

Do the Dams Spell Disaster for the Kafue Lechwe?

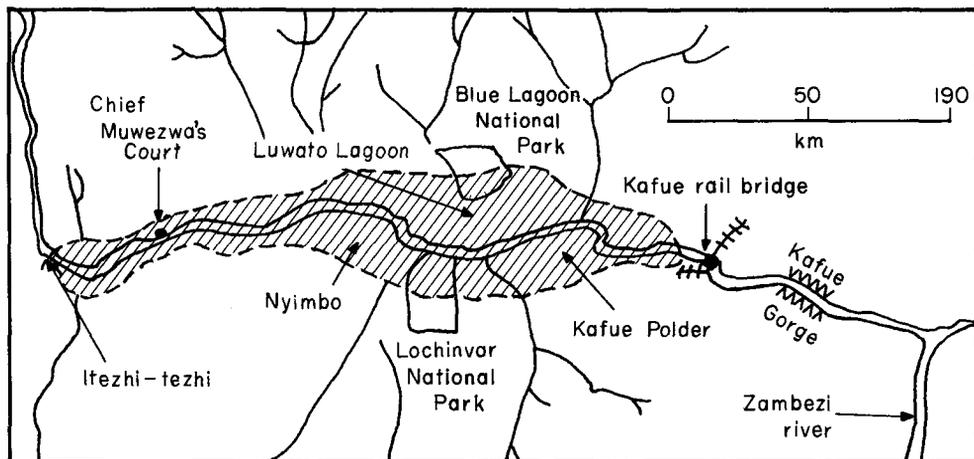
W. A. Rees

The author shows how the Kafue lechwe in Zambia are dependent on the complicated flood regime of the Kafue Flats. But the dams that have been built on the Kafue River to provide electricity for industry are likely to diminish both the extent and the duration of the flooding so drastically as to threaten the survival of the Kafue lechwe.

The lechwe *Kobus leche*, a semi-aquatic antelope, is the most characteristic ungulate of the extensive floodplains in the Zambezi and Zaire river systems. Three lechwe subspecies have been distinguished: the nominate one, the red lechwe *K.l. leche* found in small scattered populations on the floodplains of the upper Zambezi, Kafue and Okavango rivers; the black lechwe *K.l. smithemani* in the Bangweulu basin in northern Zambia, estimated to number about 16,000 plus some very small groups in neighbouring Zaire; and the Kafue lechwe *K.l. kafuensis*, which is endemic to Zambia and found only in one large population on the Kafue Flats. This floodplain is produced by the annual flooding of the Kafue, a tributary of the Zambezi, and here the Kafue lechwe is the most numerous wild ungulate. Divided into three groups, two north and one south of the Kafue river, the total number is estimated at about 94,000. The southern group is centred on Lochinvar National Park, which was my study area for a project to determine the status of the lechwe, and the vegetation.

The 158 square miles of Lochinvar National Park can be divided into zones: the northern two-fifths bordering the Kafue river, including the lagoons, old river channels, oxbows and levees and floodplain grasslands which are flooded annually; the shallowly flooded, much smaller but important water meadow grasslands; the adjacent two-fifths of slightly higher termitaria grasslands, characterised by 'anthills' or termite mounds and covered by rain water for part of each year; and the remainder in the south, higher again and so better drained, with rocky outcrops, or 'kopjes', the highest, Sebanzi Hill,

High-flood line on the Kafue flats





being more than 200 feet above the floodplain. A geological fault along the foot of Sebanzi Hill gives rise to hot springs at Gwisho, where some pools reach 158°F (70°C). Nearby are some Late Stone Age sites, the earliest signs of human occupation on the Flats. On the relatively flat and open summit of Sebanzi Hill are the remains of an Iron Age settlement, home of the ancestors of the present-day Plateau Tonga, a cattle-owning people, divided under several Chiefs, who utilise the Flat's grazing by trekking their herds from the plateau to the floodplain each dry season on a transhumance cycle.

A tremendous abundance of fish, mainly various species of bream and barbel or catfish, is found in the flood water, whose productivity is so high that a team of American scientists likened it to the quantities found in US fish ponds. Many fishermen live in villages along the banks of the river, adapting their fishing methods to the changing water level. The bird life of the Kafue Flats is internationally renowned. More than 400 of Zambia's 702 species are found there, 376 of them at Lochinvar, the greatest variety occurring during the passage of palaeartic migrants.

Lochinvar was used as a cattle ranch from the turn of the century until 1965 when it was bought by the Wildlife Department, helped by the World Wildlife Fund. It received national park status in 1972, when the animal count showed a maximum of 40,000 lechwe, 1500 zebra, 1400 wildebeest, 9 buffalo, 136 eland, 70 kudu, 200 oribi, 35 impala and 30 reedbuck.

There is one rainy season on the Flats, from November to the end of March. The rainfall in the upper catchment area drains into the main river, but the wake travels so slowly across the Flats, due to the low gradient, that the highest flood level is not reached at Lochinvar until the end of April, when the main channel is nearly six miles from the floodplain fringe. In May the flood starts to recede, reaching its lowest point in November, when the whole floodplain dries out except for a few lagoons.

During the rains the lechwe can graze the young lush grass of the termitaria and water meadow grasslands, using the mounds as refuges if needed. With the end of the rains, the ground in the termitaria zone dries out and the grasses become dry, rank and unnutritious. On the plateau most herbivores must wait for the next rains before they can eat young lush grass again, but the lechwe on the Flats cluster along the edge of the flood line throughout May, feeding on the lush grasses growing through the water, a few animals venturing so deep in search of food that water covers their backs.

As the flood water recedes at the end of May, new pastures of excellent grass are gradually uncovered. It is almost as though the lechwe had made some agreement with the water that too large an area of grass should not be uncovered at any one time, for by September it would be scorched before they could eat it. Usually this 'agreement' is nearly perfect, but occasionally it fails, as in 1971 when the flood level remained high throughout June and hundreds



Mark Boulton

of lechwe died. In July the flood water began to recede and catastrophe was averted.

The floodplain is thus part of a dynamic and delicately balanced system enabling the lechwe to feed on young lush grass for most of the year; even apparently minor alterations in the timing of the flood regime can result in large-scale changes in the type of plants in an area and the number of lechwe. As the grass species are mainly determined by the depth and length of flooding, years with different flood regimes can give rise to different plant patterns.

The lechwe have few predators. The main land predators were shot out during the cattle-keeping period, particularly between 1948 and 1965 when Lochinvar was a commercial ranch; so also were any competing grass eaters, notably buffalo. Lions have not been recorded on Lochinvar since 1960; leopard not recently; cheetah are uncommon; spotted hyenas scarce, but may be increasing; wild dogs, not recorded for more than ten years, have been sighted occasionally since 1973. Although lechwe cannot run particularly fast on dry land, in shallow water they are probably faster than any other animal. They are usually found near water, take readily to it when disturbed and spend the night close to the water's edge. Their main and almost only enemy there is the crocodile, still numerous both in the Kafue river and its tributary the Nampongwe, but not a significant predator.

The human population of the Kafue Flats was probably much smaller before Europeans came. Men rarely went more than ten miles from their village, and lechwe were not hunted apparently to any great extent. The Europeans brought security so that longer distances could be travelled, and from that time hundreds of hunters went after lechwe with their dogs. Until 1957 the Tonga had lechwe drives or 'chilas', lasting two to four days, usually in April and September of each year, times when the lechwe could be enclosed against deep water. A great cavalcade of perhaps 200 vehicles, 1000 hunters and many young boys would move off to the chosen hunting grounds. The hunters, armed with spears and axes, some in dugout canoes in the deep water, would encircle the lechwe, driving them backwards and forwards to tire them as the circle closed in. Few lechwe would survive. In 1952, 3000 were killed on Lochinvar in three days. Since 1957 the lechwe have been totally protected, and up to 1974 poaching was insignificant.

The study sought to determine how this lechwe population was regulated and what factors are responsible for maintaining a balance between lechwe numbers and the resources. Density-dependent population numbers may be regulated by predators (clearly not the case here), disease, food, or forms of social behaviour (not studied). Animals can have diseases in benign forms and they may succumb only to the active forms when under stress, such as reduction in nutritious food. This also makes them more susceptible than

healthy animals to infection. Disease was considered to be a secondary factor at Lochinvar. Inadequate food can be the result of poor quality, insufficient quantity, or a combination of both. Most African studies on the nutrition of wild ungulates have shown that quantity was sufficient, but quality was limiting at certain seasons.

The lechwe follow the receding flood line, and their changing distribution coincides with areas of high nutritional levels in the grass. During the latter half of the dry season, when the protein content of plateau grasses is extremely low, the herbage available to the lechwe was sufficient both in quantity and quality. In the wet season, the quantity appeared to be sufficient, but at times its low digestibility level may limit intake. In the first half of the dry season, if the flood water remains high, as in 1971, both the protein and digestibility levels are sufficient, but the quantity is insufficient. It is suggested that under natural flooding conditions the number of lechwe on Lochinvar was close to the carrying capacity of the habitat in normal years. In high flood years numbers exceeded the capacity.

The area surrounding Lochinvar has a high human population, and a particularly high cattle population. Inevitably there is heavy pressure from herdsman trying to extend the grazing areas for their cattle into the park. The question arises: is the present land-use the 'best' for Lochinvar, and will all the factors which combine to produce this dynamic floodplain situation remain constant for the foreseeable future?

I believe firmly that Lochinvar should retain its national park status. The tourism argument for conserving wildlife in its natural habitat is well known, and it is appreciated in Zambia. But the need for protein is great – Zambia imports more than half her meat requirements. The lechwe, however, have no natural predator, so man could step in as a 'controlled' predator to crop the lechwe and in this way provide the much needed animal protein. Cropping is not compatible with national park policy, but 1000 animals, producing some 80,000 lb of dressed meat, could be taken annually from the Game Management Area west of Lochinvar (into which the lechwe overflow) and still leave a stable park population of 25,000 animals.

Unfortunately the Kafue Gorge hydroelectric scheme has drastically altered the picture and the outlook for the lechwe. This is mainly needed for power-hungry copper mines. One dam at the eastern end of the Flats has already been completed; the other upstream of Lochinvar at the western end of the Flats will be the main holding dam and is nearing completion. Now the very survival of the lechwe is threatened. In order to minimise the high loss from evaporation, as much of the water as possible will be stored behind the upstream dam and allowed through at a rate just sufficient for the needs of the power station. This will put an end to the great annual flooding across the whole Flats on which the lechwe depend: the floods, and their duration, will be reduced, and the river maintained within its channel as far as possible.

Lochinvar and its floodplain are unique because lush young grass is available at all times of the year, due to the flood regime. This delicately balanced process hinges largely on the slow rising and receding of the flood water, its depth and duration, and the length of the dry season; different grasses grow depending on these factors. The closing of the second dam will change the flood regime, and the type and availability of the grasses. Under natural flooding the productivity of the area was one of the highest known in the

world. In this dynamic and sensitive situation any change in flooding will also alter the distribution and numbers of fish, inevitably affecting also the fish-eating birds, while a change in vegetation could affect the seed-eating birds.

Man has chosen to dam this flood water and harness its energy to increase the hydroelectric output for expanding industrialisation. The outlook for the only population of semi-aquatic Kafue lechwe is bleak.

As we go to press we learn that the second dam has been completed but not finally closed. Already some changes in the flood regime have occurred.

The Vital Lechwe Lek

Richard H. Schuster

The author has studied the behaviour of the lechwe on the Kafue Flats, and shows how their remarkable breeding behaviour would be destroyed by changes in the flood regime of the Flats; this in turn could destroy this unique subspecies.

The dam at Itezhi-tezhi, because it will change the duration and extent of the annual floods, is expected to bring ecological changes to the Kafue Flats that could result in the disappearance of the Kafue lechwe. The writer's research on the social organisation and forms of social contact in Kafue lechwe (Schuster, in press) has revealed a complex set of behavioral and structural adaptation to the floodplain ecology. Any drastic change could disrupt the lechwe's social organisation and so interfere with breeding success and endanger its future.

During the main breeding season from about mid-November until the end of January, adult males occupy and defend small territories which are compressed together to form a territorial breeding ground known as a *lek*. This functions only as a mating ground. When a female is in oestrus, she enters the lek and selects the male who will court and mate with her. The social status of territorial occupants is very unequal. Unlike most other territorial antelopes, very few territorial lechwe breed. The majority of females gather around only one male who herds them tightly together into a harem within his small territory. Another unusual feature is that lek locations tend to be traditional, literally the same from year to year.

Lekking, known principally in a few species of birds, is a most unusual phenomenon. The Kafue lechwe is one of only two known species of territorial mammals that are known to breed on leks. The other is a relative of the lechwe, the Uganda kob, *Kobus kob thomasi*. Leks are also exciting to watch. The lechwe is a beautiful and majestic animal. When 200 rutting males are gathered in one small area competing for the one territory where females will go, lots of activity can be expected. What makes the show especially striking is the ritualised ceremonial of the social contacts between competing males and between courting males and females. Males rarely fight over territories, but confront each other with displays of tearing at the ground, head-high poses, and mock charges. Threat displays have evolved as instincts in order to avoid injuries from serious combat. Courtship, too, is ceremonial. Males prance, repeatedly lift their fore-legs to touch the female and mount before mating is achieved. These rituals seem to ensure that the female will select one male from