Kafue Flats

Category: Inland Aquatic Biomes.
Geographic Location: Africa.
Summary: Kafue Flats is one of Africa's largest wetlands and among the richest wildlife areas in the world. Dam construction and operation is causing population declines among some species.

One of the most studied and unique riverine ecosystems, Kafue Flats is an extensive floodplain characterized by cyclically inundated grass-sedge associations, expansive lagoons, reed marshes, and oxbow lakes. The ecosystem ranks among Africa's largest wetlands and the world's richest wildlife areas. It is especially famous for the endemic (found nowhere else) Kafue lechwe (*Kobus lechwe kafuensis*) antelope species, and as well an abundance of waterbirds, including large aggregations of the wattled crane (*Grus carunculatus*). Within the landscape lie two parks that constitute a Ramsar Wetlands of International Importance site, owing to the parks' importance for resident and migratory species.

Human impact here is considerable. The river supports a large human population, tourism, and hydroelectric power generation. Water flow has been greatly regulated following the construction of two large dams at opposite ends of the biome in the 1970s. These dams have markedly altered the ecological dynamics, leading to declined populations of at least some ungulates.

Geography and Hydrology

The ecosystem is located midway along the Kafue River, a major tributary of the Zambezi. It occupies a low-lying plain in Zambia, stretching about 158 miles (255 kilometers) long and 25–37 miles (40–60 kilometers) wide, and covering approximately 2,510 square miles (6,500 square kilometers).

With rainfall averaging less than 31 inches (800 millimeters) per year, moisture is sustained mainly by direct rainfall in the upper river catchment, where precipitation is much heavier. Maximum inundation occurs with a time lag of up to several weeks after peak rainfall in the catchment, reaching a peak from April to June, although this pattern varies considerably from year to year. Water may take up to two months to pass through the gentle profile, whose elevation drops by only 20–33 feet (6–10 meters) along its entire length.

Soils are predominantly alluvial clays, with hydrology varying considerably from high moisture content most of the year in the finer clays, to

less waterlogged in the more coarse clays. Hard pans up to 12 inches (300 millimeters) or more in depth occur on the outer margins at the end of the dry season.

Vegetation

The general vegetation is a diverse mosaic of woodlands interspersed with miombo trees and shrubs such as acacia and bushwillows; the legume mopane tree; and grasslands characterized by species such as *Vossia cuspidata* and *Oryza barthii,* as well as representative species of *Hyperrhenia*, *Setaria*, *Cyperus,* and *Typha*.

A variety of aquatic plants predominate in the open water, including the blue water lily (*Nymphaea capensis*), pondweed (*Potamogeton* spp.), and water hyacinth (*Eichhornia crassipes*), the last being a potentially serious invasive. Floating mats often occur as a result of breakoffs from aquatic and semiaquatic riverine vegetation on the banks.

The structure and composition of vegetation within the immediate vicinity of the river depend largely on soil type and topography. Primary productivity here is much higher than in the more nutrient-poor soils further away from the river. The transition to woodland above the permanent floodline, with scattered trees and shrubs dominated by *Termitaria,* is closely associated with conspicuous termite mounds and some common woody shrub weeds such as *Mimosa pigra*.

Fauna

Kafue Flats is a globally unique wildlife paradise, containing numerous mammal and bird species, some of which remain permanently, while others migrate as part of their annual cycles and in response to drought or food scarcity elsewhere. About half of all the remaining lechwe (*Kobus lechwe*) in Africa are found here. However, the population for the endemic Kafue lechwe, one of three key subspecies, is estimated to have declined from about 100,000 in the 1970s to fewer than 40,000 now. This decline is attributed largely to changes in the flooding regime occasioned by construction of the Itezhi-Tezhi dam, which is used for storage of peak-season flows. The storage is undertaken to maximize hydropower production downstream at the Kafue Gorge, Zambia's primary power source.

Other large mammals on the floodplain and in the adjacent woodlands include the hippopotamus (*Hippopotamus amphibious*), blue wildebeest (*Connochaetes taurinus*), Burchell's zebra (*Equus burchelli*), African buffalo (*Syncerus caffer*), and greater kudu (*Tragelaphus strepsiceros*). Smaller ungulates include the sitatunga (*Tragelaphus spekei*), southern reedbuck (*Redunca arundinum*), and oribi (*Ourebia ourebi*). Some carnivores reside permanently in the area, including the spotted hyena (*Crocuta crocuta*), lion (*Panthera leo*), serval cat (*Felis serval*), and side-striped jackal (*Canis adustis*), while the wild dog (*Lycaon pictus*) visits occasionally.

The Kafue Flats biome hosts the greatest abundance of waterbirds in Zambia, including large aggregations of the wattled crane, one of the most threatened birds and the largest and rarest of the six crane species in Africa. Other notable birds include the vulnerable slaty egret (*Egretta vinaceigula*) and long-tailed cormorant (*Phalacrocorax africanus*). With more than 400 migratory bird species estimated to pass through each year, the area has been designated an Important Bird Area.

More than 50 fish species have been recorded, some of which are endemic to southern Africa, including the Kafue killifish (*Nothobranchius kafuensis*). Some migrate locally out onto the floodplains, taking advantage of increased habitat and protective vegetative cover.

Lochinvar and Blue Lagoon National Parks, located on the south and north banks of the river, respectively, have been recognized for their importance as wetlands and habitat for resident and migratory birds. They form part of the Kafue Flats Ramsar site.

Effects of Human Activity

More than 1.3 million people live within the wider watershed, about 25 percent of whom rely directly on the wetlands for their livelihoods in cattle grazing, hunting, fishing, and tourism. Sugar-cane irrigation and processing causes effluent discharges back into the river, causing nutri-

A Kafue lechwe, which is endemic to the Kafue flats area. Its population is thought to have fallen from as many as 100,000 in the 1970s to less than 40,000 today. (Thinkstock)

ent enrichment and invasive plant growth, clogging the waterway, and suffocating fish. Animal poaching and overfishing are problems, as is,the elimination of peak floods and some extreme drought conditions, due to uneven water management of the area's two dams.

As effects of global warming—both those already detected, and the potential future ramifications to temperature, precipitation, air currents, and seasonal onsets—become better understood, it is clear that human interaction with the hydrological cycle here will become an even sharper instrument that can enhance or harm these wetlands and their dependent species.

The human interference of the natural wet and dry cycles has already disrupted fish reproductive cycles, and affected the birds and local population that depend on these fish. As a result, species have been lost as the wetland habitat has degraded. Conservation programs have been undertaken by local communities, governmental and non-governmental agencies that are committed to developing coordinated programs to rehabilitate the environment and its resources.

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Further Reading

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Kakadu Wetlands

Category: Inland Aquatic Biomes.
Geographic Location: Australia.
Summary: Kakadu contains more than 10,000 insect species, in excess of 280 bird species, 117 kinds of reptiles, 60 mammals, 53 freshwater fish, and more than 1,700 plant types.

The Kakadu Wetlands has been called a climate change hotspot. Situated in the Alligator Rivers region of Australia's Northern Territory, the Kakadu Wetlands has a tropical monsoonal climate. Humidity is low and rain rare in the dry season (April to September). Build-up or transition months include high temperature and high humidity, with violent lightning storms. The rainy season is from January to March and sometimes April; it is both warm and wet. Rainfall in Kakadu averages 51–61 inches (1,300–1,565 millimeters) per year.

The Kakadu Wetlands biome is part of an extensive network of habitats here that feature stone