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Conservation Around the World

Short Communications: Notes, News, Comments

together fully 5 million visitors a year, this prospect does not seem at all exorbitant.

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THE LAST REMNANTS OF THE JAVAN RHINOCEROS IN UDJUNG KULON NATURE RESERVE, JAVA

The Javan Rhinoceros (*Rhinoceros sondaicus* Desm.), which formerly occurred in large parts of south-east Asia (at least in Java, Sumatra, the Malayan Peninsula, Assam, Burma, Thailand, and Indo-China), nowadays only survives as a very small population near the westernmost tip of Java, in the Udjong Kulon Nature Reserve.

IUCN and WWF, highly alarmed at the precarious situation of the species, have sent several missions to Udjong Kulon in the last few years. The authors have spent altogether 13 months from 1967 until now, studying the ecology and behaviour of the Javan Rhino and assisting the Indonesian government in tackling problems of its protection and management.

Udjung Kulon Nature Reserve is a semi-island covering about 360 sq km. It consists mostly of plains or low undulating country with many watercourses and swamps, but the western part rises to a mountain about 460 metres high. Almost the entire area is covered by dense vegetation: high forest, bamboo stands, palms, and *Pandanus* clusters. Owing to the denseness of the vegetation and to the ever-changing local wind, it is difficult to find a Rhino and to observe it for any length of time. The observer has to get rather close to the animal to see it, and then usually the Rhino is alerted by noise (Fig. 1) or human scent. The consequence is intense alarm and rapid flight. Continuous observation of individual animals was therefore impossible. Observations had to be supplemented by the analysis of all traces produced by Rhinos—mainly footprints, urine, and dung, and traces of feeding and wallowing.

The Javan Rhino is a browser, feeding mainly on saplings of a large number of different trees and other woody plants. It bends the sapling down, sometimes cracks it by gripping the stem with its jaws, then feeds on small braches and twigs of the top. Usually such saplings do not die, but grow new shoots which are still in the rhino's reach. In Udjung Kulon the Rhino's food-plants are scattered and rather scarce, for the most frequent components of the forest's understorey, the Rattan and Salak palms, *Arenga* palms, and bamboos, are not eaten by the Rhino. It has been reported that in former centuries the Javan Rhino was especially attracted by areas of secondary growth, such as plantations or deserted fields of shifting cultivation (Malayan: 'ladang'). Obviously it has similar food preferences to those of the Sumatran Rhinoceros.*

* Of this, according to Lord Medway (*Biol. Cons.*, **1**(1). p. 94, 1968), 'a major part of the natural diet consists of the leaves and shoots of young trees and shrubs that are characteristic of disturbed or regenerating forest'.—Ed.

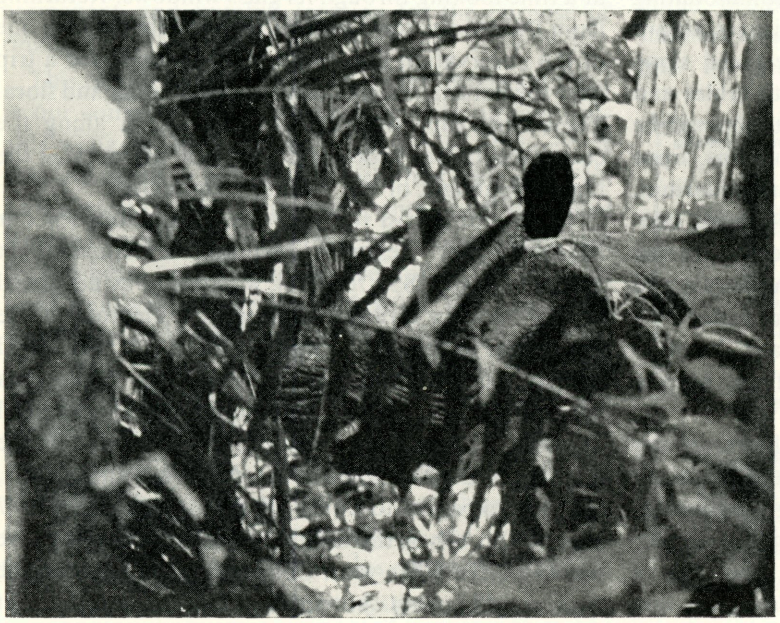

Fig. 1. *The Javan Rhino is difficult to approach and photograph especially in its native forest. This animal, in dense vegetation, has been alerted by noise and is 'listening with ears directed towards the observer.' Photo: Professor Rudolf Schenkel.*

Fig. 2. Javan Rhinos like to rest in mud wallows or in river basins, this animal being characteristically almost submerged. Photo: Professor Rudolf Schenkel.

The Javan Rhino, in the manner of the Indian species (*Rhinoceros unicornis* L.), likes to rest in mud wallows or in river basins (Fig. 2). Often it urinates while lying in a wallow. The scent of urine becomes attached to the rhino's skin and, when the animal moves on, impregnates the track—especially the tunnel-like paths leading through dense vegetation. Besides urinating in the wallow, the Rhino also squirts urine in small quantities while walking. As in other rhino species, it is most probably the male that squirts urine in a backward-upward shower onto the vegetation, and in this way produces 'scent-marks', while females drop urine in a backward-downward splash or squirt.

The Javan Rhino often defecates in a river or rivulet near a main track or at a crossing of two tracks. In such locations several dung-heaps of different ages may be found close together; but the Javan Rhino does not maintain large dung-piles like those of the Indian Rhino, nor does it rub its hindfeet after defecation as the African rhinos do. This behavioural pattern which results in marking the trail with dung-scent may be an adaptation to a comparatively dry and open habitat.

In Udjung Kulon, the Javan Rhino and the Banteng (*Bos javanicus* d'Alton) make use of the same tracks; but owing to the low population density of both species, the track-system is poorly maintained. Most of the Rhinos observed were single individuals; only on a few occasions were mother and calf seen together. Most probably the mother and calf keep together for about 1 to 2 years, as in the case of the Indian Rhino. The association between bull and cow is only of short duration. Several times fresh tracks of three or four individuals were observed in the same area; presumably such animals were loosely associated. Besides olfactory communication, a special far-reaching whistling call which was noticed on a few occasions may function as a signal between members of such a grouping. The Javan Rhinos do not defend territories, but live as independent or loosely associated nomads.

The size of the rhino population in Udjung Kulon was determined by the evaluation of fresh traces, mainly footprints. Six or seven teams, each working in a defined sector, registered all the fresh tracks. The width of the footprints was measured in each case. Owing to slow progress in the dense vegetation, the counting had to be extended over 5 days, and even so not the whole reserve, but only the main rhino areas, could be covered. The possibility of double counting of one individual, due to migration during the time of the census, was considered: tracks of the same size in adjacent areas were counted as originating from one or two animals, and correspondingly a minimum and a maximum number, 19 and 29 animals for the whole population, were obtained.

An approximate correlation between the size of footprints and the age of Javan Rhinos was obtained by comparison with the Indian Rhinos bred and kept at Basel Zoo. For as adult Indian Rhinos have similar-sized footprints to those of Javan Rhinos, it seems reasonable to assume that in both species the feet grow at a similar speed. In both the years of this study, 1967 and 1968, the footprints of at least one new-born animal were found. According to foot-track analyses, the number of immature animals (less than 3 years old) lies between 1/5 and 1/4 of the population. This suggests that the population reproduces adequately.

At present the survival of the species depends mainly on effective protection against poaching. Therefore,

top priority has been given to measures of protection: since 1967, the guard-system of Udjung Kulon has to a large extent been equipped and subsidized through funds from WWF. If the rhino population increases markedly, additional problems will arise. As indicated above, rhino food-plants are rather scarce—especially in the many areas where palms of the genera *Arenga* and *Zalacca*, or bamboos, dominate the understorey of the forest. Measures of management to provide additional secondary growth of rhino food-plants will have to be planned and executed. The basis for such management is being investigated at present. A full account is being published in *Acta Tropica*, vol. 26, pp. 98–135, 1969, entitled 'The Javan Rhinoceros (*Rh. sondaicus* Desm.) in Udjung Kulon Nature Reserve, Its Ecology and Behaviour.'

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Kainji Lake, a New Aquatic Habitat in Northern Nigeria

Throughout Africa new dams and reservoirs are being created to provide electricity. Nigeria is no exception. The Kainji dam project had its beginnings in 1951, when it was realized that the hydroelectric potential of the River Niger might solve the problem of the increasing demand for electricity in Nigeria. The dam is sited in Northern Nigeria on the Niger some 300 miles (480 km) north of the port of Lagos. Work on the dam started in 1964 and was completed in 1968. Its construction, at a cost of nearly £87 million, has had many far-reaching consequences. Nearly 50,000 people have been displaced, and two towns and many villages have been flooded. Some 40–50,000 people have been resettled in two new towns and about 124 villages.

Because of potential health hazards accompanying these operations or their effects, a Vector-borne Control Unit was established at the dam site to ensure that the three principal endemic insect-borne diseases—malaria, trypanosomiasis, and onchocerciasis—were under control. The last-named is the most serious of these diseases in the area and is controlled by regularly dosing the Niger and its tributaries with DDT. Although this insecticidal campaign has operated since 1964, there have unfortunately been no investigations into its effect on the local aquatic fauna.

The dam has created a freshwater lake of about 480 sq miles (1,243 sq km), 85 miles (136 km) long and up to 15 miles (24 km) wide, impounding some 15,000 million cu metres of water. For the first time, navigation from just above the dam all the way to the sea, a journey of some 630 miles (1,008 km), is possible throughout the year. Scientists at the Kainji Biological Pilot Research Station have made preliminary studies of the freshwater biology of the area and the changes in the fauna and flora that will probably result from changing a river habitat to a large expanse of still water. Upstream, the dam will result in a greatly increased variety of fish, which will provide a much-needed cheap and reliable source of protein. It has been estimated that the annual yield of fish could be 10,000 long tons (10,160 tonnes). Downstream, full flood control will be obtained for the first time, and this will allow expansion of agriculture along the banks of the Niger.

The dam will also have an impact on the birds and mammals of the area. The proposed boundaries of the newly-created Borgu Game Reserve (1,462 sq miles = 3,786 sq km) were extended so that some 15 miles (24 km) of shore-line of the Kainji Lake were included in the reserve. There are some 30–40 hippopotamus (*Hippopotamus amphibius*) in the Reserve, and it is hoped that these, together with other animals such as the Waterbuck (*Kobus defassa*), Manatee (*Trichechus senegalensis*), and Nile Crocodile (*Crocodylus nilaticus*), will be able to increase in numbers. The Lake attracts birds such as the Woolly-necked Stork (*Dissoura episcopus microscelis*), West African Hadada (*Hagedashia hagedashia brevirostris*), Hammerskop (*Scopus umbretta umbretta*), River Eagle (*Cuncumu vocifer clamans*), and Blue-breasted and Giant Kingfishers (*Halycon malimbicus firbesi* and *Megaceryle maxima maxima*). Some birds—such as ducks, waders, and grebes—may increase in numbers during the next few years as a result of the Lake, but a reduction has apparently occurred in the numbers of other birds which formerly nested amongst the marshy edges of the Niger and on its sandbanks. Flooding has resulted in the loss of these valuable nesting sites.

It is fortunate that Kainji Lake borders the Borgu Game Reserve, and that the value of the impounded water as a haven for wildlife has been appreciated. Attempts are being made to set up a Wildlife and Ecology Subcommittee to advise on research and management, but unfortunately the value and importance of conservation is not at present widely appreciated in West Africa. Consequently it may be some time before any sound ecological programme is in operation.

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