rises. Currently the small-scale farmers graze their cattle in pastureland outside the forest, and the large herds in the forests apparently belong to wealthy individuals who are influential locally. Embotut forest has a long-standing squatter problem, with c.5,000 people living within the forest boundaries. These hills have tremendous potential for ecotourism for those visiting the western and north-western part of Kenya. They are scenically beautiful, with undulating forested slopes, cascading rivers and open grasslands filled with wild flowers. Ecotourism could help provide local employment and alternative sources of revenue for those living around the forest. The Forest Department needs to be better aware of the national and global significance of the Cherangani forests and to protect them more effectively. Education of the local people, especially with respect to bee keeping, is important too, and can help to prevent forest fires and tree losses caused by honey gatherers. Honey collection, if properly controlled and managed, can be a sustainable use of the forest and indeed provide substantial incentives for habitat conservation.

Further reading

Beentje (1990), Blackett (1994i,j), Cheke (1972, 1978), Hancock (1971), Maberley (1975), Waiyaki (1996), Young (1994).

Lake Baringo

Admin region Rift Valley
Coordinates 0°38'N 36°05'E
Area c.28,400 ha
Altitude 975–1,070 m

KE044

A3 (A08)
National Reserve,
Unprotected

Site description

The IBA includes Lake Baringo (16,800 ha) and its islands, the bushland within the 1,000 m depression contour surrounding the lake (11,600 ha), and the striking cliffs to the west of Kampi ya Samaki. Baringo, a shallow freshwater lake, lies c.110 km north of Nakuru town. The Laikipia escarpment to the east and the Tugen Hills in the west borders its catchment. The maximum depth is only c.6 m, and the lake is becoming shallower through soil erosion in the surrounding land. Rainfall is c.650 mm/year. The area around the western shore is mainly

Acacia tortilis woodland, with small bush-covered hills, gorges and cliffs. *Ficus* spp. grow on the cliff faces. The north and east have denser bush, thinning out towards the south, dominated by *Acacia mellifera*, *A. reficiens* and species of *Boscia*, *Commiphora*, *Terminalia* and *Balanites*. The open, flat southern part is bushland interspersed with dry riverbeds and stands of *Acacia tortilis* and *A. elatior*. Swampy wetlands, with *Typha* reeds and *Echinochloa* marsh grass, occur at the mouths of rivers draining into the lake, notably the Ndau, Molo and Mukutan, and much of the shore is lined with Ambatch *Aeschynomene* sp. The lake supports an important fishery and is a major tourist destination.

Birds

See Box and Table 3 for key species. Several of the Somali–Masai biome species are found at few other sites, most notably the uncommon *Tockus jacksonii* and *Tockus hemprichii*, the latter frequenting the cliffs, and *Onychognathus salvadorii*. Baringo is a well-known destination for birdwatchers and over 500 bird species have been recorded. A colony of up to 20 *Ardea goliath* has nested on one of the islands in the lake. While the diversity of waterbirds is considerable, total numbers are usually only in the low thousands. Globally threatened species include *Falco naumanni* (a passage migrant in small flocks), *Phoenicopterus minor* (an occasional visitor, usually on passage), *Ardeola idae* (a rare non-breeding visitor) and *Circus macrourus* (a regular passage migrant). A number of regionally threatened species are also recorded, namely *Podiceps cristatus* (no recent records); *Anhinga rufa* (small numbers resident, has bred on Ndau Island in the lake); *Casmerodius albus* (regular, up to 100 recorded); *Ephippiorhynchus senegalensis*; *Thalassornis leuconotus*; *Trigonoceps occipitalis*; *Polemaetus bellicosus*; *Porzana pusilla*; and *Rynchops flavirostris*.

Key species

A3 (A08) Somali–Masai biome: 36 of the 94 species of this biome that occur in Kenya have been recorded at this site; see Table 3.

Other threatened/endemic wildlife

The lake supports large populations of *Crocodylus niloticus* and *Hippopotamus amphibius*. An apparently range-restricted snake, *Coluber keniensis*, is known from only one specimen collected here. Little is recorded about the other wildlife values of the area.

Conservation issues

The main conservation issue in Baringo District is land degradation. This has a long history, being documented as early as 1928. Before the colonial period, livestock numbers were kept at relatively low levels by diseases and stock theft. These forces have been checked since then, and livestock numbers have steadily increased. Overstocking and high grazing pressures have reduced ground cover and encouraged soil erosion. Excessive tree cutting is a related problem: in many areas *Acacia reficiens*, which is unpalatable to livestock and inhibits the growth of other plants, has replaced the original trees and shrubs. Extensive clearing of large trees for charcoal has seriously degraded some of the most important and well-known birdwatching areas, and changed the nature of the local avifauna. These environmental changes have contributed to periodic flooding that causes massive episodes of erosion, with most of the soil being washed down into Lake Baringo. The lake is much more turbid than in past years and fish stocks have declined. Excessive offtake of water from the Molo river in its catchment is also a problem, since it has greatly reduced the amount of water reaching the lake. Many environmental projects have attempted to solve these problems, but most have been conspicuously unsuccessful. A community-based initiative begun in 1981 (Rehabilitation of Arid Environments, formerly the Baringo Fuel and Fodder Project) has succeeded in rehabilitating parts of the degraded western shores. Areas are ploughed and contoured to trap water, and replanted with grasses and trees in fenced-off plots. The GEF-funded 'Lake Baringo Community-based Integrated Land and Water Management Project', started in 2000 and will continue and expand this work. The lake and part of its hinterland are now a National Reserve under the management of the Baringo County Council. However, this move has not been unanimously welcomed by local residents and hotel-keepers, some of whom claim that the County Council collects gate fees but does little to deal with pressing conservation concerns. Baringo's ecotourist potential is already being exploited. This needs to be better tied in to the local economy, so that

those living around the lake have more of a stake in conserving its special birds and their habitats.

Further reading

Bennun (1992a), Gitogo (1993), Hartley (1986), Otieno and Rowntree (1986), Stevenson (1980).

Lake Bogoria National Reserve

KE045

Admin region Rift Valley

Coordinates 0°15'N 36°06'E

Area 10,700 ha Altitude 1,000–1,600 m

A1, A4i, A4iii

National Reserve

Site description

Bogoria is a narrow, shallow, alkaline lake on the Rift Valley floor, varying from 3,000 to 4,250 ha in extent, with a maximum depth of 8.5 m. To the east, the Siracho escarpment rises abruptly from the lakeshore, while on the relatively flat western shore is a series of spectacular hot springs and geysers. The reserve was gazetted in 1981 and includes the entire lake and its immediate surroundings. The water usually supports a dense bloom of the cyanophyte *Spirulina* sp. The terrestrial vegetation is mainly thorny bushland, dominated by species of *Acacia*, *Balanites* and *Commiphora*, with patches of riverine woodland containing *Ficus capensis*, *Acacia xanthophloea* and *A. tortilis*. The open shore, often littered with lava boulders, is dominated by alkaline-tolerant grasslands of *Sporobolus spicatus*, with the sedge *Cyperus laevigatus* around the hot springs. The lower slopes of the Siracho escarpment are covered by *Combretum* and *Grewia* thicket. The lake is fed by its springs and by the Sandai (or Waseges) river, which rises on the eastern scarp of the Rift Valley. The Sandai flows past the lake and then turns through 180° to enter it from the north through the Kisibor swamp, a sizeable freshwater wetland dominated by *Typha*.

Birds

See Box for key species. Bogoria is a key feeding ground for the itinerant Rift Valley population of the Near Threatened *Phoenicopterus minor*. Spectacular congregations (estimated at up to 2 million birds) occur at times, and several hundred thousand birds are often present, with numbers fluctuating less than on other Rift Valley lakes. Although large numbers of very young birds may be present at times, this species has not bred successfully here. *Podiceps nigricollis* and *Anas capensis* are usually present in good numbers. The 10 year (1992–2001) January mean for waterbird numbers was 542,200, with a maximum of 1,078,400 recorded in January 1999. An estimate of 1.5 million birds (primarily flamingos) was made for July 1994. Thirty-one of Kenya's 94 Somali–Masai biome species occur in the bushland and woodland around the lake. Other species of global conservation concern recorded at Bogoria include *Circus macrourus* (on passage) and *Falco naumanni* (also on passage, but in small numbers). Regionally threatened species include *Podiceps cristatus* (no recent records); *Anhinga rufa* (has occurred in swamp to north of lake); *Oxyura maccoa* (no recent records); *Thalassornis leucotis* (no recent records); *Trigonoceps occipitalis* (status uncertain); and *Polemaetus bellicosus* (probably resident).

Key species

A1	<i>Phoenicopterus minor</i>		
A4i		Non-breeding	Year
	<i>Phoenicopterus ruber</i>	max. 18,540	2001
	<i>Phoenicopterus minor</i>	max. 1,070,000	1999
	<i>Podiceps nigricollis</i>	max. 3,700	1997
A4iii	Up to 1,078,400 waterbirds have been recorded at this site in January, with 1.5 million birds estimated in July.		

Other threatened/endemic wildlife

The hot springs contain a highly specialized microbial fauna, with several endemic species.

Conservation issues

Lake Bogoria is spectacular. The extraordinary hot springs and geysers, the rugged faulted landscape, the huge numbers of flamingos and the chance of seeing greater kudu are great attractions for visitors. At present, tourists exert no obvious pressure on the

environment at Bogoria. The Koibatek County Council manages the reserve but its existence is not free of controversy, with some local people claiming that they are not benefiting adequately from the income that it generates. A symptom of this is that cattle grazing and human settlement have recently become evident within the reserve's boundaries and are steadily increasing. Mass deaths of *Phoenicopterus minor* have occurred on and off in recent years. The reasons for this are still unclear, though the birds seem to be succumbing to a stress-related infectious disease. It has been suggested that a contributory factor may be heavy metal pollution of their feeding grounds at Lake Nakuru (IBA KE045), but there is little direct evidence for this. The hydrology of Bogoria is poorly understood, but the rivers and springs that feed the lake are likely to be affected by extensive deforestation and land degradation within the catchment.

Further reading

Bennun (1993), Bennun and Nasirwa (2000), Brown (1973), Burgis and Mavuti (1987), Hartley (1986), Nasirwa and Bennun (1994, 1995), Nasirwa and Owino (2000), Njuguna (1996), Owino and Nasirwa (2001), Owino *et al.* (in press), Oyugi (1994), Oyugi and Owino (1998a,b, 1999), Tuite (1979, 1981).

Lake Elmenteita

KE046

Admin region Rift Valley

Coordinates 0°27'S 36°15'E

Area 7,200 ha Altitude 1,775–1,950 m

A1, A2 (108, 109), A4i, A4iii

Unprotected

Site description

Elmenteita is a shallow alkaline lake (1,800 ha; maximum depth 1.9 m) lying on the Rift Valley floor some 20 km south-east of Nakuru town. It is fed by the Kekokey hot springs at its southern end, and two small streams, the Meroronyi and Kariandusi, flowing from the eastern plateau. The surrounding landscape is characterized by dramatic rocky faults, volcanic outcrops and cones. Rainfall is erratic and averages less than 600 mm/year. To the east, the lake is flanked by small-scale agriculture, while several large ranches surround the remainder. The northern and south-eastern lakeshores are open and flat, a spectacular cliff rises to the north-east, and the western shores are broken and rocky. The natural vegetation is mainly *Acacia* and *Tarconanthus camphoratus* bushland interspersed with *Themeda triandra* grassland. Patches of *Acacia xanthophloea* woodland occur near the shore, and formerly covered a large area south of the lake. The IBA consists of the lake and its surrounding shoreline, including the hot springs and the cliffs, and the Soysambu Wildlife Sanctuary (5,400 ha), part of the Delamere Estate, that abuts the lake to the north and west.

Birds

See Box and Table 2 for key species. The threatened, restricted-range *Prionops poliophus* occurs in the surrounding woodland (where it may be resident), and *Euplectes jacksoni* is a seasonal visitor nesting in the tall grassland. The lake consistently holds internationally important populations of *Phoenicopterus ruber* (1991–2001 January mean: 5,600) and *P. minor* (1991–2001 January mean: 140,300) and *Recurvirostra avosetta* (1991–2001 January mean: 1,440). At least 69 waterbird species are recorded, including 29 Palearctic migrants. Fish have recently spread from the peripheral hot springs to the main lake, but even before this Elmenteita often hosted large numbers of *Pelecanus onocrotalus*. Up to 8,000 pairs have bred there when water levels are high and rocky outcrops in the eastern sector are flooded to form islets, on which the birds can safely nest. The pelicans move daily to Lake Nakuru (IBA KE049) to feed. *Phoenicopterus ruber* have also bred at Elmenteita in the past, but have been displaced by pelicans in recent years. There have been occasional, but unsuccessful, breeding attempts by *Phoenicopterus minor*. The woodland and bushland are rich in birdlife (over 400 species have been recorded), particularly raptors. Globally threatened species additional to those shown in the Box are *Falco naumanni*, which occurs on passage, and vagrant *Aquila clanga* and *Parus fringillinus*. Regionally threatened species include *Podiceps cristatus* (which has nested here recently), *Casmerodius albus* (an important non-breeding site, with regularly more than 50 and as many as 156 counted in January 1994); *Trigonoceps occipitalis*; *Hieraaetus ayresii*; *Stephanoaetus coronatus*; *Polemaetus bellicosus*; *Buphagus africanus*; and *Euplectes progne*.

Key species		
A1	<i>Phoenicopterus minor</i> <i>Prionops polioliophus</i>	<i>Euplectes jacksoni</i>
A2 (108)	Serengeti plains EBA: One of the three species of this EBA that occur in Kenya has been recorded at this site; see Table 2.	
A2 (109)	Kenyan mountains EBA: One of the eight species of this EBA that occur in Kenya has been recorded at this site; see Table 2.	
A4i		Breeding Non-breeding (Year)
	<i>Podiceps nigricollis</i>	— 3,000 (January 1990)
	<i>Pelecanus onocrotalus</i>	up to 8,000 11,800 (January 1992)
	<i>Platalea alba</i>	— 260 (January 1994)
	<i>Phoenicopterus ruber</i>	— max. 23,800 (1993)
	<i>Phoenicopterus minor</i>	— max. 588,400 (2000)
	<i>Recurvirostra avocetta</i>	— max. 4,200 (1997)
A4iii	Up to 486,000 waterbirds have been recorded at this site (1994).	

Other threatened/endemic wildlife

Soysambu holds good populations of large mammals, including an introduced population of *Giraffa camelopardalis rothschildi*. The snake *Bitis worthingtonii*, endemic to the central Rift Valley above 1,500 m, is known from here. The cichlid fish *Oreochromis alcalicus grahami*, endemic to alkaline lakes in this part of the Rift Valley, occurs in the hot springs and has recently spread to the main lake.

Conservation issues

Private ranches, including the Soysambu Wildlife Sanctuary, cover c.75% of the shoreline, and this portion is generally well protected. Subsistence farming on the eastern side is leading to increased siltation of the lake from soil erosion, while increased offtake from the Meroronyi stream and destruction of vegetation in the catchment are reducing water inflows. There has been substantial destruction of the *Acacia xanthophloea* woodland on the south-eastern shores. Overgrazing on the ranchland during periods of drought, particularly in the south-eastern sector, accelerates erosion after heavy rain. Soda extraction and sand mining on the eastern shores are limited in scale at present but may be a serious problem in future. Tourism at Elmenteita is increasing, the main attractions being the scenery, birdwatching and the chance to see unusual animals by night (night driving is not permitted in National Parks). There is a tourist lodge (Lake Elmenteita Lodge) on the escarpment above the lake and a tented camp (Delamere's Camp) in the Soysambu Wildlife Sanctuary. At the moment tourism exerts little pressure on the lake, and is a force for its conservation.

Further reading

Bennun (1992a,c), Brown (1973), Hughes and Hughes (1992), Lincer *et al.* (1981), Nasirwa (1998), Nasirwa and Bennun (1994, 1995), Nasirwa and Owino (2000), National Biodiversity Unit (1991), Owino and Nasirwa (2001), Owino *et al.* (in press), Oyugi and Owino (1998a,b, 1999), Oyugi *et al.* (1993), Richards (1991), Spawls (1978), Vareschi (1978).

Lake Magadi

Admin region Rift Valley
Coordinates 1°52'S 36°17'E
Area 10,500 ha Altitude 580 m

KE047

A4i, A4iii
Unprotected

Site description

This is a shallow alkaline lake, its surface largely covered by crusts of sodium carbonate, 85 km south-west of Nairobi in a low-lying basin on the floor of the Rift Valley. Extensive surface water is present only after heavy rains over the local catchment, when run-off reaches the northern end of the lake via three wadis. Most of the lake is a vast expanse of solid sodium carbonate (trona) and allied salts, some 15–30 m thick. This is mined by the Magadi Soda company, whose factory and associated town are on the north-eastern shore. The lake's main basin is 29 km wide and oriented almost due north-south; the north-west arm is 12 km long and 2.5 km wide. The lake is surrounded and fed with water by a number of hot springs that feed shallow, permanent lagoons at the northern, southern and western extremities (other springs well up invisibly below the surface). These warm lagoons are carpeted with cyanophytes, which are grazed upon by shoals of the fish *Oreochromis alcalicus grahami*. The climate is inhospitably hot

and arid (mean maximum temperatures c.35°C, rainfall c.400 mm/year), and the vegetation surrounding the lake is sparse, open bushland.

Birds

See Box for key species. Bird life is concentrated at the lagoons. *Phoenicopterus minor* is often present in internationally important numbers (mean January count, 1994–2001 (seven years): 23,250), though Magadi is a much less significant feeding site for this species than Bogoria (IBA KE045) or Nakuru (KE049). Very large numbers of this species may breed here on rare occasions, perhaps once a century: the last such event was in July 1962, when over a million pairs were nesting. A good variety of other waterbirds is present, including a sizeable resident population of *Charadrius pallidus* (mean count 1994–2001: 420). Mean total waterbird numbers in January for between 1994–2001 were 25,800. Other birds nesting at Magadi include *Platalea alba*, *Anas capensis*, *Recurvirostra avocetta* and *Himantopus himantopus*. Many Palearctic migrant waders winter here too, notably *Calidris minuta*. The bushland around the lake supports 28 of Kenya's 94 Somali–Masai biome species. *Casmerodius albus*, a regionally threatened species, is an occasional visitor.

Key species

A4i	Non-breeding	Year
<i>Phoenicopterus minor</i>	max. 50,000	July 1994
A4iii	Up to 50,000+ waterbirds have been recorded at this site (1994).	

Other threatened/endemic wildlife

The cichlid fish *Oreochromis alcalicus grahami*, endemic to alkaline lakes in this part of the Rift Valley, is abundant in the hot springs. The springs also contain a highly specialized microbial fauna, with several endemic species.

Conservation issues

The lake is unprotected and is commercially mined for sodium carbonate (which appears to be replenished at least as fast as it is removed). Removal of trona takes place from an area not used by waterbirds, and appears to have minimal impact on wildlife. Magadi faces no obvious conservation problems at present.

Further reading

Bennun (1992a, 1993), Brown (1973), Crees (1985), Hughes and Hughes (1992), Nasirwa (1998), Nasirwa and Bennun (1994, 1995), Nasirwa and Owino (2000), Owino and Nasirwa (2001), Oyugi and Owino (1998a,b, 1999).

Lake Naivasha

Admin region Rift Valley
Coordinates 0°46'S 36°21'E
Area 23,600 ha Altitude 1,890 m

KE048

A1, A2 (108), A4i, A4iii
Ramsar Site (unprotected)

Site description

This site lies on the floor of the Rift Valley, 80 km north-west of Nairobi, and consists of a shallow freshwater lake (15,600 ha) and its fringing *Acacia* woodland (c.7,000 ha). Lake Naivasha is of recent geological origin, and is ringed by extinct or dormant volcanoes, including Mounts Longonot, Ol Karia and Eburu. Naivasha's water is supplied by the permanent Malewa and Gilgil rivers, which respectively drain the Aberdare mountains (IBA KE001) and the Rift Valley floor to the north, by the seasonal Karati river (also draining from the Aberdares) and from substantial ground-water seepage. The Malewa covers 1,730 km² of the 2,800 km² catchment, and contributes 90% of the surface water entering the lake. Naivasha has no surface outlet. It is thought that a combination of underground outflow and sedimentation of salts keeps the lake fresh, unlike other endorheic lakes in the eastern Rift Valley. Naivasha includes three chemically distinct water bodies. The main lake (c.15,000 ha, maximum depth c.8 m) incorporates a partially submerged crater, the Crescent Island lagoon (maximum depth c.18 m), at its eastern end. The lagoon is largely isolated at low water levels. To the south-east, separated by papyrus *Cyperus papyrus* swamp and an isthmus of *Acacia* woodland, is the small (c.550 ha), somewhat alkaline Lake Oloidien. Papyrus fringes the main lake's shore (with scatterings of other sedges and *Typha*) and cloaks the inlets of the Gilgil and Malewa rivers. There are large floating, wind-driven rafts of the exotic water-hyacinth

Eichhornia crassipes, usually concentrated in the south-west sector. Submerged macrophytes (including *Potamogeton* spp. and *Naja pectinata*) sometimes occur in large beds, mainly in the shallow eastern part, but these vary greatly in extent. The shores of Crescent Island lagoon are steep and rocky or flat and muddy, while Oloidien has an open, grassy shoreline, with no emergent or floating macrophytes. The lake's levels fluctuate enormously, and Naivasha has been dry within historic times. The surrounding riparian land is almost all privately owned, much of it now used for intensive horticulture and floriculture using water from the lake. A belt of tall *Acacia xanthophloea* woodland fringes the lake and extends along the rivers to the north, though portions have been cleared for farming; further from the water this gives way to dry open grassland, *Tarchonanthus camphoratus* scrub and (on rocky hillsides) *Euphorbia* forest. Naivasha is the second site listed by Kenya as a Wetland of International Importance under the Ramsar Convention.

■ Birds

See Box and Table 2 for key species. The woodland north of the lake and around Lake Oloidien provides habitat for *Prionops poliophilus*, which has been recorded here regularly and is known to nest. *Acrocephalus griseldis* is a winter visitor and passage migrant, the exact status of which is unknown. The lake itself supports a diverse waterbird community, with more than 80 species regularly recorded during censuses. Mean numbers during 1991–2001 were 19,600 waterbirds. Depending on water levels, it can be a significant site for *Fulica cristata* (mean 5,050 during 1991–2001), *Platalea alba* (mean 138 during 1991–2001) and *Tachybaptus ruficollis* (mean 650 during 1991–2001). Many species of duck and Palearctic waders also occur in numbers; Palearctic duck are especially abundant in November and February. *Phoenicopterus minor* occurs in small numbers at times, mainly on Oloidien. The lake is known for its high density of *Haliaeetus vocifer*, which nest in the surrounding *Acacia* woodland. Regionally threatened species include *Podiceps cristatus* (most recent Kenyan records are from Oloidien, with seven birds seen in January 1996); *Oxyura maccoa* (regular on Oloidien, with 170 in January 1994 and January 1997); *Anhinga rufa* (one recorded on Oloidien in January 1997); *Casmerodius albus* (regular at Naivasha, which is an important feeding site; 73 counted in January 1997); *Ephippiorhynchus senegalensis* (2–3 birds usually present); *Thalassornis leuconotus* (occasional; 12 counted on Oloidien in January 1994); *Porzana pusilla* (status uncertain); and *Rynchops flavirostris* (irregular visitor). Since 1995 a large nesting colony of *Phalacrocorax carbo* has established itself in the fringing *Acacia* woodland at Lake Oloidien.

Key species

A1	<i>Prionops poliophilus</i>	<i>Acrocephalus griseldis</i>
A2 (108)	Serengeti plains EBA: One of the three species of this EBA that occur in Kenya has been recorded at this site; see Table 2.	
A4i	Non-breeding	Year
	<i>Fulica cristata</i>	max. 19,400 1991
	<i>Platalea alba</i>	max. 412 1997
	<i>Tachybaptus ruficollis</i>	max. 1,500 1997
A4iii	Up to 30,600 waterbirds have been recorded at this site (1991).	

■ Other threatened/endemic wildlife

The lake supports a large and expanding population of *Hippopotamus amphibius* (c.300 individuals at present). The snake *Bitis worthingtonii*, endemic to the central Rift Valley above 1,500 m, is recorded from Naivasha.

■ Conservation issues

The conservation issues surrounding Naivasha are complex, with the effects of human pressures superimposed on a naturally variable system. The lake has seen dramatic ecological changes through the effects of introduced species. In the 1960s and 1970s, *Mycocaster coypu* (now probably extinct) and the crayfish *Procambarus clarkii* ate their way through the lake's submerged plants and extensive beds of water-lilies (*Nymphaea* sp., now almost vanished). The floating plant *Salvinia molesta*, a problem in the 1980s, was largely replaced in the 1990s by the notorious water-hyacinth *Eichhornia crassipes*. *Eichhornia* appears to provide excellent shelter for young and adult crayfish, contributing to a crustacean population boom that is preventing any recovery of the submerged macrophytes. This in turn has negative effects on several bird species, notably the *Fulica cristata*, numbers of which have

declined dramatically. All the lake's five fish species are introduced. Two tilapias (*Oreochromis leucostictus* and *Tilapia zillii*) and the predatory *Micropterus salmoides* support a once-productive fishery. Much fishing goes on illegally, often with small-mesh gill-nets that catch undersized fish, and over-exploitation has caused fish populations to slump. Gill-netting itself is a cause of high mortality in diving birds such as *Podiceps cristatus* and *Anhinga rufa*. These two regionally threatened species, once common on the lake, have nearly vanished; most recent records are from Lake Oloidien, which is not fished. Increasing human pressures are the major threat to Naivasha. Since the late 1980s the area has seen an extraordinary explosion of horticulture and floriculture for the European export market. The climate and soils, and the ready supply of irrigation water, are ideal for intensive production of cut flowers and crops such as green beans. Large areas of woodland and fringing swamp have been cleared, with cultivation sometimes extending right down to the lake edges. Irrigated agriculture extracts large quantities of water from the lake, as does the nearby geothermal power plant at Ol Karia (now being expanded in a second phase). Water extraction may now exceed replenishment, although no adequate water budget is available. Intensified cultivation and the removal of fringing swamps has increased the amount of sediment and nutrients (along with potentially hazardous agricultural chemicals) reaching the lake. Turbidity and algal biomass increased rapidly throughout the 1980s. Waterbird populations, especially of *Fulica cristata*, kingfishers and *Haliaeetus vocifer*, showed significant declines from 1991–1997, but have increased again following a rise in lake levels during 1998. With spectacular scenery, a fine climate, tranquil surroundings and easy access, Naivasha is already an important site for local and international tourism. Visitors come for bird watching, hippo viewing and watersports, and to visit the nearby National Parks of Hell's Gate and Longonot. Administratively the lake is entirely within Naivasha town, but almost all the land around it is privately owned. The Ministry of Water Development and Department of Fisheries are in charge of controlling water and fish exploitation, respectively, but it is the riparian landowners that can contribute most to management efforts. The Lake Naivasha Riparian Owners' Association was instrumental in having Naivasha declared a Ramsar Site in 1995, and in drawing up a comprehensive management plan that was accepted by Government in 1997 and is presently being implemented. The woodland north of the lake and around Lake Oloidien has generally been well conserved by landowners. Elsewhere, large tracts have been cut to make way for greenhouses. This may be having an impact on the populations and movements of *Prionops poliophilus*, which are poorly understood, and further work on this species is required.

■ Further reading

Bennun (1992a, 1993), Bennun and Nasirwa (2000), Burgis and Mavuti (1987), Harper (1984, 1987, 1992), Harper and Mavuti (1996), Harper *et al.* (1990, 1993, 1995), Henderson and Harper (1992), Higgins (1994), Lewis (1983), Nasirwa (1998), Nasirwa and Bennun (1994, 1995), Nasirwa and Owino (2000), Owino and Nasirwa (2001), Owino *et al.* (in press), Oyugi and Owino (1998a,b, 1999), Spawls (1978), Tarras-Wahlberg (1986), Tyler (1991), Virani *et al.* (1997).

Lake Nakuru National Park

KE049

Admin region Rift Valley

Coordinates 0°22'S 36°05'E

A1, A2 (108), A4i, A4iii

Area 18,800 ha Altitude 1,750–2,070 m National Park, Ramsar Site

■ Site description

This area comprises a very shallow, strongly alkaline lake (3,300 ha), with surrounding woodland and grassland. Set in a picturesque landscape, the park abuts Nakuru town, an important and expanding agricultural and industrial centre. The lake catchment is bounded by Menengai Crater to the north, the Bahati Hills to the north-east, the Lion Hill ranges to the east, Eburu Crater to the south and the Mau escarpment to the west. Three major rivers, the Njoro, Makalia and Enderit, drain into the lake, together with treated water from the town's sewage works and the outflow from several springs along the shore. Nakuru was first gazetted as a bird sanctuary in 1960 and upgraded to National Park status in 1968. A northern extension to the park was added in 1974. The foundation of the lake's simple food chains is the cyanophyte *Spirulina platensis*, which often occurs as a

unialgal bloom. At such times it can support huge numbers of *Phoenicopterus minor* and the fish *Oreochromis alcalicus grahami* (introduced in 1960 from Lake Magadi, IBA KE047, to curb mosquitoes). The fish in turn support a number of secondary consumers. The lakeshores are mainly open alkaline mud, with areas of sedge *Cyperus laevigatus* and *Typha* marsh around the river inflows and springs, giving way to grassland and a belt of *Acacia xanthophloea* woodland. Rocky hillsides on the park's eastern perimeter are covered with *Tarchonanthus* scrub and magnificent *Euphorbia* forest.

■ Birds

See Box and Table 2 for key species. The lake is internationally famous for its populations of *Phoenicopterus minor*; numbers can reach 1.5 million at times, though drastic and unpredictable fluctuations occur. Undoubtedly Nakuru is a very important feeding site for this species; attempts by flamingos to breed here have not been successful. Other waterbirds have increased considerably in numbers and diversity since the introduction of fish in 1961. At times Nakuru is a major feeding ground for *Pelecanus onocrotalus*, which nest on rocky islets in nearby Lake Elmenteita and move to Nakuru daily to feed. Large numbers of Palearctic waders winter at Nakuru or use the site on passage, and Nakuru (at least in the past) has been a key site in the eastern Rift Valley flyway. Nakuru is rich in birds generally—some 450 species have been recorded. Globally threatened species include *Ardeola idae* (a non-breeding visitor, May to October); *Phoenicopterus minor* (a key feeding site for this species); *Falco naumanni* (a passage migrant, relatively common in the past); and *Prionops poliophilus* (probably resident in the *Acacia* woodland, where it has nested). Regionally threatened species include *Podiceps cristatus* (used to occur in numbers, but no recent records), *Oxyura maccoa* (no recent records), *Casmerodius albus* (up to 84 recorded, numbers have declined in recent years), *Polemaetus bellicosus* (sparse resident), *Rynchops flavirostris* (no recent records) and *Euplectes progne* (seasonal visitor, in long grassland).

Key species			
A1	<i>Ardeola idae</i>	<i>Falco naumanni</i>	
	<i>Phoenicopterus minor</i>	<i>Prionops poliophilus</i>	
A2 (108)	Serengeti plains EBA: One of the three species of this EBA that occur in Kenya has been recorded at this site; see Table 2.		
A4i		Non-breeding	Year
	<i>Phoenicopterus ruber</i>	max. 9,940	1991
	<i>Phoenicopterus minor</i>	max. 1,448,000	1993
	<i>Podiceps nigricollis</i>	600	1993
	<i>Tachybaptus ruficollis</i>	max. 7,860	1991
	<i>Pelecanus onocrotalus</i>	max. 44,430	1992
	<i>Mycteria ibis</i>	max. 1,620	1991
	<i>Platalea alba</i>	max. 580	1992
	<i>Himantopus himantopus</i>	max. 3,120	1991
	<i>Larus cirrocephalus</i>	max. 9,040	1991
	<i>Sterna nilotica</i>	1,390	1992
A4iii	Up to 1,496,000 waterbirds have been recorded at this site (1993). The 1991–2001 mean (22 counts) is 298,200.		

■ Other threatened/endemic wildlife

The park is a sanctuary for the rhinos *Diceros bicornis* (CR) and *Ceratotherium simum* (LR/cd), the latter introduced from South Africa. *Giraffa camelopardalis rothschildi* was also introduced into the park in 1977. The rare bat *Hipposideros megalotis* is resident. Other large mammals, some recently reintroduced, include *Panthera leo* (VU) and small numbers of *Acinonyx jubatus* (VU).

■ Conservation issues

Conflicts between conservation and development remain unresolved at Nakuru. On the one hand, the National Park is a major tourist attraction, with up to 300,000 foreign and local visitors each year, and the lake was designated as Kenya's first Ramsar Site in 1990. On the other hand, Nakuru town is an important industrial and agricultural centre, whose growth directly affects the lake. Until recently, treatment of wastewater entering the lake from the town was inadequate. An expanded sewage treatment works is now in commission, but concerns about industrial pollution persist. The Lake Nakuru Conservation and Development Project, run by World Wide Fund for Nature, has been working for some years to improve urban environmental standards and encourage sustainable land-use in the catchment. Nearly half the catchment is now under cultivation, much

natural vegetation has been removed, and dry-season river flows have reduced markedly while silt loads have risen. This problem will be severely exacerbated by recent deforestation in the Eastern Mau Forest Reserve (part of IBA KE051), which provides the catchment for much of Nakuru's water. Encroachment and settlement in this forest (reportedly by as many as 28,000 people) needs to be reversed and natural vegetation allowed to regenerate, or the lake may have little future. The lake's ecology, though relatively simple, is fragile. Populations of *Spirulina*, and the invertebrates, fish and flamingos that feed on it, can only be supported under specific, narrow conditions. Lake Nakuru's levels fluctuate naturally due to little-understood interactions between hydrology, meteorology and geology. It is unknown how human pressures may have influenced the natural cycle A trough in waterbird numbers (other than flamingos) in the mid-1990s points to major changes in the food chain—specifically, a lack of fish and invertebrates—associated with a period of low lake levels. Waterbird populations have largely recovered since the El Niño event of 1998, when the lake level rose substantially. The National Park is now entirely surrounded by a 74-km electric fence that prevents movements of animals in or out. Large mammal populations in the park are expanding, and careful management will be needed to avoid serious ecological imbalances—for instance, giraffe are currently destroying the *Acacia* woodland through debarking. The requirements of threatened birds such as the *Prionops poliophilus* should also be considered in management planning, which presently is focused entirely on large mammals.

■ Further reading

Bennun (1992a,b, 1993, 1994a), Howard and Bennun (1993), Hughes and Hughes (1992), Mburugu (1974), Mutangah (1994), Myers (1974), Nasirwa (1998), Nasirwa and Bennun (1994, 1995), Nasirwa and Owino (2000), Owino and Nasirwa (2001), Owino *et al.* (in press), Oyugi and Owino (1998a,b, 1999), Richards (1991), Vareschi (1978), Vareschi and Jacobs (1985).

Masai Mara

KE050

Admin region Rift Valley

Coordinates 1°30'S 35°00'E

Area 664,000 ha

Altitude 1,500–2,170 m

A1, A2 (108, 109)

 National Reserve,
Group Ranches

■ Site description

This area includes the Masai Mara National Reserve (181,200 ha) and the surrounding wildlife dispersal areas (482,800 ha) in south-western Kenya. Collectively, the reserve and its surrounds are often called the Greater Mara; here, Masai Mara refers to the entire IBA. The site adjoins the Serengeti National Park along the Kenya/Tanzania border, and is considered part of the same ecosystem. The National Reserve is Kenya's most-visited protected area, world famous for its high density of herbivores and predators, and the annual migrations of wildebeest *Connochaetes taurinus*. In 1996, it was nominated for designation as a World Heritage Site. To the north, east and west are large parcels of land demarcated as group ranches owned and inhabited by the semi-nomadic pastoral Maasai people. This communal land forms an extensive wildlife dispersal area for the reserve, comprising the group ranches of Siana (152,000 ha), Koiyaki (94,000 ha), Olkinyei (80,000 ha), Lemek (66,000 ha), Kimindet (37,000 ha), Olorien (26,000 ha), Olchorro Ouirwa (11,800 ha), Kerinkani (8,100 ha) and Angata Baragoi (7,900 ha). Habitats in the Masai Mara are varied, including open rolling grassland, riverine forest, *Acacia* woodland, swamps, non-deciduous thickets, boulder-strewn escarpments, and *Acacia*, *Croton* and *Tarchonanthus* scrub. The permanent Mara and Talek rivers, and their tributaries, flow through the reserve and approximately trisect it. There is a pronounced rainfall gradient from the drier east (with c.800 mm rain/year) to the wetter west (with c.1,200 mm/year).

■ Birds

See Box and Table 2 for key species. The Mara's extensive grasslands are a stronghold for the threatened, migratory *Crex crex* and the near threatened, restricted-range *Euplectes jacksoni*. The woodlands around the reserve are probably the centre of abundance for the threatened, restricted-range *Prionops poliophilus*. The restricted-range *Histurgops ruficauda* has recently been sighted within the reserve, near the southern

border, and may be expanding its range northwards. More than 500 other bird species are known to occur, including 12 species of *Cisticola* and 53 birds of prey. Grassland birds are especially well represented. Large numbers of Palearctic migrants winter in the area, including *Charadrius asiaticus* and *Ciconia ciconia*. The Oololo or Siria Escarpment is one of the few Kenyan sites for *Cisticola aberrans*. Other local and unusual birds in the Masai Mara include *Ardeola rufiventris*, *Neotis denhami*, *Centropus grillii*, *Cercomela familiaris*, *Calamonastes undosus*, *Cisticola angusticauda*, *Hippolais icterinia* (in the northern winter), *Hyliota flavigaster*, *Eremomela scotopus* and *Corvinella melanoleucus*. There is a single record of *Balaeniceps rex*, from the Musiara swamp. Regionally threatened species include *Anhinga rufa* (occasional visitor), *Casmerodius albus*, *Ephippiorhynchus senegalensis* (several pairs nest), *Trigonoceps occipitalis* (regularly nests), *Circaetus cinerascens* (small numbers), *Hieraetus ayresii* (occasional visitor), *Polemaetus bellicosus* (resident), *Stephanoaetus coronatus*, *Coturnix adansonii* (rare intra-African migrant), *Porzana pusilla* (occasional visitor), *Podica senegalensis* (resident), *Neotis denhami* (possibly only 2–3 individuals), *Scotopelia peli* (resident) and *Buphagus africanus* (common resident).

Key species

A1	<i>Ardeola idae</i>	<i>Prionops poliophopus</i>
	<i>Falco naumanni</i>	<i>Parus tringillinus</i>
	<i>Crex crex</i>	<i>Euplectes jacksoni</i>
A2 (108)	Serengeti plains EBA: All three of the species of this EBA that occur in Kenya have been recorded at this site; see Table 2.	
A2 (109)	Kenyan mountains EBA: One of the eight species of this EBA that occur in Kenya has been recorded at this site; see Table 2.	

Other threatened/endemic wildlife

The Masai Mara is remarkable for its great concentration of large herbivores and their attendant predators. The density of herbivores is estimated as nearly 240/km², with a biomass of just under 30 tonnes/km². The extraordinary annual migration of some 1.5 million *Connochaetes taurinus* (and 200,000 *Equus burchelli*) is world famous. There are particularly large numbers of *Panthera leo* (VU) and spotted hyaena *Crocuta crocuta*, and populations of the threatened *Diceros bicornis* (CR) and *Loxodonta africana* (EN). *Lycyaon pictus* (EN) now appears to be extinct in the reserve, having succumbed to epidemics of rabies and canine distemper virus (possibly caused by exposure to domestic dogs). A population still survives in the scrublands of Naikarra and Laleta Hills on Siana Group Ranch.

Conservation issues

The Masai Mara Game Reserve is owned and managed by the Narok County Council and Transmara County Council, which collect gate and other fees. Lodges and camps outside the reserve remit occupation, concession and viewing fees directly to wildlife and tourism associations composed of the local communities. Wildlife generates very substantial revenue in the Masai Mara. An estimated KSh 444 million was earned in 1987, when 122,000 people visited the area. Visitor numbers rose to almost 159,000 by 1994, with revenue presumably increasing in proportion. At US\$27 dollars per person, daily 'viewing fees' are currently the highest in Kenya. However, only a small amount of the overall earnings are retained locally (around 10% in 1987). Of this, an even smaller amount appears to trickle down to the local communities. Most Maasai still feel that they benefit little from the wildlife on their land. As a result, and because of a rapidly growing human population, land-use changes are accelerating. With moderately high rainfall and fertile soils, parts of the area have good agricultural potential. Large-scale farms with fields of wheat, maize, barley, soya beans and sorghum already cloak the landscape towards the north, in Lemek and Olkinyei, and there are now farms within 17 km of the reserve boundary. Over the IBA as a whole, agriculture covered 12% of the land area in 1996, compared to just 3% in 1975, while open grassland (the preferred habitat for conversion to cropland) had declined from 24% to 13%. Most farmers are non-Maasai who either lease the land (for large-scale farming) or have bought small plots. A number of local people are also turning to farming, and fenced-off agricultural plots are mushrooming in areas of rangeland and along the Mara river. There is also increasing pressure to demarcate and subdivide land. This involves the splitting up of group ranches (where the land is unfenced and held collectively by members of the group) into individual plots that can be fenced, leased or sold. However, in

areas where the rainfall is erratic and unpredictable, the resulting fixed, small land-holdings are widely regarded as ecologically inappropriate, unable reliably to support either farming or ranching. As subdivision proceeds, the movement of wildlife is inevitably impeded, and human-wildlife conflict increases. Some 25 tented camps and lodges now operate in and around the reserve. There has been little consideration of how many tourist facilities the area can support, and the proliferation of accommodation puts severe pressure on resources, particularly fuelwood. At the same time, there is widespread concern that investment in conservation and in basic facilities, such as roads, has been minimal, and the standard of protected area management generally appears wanting. Uncontrolled dry-season grass fires, poaching for meat (both for subsistence and on a commercial scale, especially along the western boundary), invasion of the reserve by livestock, rampant off-track driving and chronic harassment of animals have all attracted unwelcome attention. Epidemics of canine distemper virus have killed many lions and eliminated the reserve's hunting dog population. Riverine forests are being destroyed in many places by the increasing number of elephants, which have moved into the reserve from insecure lands around it (including the Serengeti National Park in Tanzania). An integrated land-use plan is urgently needed to address the serious social, economic and conservation problems that are emerging in the Masai Mara. This should not ignore the area's birdlife. The Serengeti–Mara ecosystem is already the focus of considerable long-term biological research (notably on predator–prey relationships and the ecology of grazers, hunting dog, spotted hyena and lion), but very little scientific attention has been paid to its birds. As grassland habitats vanish elsewhere in Kenya, the Masai Mara becomes ever more significant for bird conservation, and its birds require proper study.

Further reading

Bennun (1994c), Braunstein (1996), Douglas-Hamilton (1988), Finch (1994), Gakahu (1991, 1992), Jones (1982), Kahindi (1994), Kahindi and McIlvaine (1993), Martyn (1995), Opala (1996), Scott (1992), Stattersfield *et al.* (1998), Tuya (1996), Wasilwa (1997), Wilson (undated).

Mau forest complex

Admin region Rift Valley
Coordinates 0°30'S 35°20'E
Area 273,300 ha
Altitude c.1,800–3,000 m

KE051

A3 (A07)
Forest Reserves,
Ungazetted forest

Site description

This forest complex covers a substantial area of the south-western highlands of Kenya, and probably represents the largest remaining near-continuous block of montane indigenous forest in East Africa. The forests cloak the western slopes, and part of the crest, of the Mau Escarpment, a block of raised land that forms the western wall of the Gregory Rift Valley, rising steeply from the floor and sloping away more gradually to the west. There are five main Forest Reserves: Eastern, Western and South-western Mau (c.66,000, 22,700 and 84,000 ha respectively), Trans-Mara (34,400 ha) and Ol Pusimoru (17,200 ha). A sixth large block, the Maasai Mau (c.46,000 ha) is as yet ungazetted. In early 2001, a total of 59,134 ha (35,301 in Eastern Mau, 22,797 ha in South-western Mau, 713 ha in Western Mau and 1,03 ha in Western Mau) was designated for degazettement. The Mau has deep, fertile, volcanic soils, and rainfall in places is among the highest in Kenya. Annual precipitation ranges from c.1,000 mm in the east, with a seasonal regime, to 2,000 mm in the west, where it is more-or-less continuous around the year. Numerous streams drain the forests west of the scarp crest, forming part of the Sondu and Mara river systems, which flow into Lake Victoria, and the Southern Ewaso Ngiro system, which flows into Lake Natron. The Eastern Mau is the main watershed for Lake Nakuru, through the Njoro, Makalia and Enderit rivers. The surrounding areas are intensively farmed, with human population densities about twice as high on the western side of the forest as on the east. Vegetation patterns are complex, but there is a broad altitudinal zonation from west to east, lower montane forest below 2,300 m giving way to thickets of bamboo *Arundinaria alpina* mixed with forest and grassland, and finally to montane sclerophyllous forest near the escarpment crest. The lower montane forest is in best condition in the South-western Mau Nature Reserve, where characteristic trees include *Aningeria adolfi-friedericii* and *Strombosia scheffleri*.

Elsewhere, this zone has been heavily and destructively logged, most recently for plywood from *Polyscias kikuyuensis*. Logged-over areas are dominated by pioneer species such as *Tabernaemontana stapfiana*, *Syzygium guineense* and *Neoboutonia macrocalyx*, while pockets of less-disturbed forest hold *Olea capensis*, *Prunus africana*, *Albizia gummifera* and *Podocarpus latifolius*. Substantial parts of the high *Juniperus–Podocarpus–Olea* forest have been encroached and cleared, although some sections remain in good condition. Large areas of both the Eastern and Western Mau have been converted to plantation forest.

■ Birds

See Box and Table 3 for key species. The avifauna of the forests (except for the Maasai Mau) is now fairly well studied. The Mau generally has a rich highland bird community, characteristic of the Central Kenya highlands but with some western affinities. A number of regional endemics occur such as *Tauraco hartlaubi* and the restricted-range *Cisticola hunteri* and *Francolinus jacksoni*. Regionally threatened species include *Hieraetus ayresii* (scarce and local); *Stephanoaetus coronatus* (resident in small numbers); *Tyto capensis* (no recent records); *Bubo capensis*; *Glaucidium tephronotum* (fairly common); *Indicator exilis*; *Sheppardia polioptera* (uncommon and local); and *Campephaga quiscalina* (uncommon resident). This forest holds one of the richest examples of a central East African montane avifauna, and its size means that populations of most species are likely to be viable.

Key species

A3 (A07) Afrotropical Highlands biome: 49 of the 70 species of this biome that occur in Kenya have been recorded at this site; see Table 3.

■ Other threatened/endemic wildlife

Notable mammals include the rare *Cephalophus silvicultor* (LR/nt), the little-known *Felis aurata* and the very sparsely distributed bat *Stenonycteris lanosus*. There appears to be a sizeable population of *Loxodonta africana* (EN) and what was once probably the largest Kenyan population of *Tragelaphus eurycerus* (LR/nt), now scarce. The butterfly *Capys cupreus* is endemic to the Mau Escarpment. There is little information on other fauna. With their relatively high rainfall, the Mau forests, and the South-west Mau in particular, are important for orchids. Three rare and unusual species occur in the South-west Mau. *Polystachia bella*, one of the few Kenyan endemic orchids, grows on the mossy branches of tall forest trees from 1,800–2,000 m in the Kericho area. Another endemic, *Bulbophyllum bidenticulatum*, is known from only two specimens collected along the Kiptiget river. *Chaseella pseudohydra* is a near-endemic recorded only from the South-west Mau and from Honde Gorge in Zimbabwe. The Mau is also one of the centres of abundance for the tree *Polyscias kikuyuensis*, endemic to central Kenya.

■ Conservation issues

The most valuable parts of the Mau for bird conservation are the relatively intact forests of the lower parts of the South-western Mau, and the high montane forests on the eastern rim. These areas cover only a small proportion of the forest. The more open, destructively-logged forest holds good populations of many highland species, but densities of forest-specialist birds are relatively low. The bamboo-forest-grassland mosaic has an impoverished avifauna, though it may be important for some species such as *Buteo oreophilus*. The main conservation problem in the Mau is that facing many Kenyan forests: increasing pressure on productive land from an expanding population. A particular complication in this case is the presence of the forest-dwelling Okiek people, several thousand of whom have been evicted from the forest since the mid-1980s and are awaiting resettlement. The Okiek may have used the forest's resources sustainably in the past, but their hunter-gatherer lifestyle was in direct conflict with forestry policy. Immigration of other ethnic groups to the eastern edge of the forest (particularly from the densely populated western borders) has added to the number of people expecting to be resettled, and increased the pressure on forest resources. Current use of the forest by local people includes (illegal) hunting (*Tragelaphus euryceros* are often pursued using dogs, and this has had a severe impact on their population), honey-gathering (forest trees are cut and debarked to construct hives), fuelwood collection and grazing. These activities, which might be carried out sustainably, are largely unregulated at present, causing further degradation and preventing degraded areas from recovering. It is estimated that 28% of forest cover in the eastern

sector was lost between 1967 and 1989, and clearly this process is continuing. The western boundary (flanked by well-established smallholdings or large tea estates) has been more stable. Unfortunately, a number of recent excisions have, for unclear reasons, targeted areas in the west, which contain the most valuable and intact tracts of closed-canopy forest. In the Eastern Mau, forest plots were allocated in the late 1990s to a reported 28,000 settlers. This may have destroyed much of the watershed for Lake Nakuru (IBA KE049). This and other illegal encroachments are formalized in degazettement proposals published in February 2001 and affecting more than a quarter of the current gazetted area. The degazettement notice covers some tracts of relatively intact forest as well as recently settled areas; it will have a permanent and serious negative effect on water catchment. The main Olenguruone–Silibwet road passes through the centre of the Trans-Mara forest. This road has recently been upgraded, despite concerns about the indirect impact this might have on forest conservation. With reasonable roads, the Mau could potentially be included on a tourist circuit that included Lake Nakuru and the Masai Mara Game Reserve (KE049 and KE050). However, the lack of spectacular scenery, poor condition of much of the logged forest and high rainfall would make ecotourist development a challenge.

■ Further reading

Bally (1946), Bennun (1991), Bennun and Waiyaki (1992a,b), Betts (1966), Blackett (1994a), Davies (1993b), Davies *et al.* (1993), ERL (1990), Jackson and McCarter (1994), Kerfoot (1964), Mutangah *et al.* (1992, 1993), Reuling *et al.* (1992), Sessions (1966), Toschi (1946), Wilson (1988).

Mau Narok–Molo grasslands

KE052

Admin region Rift Valley

Coordinates 0°33'S 35°55'E

A1, A2 (109)

Area undefined, c.40,000 ha Altitude 2,700–3,100m Unprotected

■ Site description

An extensive area of montane grassland along the crest of the Mau Escarpment, which forms the western wall of the central Rift Valley in Kenya. This high, open plateau runs for c.80 km south-east to north-west, and is bounded on each side (and partially interrupted) by the forests of the Mau forest complex (IBA KE051). Rainfall is c.1,000 mm/year, and the original vegetation is short grassland, with some heather and scrub on the ridges where the soil is deeper. The area has high potential for cultivated agriculture, and has gradually been settled and cultivated since the 1950s; it is now heavily populated, with a landscape severely modified by cultivation. Cereals are the major crops, and much grassland has been converted by ploughing and re-seeding with exotic species to provide better grazing for sheep.

■ Birds

See Box and Table 2 for key species. *Macronyx sharpei* and *Cisticola aberdare* are both known to occur, but their current status and distribution within the IBA are unknown. *Falco naumanni* is a formerly regular Palearctic passage migrant, and *Gallinago media* is an uncommon Palearctic winter visitor. The current status of *Euplectes jacksoni* is unknown. The restricted-range *Francolinus jacksoni* was formerly common at forest margins, and *Cisticola hunteri* is likely to be common in scrubby areas. A bird list was compiled in the 1960s, but there is little recent information on the birds of this area. The present-day avifauna is likely to be similar to that of the Kinangop Plateau (IBA KE004) on the opposite side of the Rift Valley. Regionally threatened species include *Neotis denhami* (probably extirpated) and *Podiceps cristatus* (status unknown; may still breed on upland dams).

Key species

A1	<i>Falco naumanni</i>	<i>Cisticola aberdare</i>
	<i>Gallinago media</i>	<i>Euplectes jacksoni</i>
	<i>Macronyx sharpei</i>	
A2 (109)	Kenyan mountains EBA: Four of the eight species of this EBA that occur in Kenya have been recorded at this site; see Table 2.	

■ Other threatened/endemic wildlife

The fauna and flora of these grasslands has been little studied. A number of plant, insect, amphibian and reptile species that are confined to highland grassland probably occur. There are records of two near-

endemic frogs, *Hyperolius montanus* and *Rana wittei*. *Hyperolius montanus* was considered secure in 1980, but it is a species of montane grassland and may now be under threat. The snake *Bitis worthingtonii*, endemic to the central Kenyan Rift Valley above 1,500 m, probably occurs.

■ Conservation issues

Kenya's unique montane grasslands have no formal protection. This IBA faces similar threats to those on the Kinangop Plateau (IBA KE004), with grassland habitat diminishing and fragmenting rapidly as agriculture spreads. A survey is urgently needed to assess its status and that of the threatened birds.

■ Further reading

Sessions (1966).

North Nandi forest

KE053

Admin region Rift Valley

Coordinates 00°20'N 35°00'E

A1, A2 (s058), A3 (A05)

Area 10,500 ha Altitude 1,700–2,130 m

Forest Reserve

■ Site description

This area is a strip of high-canopy forest on the edge of the Nandi escarpment, above and immediately east of Kakamega forest (IBA KE058). North Nandi stretches for more than 30 km north to south and is 3–5 km wide for most of its length. Drainage is mainly eastwards into the Kigwal and Kimondi river systems, which flow through the South Nandi forest (KE055) and westwards into the Yala river and Lake Victoria. Biogeographically, North Nandi is transitional between the lowland forests of West and Central Africa (the easternmost outlier of which is Kakamega) and the montane forests of the central Kenya highlands. It is higher in altitude than Kakamega and the vegetation is floristically less diverse. Common trees include *Diospyros abyssinica*, *Croton macrostachyus*, *Syzygium guineense* and *Celtis africana*, with a dense undergrowth of *Acanthus* and *Brillantaisia*. Rainfall is c.1,500 mm annually, and the well-drained, friable soils are moderately fertile. North Nandi was first gazetted in 1936 as a Trust Forest covering 11,850 ha. In 1968 the North Nandi Nature Reserve was established, amounting to 3,434 ha. Since gazettement, a total of 1,343 ha have been excised, including part of the nature reserve. An additional 410 ha has been converted to Nyayo Tea Zone. Of the present gazetted forest area (10,500 ha), c.8,000 ha is indigenous, closed-canopy forest, the remainder consisting of cultivation, scrub, grassland, plantations and tea. All areas outside the nature reserve were originally slated for conversion to plantation forest, but this has not taken place.

■ Birds

See Box and Tables 2 and 3 for key species. The forest belongs to the Kakamega and Nandi forests Secondary Area of endemism, defined by the presence of the globally threatened, restricted-range *Muscicapa lendu* (a scarce resident). The avifauna is similar to that of Kakamega forest, being a mixture of species characteristic of two biomes: the Guinea–Congo Forests and Afrotropical Highlands biomes (34 out of 70 species in this latter biome are present). Around 160 species in all are recorded. North Nandi is less rich in species than Kakamega and its bird communities have a larger montane element. There have been no recent surveys here and the present status of North Nandi's rare birds, including *Muscicapa lendu*, is unknown. Regionally-threatened species include *Bostrychia olivacea* (possibly locally extinct), *Stephanoaetus coronatus* (resident in small numbers), *Glaucidium tephronotum* (uncommon), *Indicator conirostris* (local and uncommon), *Indicator exilis* (local and uncommon), *Kakamega poliothorax* (scarce), *Hyltiota australis* (uncommon) and *Dyaphorophya concreta* (uncommon).

Key species

A1 *Muscicapa lendu*

A2 (s058) Kakamega and Nandi forests Secondary Area: *Muscicapa lendu* has been recorded at this site.

A3 (A05) Guinea–Congo Forests biome: 23 of the 43 species of this biome that occur in Kenya have been recorded at this site; see Table 3.

■ Other threatened/endemic wildlife

None known to BirdLife International.

■ Conservation issues

North Nandi is an unusual and important forest. It contains many bird species that have very limited ranges in Kenya: a number occur only here and in Kakamega. Conversion of the forest to plantations, as originally envisaged, has fortunately not taken place. However, the forest remains a relatively narrow strip, under severe pressure from illegal timber extraction, charcoal burning, forest grazing of livestock, and unsustainable removal of forest products (firewood, honey and medicinal plants). There appears to have been no special protection of the nature reserve. Much encroachment and clearance has taken place on the western edge of the forest, especially since 1982. Because the forest boundaries are unclear this has been difficult for Forest Department staff to control. The forest's shape, with a high perimeter-to-area ratio, means that edge effects are likely to be substantial. The Forestry Department is inadequately equipped to protect and manage the reserve, and its capacity urgently needs to be increased. Biological surveys were carried out here in the 1970s but there is little up-to-date information on the avifauna. The status and habitat requirements of *Muscicapa lendu* in particular need to be assessed.

■ Further reading

Blackett (1994g), Cunningham-van Someren (1979, 1980), Mann (1980), Schifter and van Someren (1998), Stattersfield *et al.* (1998).

OI Donyo Sabache

KE054

Admin region Rift Valley

Coordinates 0°50'N 37°32'E

A1

Area 1,000 ha Altitude 1,880 m

Unprotected

■ Site description

This area is an isolated basalt mountain with dramatic cliff faces that tower above the surrounding plain, OI Donyo Sabache is some 30 km north-west of Archer's Post along the main Isiolo–Marsabit road. It is often called Ololokwe, a name that refers to the general area rather than the mountain itself. Three-quarters of its circumference (c.14 km) is a sheer precipice up to 500 m high. The summit is a plateau of c.900 ha, divided in two by a small wooded valley that contains several springs. Around half the summit area is covered by dry *Juniperus–Podocarpus* forest, with numerous cycads *Encephalartos tegulaneus*. The steep cliffs are sparsely vegetated. The semi-arid plains below (at 1,100 m) are covered by bushland, but with many drainage lines that support some taller trees.

■ Birds

See Box for key species. OI Donyo Sabache is one of the most important sites in Kenya for birds of prey. At least one pair of *Falco fasciinucha* nests here, and 61 other diurnal raptors and nine species of owl have been recorded on the mountain and its foothills. The mountain is a stop-over and 'refuelling' point for numerous Palearctic migrants, including unusual species such as *Accipiter brevipes*, *Accipiter nisus*, *Falco cherrug* and *Falco peregrinus* (race *calidus*), as well as *Falco amurensis*, *Buteo buteo* and *Pernis apivorus*. Raptors nesting on the mountain (in forest or on the cliffs) or in the drainage lines below it include *Aquila verreauxii*, *Hieraaetus spilogaster* and the regionally threatened *Hieraaetus ayresii*, *Plomaetus bellicosus* and *Aquila rapax*, *Polyboroides typus*, *Terathopius ecaudatus*, *Falco peregrinus* and (probably) *Falco pelegrinoides*, and *Bubo capensis*. *Stephanoaetus coronatus* nested here until the drought year of 1984. Up to 120 *Gyps rueppellii* roost and nest in a colony on the cliffs. The avifauna at the base of the mountain is similar to that in Samburu National Reserve (IBA KE033), while that on the summit contains an impoverished set of species characteristic of the central Kenyan highlands, including the restricted-range *Cisticola hunteri*. Regionally threatened species include *Gypaetus barbatus* (rare visitor), *Polemaetus bellicosus* (nests near the base of the hill) and *Stephanoaetus coronatus* (not recorded since 1984).

Key species

A1 *Falco fasciinucha*

■ Other threatened/endemic wildlife

The large mammal *Diceros bicornis* (CR) formerly occurred here, but the animals were translocated to sanctuaries in 1982. *Loxodonta africana* (EN) move on to the mountain from the plains during the wet season,

and six individuals of *Lycaon pictus* (EN) were sighted here in 1995. Ol Donyo Sabache shelters a near-endemic plant, *Streptocarpus exsertus*, and many fine specimens of the rare cycad *Encephalartos tegulaneus*.

■ Conservation issues

The forest on Ol Donyo Sabache has been deteriorating since the drought of 1984. Populations of livestock (mainly cattle and goats) had built up on the plains, thanks to the provision of new watering points. When drought struck, the only available grazing was on top of the mountain. The hillsides and summit were set on fire, in the belief that this would encourage rain, kill ticks and improve grazing. The effect was to destroy many forest trees and cause the springs to dry up, in turn causing the death of much wildlife and livestock as well. Subsequent fires, and continued grazing pressure, have severely damaged the forest and other vegetation on the summit. The cycads are fire-resistant, but many have been damaged by Samburu *moran* who cut the leaves away in order to collect and eat the cones. Other threats are less serious. Visitors to the site, mainly climbers, leave a considerable amount of garbage on the climbing route and at campsites. The main cliff face has at times been extensively mortared and shelled for military practice, thus disrupting nesting raptors. With its magnificent views, extraordinary diversity of raptors and proximity to the Shaba, Samburu and Buffalo Springs National Reserves (IBAs KE033 and KE034) Sabache has potential for ecotourism. A community-based programme might be developed to protect the mountain and its vegetation, while bringing in revenue to compensate for the potential loss of dry-season grazing.

■ Further reading

Allen (1975), Thomsett (1997)

South Nandi forest

Admin region Rift Valley

Coordinates 0°05'S 35°00'E

Area 18,000 ha Altitude 1,700–2,000 m

KE055

A1, A3 (A05)
Forest Reserve

■ Site description

This area is a mid-elevation forest lying just west of Kapsabet town and south of the main Kapsabet–Kaimosi road. South Nandi was once contiguous with Kakamega forest (IBA KE058) and the two forests are still no more than a few kilometres apart at their closest points. Rainfall is high, 1,600–1,900 mm/year depending on altitude. The forest is drained by the Kimondi and Sirua rivers, which merge to form the Yala river flowing into Lake Victoria. The landscape is gently undulating and underlain by granitic and basement complex rocks, which weather to give deep, well-drained, moderately fertile soils. The South Nandi area has high agricultural potential and human densities around it are also high, particularly to the west. Biogeographically, South Nandi is often considered an eastern extension of Kakamega. However, it is higher in altitude than Kakamega and floristically less diverse. In effect, South Nandi is transitional between the lowland forests of West and Central Africa (the easternmost outlier of which is Kakamega) and the montane forests of the central Kenya highlands. Common trees include *Tabernaemontana stapfiana*, *Macaranga kilimandscharica*, *Croton megalocarpus*, *C. macrostachyus*, *Drypetes gerrardii*, *Celtis africana*, *Prunus africana*, *Neoboutonia macrocalyx* and *Albizia gummifera*. South Nandi was gazetted in 1936 as a Trust Forest covering 20,200 ha, since when c.2,200 ha have been excised for settlement, c.340 ha planted with tea, and 1,400 ha planted with exotic tree species. Of the remaining area, at most c.13,000 ha is closed-canopy forest, the rest being scrub, grassland or cultivation.

■ Birds

See Box and Table 3 for key species. South Nandi forest is almost certainly the most important site in the world for the threatened *Eremomela turneri*. The area supports exceptionally high densities of this little-known species (around 0.27 groups/ha, equating to 1.1 birds/ha), and an estimated population of 13,000 birds. The avifauna (like that of North Nandi, IBA KE053) is mainly Afromontane, but with strong western affinities. There is so far no comprehensive bird list, but a survey in 1996 recorded 111 species of forest birds, including 47 forest specialists. Regionally threatened species include *Stephanoaetus coronatus* (uncommon resident), *Glaucidium tephronotum* (status

unknown), *Indicator conirostris* (local and uncommon), *Indicator exilis* (local and uncommon), *Kakamega poliothorax* (scarce and very local), *Sheppardia polioptera* (local and uncommon), *Dyaphorophya concreta* (scarce) and *Hyltiota australis* (uncommon).

Key species

A1 *Eremomela turneri*

A3 (A05) Guinea–Congo Forests biome: 29 of the 43 species of this biome that occur in Kenya have been recorded at this site; see Table 3.

■ Other threatened/endemic wildlife

The ungulate *Tragelaphus eurycerus* (LR/nt) is reported to occur, but there are no confirmed records.

■ Conservation issues

South Nandi is one of the most threatened IBAs in Kenya. A dense and rapidly growing human population surrounds the forest, and pressure on land is very high. Several large excisions have taken place in the recent past, and there is no indication that this process will end soon; in February 2001 a further 35 ha were designated for degazettement. Substantial chunks of indigenous forest have also been clear-felled to create the Nyayo Tea Zone and for running a power line from Kobujoi town to a water tank in the forest. Illegal encroachment is a very serious problem. The policing of forest boundaries seems to have failed completely in the south-western sector, and hundreds of hectares have recently been encroached in the Morongiot and Kamaindi areas. Beyond the Nyayo Tea Zone, which was meant to act as a buffer, all the forest undergrowth has been cleared and maize planted as far as the eye can see. Only large trees are left standing, and these are rapidly being converted into charcoal. There is an evident failure to appreciate the biodiversity conservation and water catchment importance of South Nandi, either at the level of land-use planning or the day-to-day work of the Forestry Department. South Nandi has been heavily logged-over in the past, which has severely affected the vegetation structure—some parts have reverted to a thicket formation. For unknown reasons, this forest appears now to be exempted from the general Presidential ban on commercial exploitation of indigenous trees. An Eldoret-based company, Rai Ply, has been logging intensively in several parts of the forest since the early 1990s. The felling targets valuable timber as well as species with lighter wood. The logging operation is intensive and appears very poorly managed, with enormous structural damage to the forest as a result. As early as 1993, a survey report recommended that “the discontinuation of logging should be strongly enforced” because of extensive depletion of the growing stock. The present logging gives the impression of an exercise that is deliberately unsustainable, aiming to extract the maximum amount of timber before commercial exploitation is controlled once again. Many of the other problems faced by South Nandi are common to indigenous forests all over Kenya. Tree poaching and platform sawing are rampant in the Kaimosi area, and near other major settlements. Forest antelope are hunted heavily in the eastern sector, where the surrounding human population is lowest; the lack of hunting elsewhere may reflect a lack of wildlife to hunt! Birds are also trapped seasonally, particularly *Coturnix delegorguei* in the grasslands. Honey gathering, seemingly a sustainable activity, also constitutes a conservation threat. Honey collectors here frequently fell an entire tree in order to reach one bee’s nest. These trees are often large and old, with natural cavities that provide essential nesting sites for a large array of hole-nesting forest birds. Livestock grazing inside the forest occurs, but may be a less serious problem than at Kakamega. Areas cleared for the development of tea plantations but not planted with tea are heavily grazed, preventing forest regeneration.

South Nandi is especially significant for its population of *Eremomela turneri*. A six-month study of this species shows that the birds are most abundant in the low-altitude parts of the forest (which have been substantially encroached by people) and show a strong preference for foraging in large *Croton* trees (which are one of the particular targets of the commercial loggers). Scientists, conservationists and the forest management authorities alike have unjustly neglected South Nandi. A *laissez-faire* approach prevails that seems to allow practically any abuse of the forest to continue unchecked. A proper management plan for the forest, produced with the whole-hearted involvement of both the Forest Department and Kenya Wildlife Service, and incorporating the needs of local people as opposed to industrial timber companies, is urgently needed. In the meantime, commercial logging should cease,

encroachers should be repulsed, and a moratorium should be placed on any further degazettements.

Further reading

Blackett (1994h), Kigomo (1987), Kosgey (1998), Waiyaki (1998).

South Nguruman

Admin region Rift Valley

Coordinates 1°50'S 35°50'E

Area c.50,000 ha Altitude c.900–2,300 m

KE056

A1, A2 (108, 109)

Unprotected

Site description

The Nguruman Escarpment forms the western wall of the Rift Valley in southernmost Kenya, some 150 km south-west of Nairobi. The scarp rises steeply in a series of stepped, rocky faults from the flood-plain of the Southern Ewaso Ngiro river on the valley floor at c.900 m to some 2,300 m on the escarpment crest. From here the land falls more gently away to the Loita Plains and the Masai Mara (IBA KE050). The vegetation changes from open *Acacia tortilis* woodland on the plain, to dense *Acacia-Commiphora* bush on the lower slopes, to *Tarchonanthus* thicket and grassland and, finally, submontane forest. Clear, fast-running, rocky streams flow down the escarpment, fringed on their lower reaches with tall riparian forest of figs *Ficus* spp. Beyond the escarpment crest, the rolling country is a mosaic of grassland, scrub and forest, with *Podocarpus falcatus*, *P. latifolius* and *Diospyros abyssinica* among the trees. Rainfall at the base of the eastern scarp is c.400 mm/year, rising to 750 mm on the forested ridges and peaks. Mist and dew can be heavy in the highest areas. Several Maasai group ranches communally own land on the escarpment and hills. One section of the escarpment has been leased to a private company for the development of luxury tourism.

Birds

See Box and Table 2 for key species. This is likely to be an important site for the threatened, restricted-range *Prionops poliophilus*, but although recorded here its status is uncertain. It is most likely to be found in *Tarchonanthus* thicket. The [near-?] threatened *Parus fringillinus* is probably resident in *Acacia* woodland, and *Euplectes jacksoni* nests in long grassland above the escarpment crest. *Cisticola hunteri* occurs at forest edges and in scrub on the escarpment crest. South Nguruman has very varied habitats and thus supports a diversity of bird species, from those characteristic of the Somali–Masai biome (27 of 94 Kenyan species), on the lower slopes, to Afrotropical Highlands biome species in the forest (30 of 70 species). South Nguruman is the only Kenyan site for *Apalis alticola* and one of the very few for *Corvinella melanoleucus*. Only parts of the site have been surveyed, and additional species will doubtless be added to the list. Regionally threatened species include *Gypaetus barbatus* (status uncertain, may be only an occasional visitor), *Stephanoaetus coronatus* (uncommon resident), *Sarothrura affinis* and *Campephaga quiscalina* (uncommon).

Key species

A1	<i>Prionops poliophilus</i>	<i>Euplectes jacksoni</i>
	<i>Parus fringillinus</i>	
A2 (108)	Serengeti plains EBA: One of the three species of this EBA that occur in Kenya has been recorded at this site; see Table 2.	
A2 (109)	Kenyan mountains EBA: Two of the eight species of this EBA that occur in Kenya have been recorded at this site; see Table 2.	

Other threatened/endemic wildlife

The site holds substantial populations of large mammals, possibly including *Diceros bicornis* (CR) and *Lycan pictus* (EN). There is little information on other fauna and flora.

Conservation issues

Although it has no formal protection, South Nguruman remains a relatively wild and untouched part of Kenya, with large areas of natural habitats. Tsetse-fly infest much of the lower, bush-covered escarpment, and the Maasai people generally avoid the area for livestock grazing except in drought conditions. The local communities, with considerable success, have traditionally protected the highland forests on the escarpment crest. It is unclear how long this system can continue, as there have been controversial attempts to assert central Government control over this land. South Nguruman is an area of

great scenic beauty and has good potential for ecotourism, although access is not easy. Several small-tented lodges have been built in a leased concession on the lower slopes of the escarpment, but the low-volume, luxury safari tourism that was planned has not yet begun. More information is needed on Nguruman's birds, especially the threatened species, and the conservation status of their habitats: a thorough avifaunal survey is recommended.

Further reading

Bennun (1994c), Cunningham-van Someren (1977).

Busia grasslands

Admin region Western

Coordinates 0°25'N 34°15'E

Area 250 ha Altitude 1,200–1,220 m

KE057

A1, A3 (A04)

Unprotected

Site description

This area comprises a chain of small grassland patches (some seasonally flooded) in western Kenya, including Mungatsi (36 ha, 0°27'67"N 34°19'69"E), Matayo (210 ha, 0°23'01"N 34°08'73"E), Sikoma (1 ha, 0°24'03"N 34°11'03"E), and Malanga (3 ha, 0°25'96"N 34°18'44"E). All the patches are surrounded by intensive agriculture, mainly maize and sugarcane, and are grazed by livestock. The most important of them is Mungatsi, located 2 km from Mungatsi market along the Mungatsi–Munami road. This privately-owned site lies on either side of a small stream (a tributary of the River Sio), which is fringed by riverine forest and scrub.

Birds

See Box and Table 3 for key species. *Hirundo atrocaerulea*, a globally threatened intra-African migrant, is a non-breeding visitor to this area from April to September. It feeds over grassland and over 100 have been recorded roosting at the flooded grassland patch near Mungatsi. *Gallinago media* is an uncommon Palearctic migrant, likely to occur here regularly but its current status is uncertain. The riverine forest and scrub at Mungatsi also holds several Sudan–Guinea Savanna biome species that are not found in other IBAs. This is also the only Kenyan IBA in which *Caprimulgus (pectoralis) nigriscapularis* and *Sylvietta virens*, two Guinea–Congo Forests biome species, are recorded. Regionally threatened species include *Circaetus cinerascens*, *Alcedo quadibrachys* (recorded at Mungatsi) and *Euplectes hartlaubi* (nests in flooded grassland).

Key species

A1	<i>Hirundo atrocaerulea</i>	<i>Gallinago media</i>
A3 (A04)	Sudan–Guinea Savanna biome: Five of the 13 species of this biome that occur in Kenya have been recorded at this site; see Table 3.	

Other threatened/endemic wildlife

These vanishing grasslands have been little studied. On biogeographic grounds, they are likely to have close links with Ugandan grasslands and to contain species that are found nowhere else in Kenya.

Conservation issues

The tiny grassland patches in Busia District are under severe and immediate threat. Busia has a high human population density that is increasing very fast, and there is great pressure on land. A sugar factory is now established in the area and cane growing is being promoted—in 1996, several grassland areas were slated for conversion into sugarcane plantations. These developments may spell doom to the small pockets of grassland on which *Hirundo atrocaerulea* depends. Swallows move long distances in search of prey, which suggests that a mosaic of grasslands could sustain a wintering population. However, the presence of a suitable roosting site may be critical. Protection of Mungatsi, by land purchase if there is no other option, is an urgent priority. This site is also home to a number of other bird species that are difficult to find elsewhere in Kenya, such as the *Sylvietta virens*. It is already visited by many birdwatching groups and has potential for small-scale bird tourism.

Further reading

Finch (1989), Nasirwa and Njoroge (1997), Turner and Rose (1989), Zimmerman *et al.* (1996).

Kakamega forest

Admin region Western

Coordinates 0°17'N 34°53'E

Area 18,300 ha

Altitude 1,550–1,650 m

KE058

A1, A2 (s058), A3 (A05)

Forest Reserve,
National Reserve, Unprotected

Site description

The site is a mid-altitude tropical rainforest, the easternmost outlier of the Congo Basin forests. Its West African affinities are unique in Kenya, and the forest contains many species found nowhere else in the country. The forest lies in the Lake Victoria catchment, c.40 km north of Kisumu, and just east of the Nandi Escarpment that forms the edge of the central highlands. It was first gazetted as Trust Forest in 1933, and two small nature reserves, Yala and Isecheno (c.700 ha), were established within the Forest Reserve in 1967. In 1986, nearly 4,000 ha of the northern portion of the forest, along with the adjacent 457 ha Kisere forest, were gazetted as a National Reserve, managed by the Kenya Wildlife Service. Only an estimated 10,000 ha of the overall gazetted area is still closed-canopy indigenous forest, of which some 3,200 ha is in the National Reserve. The remaining area consists of grassy and bushed glades (some natural, some maintained by fire or grazing), tea, cultivation and 1,700 ha of plantations of softwoods and commercially valuable hardwoods. Kakamega forest is an important water catchment; the Isiukhu and Yala rivers flow through the forest and gather tributaries from it. The terrain is undulating, with often steep-sided river valleys. The soils are well-drained, deep, heavily leached, clay-loams and clays, of generally low fertility. Rainfall is c.2,000 mm/year, decreasing from south to north, and apparently declining due to deforestation.

Birds

See Box and Tables 2 and 3 for key species. The avifauna is well known, rich, and unusual in its composition. Two globally threatened species occur, *Muscicapa lendu* (scarce resident) and *Eremomela turneri* (reasonably common). The 194 forest-dependent bird species (the highest total for any Kenyan forest) include many of Kenya's Guinea–Congo Forests biome species, as well as 33 of Kenya's 70 Afrotropical Highlands biome species. The mixture reflects Kakamega's altitudinal position between lowland and montane forest. Kakamega's avifauna is unique not only nationally, but continentally. Several species have isolated, relict populations here, including *Andropadus ansorgei*, *Merops muelleri*, *Muscicapa lendu* and *Eremomela turneri*, which are absent from all or nearly all of the superficially similar mid-elevation forests in Uganda. *Muscicapa lendu* is a restricted-range species that characterizes the Kakamega and Nandi forests Secondary Area, and is also present in the Albertine Rift mountains Endemic Bird Area. The presence of the eremomela indicates biogeographic links to the Eastern DR Congo lowlands Endemic Bird Area. Kakamega itself has few endemic taxa; among birds, there is an endemic subspecies (*kavirondensis*) of *Andropadus ansorgei*. At least 16 bird species occur in Kakamega but nowhere else in Kenya, and another 30 (such as *Psittacus erithacus*) are probably now confined to this site. The grassy glades have their own distinctive avifauna, with many moist-grassland species that are now rare elsewhere in western Kenya. Regionally threatened species include *Circaetus cinerascens* (fairly common resident), *Hieraetus ayresii* (relatively abundant), *Stephanoaetus coronatus* (resident in small numbers), *Tyto capensis* (no recent records), *Glaucidium tephronotum* (widespread at low density), *Indicator exilis* (not uncommon), *Indicator conirostris* (uncommon), *Prodotiscus insignis* (rare, with few recent records), *Phyllastrephus baumannii* (not uncommon, but rarely recorded), *Kakamega poliothorax* (extremely local and generally scarce), *Sheppardia polioptera* (patchily distributed), *Hyliota australis* (uncommon in forest canopy), *Dyaphorophya concreta* (very local), *Campephaga quiscalina* (rarely recorded) and *Euplectes hartlaubi* (local).

Key species

A1	<i>Muscicapa lendu</i>	<i>Eremomela turneri</i>
A2 (s058)	Kakamega and Nandi forests Secondary Area: <i>Muscicapa lendu</i> has been recorded at this site.	
A3 (A05)	Guinea–Congo Forests biome: 40 of the 43 species of this biome that occur in Kenya have been recorded at this site; see Table 3.	

Other threatened/endemic wildlife

Several West African forest mammals occur, including *Potamogale velox* (EN). The small mammal community is also very rich and shows strong

affinities to the Congo basin. At least 28 snake species are recorded, including the rare *Pseudohaje goldii* and other West African species such as *Philothamnus heterodermus carinatus*, *Hapsidophrys lineata*, *Dendroaspis jamesoni kaimosae*, *Atheris squamiger squamiger*, *A. hispida* and *Bitis nasicornis*. Two notable and probably endangered forest amphibians, *Leptopelis modestus* and *Hyperolius lateralis*, are recorded. The forest's butterfly fauna is very diverse and important, both regionally and continentally; around 350 species are thought to occur, including at least one endemic, *Metisella kakamega*, and a near-endemic, *Euphaedra rex*. Kakamega has a rich diversity of trees, although endemism is low, the only woody endemic being the liana *Tiliacora kenyensis*.

Conservation issues

Kakamega is a complex and fragmented forest, and one that has been under attack, from inside and out, for many years. Logging for commercially valuable timber, and clear-felling of indigenous forest to make way for plantations, was extensive under the colonial Forest Service and continued until the late 1980s. This began the process of isolating the northern and southern blocks. Excisions for settlement, schools and tea plantations (the 'Nyayo Tea Zones') have claimed additional chunks of the forest. Kakamega District is one of the most densely populated in Kenya, and human pressure on the forest is extremely intense. Local people are estimated to derive products worth c.US\$1.7 million from the forest each year. Forest protection remains totally inadequate, especially in the southern sector under the management of the Forest Department. Agricultural encroachment has led to large-scale destruction (e.g. within Yala Nature Reserve) in recent years, and illegal tree-felling and charcoal burning are rampant. Forest and glade grazing of livestock, allowed once again by Presidential decree in 1994, prevents tree regeneration and causes policing problems. Hunting for bush-meat, debarking of certain trees for traditional medicine, and firewood collection (estimated at 100,000 m³/year) are also serious problems. Continuing forest fragmentation and destruction in Kakamega appears to have taken its toll on the avifauna. Some forest species, such as *Ploceus tricolor*, have not been recorded for many years, and may now be locally extinct. A number of montane forest birds that formerly occurred here, such as *Tauraco hartlaubi* and *Campethera tullbergi*, seem to have disappeared since the severing of forest connections with the nearby, higher altitude North Nandi forest (KE053). The Kenya Indigenous Forest Conservation Programme (KIFCON) developed an innovative conservation plan for Kakamega in the early 1990s, but this has never been implemented. The plan proposed a number of mechanisms for balancing the needs of biodiversity conservation and forest-adjacent communities, including a forest-zoning approach. These ideas should be revisited and, where appropriate, revived. An integral part of this plan was ecotourism development. The forest is one of Kenya's top birdwatching destinations, and has enormous potential for tourism if properly protected. This is one obvious means of generating revenue to help conserve Kakamega's immensely important biodiversity. A forest guides association, whose members are skilled local naturalists, already exists and has embarked on an ecotourist enterprise with GEF Small Grants support.

Further reading

Angwin (1980), Beentje (1990), Bennun (1994a), Bennun and Waiyaki (1992c), Blackett (1994c), Brooks *et al.* (1999), Diamond and Fayad (1979), Emerton (1994), Kigomo (1987), Kokwaro (1988), Mann (1980, 1985), Mutangah and Mwaura (1992), Oyugi (1996), Rowell (1992), Savalli (1989, 1991), Spawls (1978), Stattersfield *et al.* (1998), Tennant (1965), Wahome (1992), Wass (1995), Zimmerman (1972).

Mount Elgon

Admin region Western, Rift Valley

Coordinates 1°20'N 34°38'E

Area c.95,000 ha

Altitude 2,100–4,280m

KE059

A1, A2 (109), A3 (A04, A07)

National Park, Forest Reserve,

Unprotected

Site description

This area comprises montane forest, wooded grassland, bamboo and alpine moorland on the eastern slopes of Mount Elgon, Kenya's second-highest mountain. Mount Elgon lies c.140 km north-east of Lake Victoria and is bisected by the Kenya/Uganda border. It is an ancient, eroded volcano with a huge caldera and, on its summit, the spectacular flat-topped basalt column known as Koitobos. Another unique feature of the mountain is the 'lava tube' caves, some over 60 m wide and frequented

by elephants (and other animals) digging for salts. The mountain soils are red laterite, and rainfall is c.1,200 mm on the mid-slopes. The vegetation is zoned by altitude, with wet montane forest dominated by *Olea capensis* and *Aningeria adolfi-friedericii* grading into *Olea-Podocarpus falcatus* forest, a zone of mixed *Podocarpus* and bamboo *Arundinaria alpina*, and the *Hagenia abyssinica* zone with giant heath *Erica arborea* and *E. trimera elgonensis*. Afro-alpine moorlands occupy the highest parts of the mountain, with tussock grasses such as *Festuca pilgeri*, bogs of *Carex runssoroensis*, giant groundsels and giant lobelias. Open wooded grassland with *Erythrina* and *Combretum* covers part of the lower, drier north-eastern slopes. Mount Elgon National Park (16,900 ha, gazetted in 1968) covers a narrow transect up the north-eastern slopes of the mountain, from lower montane forest to the caldera edge. The remaining forest and moorland (73,000 ha) is part of Mount Elgon Forest Reserve. The north-eastern wooded grassland (c.5,000 ha) is unprotected. The Ugandan side of the mountain, above c.2,000 m, is protected within Uganda's Mount Elgon National Park. Mount Elgon is an important water catchment for the Nzoia river, which flows into Lake Victoria, and for the Turkwel river, which flows into Lake Turkana (IBA KE028).

■ Birds

See Box and Tables 2 and 3 for key species. The globally threatened, restricted-range *Macronyx sharpei* is local and uncommon on the moorland (where it has been collected at 3,400 m). Other restricted-range species are *Cisticola hunteri*, which is common above 3,500 m, and *Francolinus jacksoni* known from just one sight record. Mount Elgon has a rich montane avifauna. The wooded grasslands on the north-eastern side hold a number of unusual birds, including the Sudan–Guinea Savanna biome species that all have very restricted ranges in Kenya. Nineteen of Kenya's 43 Guinea–Congo Forests biome species have been recorded, although as many as 10 of these may now be extinct. Regionally threatened species include *Gypaetus barbatus*, *Stephanoaetus coronatus* (resident in small numbers), *Francolinus streptophorus* (very scarce), *Sarothrura affinis* (scarce resident), *Bubo capensis*; *Glaucidium tephronotum* (uncommon), *Indicator conirostris* (uncommon), *Phyllastrephus baumanni* (may be extinct), *Kakamega poliothorax* (may be extinct), *Sheppardia polioptera* (uncommon) and *Campephaga quiscalina* (uncommon).

Key species

- A1 *Macronyx sharpei*
 A2 (I09) Kenyan mountains EBA: Three of the eight species of this EBA that occur in Kenya have been recorded at this site; see Table 2.
 A3 (A04) Sudan–Guinea Savanna biome: Five of the 13 species of this biome that occur in Kenya have been recorded at this site; see Table 3.
 A3 (A07) Afrotropical Highlands biome: 47 of the 70 species of this biome that occur in Kenya have been recorded at this site; see Table 3.

■ Other threatened/endemic wildlife

Among mammals, the rare *Felis aurata* has been recorded in this forest, but its status is unknown, and *Loxodonta africana* (EN) and *Tragelaphus eurycerus* (LR/nt; declining and uncommon in Kenya) occur. There is a distinctive endemic subspecies of *Tragelaphus scriptus heterochrous*, and several endemic small mammals, including *Crocodyrus elgonius* (VU), *Tachyoryctes ruddi* and *Mus sorella*. The frog *Anthroleptides dutoiti* (EX) is known only from one specimen collected from the Koitobos river on Mount Elgon in 1980. Notable alpine plants include *Senecio johnstoni elgonensis*, *Lobelia deckenii elgonensis*, *Lobelia cheranganiensis*, *Alchemilla elgonensis*, *A. microbetula* and *Helichrysum amblyphyllum*, all of which are endemic or near-endemic to Mount Elgon.

■ Conservation issues

The Mount Elgon forest has suffered severely from encroachment on the lower slopes: very little lower-altitude forest remains, and a number of forest bird species formerly known from below 2,000 m are almost certainly extinct. The forests contain valuable timber, in particular *Olea capensis*. Illegal timber extraction and (more recently) licensed commercial logging by Rai-Ply, an Eldoret-based company, have done tremendous damage to the forest structure. The recent, apparently uncontrolled devastation of substantial areas by a commercial concern has been severe enough to spark protests and demonstrations by those living around the forest. Mount Elgon faces similar management problems to most other forests in Kenya, with the Forest Department finding difficulties in controlling fuelwood collection, fires set by honey

hunters, collection of poles, debarking of medicinal trees, and forest grazing. The moorland has also suffered damage from fires set during drought periods, though there is evidence that some of the vegetation communities there are fire-maintained. The wooded grasslands on the north-east are an unprotected and undervalued habitat whose special birds are in imminent danger of disappearing, as expansion of cultivation and destruction of habitat continue apace. The mountain lies across the international border, which has made it difficult to control the poaching of large animals on the Kenyan side, and organized smuggling has at times created a security problem, deterring visitors to the National Park. This is unfortunate, because the mountain has many attractions. The moorland and peaks have great scenic beauty, the caves and their elephant visitors are fascinating, and a wide range of mammals, birds and vegetation can be seen during a short visit. Surveys are needed to: establish the status of *Macronyx sharpei* on the moorland, and the effects of seasonal burning on this species; map out the wooded grassland and assess the populations of Sudan–Guinea Savanna biome species; and assess the current status of all the forest birds. In the meantime, commercial logging in the forest should cease. An integrated management plan for Mount Elgon is needed that will take into account the conservation requirements of all its habitats, develop the mountain's enormous potential for ecotourism, and put the interests of local people and sustainable use of resources above destructive, short-term exploitation. An IUCN-managed conservation and development project is presently starting to address these concerns.

■ Further reading

Beck *et al.* (1987), Britton (1980), Britton and Sugg (1973), Ekkens (1988), Hoefsloot and Onyango (1995), Wily (1993).

Sio Port swamp

Admin region Western

Coordinates 0°14'N 34°11'E

Area c.400 ha Altitude 1,130 m

KE060

A1, A3 (A06)

Unprotected

■ Site description

This site is a papyrus *Cyperus papyrus* swamp at the extreme north of the Kenyan section of Lake Victoria, on the Kenya/Uganda border. The site consists of mature, almost undisturbed, continuous papyrus stands, stretching from the mouth of the Sio river southwards for about 3.5 km along the lakeshore.

■ Birds

See Box and Table 3 for key species. This is an important site for Lake Victoria biome species, especially three papyrus endemics: *Laniarius mufumbiri* (relatively common), *Bradypterus carpalis* and *Serinus koliensis*. The globally threatened *Chloropeta gracilirostris* is not yet recorded but is likely to occur.

Key species

- A1 *Laniarius mufumbiri*
 A3 (A06) Lake Victoria Basin biome: Seven of the nine species of this biome that occur in Kenya have been recorded at this site; see Table 3.

■ Other threatened/endemic wildlife

None known to BirdLife International.

■ Conservation issues

Sio Port is an important site because of the size of the swamp and its relatively pristine condition. Like other papyrus swamps around Lake Victoria, it is increasingly threatened by unsustainable use, and is in urgent need of better protection. Infestation by the exotic water-hyacinth *Eichhornia crassipes* in many parts of the lake has prevented fishermen from fishing, forcing them to seek alternative forms of livelihood and adding greatly to the human pressure on wetlands. Papyrus shows remarkable powers of regeneration, but excessive cutting for the local mat-making industry, combined with large-scale clearing for cultivating rice and other crops, could rapidly destroy this wetland. Further survey work needs to be carried out at Sio Port to establish whether the threatened *Chloropeta gracilirostris* is present, and if so, at what densities.

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Johnstone and Githongo (1997), Nasirwa and Njoroge (1997).

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