



Richman
3 MRT 1987

WWF YEARBOOK 1985 / 86

A review of the international conservation projects supported by WWF
in 1984 and 1985, and a selection of reports
from WWF National Organizations

Produced by the WWF Information and Education Division
Edited by Cassandra Phillips
Designed by Patrick Virolle
Phototypeset by Beck, Lausanne
Printed by Gessler, S.A. Sion

*“A new ethic, embracing plants and animals as well as people,
is required for human societies to live in harmony
with the natural world on which they depend for survival and well-being.”*

World Conservation Strategy



We encourage people to quote from and reproduce the material in this Yearbook, provided that appropriate credit be given to WWF as the source of the information.

Purchase enquiries to WWF-International, 1196 Gland, Switzerland, or to the appropriate WWF Affiliate Organizations as listed at the end of this volume.

© 1986 World Wildlife Fund

These two sets of data permit the retrieval of information through three main routes: through the jurisdiction concerned (which taxa are dealt with in the legislation of country X ?), through any desired taxon (what legal instruments mention taxon Y ?), and through the protected status (what legal texts in countries A, B, and C regulate international trade in species Z ?).

So far, over 10,000 taxa have been entered on computer, as a result of the analysis of some 1500 legal instruments. The pool of information thus created has been extensively used by the IUCN in its work, serving, for instance, as a basis for the preparation of reports on the species legislation of certain countries (see under Project 3174 — Africa: Analysis of species Legislation). It is also being used in answering queries from IUCN members and third parties, including Infoterra, the information referral system of UNEP, for which the ELC serves as a major source of information in the field of law.

Particular progress has been made during 1984 and 1985, during which period the range of species covered by the Index was extended to cover reptiles, amphibians, fish and invertebrates, and the jurisdictional scope of Index was also expanded to include analysis of legislation from Swiss Cantons, Austrian Lander, States of the United States and all countries of Africa. A brochure on the Index data base has also been prepared during this period and is available upon request.

The usefulness of the data is dependent on regular updating. It is, therefore, vital to maintain this data base on a regular basis. It is hoped that this will continue to be possible in the future, although funding for 1986 is uncertain.

Project 3312

Guidelines on Legal and Planning Aspects of Plant Protection

WWF Expenditure 1985 — \$15,679

Project Executants: IUCN Environmental Law Centre, in cooperation with CEPLA Member Cyrille de Klemm.

Objectives: To assist in the development and promotion of remedial measures to improve the conservation status of endangered plants; to review existing plant protection requirements; to identify legal mechanisms which appear to be effective and appropriate; to make proposals useful for the development of new, or the improvement of existing legislation.

Legal measures for the protection of plant species form an integral component of a comprehensive plan for plant conservation. Although not necessarily sufficient in itself, the system of protection chosen for plant species and provided for in national legislation plays a vital role in the resulting conservation status of those species. Presently, however, most plant protection legislation is limited to

measures restricting collection and trade in plants. This, obviously, is not sufficient and should be coupled with measures relating to land use planning, as well as with measures providing incentives of various sorts, in particular with regard to the conservation of endangered plant communities on private property.

The project started with an analysis of existing plant conservation legislation, taking into account, in particular, the following aspects:

- effects of the designation of protected species with regard to private activities on private and public lands; and activities requiring permits on private and public lands;
- the extent to which all potential threats to plant species can be taken meaningfully into consideration in the context of national legislation: "threats" entail not only excessive collection, but also threats to habitats and to pollinators and seed dispersing agents, as well as the introduction of alien species;
- effects of designation with regard to, e.g. the preparation of environmental impact assessments, the granting of permits, the designation of critical habitats, the establishment of reserves, the development of recovery plans, the conclusion of management agreements, etc.

It is planned, in a second phase, to ascertain the effectiveness of the available mechanisms through contacts by correspondence and interviews in the key countries concerned. A final phase will entail the development of recommendations, in the form of guidelines, for the elaboration of comprehensive national legislation related to plant species conservation and protection, and submission of these proposals to a group of selected specialists for comments, prior to publication.

This project is still in its first phase, and extensive efforts are being made to gather the information necessary to complete the review mentioned above. The information available at the IUCN Environmental Law Centre has served as a basis for this undertaking. Through correspondence with the competent authorities of some 29 countries (from Europe, North America, Australia) an attempt is being made to check this information and supplement it.

It is planned to implement the project further in 1986 by visiting key countries in order to study further some of the most interesting legal techniques reviewed. A first draft report will then be written.

Project 3637

Closing Down the International Trade in Rhino Products

WWF Expenditure 1985 — \$15,995

Project Executants: Dr Esmond Bradley Martin and Lucy Vigne.

Participating Organizations: New York Zoological Society; African Fund for Endangered Wildlife; African Wildlife Foundation; British and American Embassy assistance.

Objectives : To curtail the international trade in rhino products and reduce the demand for the horn throughout the world by encouraging appropriate government officials to enforce a ban on rhino products, and traders to deal in substitutes.

Rhinos have declined in numbers in the last fifteen years from a world population of 70,000 to fewer than 16,000 today. The reason for this is that rhino products are in excessive demand, firstly in South East Asia for traditional medicine (mainly for lowering fever) and secondly in North Yemen which imports 50% of Africa's rhino horn for carving into dagger handles. Prices for African horn have soared from US\$30 a kg wholesale in 1970 to about US\$700 today, and for Asian horn from US\$2000 to US\$9000.

Millions of dollars have been spent largely to no avail trying to protect rhinos from poachers and, recently, efforts have been focused, in Kenya, on enclosing the last rhino strongholds with electric fences. In conjunction with these projects to protect rhinos in the wild or in enclosed areas, attempts to reduce the demand for rhino horn by curtailing the trade in rhino products is vital if the rhino is to have a future in Africa and Asia, which is one of the major objectives of this project.



Pharmacies in Asia continue to sell rhino horn derivatives despite recent findings showing they have no medicinal properties.
Photo: WWF/Mark Halle

Dr Esmond Bradley Martin has been carrying out investigative research on the international trade in rhino products since 1979, with the support of WWF, and is now involved in further efforts to have the trade closed down.

A five month visit to South East Asia has been organized for Dr Martin. Appointments have been arranged, and briefing documents written (translated into Chinese, Korean and Malaysian) and circulated to political decision makers, importers, wholesalers, doctors' associations and associations of pharmacists. Dr Martin will visit a dozen different countries paying special attention to countries which still legally import rhino horn, namely Brunei, Macao, Singapore and South Korea. Dr Martin will approach the governments concerned to encourage the ban of rhino horn imports and will ask dealers in rhino products to use substitutes such as Saiga antelope horn which is an acceptable substitute for rhino horn in Chinese traditional medicine. Posters are being designed to be displayed in pharmacies portraying the same message to customers, and a general public awareness programme is being initiated in South East Asia through the media of newspapers, radio and television. American and British diplomatic missions are being very helpful towards the project and Dr Martin's visit has been well received.

Publicity about rhinos and efforts to save them is important worldwide, in order to increase awareness and concern. Major international news services have published and circulated articles to many countries as well as those in South East Asia. In addition, articles are being published in international wildlife journals. Dr Martin has assisted or appeared in TV programmes concerning the plight of the rhino, for Japan, PBS USA and BBC UK as well as radio programmes in USA, UK and elsewhere.

There have already been two major successes since the project started. In August 1985 Taiwan agreed to ban with immediate effect all imports of rhino products, and Hong Kong, which was the major entrepot for rhino horn until its import ban in 1979, will stop all exports of old stocks of rhino horn from March 1986.

The strong demand for rhino horn in North Yemen remains a major problem despite an official ban. There has been a recent devaluation of the *real* from 5 to 8 to the US\$, making rhino horn much more expensive and some traders have consequently gone out of business, so this is an appropriate time to encourage further use of substitutes such as cow and water-buffalo horn.

An advisory body for this project has been set up to help gather information about the trade in rhino products in order to help expose smuggling routes.

Prices of rhino products will be monitored in each country to see whether demand has increased or decreased over the past few years. Dr Martin will be in Asia until early April 1986 after which a thorough follow-up of his efforts will be necessary.

Project 3626**Cameroon, Environment and Development of the River Logone Floodplain**

WWF Expenditure 1984/85 — \$13,998

Project Executants: Ecole pour la Formation des Spécialistes de la Faune, (Wildlife School), Garoua, Cameroon; Centre for Environmental Studies, State University of Leiden, The Netherlands.

Participating Organizations: Ministère de l'enseignement supérieur et de la recherche scientifique, Cameroon. Délégation générale au tourisme, Cameroon. Permanent Secretariat of the Man and Biosphere Programme in Yaounde, Cameroon. Institute de Recherches Zootechniques in Garoua, Cameroon.

Objectives: Integration of wildlife conservation and utilization within the framework of the development of a biosphere reserve, including Wza National Park and its surroundings, according to the principles of Unesco's Man and Biosphere Programme.

The 10,000 sq km natural floodplain of the Logone River, which flows north into Lake Chad in North Cameroon, is an important Sahelian wetland ecosystem. The floodplain is a life supporting system for traditional human communities who depend on the seasonal flooding to support their cattle, fisheries, paddy rice and other agriculture. Wildlife and birds, the original users of the floodplain, are nowadays largely restricted to the two national parks, Waza and Kalamaloué, and their surroundings. The growing numbers of people and cattle combined with the series of recent droughts and the creation of a large scale modern rice project (SEMRY II) have led to serious environmental problems and resource degradation.

The reduced floods have led to a massive reduction of floodplain grasslands and starvation of wildlife while human lives have had to be saved by emigration and food aid. Overgrazing, and degradation of soils and forests are some of the related problems.

Within the framework of this project, African and European students are cooperating to monitor and analyze the changing environmental situation in the floodplain. After a period of five years their results should provide the necessary basic field data for the integration of nature conservation and traditional human exploitation in and around Waza National Park, including measures to improve the hydrological situation downstream of the SEMRY II project.

The optimal and sustainable management and use of the natural resources in the Logone floodplain can only be established by means of an interdisciplinary approach on the regional level. The field research carried out by students covers physical, biological, agricultural and social aspects. During the first two seasons the research concentrated on three subjects:

1. Monitoring of degradation and regeneration of the typical floodplain pastures around Waza, downstream of the Semry II project.
2. Wildlife research to clarify the interrelations between vegetation, wildlife and human activities and to determine measures to sustain their coexistence. Relevant species are the elephant, cob, dama gazelle and lion. During the first two years research will concentrate on the elephant population of Waza and its surroundings, being the largest in West Africa.

Attempts were made to determine their social groups, population dynamics, and migration patterns as well as their impact on natural vegetation and agricultural crops.

3. Human population and land use. Basic data on different ethnic and social groups in the area, their numbers, organization and land use systems formed the basis for a series of case studies at the community level. During the first two seasons three case studies concerning the Arab Choa, Fulani and Mousgoum were carried out. Their system of resource management and exploitation in relation to their social structure, traditional values and capacity to adapt themselves to the changing environment were investigated. Special attention was given to their perception of environmental problems and degradation and their ideas about corrective and sound resource management.

It is planned to continue these three research priorities in 1986. If funds are found research on agricultural practices in relation to the natural and modified hydrological regime will be included in the project. As a result of the present project, Ecole de la Faune and the Centre for Environmental Studies are developing a joint wetland management course to be held in North-Cameroon.

Central African Republic

Project 3636

Aerial Wildlife Survey in Northern Central African Republic

WWF Expenditure 1985 — \$20,569

Project Executants: Dr I. Douglas-Hamilton, Jean-Marc Froment.

Participating Organizations: UNDP, FAO, CNPAF (Centre National pour l'Aménagement de la Faune, CAR).

Objectives: To make a wildlife inventory of the northern parks and hunting zones; to define urgent measures to be taken for the protection of the elephants and the black rhinoceros; to assist the government in the preparation and execution of a policy of conservation and management.



The aerial wildlife survey in northern areas of the Central African Republic, supported by WWF, found far more dead elephants than live ones in June 1985. There had been devastating poaching of elephant, rhino and other animals.

Photo: WWF/Ian Douglas-Hamilton

As poaching of elephants and rhino increased in the northern parks of Central African Republic, the government requested WWF/IUCN and UNDP/FAO to make an aerial survey to reveal population trends and make a wildlife inventory. The aerial census was conducted from May 28th to June 23rd, 1985, by a team of Central African and expatriate personnel in an aircraft flown over from Kenya. It covered an area of approximately 64,000 sq km, including the Bamingui-Bangoran and Manova-Gounda St Floris national parks and surrounding reserves and hunting zones. Standard methods of strip sampling were used.

Elephants were estimated at 12,100 of which 4300 were live and 7800 dead. Most of the dead elephants seen on the survey had apparently died within the last four years. Comparisons within subzones indicated elephant declines of the order of 77%, 98% and 100% since the late seventies.

No rhinos were seen from the air, however hunters reported a few tracks during 1985, indicating that some rhinos still exist at very low densities. Prior to the end of 1982 this population, estimated at approximately 3000, was considered the most important concentration of rhinos (*Diceros bicornis longipes*), in Central and West

Africa. It has now been reduced to the point of extinction.

Census figures suggest that buffalo and giant eland numbers declined approximately 78% and 84% between 1979 and 1985. The epidemic of rinderpest in 1983, introduced by cattle from Chad may have been a significant factor.

Poaching in the northern parks, by spear-wielding horsemen from Sudan and Chad gained momentum with the reopening of the ivory trade in 1981. Many freshly killed and wounded elephants with deep spear wounds in their hind quarters were seen.

The invasion of the northern parks by nomads, with tens of thousands of livestock, escaping from the sahelian drought, has exacerbated both the poaching and the spread of rinderpest.

The survey confirms previous reports of the killing of elephants in Central Africa. Ivory poaching began in South East CAR in the late seventies, together with similar slaughters in the region in Southern Sudan, Northern Zaire, and Chad (see WWF Yearbook, 1982, p. 258, 269).

Despite these conclusions, a magnificent resource still exists, of vast, unspoilt natural scenery, a widespread and varied fauna and the potential for recovery within the national parks.

Following the WWF/FAO report the government has acted on its recommendations. All private trade in ivory has been abolished. The government has declared to CITES a zero quota on the export of ivory, other than that confiscated from poachers or illicit dealers. A coordinated operation has been launched to control poaching using government armed forces. A five year conservation plan has been drafted and adopted by the government, and aid is being sought from bilateral, multilateral and private sources for rehabilitating the national parks. The EEC has committed itself to a major project within this five year plan.

Project 3687

Emergency Assistance for Wildlife Protection

WWF Expenditure 1985 — \$11,778

Project Executant: Jean-Marc Froment.

Participating Organizations: Presidential Guard; Ministry of Tourism, Water, Forests, Game and Fish.

Objective: To provide assistance to anti-poaching patrols in the national parks in northern Central African Republic.

As the aerial survey carried out in this region in June 1985 showed, ivory poachers had massacred about three-quarters of the elephant population in the last three years, and had virtually wiped out the black rhinos altogether (see report of Project 3636).



Elephant in the Masai Mara National Reserve, Kenya, where WWF is providing assistance to the management authorities.

Photo: WWF/Michel Terrettaz

Recommendations for reorganizing the rhino surveillance were accepted in total by WCMD and have been implemented. The project leader is now working with WWF consultant Howard Wood to upgrade radio communications in the reserve. Improved communications are essential for security and anti-poaching work.

In considering the long-term land-use issues of the Mara region, those areas most suitable to agriculture will be identified as well as areas essential to wildlife and cattle. The dynamic nature of many of the parameters affecting agriculture and grazing pressure will need to be considered. Actual long-term development potential (profitability) for agriculture and livestock outside the reserve will be weighed against negative impacts on wildlife. Potential trade-offs, such as water development for livestock in exchange for wildlife grazing rights, will also be investigated.

Another major component of the Mara project is the ecological monitoring conducted by Holly Dublin of the University of British Columbia. The ecology of the Mara has undergone some dramatic and very fundamental changes in recent years. These changes and the long-term impact of them are little understood and could have extreme consequences for the future of the Reserve. Two aerial surveys of the Mara were conducted in 1985 and another is scheduled for April 1986.

Project 3644**Lake Nakuru Rhino Sanctuary****WWF Expenditure 1985 — \$30,556****Project Executant:** Hugh Lamprey, WWF East Africa Representative.**Participating Organizations:** Rhino Rescue; Wildlife Conservation and Management Dept, Kenya; Frankfurt Zoological Society; David Sheldrick Appeal; East African Wildlife Society.**Objectives:** To manage Lake Nakuru National Park as a rhino sanctuary to promote breeding and repopulation of other designated wildlife areas; to provide electric fencing for the 80 km perimeter of the Park.

In spite of the efforts of WWF, many other conservation NGOs and the Kenya Government, the black rhinos are still subject to poaching and have now reached critically low numbers in small isolated populations. The total count is down to below 500, compared with 18-20,000 in 1970. The only hope of saving the species in Kenya is to translocate as many rhinos as possible to a few secure sanctuaries, and then aim to repopulate the National Parks when numbers have built up in the sanctuaries. The first sanctuary planned by the Kenya "Rhino Rescue" operation, of which WWF is a member, is the Lake Nakuru Rhino Reserve.

The use of the existing Lake Nakuru Park as a rhino reserve depends on the construction of a secure fence for the Park. The type of fence necessary consists of twelve barbed wire strands mounted on wooden poles, forming a fence 3 m high, with three strands electrified. This will be constructed 10 m inside the existing park perimeter fence of chain link, which is being rebuilt.

The fence is to be constructed in 10 km sections, each of which will be served by an electric fencing unit and a monitoring device to locate breakages and short circuits caused by interference with the electrified wires. The electric fencing equipment which is to be used (purchased with a WWF grant) is of a well-known make from New Zealand which has already proved itself at the Lewa Downs rhino reserve in north Kenya.

In addition to the two fences, two other important facilities are to be provided for the Lake Nakuru Rhino Reserve, to be funded by the "Rhino Rescue" appeal. These are the repair and servicing of the four existing but derelict boreholes and their pumps to provide drinking water for the rhinos and other wildlife in the Park, and the provision of mineral licks to compensate for the known trace element deficiencies of the area.

Objectives: To survey the status of mountain gorillas and provide information for their improved protection; to habituate gorilla groups to close human presence, leading eventually to frequent tourist visits.

This project was based on the successful mountain gorilla project in Rwanda (Project 1578), which combines anti-poaching efforts, monitoring, development of a tourist industry, and a conservation education programme. If the progress achieved in Rwanda is to have lasting results, poaching and habitat destruction in neighboring Uganda and Zaïre must be halted as well.

The project is concentrating its activities in the Virunga Volcanoes National Park. There are about 140 mountain gorillas (*Gorilla gorilla beringei*) in the southern sector of this park, about 110 in the adjacent Parc National des Volcans of Rwanda, and 100 in the Bwindi Forest of Uganda, making a total world population of 350 for this rarest of the three sub-species of gorillas.

The improvement in protection of gorillas that results from carefully controlled tourism is a major aim of this project. The first step in this direction is habituation of gorilla families to accept visits from small groups of tourists, and this requires



About 140 out of a total world population of 350 mountain gorillas (*Gorilla gorilla beringei*) live in the Virunga Volcanoes National Park, Zaïre. A gradual buildup of tourists coming to see the gorillas, and a conservation education programme, should help to protect them from poaching and habitat destruction.

Photo: WWF/Russ Mittermeier

both expertise in gorilla behaviour and full-time presence with the gorillas over several months. C. Aveling identified suitable families of gorillas ranging near the edge of the park and started the habituation work, which was continued by a field assistant. The movements (ranging) of three families of gorillas were monitored for several months and these groups will form the basis of the tourism programme.

A small cabin to lodge six visitors is being built at Djomba guard post, together with a second cabin for the guards. Work has begun on improving the access roads to the park, which are in a very poor state of repair. A vehicle has been provided, and the whole guard force of the park has been re-equipped with waterproof clothing, rucksacks and sleeping bags.

Efforts to control poaching (especially elephant poaching) are not yet completely successful.

Future plans include extending operations into the Kahuzi-Biega National Park where another race of gorillas (*Gorilla gorilla graueri*) live, and launching an environmental education programme to foster an understanding of the economic benefits from maintaining an intact park.

Project 1954

Garamba National Park Rehabilitation

WWF Expenditure 1984/85 — \$244,910

(Total since 1982 — \$318,666)

Project Executant: C. Mackie.

Participating Organizations: Institute Zairoise pour la Conservation de la Nature, Frankfurt Zoological Society, Unesco (World Heritage Fund), FFPS.

Objectives: To restore the infrastructure of Garamba National Park to its former level, supply equipment and technical expertise necessary to train staff in order to control poaching.

Garamba National Park, in northeastern Zaïre on the border with Sudan, is a remarkable ecosystem with representative areas of both Sudanese savannah and gallery forest. Its position between two biogeographical realms — the Guinean and the Sudanese — makes it an area of particular biological and scientific interest. The importance of the Garamba ecosystem, in a global as well as Zairean context, was recognized in 1980 when the Park was elected a World Heritage Site.

However, Garamba is now listed as a World Heritage Site in danger because the Park's infrastructure has collapsed and poaching has become a severe problem.

Large ungulates are represented by a population of about 53,000 buffalo, 8000 elephants, 1300 hippopotamus and 175 giraffe. A small number of the northern white rhinoceros remain, probably not more than 17. The latter subspecies is

especially significant because it has been eliminated in all of its former range and is the last remaining wild population. (A few others exist in zoos.)

A consortium of donors under the auspices of IUCN have provided funds. They are in order of financial importance: WWF, Frankfurt Zoological Society, Unesco (World Heritage Fund).

Two expatriate specialists, C. Mackie (Project Leader) and F. Smith (Technical Specialist) have been on site since April 1984 to undertake the project, with Dr Kes Hillman Smith as an additional expert.

The initial phase of the project was centred around the ordering and delivery of equipment. This was a major undertaking, the equipment having been shipped from UK to Kenya and then trucked to Zaïre via Uganda. The most important items of equipment were four Land Rovers, one tractor and trailer, a Cessna 185 aircraft, heavy truck, radios, solar panels and batteries, workshop equipment, spares, fuel and guards' uniforms. It was also necessary to renovate and build living quarters.

Once all was on site, work became possible and opening of roads began so that the outlying guard posts could be visited and VHF radio base stations set up.

Aerial reconnaissance was conducted with particular reference to the rhinos. An intensive search was mounted in which a minimum of 11 individuals were ac-



One of the last 17 northern white rhinos left in the wild. This subspecies has been eliminated, mostly by poaching, from all of its former range except Garamba National Park, Zaïre. An intensive effort is underway to protect the remaining rhinos.

Photo: WWF/Kes and Fraser Smith

counted for. Regular localizations have been made since then, giving a better understanding of their distribution and numbers. There have been three births this year and there are now 17 individuals accounted for, so there are hopeful signs that the population is beginning to recover. A patrol post was established at the Garamba River near the rhino concentration area. The post is manned continuously by guards of IZCN who are deployed, rationed and paid allowances by the project.

Regular reconnaissance flights have been made to locate poachers' camps and the information passed to respective patrol posts. All information is charted and a picture of the poaching pattern is being developed. The presence of an aircraft is also a deterrent to poachers, and poaching of rhino and elephant has been significantly reduced. An aerial sample strip count survey was conducted with particular reference to large ungulate distribution. Routine maintenance on vehicles is an ongoing exercise and refurbishment of the Park workshops is well advanced.

The second phase from January 1986 onwards is the implementation and continuation of routine park management practices, training of personnel and refurbishment of the remaining park infrastructure.

An associated extension project is being proposed and it is hoped that the elephant domestication centre will be redeveloped by capture of young elephant. A plan to improve on the anti-poaching system is in process of development and would be a logical continuation of the project.

Development of tourism would help provide greater long-term security for Garamba National Park and the rhinos by enabling the Park to earn some revenue. There is already a good campsite which was improved by FAO, and a ten-year agreement has been made with a tourism group to invest in further development for tourists such as river excursions.

In January 1985, WWF supported a high-level IUCN delegation visit to President Mobutu to draw attention to the plight of the northern white rhino. The President pledged his personal support to the work of the WWF project.

Zambia

Project 1757

Save the Rhino Trust

WWF Expenditure 1984/85 — \$50,931

(Total since 1980 — \$488,822)

Project Executants: Government of Zambia, Save the Rhino Trust Ltd.

Participating Organizations: Norwegian Agency for International Development (NORAD); Department of National Parks and Wildlife Service.

Objectives: To carry out anti-poaching field operations, so as to eliminate commercial poaching and benefit rhino, elephant and other species.

The Save the Rhino Trust has been operating in Zambia since 1980, combating the ever-increasing commercial poaching of rhino and elephant.

In 1984 and 1985, the Trust received major donations from NORAD, which enabled the anti-poaching operations to continue and to extend to a fourth unit. With the increase in funding, SRT was able to purchase a Safari Lodge in Luangwa Valley which provides a capital investment that generates income for anti-poaching and also increases public awareness of the problems caused by poachers.



Rhino poachers arrested in Zambia. Poaching, especially of rhinos and elephant, continues in spite of the efforts of the Save the Rhino Trust. Photo: WWF/Save the Rhino Trust

In 1984, WWF supported a visit from a radio specialist, Mr Howard Wood, who inspected and overhauled the radio equipment of the Trust, and managed to improve considerably the range of the VHF equipment used in the field.

The Trust has continued to sponsor research on elephant and on black rhino, but in 1984 this was interrupted by a serious injury to the biologist, Dr Leader-Williams, who was charged by a rhino and was out of action for six months.

Whilst anti-poaching results expressed in terms of poachers caught and firearms seized continue to indicate a job well done, the Trust is becoming increasingly aware that its small anti-poaching units face an uphill task in protecting rhino and elephant populations within the vast areas of the wildlife sanctuaries. Even permanent protective patrols within key areas of South Luangwa National Park have failed to halt poaching within those areas. Mobility must be greatly increased to enable gangs sighted in the NP to be cut off upon returning to the Muchinga Escarpment. In spite of its expense, the Trust must consider obtaining the use of an aircraft on a more permanent basis.

to be a great success both for conservation and for the local population whilst furthering insect research. We believe that the insect and crocodile programmes can demonstrate that rational resource utilization does indeed cater to the immediate and long-term development of rural peoples.

An 18-month study funded by the EEC has been completed on an 18 km leatherback turtle nesting beach on the north coast of Irian Jaya by turtle biologist Satish Bhaskar. Mr Bhaskar has proved that this is one of the most important nesting sites of the species in Southeast Asia. Estimates after the first year of work were between 13,000 to 20,000 nests per season; however, in 1985, numbers dropped significantly due to unknown factors. The numbers for the world population of leatherbacks can nevertheless be raised by at least 4% with the data now available. It could be much more as the numbers of nesters on any beach vary because of natural factors, such as cyclical intervals or decline in food supply. PHPA wardens will be assigned to the beach during the peak nesting season (May-August) to continue the tagging operation and nightly count of nesters. It is hoped that further interest will be generated so that the valuable work begun will continue in earnest. The area is proposed as a strict nature reserve, and it is hoped that gazetting will proceed and adequate protection will be offered to the nesting animals. It is interesting to note that during the first season of work in 1984, many commercial egg harvesters were encountered. During 1985, the presence of the researchers and support from local authorities was enough to keep all the egg poachers away.

Dr Jared Diamond, a recognized authority on New Guinea birds, completed avifaunal surveys in three months in six protected areas in Irian Jaya. His discoveries increased the known range of several taxa. New taxa described are three subspecies of *Peneothello cryptoleucus* (Kumawa Mountains), *Pachycephalopsis hattamensis* (Japen Island) and *Melipotes fumigatus*. First records have also been reported for Irian Jaya for *Accipiter buergeri* and *A. meyerianus*. Diamond also found the bowerbird *Amblyornis inornatus* in the Kumawa Mountains and suggests that it also may be present in the Fakfak Mountains. He prescribed management considerations for the birds of these reserves that will be used when detailed plans are drawn up.

Work in the alpine areas of the Lorentz Reserve, the largest protected area in Indonesia at 1.5 million hectares, was begun by Project Leader Ronald Petocz, John Ratcliffe, Yance de Fretes and George Raspado. In the Meren Valley, above the large Freeport copper mine (part of whose concession lies within the reserve) investigations concentrated on plants, birds and small mammals. The team also documented considerable superficial pollution from Freeport's miners visiting the reserve and glaciers on weekends. Our protestations to mining authorities resulted in a cleanup campaign whereby six helicopters of refuse were flown out of the reserve and graffiti was removed from the surroundings. The mine has now placed controls on people visiting the area, and we hope that most of the problem has been eliminated. Work on producing a management plan for this valuable area which holds the richest and most diverse biota of our protected areas, will continue during 1986-87.

The programme will continue with, as primary objectives, focus on completion of management plans, the development of materials for conservation education and public awareness, the development of the butterfly and crocodile conservation/utilization projects, the beginning of a large southeast Irian Jaya conservation programme involving deer management, reserve management planning, and a wetlands conservation project. Assistance will also be given towards the implementation of the Cyclops Mountains management plan.

Project 1960**Ujung Kulon, Javan Rhinoceros**

WWF Expenditure 1984 — \$6,357

(Total since 1980 — \$32,916)

Project Executants: Haerudin R. Sajudin, Sukianto Lusli, Universitas Nasional, Jakarta.

Participating Organization: Biology Faculty, Universitas Nasional.

Objectives: To monitor population dynamics of the Javan rhinoceros, with particular emphasis on immature animals; to elaborate a practical conservation and protection programme.

The distribution of the Javan rhinoceros (*Rhinoceros sondaicus*) used to cover a wide area including Bangladesh, eastern parts of India, Burma, Thailand, Laos, Kampuchea, Vietnam and the Malaysian peninsula. It is also thought to have been found in the southern parts of China, along the Mekong and Songkoi rivers. In ancient Indonesia it was found in Sumatra and Java.

A drastic and rapid population reduction of this once widely distributed species started at the beginning of the 20th century. Frequent and indiscriminate hunting almost wiped out the Javan rhinoceros, and it is now found only in Ujung Kulon in western Java, where its population growth is constricted due to the relatively limited habitat.

Ujung Kulon is covered with almost impenetrable forests and swamps, making the rhinos very difficult to observe. In 1955 Hoogerwerf estimated the Javan rhino population there at 35. Schenkel in 1969 estimated it at only 25. The Government of Indonesia and WWF then cooperated to save the species from extinction. Ujung Kulon was tightly guarded; guard posts and patrol personnel were added, equipped with logistic and transport facilities such as boats, ground vehicles and firearms, to stop illegal hunting; and an annual census of the species was carried out. The efforts were successful, and the population of Javan rhinoceros has slowly increased.

In 1981, the census estimated a minimum of 54 animals and a maximum of 60. The 1984 Javan census was carried out in Ujung Kulon in April and involved 47 people, including 11 students from the Biology Faculty of the National University. The rhino population was estimated at 50-54, a substantial drop from previous years. The decrease might be related to five deaths from an unknown cause, probably disease, which occurred in 1981-82.

Prints of three newly-weaned calves, however, were found and the census indicated that the population had a healthy age composition: prints most often found were those classified in the category of adult females or young males (74.83%). The composition of print classes suggests that the population of the Javan rhinoceros in Ujung Kulon can be expected to grow, assuming that no major limiting factors emerge. Some rhino experts believe that the rhino population in Ujung Kulon has almost reached saturation point. The Chairman of the IUCN Species Survival Commission Asian Rhino Specialist Group has made a plea to revive earlier plans to set up a second breeding population in a suitable area in Sumatra.

The results of the census also show that the range and distribution in the reserve is uneven. The largest population concentration occurs in the central part of the Cape. West of the Gunung Payung complex to the tip of the Cape, very few prints were found. The distribution extends eastwards to the Karanganyar area. This shows that this region, empty after the death of the five rhinos there in 1981-82, has been reinhabited as a ranging area.

In addition to the rhinoceros, other wildlife was recorded during the census. Banteng (*Bos javanicus*) need to be given special attention and continuously monitored; they are thought to be the main ecological competitors to the rhinoceros, as they occupy the same habitat and feed on some of the same vegetation species.

Since the April 1984 census, one rhino was killed in Ujung Kulon by poachers. Three poachers were arrested in March 1985 for killing a rhino the previous December. The horn was confiscated. This was the first time poaching had occurred in the national park for several years.

The Ujung Kulon National Park has included the uninhabited island of Panaitan (17,500 ha), 10 km offshore, since 1980. The island has only secondary vegetation as it was swept bare by the tidal wave following the eruption of Krakatoa in 1883. The Biological Science Club, affiliated to the Indonesian Institute of Science, studied biological and conservation aspects of the island's ecosystem during 1984 and 1985. It is recommended that it should be kept as a wilderness area with strictly managed tourism, and that the possibility of translocating some endangered mammals from Java to the island should be investigated.

Project 1687**Development of Conservation Areas, Kalimantan**

WWF Expenditure 1984/85 — \$94,297

(Total since 1979 — \$158,266)

Project Executant: Dr Nengah Wirawan.**Participating Organizations:** Directorate General for Forest Protection and Nature Conservation (PHPA); Universitas Hasanuddin, Ujung Pandang.**Objectives:** To assist PHPA in developing a reserve system designed under the FAO/UNDP National Parks Development Project; to implement management plans drawn up with WWF/IUCN support for Kutai National Park; to advise on land-use planning aimed at reducing the environmental impact of transmigration and other development projects and of the 1983 forest fire in East Kalimantan.

The island of Borneo, of which the Indonesian province of Kalimantan is by far the largest portion, is botanically the richest lowland area in southeast Asia. For many years logging concessions and a transmigration programme have parcelled out the rich lowlands which had an inadequate and badly abused system of protected areas. Planning for conservation of the area's rich wildlife and its sustainable development received a further serious setback when the long drought in 1982 was followed by an immense forest fire which burned from December 1982 to April 1983 over an area of about 30,000 sq km in and all around Kutai National Park in East Kalimantan. In 1984 and 1985 activities under this project concentrated for the most part on the area that suffered from the fire.

Surveys and revision of the management plan for Kutai were completed in July 1985. In spite of the damage caused by the forest fire and other earlier activities, most of the original wildlife (orang utan, Malayan sun-bear, banteng, sambar deer, barking deer, and mousedeer, Bornean gibbon, proboscis monkey, etc.) are still found in the area. This may also be true of most of the 80% of Bornean forest birds previously recorded in the reserve.

The fire did not completely wipe out the forests. There are lightly damaged forests, varying from a few hectares to several thousand hectares, that are scattered in the burned over area. If left alone these patches should allow the recovery of the original forests in the reserve. Consequently, considering both its potential and the threats to it, this reserve was considered best managed as a National Park and has been established and managed as such since April 1985.

One important recommendation made in the management plan is to extend the park area from the present 200,000 ha westward and southward to include some of the unlogged and unburned forest and to protect the catchment of the Santan River which feeds the aquifer that forms the main source of water for the natural gas industries in Bontang. These extensions, which will involve the cancellation of a logging concession, have been approved and recommended by the Governor of



Fruits of seven different species of mango. They are some of the many wild relatives of cultivated mangos found in Kalimantan. Their genes could contribute to the development of new cultivated varieties.

Photo: WWF/J.M. Bompard

lowland areas (e.g. in the Mahakam basin in E. Kalimantan). Consequently, several conservation options must be kept open. The protection of existing reserves including large lowland areas should be reinforced. Additional solutions such as the maintenance and/or reintroduction of local wild mangos in small reserves and the creation of collections "on the spot" (in degraded forests or fallows on the edge of protected areas) should be considered.

Only an initial step has been taken. More investigations in areas of particular significance (e.g. the western part of the Kutai National Park) and explorations in West and Central Kalimantan will be necessary to arrive at a final result of knowing the characteristics, ecology and distribution of the species, which is a prerequisite to recognize varieties and species and to be in a position to conserve them.

Project 3133**Conservation of Large Mammals and their Habitats, Sumatra**

WWF Expenditure 1984/85 — \$152,106

(Total since 1983 — \$167,090)

Project Executants: Dr Charles Santiapillai ; Dr Hayani Suprahman ; S.V. Nash ; A.D. Nash ; K.S. Depari ; R. Blouch.

Participating Organizations: Directorate General of Forest Protection and Nature Conservation (PHPA).

Objectives: To advise PHPA on large mammal management with particular reference to elephant and rhino ; to assist PHPA in the management of large mammal habitat with particular reference to Gunung Leuser National Park, the Padang-Sugiham Wildlife Reserve and Way Kambas Game Reserve ; to create conservation awareness and generate support amongst local decision makers.

In 1984 and 1985 work under this large-scale project included investigation of the elephant (*Elephas maximus*) and tiger (*Panthera tigris sumatrae*) and conflicts between these animals and the human population. It also included work on the Sumatran rhino (*Dicerorhinus sumatrensis*) and leopard cat (*Felis bengalensis*). The protected areas given special attention were Padang-Sugihan Wildlife Reserve, the Way Kambas Game Reserve, and Gunung Leuser National Park.

The large equatorial island of Sumatra still has extensive areas of both lowland and mountain rain forest, but they are being destroyed relentlessly. Twenty years ago, for example, the forest cover of the southern province of Lampung was 44%. Today it is no more than 17%. Sumatra is one of the target areas for the resettlement of hundreds of thousands of transmigrants from Java, and the population is increasing rapidly, so that the wildlife is under growing pressure.

Elephants: Sumatra is the only island of Indonesia that has elephants, apart from a small herd still possibly surviving in Kalimantan. Recent surveys carried out as part of the WWF-Indonesia Programme indicate that there may be as many as 4500 elephants on Sumatra, living in a series of isolated populations. The problem is that man and elephant are fundamentally incompatible except at very low densities. The Sumatran elephants have been legally protected since 1931, but they are declining because of loss of suitable habitats.

In North Sumatra, for example, viable elephant populations still exist in the provinces of Aceh and Riau, because of extensive forests and relatively low human population. However, elephants prefer lowland to montane forests, and it is the lowlands that logging companies find economical to exploit. This is the threat to the elephants in Riau which is largely flat and is proposed for a number of transmigration schemes.

In South Sumatra, elephant populations are highly disrupted and scattered, separated from each other by intervening agriculture, which has led to

considerable man-elephant conflicts. Because of crop depredation by elephants between May 1984 and May 1985, the PHPA translocated 70 elephants from the Gunung Madu Sugar Cane Plantations to the Way Kambas Game Reserve. This was a highly successful translocation.

Elephants can live in logged forests as they thrive in a sub-climax, secondary vegetation. However, the logging must be carried out within strict limits, with no trees under 50 cm diameter being taken and an interval of 40-60 years between successive exploitation of the forest. Otherwise, management strategies should be directed towards maintaining viable reserves for the elephants, with buffer zones around them.

Tigers: Human population growth has already led to the extinction of the Javan and Bali tigers in Indonesia, and the Sumatran tiger is now down to well below 1000 animals. Because it is solitary, nocturnal and secretive and lives mostly in dense tangled lowland rainforest, reliable data is difficult to obtain. Much recent information comes from the WWF supported studies of Marcus Borner and Raleigh Blouch.

The Sumatran tiger has been fully protected by law since 1972, but it is under great threat from forest clearance, especially in lowland areas, poaching, and poisoning. However, attitudes are slowly changing and some farmers are realizing that the tiger holds in check the number of wild pigs, which are a serious agricultural pest. The tiger preys off a wide range of herbivores, but the two preferred species are the wild pig and the sambar.



The white-winged wood duck (Cairina scutulata) inhabits lowland rainforests in S.E. Asia, and because the lowland forests have been the most seriously depleted of all tropical forests, the white-winged wood duck is now extremely rare. A population was found in Padang-Sugihan Wildlife Reserve on the island of Sumatra in the course of WWF studies there.

Photo: WWF/Gerald Cubitt

Viable populations of tigers need very large lowland reserves with adequate prey populations. On Sumatra, the most suitable protected area is the Berbak Game Reserve in Jambi province.

Sumatran rhino: The Sumatran rhino is one of the most threatened animals in the world, with perhaps 500 or so on Sumatra and other small scattered populations in Malaysia and Borneo. They live in dense forest and are extremely difficult to observe. They are much smaller than the four other rhino species, have two horns and quite a lot of hair on the body. They are threatened both by hunting and by loss of habitat, but live mainly in mountainous areas which are not under such great pressure as the lowlands. A plan for captive breeding is under consideration by the Governments of Indonesia and Malaysia.

Leopard Cat: The leopard cat is widely distributed in India, China and throughout Southeast Asia, but lives in dense forest and is very elusive. On Sumatra, the main threat to its survival is large-scale habitat modification, and it is sometimes captured as a pet.

Padang-Sugihan Wildlife Reserve: In late 1982, over 230 Sumatran elephants (a race of the Asiatic elephant, endemic to the island of Sumatra) were driven into what is now the 75,000 ha Padang-Sugihan Wildlife Reserve in South Sumatra province, under the Indonesia Government's "Ganesha" elephant drive. The success of this drive created a unique situation, a reserve with the highest crude density of elephants of any protected area in Southeast Asia. The WWF/IUCN Padang-Sugihan project aimed to assess the status of the elephants almost three years after the drive, and to gather information on their ecology. As the area's wildlife had never been studied, efforts were made to gather similar information on the reserve's other large mammal fauna.

Field work in the predominately logged-peatswamp forest reserve was carried out by S.V. Nash and A.D. Nash from September 1984 to October 1985 with the help and collaboration of the Directorate General of Forest Protection and Nature Conservation.

Based on faecal deposition counts, a population estimate of about 240 elephants was derived, showing that the original "Ganesha" drive elephants were still within the reserve's boundaries. A large herd estimated at 86 animals was found to be confined to the northern third of the reserve, and the rest of the elephants were scattered in small groups of two to ten animals, or as solitary beasts. All of the reserve's vegetative habitats were found to be utilized by elephants, and only the large herd displayed a regular cyclical use of certain habitat types. The distribution and movements of elephants were found to be affected by the widespread presence of illegal logging operations, and by boat traffic within the reserve. These factors in particular appeared to be limiting the large herd to but a third of the reserve's area. Apart from indications of possible overbrowsing in the area of the main herd, the food resources of the reserve appeared sufficient to maintain the high total number of elephants.

Other species of large mammals found to inhabit Padang-Sugihan included the Sumatran tiger, fishing and leopard cats, agile gibbons, hairy-nosed and small-clawed otters, and the rare otter civet. During the course of the Padang-Sugihan study a population of the rare white-winged wood duck (*Cairina scutulata*) was discovered residing in the reserve. This is the first known population of the wood duck in South Sumatra province, and is the only population of this species found to reside in peat-swamp forest habitat.

In consideration of the uniqueness of the large concentration of the Sumatran elephant in the reserve, the richness of other wildlife species present, including the white-winged wood duck, and the logging and human-disturbance threats facing the reserve, IUCN's commission on National Parks and Protected Areas has proposed that Padang-Sugihan be added to the list of the world's most threatened protected areas.

Way Kambas Game Reserve: The Way Kambas Game Reserve is situated in the southeastern part of Sumatra and covers an area of 130,000 ha. Besides being one of the large lowland forest reserves in Sumatra, its conservation value is further enhanced by the fact that it also represents the largest freshwater (non-peat) swamp forest in Sumatra. Much of the original dipterocarp forest has largely disappeared through previous logging activities and 70% of the vegetation today is composed of secondary forests and stands of alang-alang (*Imperata cylindrica*) grasslands. The mammal fauna is rich and includes among others, the elephant (*Elephas maximus*), tiger (*Panthera tigris*), and the red-dog (*Cuon alpinus*) all of which are listed as endangered species by IUCN.

Since the tangled vegetation in the secondary forest rarely permits the direct observation of even the large mammals such as elephant, much of the information was gathered through indirect methods. Animal activity was deduced from the occurrence of faeces piles, tracks, trails and damage to vegetation. This was however augmented whenever possible, by direct observation of the animals.

The minimum estimate of the number of elephants in the reserve is 170, which is more than four times the number originally thought to have been present. This gives a mean crude density of 0.13 elephants per sq km. Calves account for almost 10% of the population. Small group size (less than 10 animals) is characteristic of forested areas while larger groupings are more typical of the open grasslands. The largest group that was observed had 66 animals. Six types of woody-plant damage by elephants were observed, of which branch breaking and main stem breaking accounted for about 80% of the total damage. Elephants seem to prefer woody-plants of diameter of 8.0 cm or less. The Sumatran elephant is known to eat about 80 species of plants. Elephant activity was found to be much higher in the mixed grasslands in the vicinity of the river than elsewhere. Mature stands of alang-alang (*Imperata cylindrica*) were hardly utilized by elephants. However, the early growth of this grass is eaten by the animals. Elephants seem to thrive well in a sub-climax vegetation, and their preference for the early successional stages makes it possible to manipulate selected habitats to improve the carrying capacity. Fire and logging

generally are considered to be favourable influences. Prescribed burning of alang-alang vegetation was carried out in small blocks. The elephant activity increased in such areas after the rains. Furthermore, as the provision of mineral licks and their maintenance would be useful management option to prevent the elephants from straying out of the reserve (a constant problem), a salt lick was established in the centre of the reserve.

The lack of a buffer-zone along the southern boundary of the reserve has been the cause of considerable elephant depredations in the neighbourhood. In an attempt to mitigate the crop depredations, the PHPA cut an access road along the boundary and established an electric fence (7 km). However, some bull elephants, with their insulated tusks, were able to prise an insulator off the fence posts. A number of elephants (mostly young animals) have been retrieved from wells into which they had fallen and are being cared for by PHPA. Plans are afoot to establish a training school for these elephants. Two Thai mahouts are already at work training the animals. Attempts are being made to capture bull elephants (mostly solitary animals) that regularly raid crops. Trained elephants could then be used in small scale logging operations and in the reserve (to patrol and transport visitors).

The future work would concentrate on the management of elephants in the wild and in captivity with a view to mitigating the crop depredations. The work would also extend to gathering ecological data on other large mammals in the reserve, especially the tiger.

Gunung Leuser National Park: This Park in northern Sumatra is a key rain-forest conservation area, a vital refuge for the Sumatran rhino, elephant, tiger and orang utan and contains a rich flora. WWF and PHPA have cooperated in research, poaching control and management of the area for over 14 years. The Leuser Park covers an area of about 800,000 ha and includes a wide range of habitat types and ecosystems from lowland swamp forest to alpine scrub, as it extends from sea level to the top of Mount Leuser at 3500 m.

The area has been a national park since 1980, divided into four management units. However, law enforcement is difficult as there is so far no clear legal basis for national parks in Indonesia. Only 517 km out of the 950 km boundary has been demarcated, and it is urgent to complete this work to secure the north and the west of the Park from encroachment, shifting cultivation and illicit timber cutting. Two World Bank missions have visited the Park and recommended buffer zones both to serve the needs of people and to protect the Park, but no action has been taken yet.

Plans for a new Information and Visitor Centre have been drawn up with the help of WWF, and a training course on conservation was conducted for Army and Police officers, civil service officials and youth leaders.

The Research Station at Kerambe has attracted scientists and researchers from all over the world, who have carried out valuable research into the flora and fauna of the Park (see for example Project 3309).

The establishment of a Batang Ai National Park adjacent to the southern boundary of Lanjak-Entimau has long been a goal of NPWO. It would protect the local wildlife community, including an area rich in orang utans; it would protect the southern flank of Lanjak-Entimau from encroachment; it would protect part of the catchment area for a major hydroelectric scheme; and it could be developed as an important tourist attraction. NPWO was assisted in developing this proposal and promoting it through the governmental decision-making process.

Mainly through the courtesy of the Royal Malaysian Air Force (RMAF), wide areas of Sarawak were aerially surveyed and much progress was made in demarcating the extent of the State's orang utan populations for the first time. In 1985, the technique was taken to Sabah in a joint operation between Sabah Forest Department, the Sabah Foundation, NPWO, the RMAF and WWF Malaysia (Project 3050). The results are being compared with ground survey data in order to quantify orang utan population estimates that derive from the revolutionary nest-counting technique used in the aerial surveys.

Surveys of the potential Pulong Tau National Park in the mountainous north of Sarawak led to a proposal by NPWO that it should be established as soon as possible. This idea is popular with the local Kelabit, Lun Bawang and Penan people, because it includes provisions for them to harvest some forest products on a sustainable basis; it will protect water-catchments above rice-fields; it will protect areas of deep cultural significance; and it will help in the development of a small tourist industry. However, Government endorsement of the plan has yet to be given and it is possible that the boundary will be revised to facilitate timber extraction from parts of the proposed park area. The fate of Pulong Tau remains undecided.

Project 3630

Survey of Crocodiles, Sarawak

WWF-Malaysia Expenditure 1984/85 — M\$19,800 (US\$8,148)

Project Executant: Jack Cox, Wildlife Office, Sarawak Forest Department.

Crocodiles are of significant economic importance, not least for their beneficial effects on fisheries. Populations of the two species of crocodilians known from Sarawak have declined because of intensive exploitation for their skins and increased disturbance to their breeding areas, and their present status is uncertain. In some areas however large individuals are causing problems and to assist the State Government, WWF is providing the services of a crocodile specialist to recommend measures for their conservation and management.

Project MYR-58**A Conservation Management Study of Hunted Wildlife in Sarawak**

WWF-Malaysia Expenditure 1984/85 — M\$107,520 (US\$44,246)

Project Executants: Dr Jules Caldecott, Mr Adrian Nyooi.

A variety of wild animals are hunted by the rural peoples of Sarawak (Malaysian Borneo) as their major source of protein. Logging and clearing of the forest for agriculture has depleted wild stocks at a time when the population is expanding. This study aims to assess hunting pressures on the main species involved — sam-bhur deer, wild pig and mousedeer — and to recommend measures for future hunting practice on a sustainable yield basis compatible with the conservation of wild stocks. First results indicate that over 100 million dollars' worth of game meat is consumed annually in the State.

Project MYR-63**Conservation Management Study of Proboscis Monkey in Sarawak (NW Borneo)**

WWF-Malaysia Expenditure 1984/85 — M\$72,500 (US\$29,835)

Project Executant: Dr E. Bennett.

The proboscis monkey is found only in Borneo where it is restricted to coastal swamps and riverine habitats. Hunted and disturbed by forest clearing, they have been eliminated from many areas. Little is known of the requirements of this endangered species and the aim of this project is to study the small protected population in the Samunsam Wildlife Sanctuary with a view to making recommendations for their long-term survival throughout Sarawak. This project is partly funded by the New York Zoological Society.

Project MYR-61**Development of Conservation Areas in Sabah, North Borneo**

WWF-Malaysia Expenditure 1984/85 — M\$123,000 (US\$50,617)

Project Executant: Dr Junaidi Payne.

Participating Organization: Sabah Forest Department.

Objectives: To continue efforts to develop Tabin Wildlife Reserve and to protect its rhinoceroses. Surveys of rhinos, orang utans and small conservation areas elsewhere.

Sabah, one of the thirteen states in the Federation of Malaysia, occupies the northern part of the island of Borneo. Major features of interest include evergreen tropical forests of extraordinary floral and faunal diversity, and Mount Kinabalu (4050 m), the tallest mountain in southeast Asia. Sabah's wealth and development has come about as a result of exploitation of the native hardwoods, mainly trees of the family Dipterocarpaceae, a major component of the biologically rich lowland forests.

During 1979-81, WWF-Malaysia assisted the Sabah Forest Department in conducting a state-wide faunal survey (IUCN/WWF Project 1692), which resulted in suggestions for several new conservation areas, primarily for large mammals. A followup project (IUCN/WWF Project 3050) was able to establish that the Asian two-horned rhinoceros (*Dicerorhinus sumatrensis*) can live and breed in selectively logged forest, and that the species is endangered in Sabah because of poaching and forest clearance for agriculture. This project saw the gazettelement under new legislation of Tabin Wildlife Reserve (120,521 ha) for the rhinoceros and Asian elephant, and of Kulamba Wildlife Reserve (see separate Project MYR-62). WWF-Malaysia continues in Project MYR-61 to provide the services of an experienced biologist to the Sabah Forest Department. Development of Tabin Wildlife Reserve



A young female Sumatran rhino. It is hoped to save this very rare species through a captive breeding programme.
Photo: IUCN/Nico van Strien

is of highest priority, together with several other projects related to development of conservation areas in north Borneo.

Tabin Reserve has been, and continues to be, selectively logged for large trees of the family dipterocarpaceae. In the long-term, this activity should be beneficial for all the large mammals present, in providing more food plants, but it has the unfortunate effect of facilitating access for poachers, a very serious threat to the rhinos. The Wildlife Section of the Sabah Forest Department, although chronically understaffed, has been helped under another WWF Project (No 1972) to protect Tabin's rhinos, with the donation of funds for two vehicles for Wildlife Rangers to patrol the region.

Since 1983, there has been much discussion in Sabah on the merits or otherwise of captive breeding of the Asian two-horned rhinoceros as part of a species conservation plan. Although the WWF-Malaysia project executant has provided information on the status and distribution of this species, both within Tabin and where individuals are isolated and doomed outside of protected areas, WWF-Malaysia has not been involved directly with these discussions. Late in 1985, the Sabah government formed a high level committee to assess methods and direct work for conservation of the rhinoceros. At the time of writing (December 1985), no firm decisions had been made, but it is hoped that if captive breeding proceeds, it can be linked closely with protection of Tabin and its wild rhinos. A management plan for the Reserve has been drafted, but publication awaits further clarification on its relationship with the captive breeding project.

Evidence of rhinos has been reported from several parts of central Sabah, separate from Tabin but all within contiguous Forest Reserve, probably representing a small, scattered but viable population.

A start has been made on a survey of orang utan distribution in Sabah by helicopter surveys of nests. This technique, originally used by Forest Department and WWF-Malaysia personnel in the neighbouring state of Sarawak, was used in five separate areas in Sabah through a generous donation of flying time by the Royal Malaysian Air Force. The surveys confirmed results from ground surveys, and indicate curious localized gaps in the species' distribution, not clearly related to habitat or human presence. It is hoped that survey work can continue once a Sabahan candidate has been located to carry out the project. As a general comment, orang utans are widely distributed and not endangered at present, but areas with known highest densities tend to be either small Reserves or land allocated for agriculture.

Several different areas of conservation interest have been visited, such as Gomantong Caves, home of about 1 million bats and 2 million swiftlets. It is hoped that access and visitor facilities can be improved. This would be beneficial for educational purposes, for development of tourism, and for prospects for long-term conservation of Sabah's especially varied flora and fauna.

Project 3679**Reintroduction of Greater One-horned Rhinoceros to the Royal Bardia Reserve, Nepal**

WWF Expenditure 1985 — \$24,250

Project Executants: King Mahendra Trust for Nature Conservation.**Participating Organizations:** His Majesty's Government of Nepal, Department of National Parks and Wildlife Conservation; Smithsonian Institution/Nepal Terai Ecology Project.**Objective:** To move a group of 13-20 one-horned rhinos from Royal Chitwan National Park to Royal Bardia Wildlife Reserve in an attempt to establish a second viable population in Nepal.

South Asia's rhino populations are declining rapidly, including the greater one-horned rhinoceros (*Rhinoceros unicornis*), a species which once ranged from the Brahmaputra River Valley to the Indus but is now restricted to two major reserves, one in India (Kaziranga) and another in Nepal (Chitwan). The total population is now only about 1500. Sound management of this endangered species requires relocation of small populations to well-protected reserves where rhinos once occurred. Surveys of suitable relocation sites were made and techniques for immobilization and transport worked out. This project follows on the heels of a successful relocation of four rhinos from Chitwan to Dudhwa National Park, Uttar Pradesh, India, carried out by the same project staff.

Preliminary work included extensive review of ecological data necessary for the choice of a relocation site. Fortunately studies on rhino food habits, forage quality and availability, movements, home ranges, reproductive activity and population ecology in Royal Chitwan National Park were already completed or underway. As the ecology of Chitwan is very similar to that of Royal Bardia Wildlife Reserve, data from Chitwan were appropriate in evaluating relocation sites at Bardia.

Coordinated efforts among project researchers, equipment suppliers, the Timber Corporation which provided the trucks to transport the animals and the Roads Department which supplied a crane to load the rhinos onto the trucks were arranged. In January 1986 four greater one-horned rhinos (three females and one male) were translocated from Chitwan to Bardia Wildlife Reserve.

The animals were immobilized, general data on size, age and health were collected and the rhinos were loaded into individual crates and then transported sixteen hours to Bardia Reserve. Once in the new reserve, all animals were released in the preselected location. Systematic observations on the movements, activity patterns, habitat and diet selection and behaviour of the rhinos are being made. Additional animals will be relocated to Royal Bardia Wildlife Reserve during 1986.

Since the impact of rhinoceros feeding on crops can be destructive, plans also include construction of solar-powered electric fencing along the border of the

reserve and agricultural fields of the local people living adjacent to the reserve. Through early construction of the electric fences it is hoped relations with local villagers will remain good and the rhinos will maintain ranges within the reserve away from human habitation.

Project US-331**Snow Leopard Studies, Nepal**

WWF Expenditure 1984 — \$15,000

(Project initiated 1982)

Project Executants: Rodney Jackson and Gary Ahlborn. California Institute of Environmental Studies, in association with His Majesty's Government of Nepal. Department of National Parks and Wildlife Conservation, Kathmandu.

Participating Organizations: Natural History Museum, Tribhuvan University, Kathmandu; King Mahendra Trust for Nature Conservation, Kathmandu; National Geographic Society, Washington; New York Zoological Society; International Trust for Nature Conservation, Kathmandu.

Objectives: To investigate the ecology of the endangered snow leopard, including its activity and movement patterns, home range size and configuration, habitat use and requirements, and basic predator-prey relationships in the Langu Valley of west Nepal.

Until this study, almost nothing was known about the endangered snow leopard (*Panthera uncia*) in the wild because its secretive habits, low numbers, sparse distribution and inaccessible terrain have discouraged attempts at research. Snow leopards are widely but sparsely distributed through the mountains of inner Asia, including the Himalaya of Nepal, India, Bhutan and Sikkim, the Hindu Kush of Pakistan, the Pamirs of Afghanistan, Tibet and the ranges along the border of the Soviet Union and the People's Republic of China. Except for Nepal, Pakistan and parts of USSR, where brief surveys were undertaken in the 1970s, the cat's present status, distribution and abundance are unknown.

In close cooperation with biologists from the Department of National Parks and Wildlife Conservation in Kathmandu, R. Jackson and G. Ahlborn initiated in-depth work in January, 1982 in the remote Kanjiroba Himal of the roadless Karnali Zone near the Tibetan border. Base camp is a two week walk from the nearest STOL airfield, and all supplies had to be portered in for the 8-month annual field seasons.

Snow leopards were trapped using specially designed leg-snare traps that cause no injury to the animals; in all, traps were placed out for nearly 4000 nights over the 26 month study period. Cats were trapped and immobilized on 11 occasions.