GERMAN FOUNDATION FOR DEVELOPING COUNTRIES

Utilization of Wildlife in Developing Countries

Report on an International Conference
held in Bad Godesberg
December 7 to 10, 1964

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GERMAN FOUNDATION FOR DEVELOPING COUNTRIES

Programming Division

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The International Conference on the Utilization of Wildlife in Developing Countries, the first of its kind to be held by the German Foundation, dealt with a theme which plays a major role in the overall development of many African countries. The Conference was organized by the German Foundation in collaboration with the German Federal Ministry of Food, Agriculture and Forestry and the Food and Agriculture Organization of the United Nations.

In many countries of Africa wildlife utilization effectively serves not only to ease the problem of procuring sufficient food for the rapidly growing populations but also to improve the foreign exchange situation by stimulating the development of tourism, offering African big game as a major attraction. The contradiction between these two forms of utilization, lying in the fact that whereas tourists from abroad are interested in seeing and photographing big game, the Africans themselves value these animals chiefly as a source of food, has been successfully overcome by efficient wildlife management on the part of the state.

In the realization that permanent management and purposeful utilization of wildlife populations are imperative for ethical, social and economic reasons, the Conference sought to determine to what extent these aims could be realized through the implementation of practical measures. In this connection the tasks falling to technical assistance in this field and the measures to be carried out by the developing countries themselves were thoroughly discussed.

The interest which this Conference has awakened has encouraged us to hope that a valuable contribution has been made towards a solution of these problems in the interest of many peoples of the world.

Dr. Gerhard Fritz
Director-General of the
German Foundation for Developing Countries

WELCOME ADDRESS

by Mr. F. Klose, Ministerial Assistant Director and Head of the Division of Forestry and Timber Trade in the Federal Ministry of Food, Agriculture and Forestry, on the occassion of the opening of the International Conference

Mr. Director General,
Ladies and Gentlemen,

I. I am very grateful to the German Foundation for Developing Countries for having invited a number of experts to discuss a question which so far has obviously not been given sufficient consideration. Permit me to make a few observations from the professional point of view relative to the tasks of the International Conference on "Wildlife Utilization in Developing Countries".

II. It is generally accepted that in the interest of all nations the less developed areas of the world have to be economically opened up. Usually, this is done by starting immediately with the application of modern measures of agriculture and trade and industry. In order to achieve the greatest possible effect intensive methods which already stood the test in industrial countries are being applied to different conditions. In most cases it is neglected whether the necessary basis for a successful application exists.

During efforts towards intensifying the agriculture of an entire province in a developing country the natural soil structure has been destroyed by using particularly rational soil cultivation measures and employing 40 000 tractors, disc harrows and breaker

ploughs. The supply of water and nutrients was interrupted and the topsoil exposed to erosion by wind and water. Within a period of five years the soil became bare rock. The population having already reached a primitive stage of agricultural development was now faced with complete ruin.

I have deliberately chosen this extreme example. It teaches us that the task of soil conservation is just as urgent as the mechanization of agriculture. It is only by conservation of the fertility of the soil and adopting an appropriate technique that we can start with an intensive agricultural production and develop trade and industry.

The reason for unsuitable soil utilization methods entailing grave consequences can usually be found in an insufficient knowledge of existing relations in nature. Agricultural engineering interferes with natural resources. Applied in a proper way it leads to the improvement of the regional development. It can, however, also disturb the existing balance between soil, fauna, and flora, which is particularly unstable in the tropics. In the developing countries man's claim to dominate nature is therefore much more limited than in industrial countries with temperate climatic conditions.

To prevent the fertility of the soil from being destroyed the type and intensity of soil utilization have to be adjusted to the efficiency of the respective areas. Any technical methods to be adopted in the field of agriculture have to be tested to the effect in how far they will have an impact on the rhythm and economy of nature in order to recognize intended measures as being unnatural and to restrict their application to a minimum.

Therefore, I am glad to have a possibility to welcome experts who have made it their aim to examine the effects of technical measures on the economy of nature, i.e. from the ecological angle, in order to protect mankind against the dangerous damage of modern technology.

In this connection three factors have to be observed which are useful and indispensable for obtaining a crop yield provided that they are in balanced proportion; these are: Water, plants and fauna. If one of these factors in not sufficiently available or exists in excess, this will result in a serious impairment of soil fertility.

III. During this meeting we have to give further consideration to the fauna. It is particularly by means of animals which live on plants that men derive benefit from soil. We are thinking here first of all of our domestic animals. They can provide us with high yields, such as meat, milk, fats, etc. This is, however, only possible on a relatively good soil where the forage required by the animal shows a quick regrowth.

Where, however, the soil is poor by nature, where there is temporarily a lack of water, where the sun burns inexorably during the day and where the radiation at night brings about high differences of temperature, the soil and the vegetation are particularly susceptible to damage. They allow for instance only lenient grazing and accordingly show low yields. If the number of cattle exceeds the biological capacity of the soil this will entail damage which in the majority of cases cannot be compensated.

First of all, vegetation disappears followed by a hardening of the soil due to the cattle. This can result in the formation of steppes giving rise to

erosion by wind and water. The outcome are mountains consisting of bare rock, and deserts. During past centuries areas of immense extension have in just this way turned into unproductive land in the developing countries.

We are alarmed by the fact that in the developing countries more than one third of the area is highly menaced by erosion. Applied to the fauna this means that utilization has to be carefully adjusted to the productivity of the soil, for biological as well as for economic reasons. We have to raise the question "Is there no type of utilization which is justified from the ecological point of view and economically still more advantageous than the traditional but dangerous cattle keeping?" For the developing countries this question is of extraordinary economic importance and you know that in many cases the answer can be "Game Management".

IV. Game management requires manifold measures and is of a rather complex nature. You, Ladies and Gentlemen, have dedicated a great part of your lifework to the game and its relationship towards man. I am happy to meet here quite a number of outstanding experts of international reputation.

Game management has already been discussed at several other meetings, only to mention Arusha and Nairobi. A meeting, however, deliberately dedicated to the problem of game stock management in developing countries has probably not yet been held.

We hold the view that well-planned and controlled game management based on scientific findings and practical experience can constitute an efficient means for the economic promotion of many developing countries.

Research problems or technical details many of which still await solution will not be the main topic of discussion during the forthcoming days. Of paramount interest will be the answer to the question: Which possibilities exist for initiating in the developing countries efficient measures in the field of game management and how should one proceed in order to avoid mistakes?

THE IMPORTANCE OF WILDLIFE AS A MARGINAL FORM OF LAND USE IN DEVELOPING COUNTRIES

by Thane Riney

Introduction

The international importance of marginal lands scarcely be over-estimated for the present status and trends of those zones between presently used and unused lands provides an index of the extent man is successfully adapting his food producing activities to the physical limitations of our planet. As marginal lands spread and increase in size, productivity of the total land surface available decreases. As marginal lands stabilize or shrink in size, the physical base is secured for either improvement of production from existing forms of land use or the development of new forms or techniques of production. Since these lands are marginal to established productive activities, they are on the fringe of our traditional outlook toward land use and it is understandable that a conservative creature, like man, should cling to the cliches of his training and to the modern, often incredible complex attitudes toward land use rising in the world's most highly developed countries. It is perhaps not too surprising that we under-estimate the significance of the spread of marginal lands in the developing countries.

It is important to note that the spread of unproductive land, when certain mountain and desert lands are considered, has the urgency of irreversability. The significance of mountains stripped of trees and soil until only rock is the dominant feature or of the recently spreading dunes of the Sahara is that within the foreseeable future, this land cannot recover to its original state of productivity. It is especially this tendency toward irreversible loss that provides the greatest motivation for the use of the best efforts of all disciplines to reverse the unsatisfactory ecological trends on marginal lands.

Under these circumstances, it seems especially important to briefly review the inter-related factors influencing the development of marginal lands, their spread, their decrease or their stability, to be aware of the types of lands suitable for the maintenance or development of the wildlife resource in developing countries, to recognize under what conditions wildlife is or may be especially appropriate as a form of land use and, finally, to touch briefly on the extent to which various types of wildlife utilization are already present or are a practical proposition for developing countries.

Inter-related factors influencing the development of marginal lands, their spread, their decrease or their stability

For purposes of discussion, it is useful to group these factors influencing the stability of marginal lands into three major classes: ecological factors, sociological factors and economic factors. Examples of each of these classes are given to illustrate the complexity of the problem of marginal lands and the consequent necessity for a very broad integrated approach to their solution.

Ecological factors as they influence marginal lands, are of two main types:

1) those areas physically unsuitable for present forms of productive land use, such as mountains, deserts, swamps, ice fields and urban areas, and
2) mis-management applied to present forms of land use that results in deterioration of land resources on which present forms of use depend.

These two aspects are commonly closely related, for present forms of land use tend to move into mountains, out into deserts, etc., and it is especially at the edges of these areas obviously unsuitable for intensive present uses that mis-management increases the magnitude of the international marginal land problem.

Sociological factors include the present stage of cultural development, the established cultural traditions (e.g. religion, exploitation and conservation, superstition, etc.), the form of government (dictatorial, socialist, communist, democratic), educational facilities and present levels of education, political decisions - and the extent to which the government is stable - and health factors (both human and animal). Either the assignment of new forms of land use or the deterioration of existing patterns of use may have the most profound changes with respect to these various sociological factors and, conversely, unless sociological considerations are taken fully into account, a development plan (particularly large scale projects) may be doomed from its start, no matter how appealing are the economic and ecological justifications for its existence.

Economic factors include, for example, such considerations as the shifting profit margins for various present forms of commercial use on occupied lands and the extent to which labour is available (including the availability of a spectrum of different types of workers). The profit motive is certainly one of the most dangerous single factors contributing to instability of present forms of land use on marginal lands for the tendency of land users to ignore ecological limitations of marginal lands produces short term profits and long term deserts. International economic relations - including the extent to which a country is dependant on expatriate funds for its development - can also be an important indirect influence on marginal lands.

Certain ecological requirements must be met in any land to ensure the continuation of the physical resource being used. Each country has sociological characteristics that automatically rule out (at the present stage of its development) certain proposals that may be ecologically and economically sound, and the costs and benefits of alternative proposals, both ecologically and sociologically acceptable, must be satisfactory to achieve a healthy stability between

man and land. The interplay of these three classes of factors form a kaleidoscopic and ever-changing mosaic against which marginal land questions must be considered.

Lands suitable for the maintenance or development of the wildlife resource

Wildlife can and does occur on almost all types of land and has been specially developed as an accessory or major resource on the following types of lands: arable or potentially arable; lands now or potentially grazed by domestic stock; forest lands; and on wild lands unsuitable to present forms of land use (e.g. mountains, deserts, swamps, oceanic islands). Marginal lands and unused lands are being increasingly recognized as lands appropriate for the development of some form of wildlife utilization.

Distribution of marginal lands

There has been no international survey of the area of the earth covered by marginal lands nor do we have a precise view of the extent to which they are increasing, or the extent to which land is going out of production. We do know that the trend is for land to go out of production under certain present forms of land use and that this trend is easily observed in developing countries.

In approximate figures two fifths of the earth's land surface is arable land, one fifth mountains, one fifth desert and the remaining fifth permanent ice and snow. The borders between these types of land surface are rarely clear-cut and it is especially in the desert and mountain areas bordering arable or grazing lands that the great bands and patches of marginal land occur. For example, the southward spreading Sahara is bordered not by a clear edge but by a zone of between a few miles and two or three hundred miles inside of which patches of bare soil are growing; streams are drying and dunes are forming and spreading. Transhumance and more stable forms of present

use are accelerating the southern expansion of the Sahara. Likewise, in mountain areas vast strips of land become marginal where acceptable lowland agricultural and pastoral management practices have been mis-applied on steeper slopes with higher rainfall, thus accelerating the destruction of vegetation and soil loss through erosion.

The utilization of the wildlife resource on these critical lands offers a possible solution to stabilizing the debilitating advance of unproductive land while at the same time allowing the land to contribute to the world's food supply. The main arguments favouring the utilization of African wildlife are: most kinds of wild animal carcass contain a higher proportion of meat than cattle or sheep; they are much more productive as species, particularly on land marginal to domestic animals (i.e. a higher proportion of the population can be removed annually); some combinations of wild animals can thrive on land on which domestic animals waste away and die; wild animals are more resistent to African diseases; that in some arid unimproved lands combinations of wild animals, each species using the land in its own special way, can result in a total production of protein that far exceeds the maximum amount of protein produced by domestic animals on the same lands; large numbers of wild animals can exist on much of Africa on a permanent basis and without destroying the vegetation and soil while on the same dry lands even a small number of cattle and other domestic animals will often result in rapid destruction of vegetation and soil and ultimately in rivers silting, becoming drier and stopping and in water levels becoming lower, in increasing bush encroachment and in increasing pressure on humans looking for more land to destroy in traditional ways; and finally that several types of wildlife utilization yield quick returns with little capital investment.

There are several problems facing wildlife managers that are, at least locally, serious ones. For example, there

is the question of disease that threatens domestic animals, and the question of competition with domestic animals. There is the problem of matching the most suitable combinations of animals with the most suitable environments, and when wild animals become overpopulated, they also can be destructive of soil and vegetation.

In a more restricted local sense, small patches of marginal lands occur within many other types of land use and as human populations continue to increase and more intensive agricultural grazing and forestry practices develop, there will be increasing pressure for us to make the best use of even small bits of marginal land in countries now in comparatively early stages of development.

Under what conditions is wildlife especially appropriate as a form of land use?

1. When utilization of wildlife is the present form of use and other more suitable uses have not been developed.
2. When the use of wildlife becomes a better economic, sociological and ecological activity than existing forms of land use.
3. When past forms of use have destroyed the physical base supporting them and the land is abandoned or being abandoned.

Under these conditions, wildlife is proposed:

a) as an acceptable, long term, new form of land use or
b) as a temporary means of gaining value from land while it recovers to become suitable for some other type of use.

When one or more of these three basic conditions are observed, it is suggested that governments at least consider the possibility of encouraging the development of some form of wildlife utilization alongside other proposed forms of land use.

What is the present position regarding the use of wildlife as a form of land use in developing countries?

To deal with this subject on a regional basis would require far more time than we are now allowed.

The major present types of utilization of the wildlife resource are:

1) hunting for meat both by hunting tribes and by members of agricultural or semi-agricultural tribes;
2) hunting for trophy or for sport;
3) protection of animals in parks and reserves as tourist attractions;
4) commercial use of animals and animal products, specifically the sale of meat, skins and other trophies and musk; and finally
5) capturing and selling live animals.

The domestication of several species of wild animals is another important development which has accelerated within the past fifty years and which will certainly continue to expand - perhaps develop into another major type of use.

Although time does not permit a complete review of utilization, activities already established and growing in developing countries, it may be useful to mention a few examples of regions where these major types of utilizations are developing.

1) Hunting for meat both by hunting tribes and members of agricultural or semi-agricultural tribes

   Africa, Latin America, South East Asia, China, India are notable examples. The extent to which the animal populations are able to sustain present levels of tribal hunting is almost unknown, but the utilization is a well established and important part of the social and cultural organization of many hundreds of tribal units in these various major regions.

2) Hunting for trophy or for sport, usually by Europeans

This has been rapidly increasing in recent years, particularly in the western French-speaking African countries, Australia, New Zealand and in several of the eastern bloc countries. The development is in its infancy because it has been cautiously based on ignorance of the extent to which populations of large mammals can be exploited without destroying the capital. In Africa, tourist hunting is best developed in French-speaking West Africa where road communications and a network of acceptable tourist accommodation is poor. Tourist hunting in many developing countries is the first way of attracting tourists to the country and, although largely unmeasured, from what little information we have, the effect of hunting on the populations is negligible for most species although there are several exceptions, such as rhino, the scimitar horned oryx and the addax of the Southern Sahara.

3) Protection of animals in parks and reserves as a tourist attraction

National Parks are perhaps the most familiar type of wildlife utilization because of the publicity associated with the parks in English-speaking East, Central and South Africa. Since the formation of Krueger National Park about 40 years ago, many of these parks have become internationally famous and already contribute significantly to the economy of several countries as discussed in other sessions.

It is not generally realized that the tourist potential for combinations of West African Parks ("Package" tour system pioneered by Dr. Grzimek in East Africa) is at least as great as for East Africa. In addition, Tunisia, Turkey, Ethiopia, Iran and Jordan are starting their development.

International conferences relating to National Parks are becoming increasingly popular. Since the IUCN sponsored conference in Seattle, Washington, 1962, several other conferences have been held or are being organized. These include a FAO sponsored Latin American Conference on Parks and Wildlife that was held in November 1964 and a conference jointly sponsored by IUCN, UNESCO and FAO will take place next year in S.E. Asia. The 1966 World Forestry Congress in Madrid will devout an entire day to National Parks Recreation and Wildlife. The recommendations of this Congress should have far reaching effects on the development of the wildlife resource on an international basis.

4) Commercial use of animals and animal products

This subject overflows with excellent examples of either established uses, promising starts or serious potential, and for our present purposes of discussion I have roughly classified and selected a few highlights. Viewed as a source of protein, wildlife already makes a very significant but largely unmeasured contribution to the human diet. In Africa, easily the foremost area for game utilization is West Africa where FAO Nutrition experts have estimated that over 80 % of the meat consumed in several countries is game meat, where there have long been established hunters, middlemen, processors, transporters and where sales take place in the markets of all large towns. Several species of ungulate are harvested as well as cane cat and flying foxes and the activity is unstudied and unpublished.

a. Meat. Over $ 1,120,000 worth of game meat is sold annually on the Transvaal markets* and, as Dr. Mossman has described, Southern Rhodesia is making

* Riney, T. and Kettlitz, W.L.
1964 Management of Large Mammals in the Transvaal
Mammalia 28(2): 189-248

an excellent start. Both of these countries are comparatively "westernized" and the type of utilization is not as readily applicable to under-developed areas generally as the West African activities or as the several promising starts under way in Zambia, Kenya and Uganda.

The Saiga antelope and several others in Russia has become an extremely important animal developing in value in some of the cold steppe areas. Introduced animals such as red deer are already being utilized commercially and their meat exported from New Zealand and South America (Brazil). The production of tinned wallaby and kangaroo tail is a growing export business in Australia and three years ago these exports had reached a small town store at the edge of a large game reserve in Southern Rhodesia. It was strange to buy such a tin in Africa but we did, and the meat was good.

Off-shore islands in the Southern Oceans hold one of the most potentially important wildlife resource in the form of the edible duck-sized "mutton bird" of the Maori (Puttinus griseus). Although little studied from the point of view of development as a protein resource, it is already known that one young chick of each pair can be harvested annually for the pair lays again. Small islands but a few miles square are populated by several million birds each and to harvest, one simply takes the chick from the nest. This incredible production is in truth harvest from the productive southern seas, but the operation of harvesting, already well established and growing, takes place on land unused for any other purpose by man as it is either marginal or unsuitable to present known forms of use.

And so we find already many wild animals already in use commercially on marginal or wild lands and it is clear that there are several species better adapted to drought, to lack of grass, to steep slopes or to the rigours of rugged terrain and high elevations than any our domestic animals. The processes of selection and inter-adjustment between wild animals and what we now call marginal lands and wild lands have been going on for several million years and it is unlikely that even the most modern methods of changing the genes of domestic animals is likely to produce something as ecologically adapted to the desert as the addax or oryx, as potentially productive on savanna wasteland where grasses are mostly missing as the eland or as good at thriving in periodically inundated swamps as the lechwe.

b. Skins and furs. One of the largest shoe manufacturing companies in the world already uses red deer skins from Latin America and wildebeest and buffalo from Bechuanaland. The fur industry is already an important international industry that is having an increasingly important influence on wildlife populations in South America and Africa because of the swing of fashion. While 1951 fur sales in Canada amounted to 68.2 million dollars*, developing countries have not started to develop this aspect of wildlife management. They need guidance in the management of their commercially exportable fur bearers on their marginal and wild lands and this could become an important aspect of future international assistance with wildlife.

c. Ivory and tusks constitute a tremendous business again largely unmeasured but growing, for more and more developing countries are getting in on the market. The need for managing elephant populations

* A.G. Loughrey. The Economics of the Fur Industry in Canada. (Resources for Tomorrow, Vol 2: 845-856)

grows each year. Two examples from West Africa illustrate the extent to which tusks are being exported. Between 1951 and 1962, 20.5 tons of elephant tusks were exported from Tchad alone, and in 1962 over 37 tons were exported from the Central African Republic, the fees for tusks alone amounting to 30,787,204 CFA francs ($ 755,514).

d. Capturing and selling is another very large international business in which many developing countries are involved. This is especially true for Africa, especially West Africa and South America and almost every developing country in these regions specializes in some type of animal export. For example, a recent report from Talbot in the Philippines indicates that annual exports of live animals are worth over $ 200,000 annually. Over 7,000 animals were exported from one Nigerian airport alone in 1960. Between 1959 and 1963, a total of 10,204 animals were exported from Sierra Leone, the major items being monkeys, birds, snakes and frogs.

e. Domestication of wild animals is another aspect of the use of wildlife on marginal lands. The alpaca and llama are successfully and increasingly used in South America and a FAO expert is at present in Peru trying to help with the development of practical plans for utilizing the vicuña on the altiplano. For over 50 years, herds of eland have been maintained on a small scale in several parts of Eastern and Southern Africa. Ostrich farms have been successful for many years in South Africa and are increasing. A recent development is the concept of a crocodile farm and plans are being drawn up to test its practicability. We could go on with a long list. Even in cool-temperate regions there are signs of an awakening feeling for finding an ecologically

suitable and sociologically acceptable animal for a difficult environment and the recent introduction of reindeer into Scotland is a fine and promising example.

The special significance of introductions

From experience within the past 50 years in New Zealand, South Africa, Australia, South America, Russia. Manchuria, Hawaii, New Caledonia and several other Pacific Islands, we can now view introductions of animal species as we would the assembly of various elements in a balanced aquarium. We have the potential for the creation of new environments. We can destroy (this is more than adequately proven) or we can build to achieve a value for humans where none existed before. As a biological activity, this has already started on wild and marginal lands and its development is certain to increasingly attract the special attention of aid-granting organizations.

During the remainder of the conference, we well further explore several of the ideas touched upon lightly in the present discussion. However, it seems important at the start of the present meeting to realize that we are not pioneers in the development of a new resource; we are pioneers in the understanding of the oldest form of protein gathering by man and in using our understanding of wild animals and of natural and modified ecosystems to try and achieve a greater social and economic value from lands, the potential productivity of which the world cannot afford to lose.

WILDLIFE UTILIZATION AND TECHNICAL ASSISTANCE

by Dr. W. Ehmann

Technical assistance of the kind pursued by the Government of the Federal Republic of Germany is the field of development aid concerned with helping those countries whose degree of economic development has lagged behind that of the industrialized countries to gain the knowledge and know-how necessary to accelerate this development. This is one of the definitions on which our daily work is based, a definition that is rather abstract and even unclear but which includes all forms of technical assistance. The terms "technical", taken here in its former broad sense, includes all faculties and means by which human beings, having recognized the laws of nature, can utilize these to transform their surroundings in a certain specific manner. It is his economic surroundings that man must transform, directly or indirectly. No one would be so presumptuous as to attempt to develop the ancient cultures of Asia. But even so, the field open to development is wide, covering the development assistant training skilled workers in the Far East, the currency expert advising the national bank of a developing country in Latin America, the physician struggling to control the dreaded bilharziasis in Egypt, and even those working to establish wildlife reserves in East Africa.

Technical assistance should help to enable the receiving country to speed up its economic development on its own. It is assistance, as we say, leading to self-help. As is the case with all learning, the pupil must make an effort to learn what he is taught and then apply it himself. Technical assistance would be pointless if those receiving it were to make no efforts of their own and if there were no hope of these efforts succeeding in due course. Good will alone is not sufficient basis on which to run

a school or a hospital once it has been built and begun operating with the help of assistance. Neither is technical and administrative know-how sufficient. The government of the developing country concerned must be able to bear the financial burden of the newly established institution. Technical assistance cannot help in this and neither can general development aid in the long run. So we see that in this field, known in administrative circles as partnership activities, there are an abundance of difficulties in the way of technical assistance.

Can wildlife utilization be regarded as a field open to technical assistance of this kind? This question is contained in my title "Wildlife Utilization and Technical Assistance", which is of course not an invitation to deal with the two subjects separately. We might ask even more directly: Can wildlife utilization be promoted within the framework of technical assistance projects?

The answer to this question depends on what is meant by wildlife utilization.

Professor Grzimek can count on a wide audience for his vividly descriptive television programmes on rare wild animals. But how will this audience react when he speaks in this connection of development aid rendered by the state, as he did a little while ago? Surely many people, however fond of and interested in giraffes and elephants they may be, will ask in surprise or indignation whether the tax payer's money is to be spent on wild animals now, in addition to all the other uses to which it already has to be put. We all know of and can sympathize with the public's exceedingly critical attitude towards development aid. May be you yourselves are among those who have uttered criticism at some point. I certainly feel that this question is by no means absurd and that it should be taken seriously and answered.

e must now try to define what we mean by wildlife utilization. Thumbing through my papers I came across various terms such as landscape maintenance and soil preservation, utilization of wild animals, conservation, management of wildlife populations, wildlife protection. There are others, too, but these will do to demonstrate the necessity of defining the term.

I do not intend to break my promise to spare you the views of a dilettante, but I would like to state what in my opinion wildlife utilization as a possible field of technical assistance can not be, since I feel this is important in this connection.

Since technical assistance is aimed at promoting economic development it can be of use in connection with wildlife utilization only if measures here are also aimed at promoting economic development. Measures with purely scientific or idealistic aims cannot be considered. From the point of view of a zoologist it is of course important to study the habits of a certain rare bird in order to be able to fill in a hitherto blank space on the coloured map of this science. But development assistance can have nothing to do with this. Its aims are quite different and more realistic. Its concern is daily bread in the widest sense of the term. On the other hand the promotion of tourism for the purpose of obtaining foreign exchange urgently needed for economic development, the supply of protein for the population, or the protection of the soil through expert management of wildlife are all possible economic aims. and there are no doubt others, connected with wildlife utilization, for which technical assistance measures seem worth promoting.

If a wildlife utilization measure proves to have a bearing on economic development, it must then be weighed against the following further criteria in order to determine whether it can come under the category of technical assistance:

1. The project must be carried out in a developing country unless it is concerned, for instance, with the training of trainees in the Federal Republic, in which case this must be for the benefit of a developing country.

   I cannot go into detail here. It will suffice to state that the developing country must be either independent or about to become so. Dependent territories are under the guardianship of their respective protecting states. The country to be benefited must require development in the field with which the project is to deal. If it already has the knowledge and know-how which projected technical assistance measures are intended to transmit it can no longer be regarded as a developing country with respect to the field in question.

   If, in spite of knowledge and know-how on hand, the planned project cannot be carried out without external help because of lack of funds, technical assistance can nevertheless still not be granted, since technical assistance is not financial aid. This principle sounds simple, but in practise it is infinitely difficult to apply. We must not forget that development aid, and with it technical assistance, has an eminently political side which leads to a succession of quite legitimate compromises with regard to our basic principles of promotion.

2. The measure must involve bilateral technical assistance in the sense already explained.

   Technical assistance is as a rule not restricted to the mere delivery of material, since knowledge and know-how can in general not be passed on without human activity and contact.

   Technical assistance consists of training, demonstrating and advising and includes the funds necessary to

make all these possible. Constantly renewable impulses are provided in the establishment of schools and demonstration facilities.

Technical assistance is not aimed at covering requirements in a certain field. It cannot, for instance, suffice to cover the demand for skilled workers in a country. The financial means at its disposal are not sufficient for this. Its task is to provide examples and models which the developing country can then imitate on its own and at its own expense. It is in this that its true value is apparent. This value goes far beyond what technical assistance actually costs us in terms of money. It is this that makes the publication of the sums spent on technical assistance so bothersome.

Technical assistance is designed to provide the initial incentive towards a certain development. It should become superfluous as rapidly as possible and its target is achieved when our counterparts in the developing country are ready to carry on alone the work of our experts. It would be contradictory to the character of technical assistance if it were designed to last over long periods of time. Many factors, including the actual nature of the project, unite to determine its length, which of course varies considerably from one case to the next. A mobile hospital unit to be operated by a single doctor can obviously be handed over to our counterparts more rapidly than can a trade school. It is always essential, however, that the target of the project, i.e., the moment in which our counterparts take it over, should be reached after a reasonable period of time.

I have already indicated that the target cannot be reached without the collaboration of our counterparts. Even if we pay our experts ourselves and provide the

necessary material, technical assistance can still in most cases not be regarded as a present from the point of view of the recipient country, as it nearly always constitutes a burden on its budget. Even if we are able to desregard all financial considerations on our part, it is nevertheless essential that our partner should at least in the long run be able to bear the burden of a school or hospital established during the course of a technical assistance project. Were we, as is often asked of us, to take over responsibility for the current costs of an establishment of this kind, we would in many cases never and frequently only after lengthy periods of time be able to free ourselves of the project. It would be difficult for any donating country acting in this manner to raise the necessary funds.

On principle we like to employ German experts to carry out technical assistance projects, not because we believe German experts to be better than others but because we wish it to be obvious that a project is being carried out with the help of German technical assistance. I am sure I need not explain this further to you. All donor countries act according to this principle. This of course means that we cannot provide technical assistance in fields in which we have nothing to offer, for instance, though you may contradict me here, combatting diseases of the coconut palm. I hope that this is not the case with wildlife utilization. It is for political reasons that we do not favour mixed projects promoted by several donor countries or institutions, since it is then not obvious that Germany is participating. Such projects must be looked upon as multilateral rather than bilateral undertakings and there are therefore also legal budgetary reasons against participating in them. I do not mean by this that there is anything wrong with multilateral aid and the Federal Republic spends considerable sums on this form of de-

velopment aid. But I am of the opinion that we should always strive to co-ordinate bilateral measures, even though experience has shown that this is extremely difficult.

3. The technical assistance project must accord with our overall development programme in respect of the country for which it is planned and with regard to its actual nature. Although our plans are exceedingly flexible in order to be able to take into account all genuine requirements that cannot always be foreseen well ahead, we can nethertheless not launch every project suggested, even if it is good and worthy of promotion according to the above criteria.

   The following figures will demonstrate the difficulties to be overcome here:

   The Federal Republic of Germany has hitherto granted technical assistance to 90 countries. For 1965 we shall have 155 million DM at our disposal for new bilateral technical assistance projects in the narrow sense of the phrase. It has been estimated that we shall need about 60 per cent of this for additional promotion of former projects - which from the point of view of the budget are new projects - and for measures necessary to complete and conclude projects. This means that only about 65 million DM will remain for entirely new projects. Applications for promotion received so far already involve sums totalling about 360 million DM. This is no doubt sufficient demonstration of the difficulties mentioned.

   By this, as I hope, I could give you some aspects of German technical assistance. I am sure that other donor countries have similar criteria.

   Measures in the field of wildlife utilization so can be carried out, if their criteria come under the category of technical assistance.

ROLE AND TASKS OF SYSTEMATIC GAME MANAGEMENT FROM THE POINT OF VIEW OF DEVELOPMENT POLITICS

by D. von Hegel

I. Is Game Management a Task of Development Assistance?

Industrial countries make efforts to assist developing countries in establishing a self-sufficient economy. Considering this immense task only limited funds are available. Therefore, we have to make our choice among the unlimited possibilities of extending assistance. Only such measures are to be promoted, which promise to have the greatest effect.

General criteria have been just mentioned which should be considered in each particular case when measures of technical assistance are being carried out. Now, I put forward the concrete question, whether and under which conditions it is justified to extend the limited possibilities of aid measures also to game management. Many politicians doubt it to be a legitimate task of development assistance to help developing countries in organizing systematic game management.

Certainly, there will be different answers to this question, due to the manifold conditions of individual developing countries. It is, however, possible to make a few general statements:

1. In order to supply their population with the necessary consumption-goods the developing countries have to see to it first of all that their own natural resources are being exploited. Where there is plenty of game - as is the case in large parts of Africa - well organized game management can contribute to an improved protein nutrition of the local population. For this, the possibilities of fishing in inland waters should not be neglected.

They form also part of the natural resources of these countries.

2. Whenever systematic game management is encouraged by development assistance, the organization of the mangement of game laire and game protection, the utilization of venison and by-products, e.g. skins and bones, can provide a direct and important impulse towards economic development. Moderate measures towards organizing primitive hunting and game utilization offer already manifold possibilities of work. According to the level of ability, idle labour might be employed in a productive way.

3. Well-organized wildlife with hunting grounds, game reserves and national parks mean a considerable attraction for tourists. The promotion of these measures means at the same time an indirect encouragement of tourism. Thus, development assistance contributes to reducing the chronical shortage of foreign exchange of the country in question.

4. We are aware that vast areas of the developing countries are not suited for intensive cultivation measures. Pasture farming also shows often the effect of destroying the soil. Ecological investigations have proved that often game offers the possibility of profitable and lasting land use, if there is planned management. In many regions the task involved in protection of nature and landscape can be realized simultaneously by rational game management; thus, the acute danger of destroying the fertility of entire landscapes can be done away with and finally the eradication of game can be prevented, in case indivual game species are already manaced.

5. A too big game population often causes damage in agriculture and forestry. Besides, it means a competition for livestock. Hence follow very many conflicts. The condition of systematic game management is organizing the field of land use. Thus, it contributes to avoiding disadvantages for agriculture and forestry.

6. If systematic game management is encouraged by measures of development assistance this results not only in direct advantages for the economy of the country. Such a measure has an indirect dynamical effect on the development of the entire national economy. As shows the example of New Zealand, a world-wide trade with venison might develop. The by-products resulting from game utilization provide an incentive for the establishment of supplementary handicraft or industrial plants. The attraction of tourists does not only promote tourism, but also contributes to the redemption of traffic connections and thus offers incentives for investments into structural measures, e.g. the construction of roads leading to national parks.

If development assistance includes the promotion of systematic game management in such countries which possess plenty of game an improved supply of the local population with protein, an increased productivity of work, an improved balance of foreign exchange, the conservation of nature and landscape, the protection of agriculture and forestry against damage and a dynamical effect on the entire national economy will be the outcome. The input of capital and labour would already be justified for reasons of development, if only one of the above mentioned effects could be

realized in an economic way. Therefore, there cannot be any doubt that in many cases the promotion of game management is a legitimate task of development assistance.

II. Conservation and Exploitation of Natural Resources are necessary

Everywhere in the world the evolution of mankind follows the same laws.

First, the human being lives in small groups as collector and hunter on the almost unlimited richness of nature. Later, he settles, clears the land and cultivates it.

With the growth of population, the demand for food and materials for building and heating purposes rises. The human being collects them wherever he finds them. He takes advantage of more and more land. The necessity of careful treatment and conservation has not yet been recognized. Due to predatory exploitation the natural resources are more and more exhausted, and this leads to an impoverishment of the country.

Only with an increasing shortage of articles in daily use, economic considerations get into the foreground, the necessity of systematic management becomes evident.

This is followed by the difficult phase of shifting to other bases of income, in connection with the efforts which are now indispensable for the conservation of natural resources. This is where development assistance starts. Its task is difficult.

Every flight over any developing country proves that a big part cannot be exploited in an economic way. On the average, this is almost one third of the area.

Such a flight also shows that only one third of the remaining arable area is as fertile as to permit a satisfactory utilization by agriculture and forestry. The rest is a vast area of some 2900 million hectares the utilization of which is not yet planned but which is under a type of predatory exploitation.

On an area of the size of the entire African continent in all developing countries the fertility of the soil is menaced and thus also the available plants and animals on which a considerable part of the population in developing countries has to live.

Particularly in such cases systematic game management often offers unique chances. Its effect depends on the question whether it can develop within the samll margin between natural resources and technical and economic possibilities. It has to meet the requirements of nature and economy. In all projects we must not consider only one aspect, i.e. not exclusively the economic or biological aspect. We have to organize our measures with nature - not against it - and at the same time in a rational way, if the local population is to derive profit from them.

III. Extensive and Manifold Tasks of Developing Countries

Where and how development assistance has to be specifically started with in organizing systematic mangement, is the basic question of this meeting. It will not be possible, to answer it exhaustively. First of all, in my opinion many developing countries require assistance in the following fields:

1. In land use planning suitable areas have to be found out for the development of open-air game populations as well as for national parks and

game reserves. Suggestions have to fit into the framework of national planning and will have to be decided from a political angle. Ecologists, technicians, economic and social experts who are not available in developing countries, should cooperate for the realization of this task.

2. Politicians have to determine the extent and purpose of these areas and issue the regulations necessary to their conservation, development and exploitation. In many countries this includes also the establishment of a well-functioning administration, i.e. the increase of staff and financial means of the government (game department) or the participation of regional administration (district councils) in the revenue from game management and hunting-tourism. For this, advice has to be extended to governments.

3. Game protection should include all measures necessary to the conservation and protection of game populations. Among these measures there are the control of poaching wide-spread in quite a number of countries and regulations on the use of fire-arms, the supervision of hunting and of game utilization by trained supervisory staff and the coordination of activities of all organizations co-operating in game protection.

4. In game research such factors have to be found out as influence the development of a game population and practicable suggestions for the organization of projects should be submitted. Investigations into game diseases and their transmission, into the habitats of the different game species, their migration, their food requirements, their population dynamics etc. are necessary. It is, however, not always possible to wait for the results.

5. In game utilization the best possiblities for an economic utilization of the cropped animals should be found out, simple methods of transportation, of preservation and processing of venison, skins, and trophies should be developed and suggestions submitted for the establishment of processing plants.

6. In market research it should be established in which way the population can be best supplied with the necessary meat - either by self-support or by trade. The market for skins and other game products should also be investigated and suggestions submitted for organizational and legal measures.

7. The training of the local game protection and supervisory staff is an indispensable condition of planned game management. This is one of the foremost tasks of development assistance. The College of African Wildlife Management established in Mweka/Tanzania for the English speaking countries of Africa should receive an equivalent for the French speaking African countries.

8. It is highly important to pursue the information of politicians and of the population on the necessity of exploiting the natural game resources of their country in a considerably more careful way.

IV. The Error of Politics

Even politicians recognize more and more that the conservation of natural resources, of the game population or of specific game species is of general interest. Hence they conclude, however, that the expenditure involved in the conservation of game and the limitations which follow from it for the local population,

e.g. by a limitation of pastures, should be borne by mankind as a whole. These politicians thus claim a compensation from the industrial nations, and do not apply for measures inteded to develop game management.

A compensation is, however, incompatible with the basic idea of development assistance. It is contrary to its task of promoting by measures of limited duration an economic institution which later on should be financed on its own and maintained by itself.

Financial means of development assistance are only available for game management if the conservation can be reached by economic measures, i.e. if the expenditure for organizing systematic game management has a direct or indirect remunerative effect.

In view of the actual situation of many developing countries where the game population is withdrawing to an increasing extent due to increased animal husbandry, continued shifting cultivation and poaching, we are faced with a very difficult, but also expedient task.

ESTIMATING THE NUMBERS OF GAME POPULATIONS

by Prof. Dr. A. de Vos

One of the most difficult, yet one of the most vital aspects of wildlife management is to obtain reliable enough estimates of game populations for management purposes.

Game administrators faced with the needs for a management programme are inevitably faced with the following questions:

(1) How many animals by species are there in the management unit?

(2) How many animals by sex, age and species can be cropped annually?

(3) Is the range over, under or properly stocked?

(4) When and how can the harvesting best be accomplished?

All these questions are obviously inter-related. I shall endeavour to restrict myself to giving you an answer to the first question. This is a rather impossible task in the assigned period, because really I should delve into the statistical aspects of the problem in order to do justice to it. The best I can do under the circumstances is to appraise some of the biological aspects of the problem, refer to existing methods and to point out some of the many pitfalls one may be faced with. In my analysis of the problem I follow closely the excellent chapter on "Estimating the numbers of game populations" by David E. Davis in "Wildlife Investigational Techniques", published by The Wildlife Society in 1963. I shall emphasize big game populations in my selection of examples.

Although it is absolutely essential to resort to statistical methods in planning for a census and in analysing the results of same, it cannot be stressed enough that a sound understanding of the biology of the species under investi-

gation is an absolute and first requirement to obtain the desired results. By this I mean that one should have some appreciation of the following aspects of the life history of the species concerned: reproductive and mortality rates, sex and age structure, movement patterns in relation to food, cover and seasons, influence of reproductive behaviour on population structure, food and drinking habits, and activity patterns in general.

A great many methods are available for estimating the numbers of game populations, but the reliability of many of these methods has been inadequately tested. Rarely has a thorough investigation been made of the use of a census method with a known population. The failure to check population estimates against known numbers is a deplorable situation. Further progress in the study of populations requires concentration on a checking of the accuracy of estimates.

Most present day techniques of estimation have such low precision that only large changes of the population or the large influence of a factor can be detected. Fortunately, however, at this stage in the development of management of game populations, low precision population estimates may be adequate. To be worth the effort, a management technique must have a large effect; a method of low precision can detect a large effect.

A fundamental problem in population dynamics is to determine the density of a population. Density means the number of animal per area unit. The reason for its importance is that density relates the population to habitat.

A complication of the density problem results from the fact that we are interested really in an "instantaneous" density. A little reflection will make it clear that if we study an area over a period of time (which is necessary to secure adequate data) we will include all immigrants

whether due to births or to movements. This not only produces erroneous results, but by the time we have accumulated the data, the populations may have changed to such an extent that the data are of little value from a management point of view.

The possibilities for developing new techniques of estimating population numbers have by no means been exhausted.

Basic considerations

Methods of estimating wild animal populations usually include two basic assumptions, namely that:

(1) Mortality and recruitment during the period of study are negligible. If not, corrections should be made. Movement out of a population is treated as part of mortality; movement into as part of recruitment, and

(2) all members of the population have an equal probability of being counted.

The latter requirement is rarely met. Individuals rarely mix randomly in a population, but often group by sex, age, or other characteristics.

If the two assumptions are not met to an acceptable degree, the estimate will be unreliable and therefore cannot be used for management purposes.

In order to obtain population data, "censuses" are taken. These are counts which include details as to sex, age, etc., of a given species for a circumscribed area. Actual counts of individual animals are rarely possible, or even desirable, because of cost. Therefore, estimates are usually made, following some sample procedure. The results should be expressed in statistical form. Estimates are usually expressed as the mean, plus or minus two standard errors of the mean. Biases often creep in estimates because one sex may be more conspicuous than another or use a different part of the habitat. Before an estimate of a

population is made, considerable thought should be given to the precision required and the cost of attaining that precision.

A difficult feature of census procedures is to know what proportion of the population is detectable. Techniques based on calls or dropping counts may evaluate only a part of a population. In using "population indices" the assumption is made that the same proportion of the total population is tabulated when the same technique is used under similar field conditions with the same species. The method employed in making an estimate must be chosen for the particular species, time, place, area, and purpose. If at all possible, several methods of estimation should be used.

The census

A true census is an actual count of all individuals present on a given area. One obvious method is to count or capture all individuals in a given area. This method is practical only under special circumstances. The populations may be described in time (individuals seen per hour), distance (animals seen per kilometer of road) or area units (individuals seen per hour).

Many territorial species may be readily observed, located in their territory, and thus counted for a specific area. Since only males occupy territories, further calculations are required.

Direct counting of animals that congregate in herds, flocks or groups is another simple method. Herds can be driven past counters and segregated by sex and by age. This technique could be readily applied to lechwes.

Direct counts from airplanes, particularly in open-type country, are taken with increasing frequency. A modification of such counts is to take aerial photographs and to count the animals on these. A major problem is to conduct counts under sufficiently similar conditions, so

that comparisons of counts are valid. No statistical procedures will make data collected under different conditions comparable.

Fairly accurate census data have been obtained by counting tracks of migratory mammals as they cross roads or strips of barren ground.

Seasonal congregations of mammals and birds can often be accurately enumerated. Concentrations of wildebeest, ducks and geese are examples.

It is often possible to capture a relatively high proportion of a population in live-traps. However, the catch does not include young or trap-shy animals. A study should therefore indicate what is known about the non-trapable individuals.

Hunter (1945) compared counts of deer from an airplane with estimates made by forest rangers and sometimes found close agreement between these two methods.

If at all possible, several methods should be used to estimate a known population at a particular time and place as a basis for appraising estimates of populations.

Population estimates

A sampling estimate is derived from counts made on sample plots. Techniques of estimating animal populations may be separated in:

(1) Those based on direct observation and counting of animals or their signs, or

(2) those based on determining ratios to some sign such as tracks, feces and counts of calls.

Strip census methods have been widely used to estimate animal populations. These methods entail walking or driving a predetermined line and counting animals of a certain

species and recording the distances at which they are flushed. The population of an area then is the number of animals flushed, divided by the area of the strip and multiplied by the total area. Various assumptions will have to be made, however, which are not always correct. The main problem is that this technique does not allow for the area actually sampled beyond the animals observed. A modification of this method can be used to count big game from airplanes while flying over predesignated strips. This method should be tested more fully under various conditions in Africa.

In a roadside census, roads are travelled for the specific purpose of counting the numbers of individuals of a species being censused which are then related to the number of miles travelled. Advantages of this method are that large areas can be quickly and easily traversed. Unfortunately there are many factors affecting results obtained. These include:

(1) The activity of animals as influenced by hour of day, food supply, and weather, and

(2) condition of the roadside cover.

Activity and cover may vary seasonally.

Daily weather changes may have a pronounced effect on animal activity. Some factors which affect roadside censuses can be assessed: A study of the daily activity patterns of a species can suggest the most favourable time of the day for a census. The effect of seasonal changes in activity may be circumvented by comparing only those censuses made during a given month. The effects of the weather may be circumvented by avoiding unusual weather conditions and by taking censuses over a period of many days during the month. The factors mentioned for roadside censuses are equally effective in aerial censuses.

A common census method consists of counting the number of times that an animal is recorded in a certain type of situation in a certain time interval. Unfortunately, comparisons of populations in quadrats of the same size may give deceptive results. A further dificulty is that most populations are not distributed randomly.

Population indices

An index is a count of some object which is related in some numerical way to the animal. The sample upon which the estimate is based must be collected according to certain standards in order to be representative. A measure of change that can be obtained from a relative count is often satisfactory to determine the absolute number of animals in a particular area.

One example of how some object can be related numerically to the population of an animal is a study of beavers by Hay (1958) in which he found that an aerial count of food caches was reliable because there was only one food cache per colony. He found 7.8 beavers per cache in aspen areas and 5.1 beavers per cache in willow areas. This example illustrates that the relation of an index to a population may vary from place to place.

One version of the index method is to use the number caught or observed as a measure of relative changes, based on the assumption that the number is the same fraction of the population at the times being compared. Many American big game biologists are of the opinion that approximately 10 % of a white-tailed deer herd is harvested when only buck deer are legal game. If this is true, an approximation of the size of the deer herd can be made if the total number of male deer taken in the legal season is known. Very few studies, however, demonstrate that the fraction is really the same at different population levels of density.

A variety of census methods have been based upon ratios calculated from animal "signs". Basically these methods

are the same as the technique based on observing the animals directly. Signs include burrows, tracks, feces and dead individuals. Most of the results are in relative terms.

In considering indices, it is essential to evaluate the variation among the several investigators participating on the study. Inexperienced observers may not end up with the same results as experienced observers. There are many other pitfalls. The conditions under which counts are made must be comparable: Changes in population density may affect behaviour, fecal pellets may vary in rates of decomposition. Great care must be taken to account for such variables.

In some cases the number of animals may be estimated by the number of pellets. However, definite procedures need to be followed and cautions taken to make these estimates statistically valid. The detection of a change in pellet numbers may be satisfactory for management purposes.

Estimates based on rates of capture

Since it is rarely possible to capture all individuals, a number of methods has been developed to estimate the population from the rate of capture. The data may be obtained by a variety of means of capture. Estimates can be obtained by plotting the sum of daily captures, by plotting cumulatively added the number caught per day or the number caught each day against the number previously caught.

The decline in catch in relation to some unit (hour, trap, etc.) has been widely used in estimating populations. The catch effort method involves several basic assumptions:

(1) That the population is closed; i.e. that immigration and emigration, births and deaths are negligible,

(2) that the probability of capture remains constant during the period of collection of data, and

(3) that the catch is in proportion to the population.

This method requires a knowledge for each species that the assumptions hold. Catchability varies with the size of home range and other factors place, season and population level. Animals may learn to avoid traps. In many cases the catch is not proportional to the population. The three assumptions made are not frequently fulfilled.

Estimates based on changes in ratios

Another form of the catch-effort method is based on a change in a ratio of some feature due to removal of some individuals. The removal changes the ratio of catch to traps, or males to females or adults to young or marked to unmarked. A great variety of ratios could be used.

This method has been used to estimate game populations from changes in sex or age ratios. Serious deficiencies may occur in the assumption that the sexes or ages are equally countable before and after harvesting and that individuals are collected in proportion to their abundance: Juveniles may be more easily shot than adults. Population estimation techniques based on changes in ratios have not received the attention they deserve. Standardisation of conditions is essential: time of day, weather, and other features must be similar. The effectiveness of the removal equipment must be established before using the removal technique of estimating animal numbers.

Estimates based on recaptures

A large number of studies of populations use a method basedupon the recapture of marked individuals. The method is best known as the "Lincoln index". The animals are marked in a variety of ways after capture. The population is related to the number marked and released in the same way as the total caught at a subsequent time is related to the number recaptured. The population may be

calculated by applying a simple formula.

Ideally the marking and releasing should all be done at one time (a day) and the recaptures also at one time (another day). However, in many cases, so few animals are caught in one day that the ideal is not attainable. In these cases it is permissible to group together the captures for a period.

The recapture method requires several assumptions:

(1) No loss of marks;

(2) no recruitment (births or immigration);

(3) no difference in mortality of the marked and unmarked individuals; and

(4) catchability is the same in marked and unmarked individuals.

The habits of species rarely fulfill these assumptions. Some individuals become trap-happy or trap-wise. In many cases, recapture by a procedure different from the capture procedure will overcome the difficulty.

In many estimates based on the recapture technique, there is a wide variance of the estimate. The only way to reduce these limits is to increase the probability of capture to a very high value. As a result of this estimation, game managers will have to spend fantastically greater time and money on estimates than has been done in the past if they wish to detect changes of much less than 25 - 50 % of the population. This method has been applied too often without adequate caution, test, or even knowledge of the assumptions. Each investigation must involve a testing of the assumptions for the species, time and place.

Estimates from home - range areas

A very simple relationship may exist between the popula-

tion and area. If we know how much space (home range) is occupied exclusively by an individual, then we can estimate the population merely by dividing the area completely occupied by members of the species by the area occupied by one individual. This method works satisfactorily in territorial species but it has these major objections:

(1) Most home ranges overlap;

(2) individuals range outside the trapping area;

(3) size of home range may differ with sex, age and season or place;

(4) data on range may be difficult to obtain because individuals may be hard to recapture.

POSSIBILITIES OF WILDLIFE MANAGEMENT IN HUNTING AREAS

by W. Leslie Robinette

In my assignment of "Possibilities of Wildlife Management in Hunting Areas", my comments are going to be tinged with big game management procedures as practiced in western United States where I have worked for many years. It is my hope that in the discussion which follows we might decide which, if any, of these procedures are practicable under African conditions.

I therefore wish to discuss some of the minimum essentials of a game management program.

(1) Establishment of hunting or management units

It is especially important that unit boundaries enclose the year-long range for the game species being managed. In some instances, the same unit may serve several game species. However, in cases where the year-long ranges of the major game species differ greatly, separate units should be established.

The studies of game movements on the Serengeti by Professor Grzimek and Talbot have forcefully demonstrated the necessity for knowing seasonal game movements before realistic management unit boundaries are set up.

In the State of Colorado where I presently reside, mule deer (Odocoileus hemionus) range has been divided into 93 management units varying in area from 50,000 to 300,000 hectares. Elk (Cervus canadensis) range has been divided into 36 management units. Larger units are usually necessary for elk because of their greater home range and seasonal movements.

The importance of including the year-long range or an ecological unit within the hunting or management unit for each game species being managed is especially evident when removals are to be made at a time of year when game is not yet concentrated around water holes or along stream courses as in Africa during the dry season or on the winter range as in parts of the United States. These areas are usually the critical ones which determine carrying capacity, so the manager needs assurance that the removals will afford relief to the intended area.

In some instances topographic features such as mountain ranges or drainages may be conveniently used as management units, while at other times political subdivisions might be the basis for unit separation.

Another factor sometimes involved in hunting unit establishment is the type of management problems involved. Areas easy of access where game can be conveniently cropped might be separated from those difficult of access. Areas having excessive livestock or poaching pressure, or where conflict between game and agriculture exists might well be managed separately from those which are relatively free of such problems.

(2) Determination of "key" areas and their condition and trend

As mentioned previously, the critical or "key" areas dictate the carrying capacity for the entire unit. It matters little that several times the necessary forage for a herd of game animals is produced during the rainy season if it is not available during the critical dry season. No activity in the entire management program requires greater skill and training on the part of the manager than in the delineation of "key" areas within the management units and their assessment for condition and trend.

A "key" area might be described as the area or areas where the greatest game concentrations and range use occur or will likely occur. It is imperative that these areas should not be overused, for this leads ultimately to a lowered carrying capacity not only for the "key" area itself but the entire management unit as well. The "key" area should not be too small because inefficient use of the management unit as a whole may result. The manager should be prepared to sacrifice the forage producing capacity of the range within close proximity to water during the dry season. However, it is important that overuse be confined to the sacrifice areas and not be permitted to spread. The "key" areas should be so located that their proper use will result in the highest sustained carrying capacity for the entire management unit.

In selection of the "key" areas and in subsequent management of the game, the manager should determine whether the range is up to its fullest forage or browse producing potentialities, both quantitatively and qualitatively so that cropping might be adjusted accordingly. He should know the indicators of a good range, a depleted range, a range that is improving, and a range that is degrading. He should know the forage preferences and ecological requirements for each game species being managed so that responsibility for overuse can be established. He should know what represents overuse for each of the preferred forage and browse species.

Most plants, wholly within reach of herbivores, can be killed through excessive use. Long before actual death occurs, however, the plant's vigor is reduced with an accompanying reduction in the annual production of herbage or browse. With overuse of mature plants, one can expect little or no regeneration of the same species. As certain plant species are ex-

terminated, their place is usually taken by less palatable species, annuals instead of perennials, or by bare ground. In any event, the carrying capacity of the area is being reduced for the responsible animal species.

Thus it is important that the manager recognizes range overuse in its incipiency so that corrective measures can be taken before a reduction in carrying capacity has taken place.

Many range managers in the western United States judge proper use of key areas upon the degree of utilization of the more important plant species - sometimes called key species. Key species must be important contributors to the carrying capacity, and as such, should be palatable, fairly abundant, and reasonably resistant to overuse. Many controlled livestock grazing studies in the semi-arid western United States have indicated that most plants cannot withstand much more than 50 percent use of the annual growth and maintain themselves, especially through critical drought periods and at the same time provide adequate litter for soil stabilization.

Thus, if the manager has selected the proper key areas and key plant species, he should be able to judge whether a range is over, under, or properly stocked, providing he knows how much use the key species can withstand.

While 50 percent use may be about proper for range plants in parts of the western United States, it may well differ in Africa. Steep slopes, for example, cannot be utilized as heavily as level plains because of the greater danger of soil disturbance. Vegetation in areas of heavy rainfall can withstand greater use than those under more arid conditions. Similarly,

vegetation on good productive soils can withstand greater use than those on poor soils. In areas where allowable use is not known for the important forage plants, the manager should maintain vegetative transects for correlating utilization with trends in plant density and composition. I highly recommend Thane Riney's recent paper in which he describes a technique for evaluating range condition and trend which he used in Southern Rhodesia. As he pointed out in this paper, one should also learn something of the past history of fires, livestock and game use for an area as an aid in interpreting range condition and trend.

The game manager should not rely solely upon forage utilization and range condition observations for guidelines in determining the necessary removals for each game species. He should look for corroborative evidence in the condition of the game animals and their reproductive success. Standards for condition and reproduction must be established from accumulated records for different areas.

The reproductive rate in the youngest age class of breeding females is especially sensitive to changes in range conditions. Following a recent control program in Yellowstone National Park where the elk herd was substantially reduced because of critical overuse, 40 percent of the yearling females bred successfully compared to about 2 percent before.

(3) Game inventories

Censuses or trend counts should be made annually for each game species, together with sex and age composition counts. Probably the best time in Africa for these counts is toward the end of the dry season when game animals are most concentrated and when cover from

tree foliage is minimal. Game counts, when correlated with cropping records and range trend observations, should reveal within 4-5 years the numbers of game animals by species that should be removed annually through cropping as well as what the range can support.

Complete censuses of some species might feasibly be made through plane counts, while trend counts from motor vehicles over established routes might suffice for others.

As many as possible of the game animals should be classified as to sex and age. A breakdown of young of the year is helpful in evaluating herd increase, natural mortality and range conditions. A further breakdown in the older animals as to sex will indicate whether surplus males are available for cropping.

(4) Law enforcement and predator control

Decisions will be necessary for each management unit as to how much control of poaching and of predators is necessary, desirable, or possible. Obviously, there will be no huntable surpluses of game in many areas until poaching has been adequately controlled. In the protein deficient countries of Africa it may be advisable to control predators on areas outside of the parks.

(5) Removal of surplus game

In some hunting areas this, and disposition of the meat may be the game manager's biggest problem. This subject will likely come up for detailed discussion this afternoon in Dr. Ledger's session on utilization schemes. However, I have a few passing comments. It would seem that every advantage should be taken of sportsman hunting. Not only would their efforts help in removing surplus game, but their expenditures

would bring economic benefits to the communities and countries involved. At best, however, sportsman hunting will probably account for a minor portion of the necessary removals. The average sportsman is after trophies which means, for the most part, fully matured male animals. I should think that most of the game areas should be managed for maximum protein production. If this procedure is followed, it means that many females and sub-adult males must be harvested, a job which will fall to game department personnel. Sportsmen, in order to find trophy animals, may have to hunt the more remote and inaccessible areas which are under less intensive management.

There might be certain situations where organized communal hunts by Africans might be successfully used for harvesting game. Communal hunts were held for lechwe on the Kafue Flats of Zambia as late as 1957 when they were outlawed by the government. It seems possible that such hunts might still be used if closely supervised by game department officials, so that the desired numbers of animals are taken from the desired areas. Dr. de Vos may have some thoughts on this matter.

Age records should be obtained for the harvested animals. Herd mortality rates may be derived from the cropped animals and when correlated with proportion of young in the herd and hunting removals is indicative of whether or not legal hunting is deriving a reasonable share of the annual production.

(6) Habitat development

I have little concept of what types of habitat development for benefiting game might be feasible in Africa. Certainly, development of water sources in areas where it is unavailable during the dry season

would help alleviate excessive game use around existing water sources. It should be done only in areas where livestock cannot be raised, otherwise values which might accrue to game would probably be nullified by an invasion of people with their livestock.

Control of the intensity and/or frequency of range fires might offer a means of manipulating the habitat to favor some game species over others. The most practical means of improving habitat, however, would seem to be that of regulating grazing use. Every effort should be extended to reduce livestock numbers in regions where they are degrading the habitat. Efforts should be continued at convincing Africans that surplus livestock should be marketed. Perhaps it would be fruitful to work through officials of the developing countries in an effort to have the governments regulate livestock numbers to the carrying capacity of the range.

In closing, I would like to say that ideally, all game ranges in Africa, exclusive of parks, should eventually be divided into hunting or management units. In many units, management will be strictly a matter of protection from poaching until such time that a harvestable surplus might develop. In others, game numbers may be excessive and should be reduced to preserve the habitat. Management planning on a unit basis is an absolute essential if the fullest benefits of the wildlife resource are to be realized and maintained.

It is difficult for me to imagine a more complex ecological situation than exists in many parts of Africa where several species of big game, together with livestock, occupy the same range, and where annual wild fires are also influencing the environment. To

interpret and separate the effects of each factor and each species of herbivore upon the environment and to come up with sound management recommendations will require the training of Africans by the most experienced ecologists that can be obtained. The Mweka College of Wildlife Management is a highly commendable start in this direction.

UTILIZATION OF WILDLIFE IN NATIONAL PARKS

by Professor Dr. Jean-Paul Harroy

I should like to begin with the conclusion I am seeking to arrive at, which is that one cannot be too careful in mentioning the possiblity of utilizing, in whatever form, the wildlife of the national parks. The very term "utilization of wildlife" or its German equivalent "Wildnutzung", which I was asked to speak about in connection with national parks, should, I think, be used with great caution in the majority of developing countries and above all in Africa, unless it is adequately defined.

The term "national park" itself is somewhat equivocal, for what is called national park in the United Kingdom resembles more the German type of nature reserve (Naturpark) than the national parks in the United States of America or in Canada on the one hand and in Tanganyika or Kenya on the other.

Some doubt therefore remains as to the real meaning this term should be given in a number of developing countries in Asia and even in Latin America, where, after all, it has been clearly defined by the Convention of Washington of 1940. But as far as Africa is concerned all doubt has practically been removed by the London Convention of 1933 which gives a very precise definition of the term "national park". Since 1933 twenty-six countries have created 77 national parks which all comply with this definition: Neither human settlement nor exploitation by man - with a few exceptions which have to be tolerated locally - are permitted in these parks whereas tourism is not only authorized but encouraged and organized.

Having worked for several years, between 1937 and 1948, as superintendent of the national parks of Central Africa, among them the Parc National Albert at Kivu, and having

visited the national parks of various African countries, I have found that wherever I went the notion was deeply rooted in the minds of the people living in the vicinity of these parks as well as in the minds of their leaders that "the national park is the realm of the animals. Everybody knows that hunting is prohibited there". The same attitude will probably be encountered in the vast majority of African countries.

It has perhaps taken a long time for this rule to become unanimously accepted and established as a golden rule. But so it has on the whole, and any consideration of a possible utilization of wildlife requires great delicacy in order not to question the validity of the rule.

In the opinion of leading African circles as well as in the opinion of the population living in the vicinity of the national parks the game in these parks is protected for the purpose of creating an attraction for tourists and facilitating scientific investigation. The taboo science imposes is widely recognized and the reputation of tourism, above all of international tourism, as a highly desirable stimulator of money movements and a precious source of income of foreign exchange is wide-spread.

I repeat that these are very sound views which should be jealously guarded and fostered.

The preeminence given either to tourism or to scientific purposes in the management of national parks has given rise to the well-known dilemma: Management or non-intervention?

Calling upon my own personal experience I would remind you of the policy pursued in the former Belgian territories in Africa in respect of the national parks. It is not generally known that this strict policy was conceived at a camp fire in Yellowstone National Park some time after 1918, bringing together King Albert of Belgium,

J.C. Merriam and Fairfield Osborn, Sr., two American pioneers in the field of ecology, Horace Allbright, the great conservationist of the U.S. National Park Service, and the late Victor Van Straelen who was to become the President and soul of the "Institut des Parcs Nationaux du Congo Belge". The then revolutionary idea was accepted that in addition to the vast American parks devoted mainly to the enjoyment of the people, great sanctuaries of nature should be established from which human intervention was to be completely banished and where the natural equilibrium could be scientifically observed in its least disturbed form. At the time King Albert arrived at the conclusion that in the twentieth century such a project could on a sufficiently large scale be realized only in Central Africa. And in this way the Parc National Albert was founded. Complete non-intervention was established by statute, and a regulation, so often attacked by the ignorant, prohibited the ignition of bush fires at the beginning of the dry season, even if the herbivorous fauna should suffer from this. (1)

As you can imagine, this extreme case of non-intervention is the great exception. Much more numerous are the national parks in Africa where a certain amount of management is considered necessary.

In certain cases management takes the form of game control. For example, predators, above all wildcats, are cropped by park management in order to increase the number

(1) It is significant that the Institute Committee should have passed a resolution in 1958, overruling the objections raised by Van Straelen, under which early bush fire in the plain south of Lake Edward, where wildlife was abundant, was permitted in order to prevent antelopes from migrating to the nearby pasture land, annually improved by bush fire, in Queen Elizabeth National Park; but immediately after the independence of the Congo in 1960 the new Congolese Director of the Parc National Albert, M. Anicet Buranumwe, prohibited this practice again. "President Van Straelen was right", he maintained. "The grassland of a national park must not be burnt".

of herbivores which usually constitute their prey. Or herbivores are cropped to prevent overuse of pastures.

Other forms of management consist in measures to improve feeding and watering conditions of game or measures to concentrate game in certain areas: burning of grassland, taking care of water sources, distribution of salt-licks, and distribution of meat to lure carnivores, especially lions, to observation posts where tourists can easily and safely take photos of them at close hand.

In this context an occasionally highly controversial question arises. Should game control be exclusively reserved to park management personnel or could it under supervision be entrusted to sports hunters who would have to pay a great deal for a hunting licence? Often such an extra source of income is highly welcome as it contributes to the meagre financial resources of the nature reserve. In the Gran Paradiso in Italy hunters are permitted to shoot some ibexes under the supervision of park wardens. In the United States a lively controversy arose over a similar proposal concerning the reduction of the elk population in various national parks.

A further difficulty sometimes encountered is the utilization of the carcasses of cropped game. In this connection a famous precedent occurring in the heart of Africa comes to mind: The reduction in the number of hippopotamuses in Queen Elizabeth National Park in Uganda, an operation which had been decided upon after considerable hestitation and prolonged international consultations. Perhaps someone in our midst could inform us on the current implications of this measure in the economic field. From my own personal experience I can say - in support of the thesis I mentioned in the beginning - that it created confusion in the minds of the people living in the vicinity of the park. "Should the park", they said, "no longer be the realm of the animals? Can one go hunting there now? Then

why should not we be also allowed to hunt there? Why should this privilege be reserved to the directors (then European) of the park who sell the meat to us which we might have procured ourselves?"

My point therefore is that no conclusions, however scientifically formulated at a conference such as ours, should in any way suggest a breach with the principle of the inviolability of wildlife in national parks, a principle laboriously instilled in the minds of the local inhabitants over the past thirty years; the introduction of this principle in the independent Africa of today would have been extremely difficult, if not impossible, had it not already been firmly implanted in the African people before their accession to independence.

In 1964 the African national parks have been only too frequently menaced by external pressure and above all by financial difficulties. Nothing should be left undone in the effort to remove these threats and to avoid the creation of new ones. One of the causes of such threats is to my mind an uncautious illusion to the possibility, insufficiently explained, of utilizing wildlife in national parks, an opportunity which might only too eagerly be seized by many African leaders.

But my conclusion should not be exclusively negative. It is in the parks rather than outside that game should be protected, even if these peripheral zones should sometimes benefit from the presence of animals coming from the adjoining national parks.

This morning Mr. Owen and Mr. Grzimek mentioned the possibility and expediency of establishing and leasing hunting grounds in the adjoining areas of Serengeti National Park. I should like to quote an example from my own experience in Ruanda, the 100,000 ha. Hunting Domain of Mutara bordering for a stretch of 100 km. on the Kagera National Park (250,000 ha.).

Like the neighbouring park abounding in wildlife, this hunting area was the object of a detailed study, including a census of its game population; at the same time a hunting schedule was elaborated and the whole area thoroughly organized for hunting, designed to attract sports hunters from abroad who would above all be tempted by the very handsome buffalo trophies. Thus it was possible to make full use of tourist facilities in Gabiro to accommodate both the hunters of Mutara and the visitors to the national park. The combination of these two aims increased the attraction of the region. In addition the authorities of Ruanda were extremely interested in the possibility of enhancing these two advantages, which promoted national and international tourism, by a third one; the supply of meat to certain population centres of the country. Problems relating to the preserving and tinning of this meat, its transport and distribution and finally its commercialization are the subject of a study project now in progress. A technical advisor assigned to the Government of Ruanda within the framework of technical assistance could no doubt aid considerably in the successful realization of this project.

WILDLIFE UTILIZATION SCHEMES IN DEVELOPING COUNTRIES

by H.P. Ledger

In recent years there has accumulated a wealth of convincing evidence that game animals are capable of converting the flora of Africa's marginal, semi-arid areas into human food, that they can do this without causing deterioration of their habitat and in certain circumstances, i.e. in country infested with tsetse fly, they would appear to provide the only means of making such land productive. There is also ample evidence that the majority of game animals produce high proportions of lean meat, relative to their live weight, which is acceptable to both sophisticated and unsophisticated markets. It would be pointless to repeat yet again the evidence already published (1) in support of the above contentions but it is pertinent to this discussion to consider why it is that, in spite of such evidence, game utilization schemes are not more numerous than they are and why it is that those that exist do so on a somewhat tenuous basis.

Because methods of game utilization are most advanced in the southern half of the African continent it follows that this source of information is most frequently drawn upon for planning similar schemes further north. Whilst much of this information is of undeniable value it must always be remembered that the success of these southern ventures has largely resulted from a steady rise in the purchasing power of the population combined with the existence of a market which, for many years, has been conditioned to a ready acceptance of game meat, such meat being readily marketable in its economically produced form of "Biltong" (dried meat) at anything from 4/ - to 8/ - per pound, according to quality. Similar or alernative markets have yet to be developed in many countries and this will call for research into internal and export market potential.

In an endeavour to indicate possible opportunities and methods for applying development aid it is proposed to outline and emphasise the very real problems that beset those who embark on such schemes in undeveloped countries. It is assumed that such aid is intended to promote the larger type of enterprise rather than the local, game control, unit with its limited and spasmodic supply which in the majority of cases can readily be absorbed by employees and the local market.

In general the problems can be divided into two groups:

(1) Those that are common to all schemes but which arise from external influences outside the control of the schemes operators and

(2) those that originate within the scheme itself.

Problems of External Origin

Disease

Many problems which effect the inauguration and execution of game utilization schemes stem from insufficient knowledge as to the role that game and game products play in the transmission and perpetuation of disease. In many countries it has been assumed that game is a reservoir of disease and this has resulted in restrictive or prohibitive legislation on the handling and sale of game products. Such legislation will require revision if schemes are to operate and such revision will be the easier if the disease status of game can be more clearly defined (2). The form in which meat can be sold i.e. fresh, chilled, frozen, canned or dried is dependent, in part, upon the recognition of the presence or absence of transmissable diseases.

It is also relevant to note here that the cost of production of processed meats is least where large plants

are operated and in many cases it would be more economic to transport game carcasses to existing processing factories. However such factories are handling meat from domesticated stock and are currently either prohibited from, or are extremely reluctant to consider, the handling of game meat because of the uncertainty of the disease position.

Legislation

In addition to the restrictions imposed for reasons of disease such restrictions also exist for purposes of game conservation. Once fresh or smoked game meat is sold freely on the open market it will inevitably become more difficult to control poaching. New legislation and control measures will be required for the licensing, control and inspection of distribution centres for game products.

Domestic Producers

If sold at the same price it is unlikely that game meat will replace the more conventional forms supplied from domestic stock, rather will it provide a supplementary alternative and sales will be proportionately small. Any attempt to increase sales of game meat by underselling the domestic supply will certainly be opposed by the producers of the latter product and possibly also by the Administration.

Administration

In Africa with its ubiquitous problem of overstocking there is certain to be opposition from the Administration to the sale of game meat in markets which draw their supplies from areas where it is the government policy to persuade or enforce stock owners to sell a high proportion of their animals as part of a destocking programme.

Statutary Boards

Game meat, as indicated above, will be marketed in competition with agricultural products which in the majority of cases are controlled by statutary boards with representation at high government, policy making, level. Unless the interests of the projects are represented on one of these boards and thus integrated with government policy their continued an ultimate success will always be in doubt.

It would be an important part of market research to investigate where and how such conflicts of interests are likely to occur and to suggest means of circumventing them.

Cropping of Migratory Herds

Where migratory herds cross national boundaries and departmental limits then there will be need to negotiate and control cropping limits at both international and departmental levels.

Problems of Imternal Origin

Internal problems, in the main, arise at the planning stage of an enterprise and it is to be hoped that the time has passed when the local Game Warden, Game Biologist, or Veterinary Officer is expected to initiate, master the intricacies of, and control a game cropping scheme in addition to his other duties.

Market Research

As has already been indicated above the successful development of any scheme depends very largely upon a sound marketing programme which calls for a considerable amount of marketing research. Such research should not only concern itself with seeking out and developing of

new markets but should indicate the type of meat processing best suited, economically, to a specific project.

However, before such research can be put into operation there must be reliable information as to the quantity, quality and, most important the regularity of the meat supply. It is quite pointless to develop a market only to find later that the supply is inadequate or spasmodic. It is this latter factor which weighs so heavily against game cropping and favours domestic production.

Quantity of Supply

With regard to estimating the quantity of carcass meat available relative to the liveweight of the animals there is no great problem as it has already been established that, for all practical purposes, the weight of muscular tissue in a carcass expressed as a percentage of an animal's liveweight is a constant for any given species. The problem is, however, how to estimate the number of animals of given weights that will be cropped within a given period. To make such an estimation it is necessary to have information about the reproduction cycle of the species and of the carrying capacity of the land. By "carrying capacity" is meant the number of pounds of liveweight that the land can economically support per unit area without deterioration of the habitat. Clearly research is required into both these aspects of production but whilst the first subject (reproduction cycle) is self explanatory it is important to note that objective measurements of carrying capacity are virtually non existent. The current practice with domesticated stock is to estimate the number of acres required to support a 1,000 pound steer for one year. Indications that land is overstocked occur when the liveweight gains of stock are reduced but as this necessarily follows a deterioration in the habitat, it is important to instigate investigations into how best a deterioration in habitat can be recognized before this is reflected in the condition of the animals utilizing it.

Regularity of Supply

The regularity of supply will depend very much upon the concept on which the scheme is based. For example if the scheme is a self contained game ranching project then the regularity of supply will depend largely upon seasonal effects such as closed breeding seasons, rainy periods when collection is impossible and, in cases where night shooting is practiced, there will be monthly variations of supply according to the state of the moon.

Where the cropping of migratory herds is practiced there will be heavy daily supplies for relatively few months of the year, whilst, where the object is to reduce the number of a species which has exceeded its optimum level the supply will initially be high but will be reduced as the desired numerical level is reached.

The Effect of Cropping on Herd Dispersal, Survival and Habits

Probably the most important of all investigations relative to maintaining a constant supply is that of studying the long term reaction of different species to varying methods of cropping. Such an investigation could include the means and possibilities of making periodic roundups of species which are disturbed by continuous forms of collection.

Domestication of Wildlife

Whilst this is not an internal problem of specific game utilization projects it would seem that there is good reason to establish a station where the objective would be to investigate the amenability of certain game species, such as eland, to limited domestic control. Such a station could at the same time provide animals for basic research, investigate problems of breeding and survival in captivity, assist in methods of ageing and growth rate studies and, in general, act as a reservoir for the pur-

pose of restocking ranches, zoos and game parks. Possibly such a station could be sited in a game park and provide added interest for tourists.

Capital and Personnel

However high the potential of any scheme may be its success will ultimately depend upon the quality of the personnel in charge, the degree of effective control they are permitted to exert and the amount of capital available to inaugurate the scheme.

It is a recognizable characteristic of all developing countries that they are desperately short of skilled manpower and of capital, with the result that it is often difficult to operate development schemes because of the inability to maintain effective control at all levels.

In view of this the discussants may care to consider the advantage to be gained by concentrating aid in the development of a single game research station rather than the dissipation of funds amongst wide and varied interests. Game cropping is as much dependent for its success upon efficient conservation of the game species as is a National Park and the interests of both could be served if a tract of land which comprised a controlled hunting area adjacent to a game preservation area were set aside as a game research station.

Such an arrangement would enable the greatest degree of concentration of skilled people who would benefit in outlook by frequent contact with those of similar interests but differing view points. Control would be simplified and the amount and value of data obtained, relative to the capital invested, would be greater. Additionally the influence exerted by a well informed central body on the outside influences referred to at the beginning of these notes would be far greater than could be obtained from individuals speaking from the wilderness, however soundly based were their arguments.

References

1. Report of the first F.A.O. African Regional Meeting on Animal Production and Health. Addis Ababa 9 - 18th March 1964.

2. It is relevant to refer here to the resolution passed at the above meeting (1) at the conclusion of the session devoted to the Productivity and Development of Wildlife.

EXPERIENCE IN WILDLIFE UTILIZATION IN SOUTH RHODESIA

by Dr. A. S. Mossman

Introduction

In Africa the potential for protein production from terrestrial animals far exceeds that for freshwater fish. There is no doubt that if effort comparable to that now applied to fisheries were applied to wildlife utilization, far more could be achieved. It is no more true of wildlife utilization than it is of fisheries that a single facet, a panacea if supported would solve all problems: Instead, a well coordinated approach is required.

The utilization of wildlife relies upon research directed toward the solution of biological, sociological and other problems (Fig. 1). An organization capable of and willing to make a concerted effort toward the solution of these problems in behalf of wildlife utilization in Africa is needed. In this paper, I will point to some of the priorities as we see them influenced by our special experience with wildlife utilization in Southern Rhodesia.

In late 1960, commercial game cropping on a multi-species basis started in Southern Rhodesia. The ideas gained momentum and now 44 concerns hold commercial game cropping permits on about 1,765,000 hectares (4,358,290 acres) in Rhodesia. About 152,000 hectares (374,636 acres) are awaiting survey and it is expected that an additional 405,000 hectares (1 million acres) will come into game production soon thereafter. A Game Ranchers' Association has been formed, and a course in Wildlife Conservation at the University College of Rhodesia and Nyasaland has just completed its initial year.

Present Status:

In 1963 game ranchers grossed approximately 1,100,000 D.Mark (£ 100,000) their products probably having a retail

value of 2,200,000 D.Mark (£ 200,000). In 1964 production of game meat was certainly as high and these very rough estimates do not take account of Land Holder Licensees who use game to feed themselves and their staff, or of the sport licence holders who also make direct use of game meat. Virtually all game products except hides and ivory are sold within Rhodesia. It is likely that this position will change so that at least canned meats will also enter the export market.

The relatively low overheads and the comparatively high production in game cropping permit the rebuilding of degraded vegetation while realizing some financial return. This is probably its most valuable attribute. Positive results of this kind can already be observed on the Buffalo Range Ranch of Mr. George Style and his sons in the South Eastern lowveld.

Game Ranching has not started in African areas, nor has any other real advance in wildlife conservation been made there. Since these areas comprise about 46 % of all Southern Rhodesia, it is obvious that here exists a real conservation challenge.

National Parks and Wilderness Areas have great esthetic value which we all recognize. In addition, they can and must serve as scientific controls to assist us in evaluating our manipulation of areas under intensive game management. This research necessity together with the many needs and great opportunities for research associated with commercial game cropping make Africa unique in yet another important way. Game ranching now gives the financial reason for doing the research - and for conserving wilderness areas and National Parks. Neither basic science nor esthetics have been able to accomplish this, but the three together may succeed.

To illustrate the mechanics of game ranching in Rhodesia, I am going to use as my principal example the company

with which I am affiliated. Our company was formed in 1963 and operated that year on the Masunga ranch of Liebigs Consolidated Ltd. This cattle ranch is located in the southern lowveld near Beit Bridge and comprises about 405,000 hectares (one million acres) of mopane (Colophospermum mopani), combretum spp. and grewia spp. wooded savannah on soils of granits and basalt origin. Early in 1964 the company started to operate on the Gwaai Forest Reserve; an area comprising about 194,500 hectares (480,000 acres) of aeolean sand soils covered with a commercially valuable teak (Baikea plurijuga) and Mukwa (Pterocarpus angolensis) forest. Only two companies are game ranching on a lease basis, and we are engaged in game ranching as much for conservation as for economic reasons, so ours is a somewhat atypical example.

Before any game cropping is allowed, the Department of National Parks and Wild Life Management assesses the allowable game crop and issues a permit for the appropriate numbers of animals. The aims of the actual operations are maximum efficiency and humanity combined with minimum disturbance of the animals sought. A 4 wheel drive vehicle drawing a trailer is used for field transport. Usually the animals are killed, field cleaned and transported back to the butchery where skinning, cleaning, quartering and chilling take place. Most chilled carcases are transported to the large towns for retail sale through butcheries. Some meat is out from the bones, spiced, salted and dried on the projects. Such biltong is usually in big demand, but fresh meat yields more money to the producer. The relation between live weight and dressed carcase weight in some game species is presented in Table 1. Since Rhodesian cattle commonly dress at 40 - 50 %, game are almost always superior in this respect.

Many techniques are used to obtain the animals. Some are snared by using a stopped cable snare that does not strangle. The construction of these snares causes them

to come off the animal if they are broken. Night shooting with lights from a vehicle, is used primarily for impala, duiker, steenbuck, springhare, and cape hare. No shooting is done from a vehicle in daylight unless the shooter is certain that only the animal to be shot is present. Zebra, elephant, buffalo and sometimes wildebeest, are obtained by foot hunting. This is not a good technique in that some animals are educated to avoid man. The more adept the hunter, the less chance there is of disturbing the animals excessively by this technique. Dogs are sometimes used to locate animals and we plan more extensive use to reduce wounding losses (Table 2). The other main technique is shooting from hides at waterholes or salt licks. This is usually done by day or on moonlit nights without the aid of artificial lighting. Telescopic sights are standard equipment except for dangerous game.

The weapons most commonly used by us are silenced .22 cal. rifles, 7 mm and 9.3 mm rifles, 12 ga shotguns and, for elephant, a .458 caliber rifle. We also use .303, 30-06, and .375 caliber rifles and 16 gauge shotguns. Some ranchers make considerable use of .22 caliber hornet rifles. We feel the need for a silenced large caliber rifle and are hoping to try one chambered for the .44 magnum pistol round. This weapon will fire the .44 special at below the speed of sound and hence we will have a silenced weapon that uses factory loaded ammunition. Shots are placed for quick kills and minimal damage to the meat.

No game rancher in Rhodesia has started the proper utilization of by-products. Dry bones are sold and most of the internal organs are sold, eaten by staff or used as animal food, but many improvements are possible.

Problems confronting Game Ranchers in Rhodesia:

Strong opposition to game ranching comes from certain parts of the cattle industry and from the Department of

Veterinary Services. They say that they are not afraid of competition but are afraid of the spread of disease by game. Since it is widely known that proper management of game is the best way to reduce disease risk, they may have other reasons for their actions. The shooting and local extermination of wildlife for tsetse control in Rhodesia is a related action. The result may be the flooding of the game meat market, but no signs of this have yet occurred and the shooting has started.

Legal problems have not caused great concern, but may in the future. Poaching and illegal sale of game meat conflict directly with game ranching and endanger the game stocks. These problems are recognized, and within the financial resources available are being combatted. They are as much sociological as legal problems and unfortunately this is not generally recognized. More intricate problems may arise in the future. For example, it would be disastrous to conservation if certain kinds of business interests were to gain monopolistic control of game utilization.

The technology used in game ranching is very young and unrefined. Great improvement is possible. Similarly, we have enough biological knowledge to crop with reasonable safety for the game stocks, but not enough for anything like optimum manipulation of the wildlife and their environment. Innumerable technological and biological problems confront us.

Suggested types of assistance:

Unbiased research into problems of animal disease and an unbiased, broadly based, marketing, economic and sociological evaluation of the wildlife utilization industry as compared to existing land use industries would be invaluable. The studies should start from the need for Environmental Conservation as their basic precept, and

should recognize that efforts to achieve human population stabilization must parallel those to provide a higher standard of living and hence a greater chance of survival for the individual.

Many basically technological problems also need solving. An especially urgent problem at the moment is the economical control of Dermestes spp. beetles. Assistance with food processing techniques would also be most useful. The possibilities of radio-sterilization to obtain fresh and processed meat products that can move freely in international commerce seem especially vast.

Operators of relatively small game utilization schemes need far more guidance than they are receiving. One solution to their problems would be for them to lease out the game cropping rights. This might also be a method applicable in African areas. For the full development of game ranching, especially on a lease basis, satisfactory mobile processing units are almost essential. At present none are available.

There is a multitude of biological problems in need of solution. Studies of biotic potential, mobility of game, habitat requirements, food habits, parasites, behaviour, competition and cooperation, plant ecology and habitat manipulation, are examples. An autonomous, international research organization would be the "best" solution but immediate needs can probably be met by adequate support via existing channels. With sufficient financing, an international organization could and should also serve as an information processing and disseminating body. Here again, a partial solution can be achieved by more adequate support of existing institutions.

I think we all recognize that lack of adequately trained manpower will probably become our biggest headache, and already is a serious problem.

Figure 1. Wildlife Utilization relies upon research to solve the diverse problems facing it.

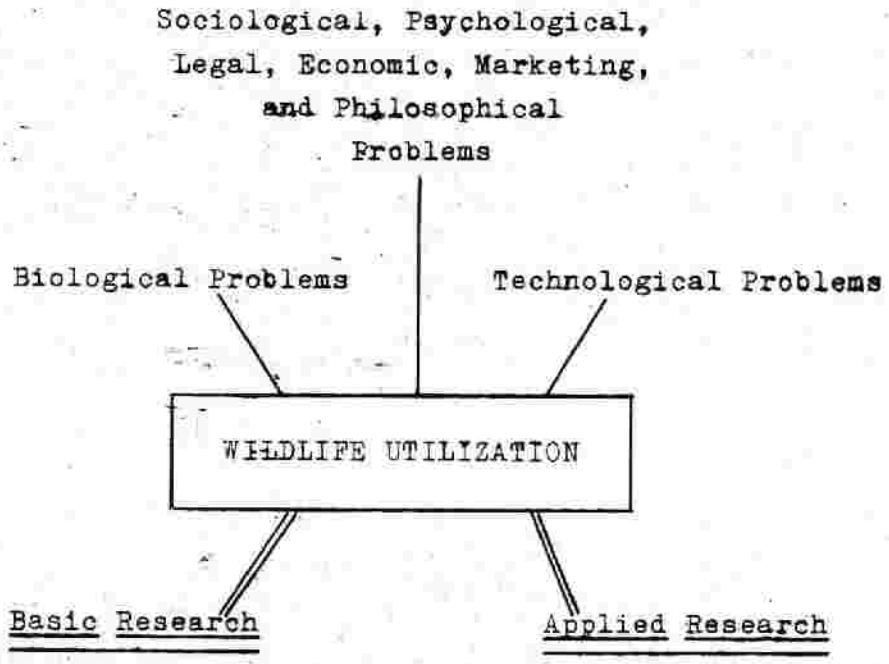

Table 1. Weight data for some African animals.*

	Species	Maximum live wt. ♂	Maximum live wt. ♀	Mean live wt. ♂	Mean live wt. ♀	Mean "Sheep Dressed" wt. ♂	Mean "Sheep Dressed" wt. ♀	"Sheep Dressing" % Max.	% Min.	% Mean
1.	Duiker	40.0	42.0	31.1	36.2	18.0	22.0	61	58	60
				29.5	-	19.0	-			
2.	Steenbuck	20.0	26.5	18.8	21.5	11.5	11.8	85	55	60
3.	Klipspringer	21.0	27.0	20.5	27.0	12.0	15.0	57	56	57
4.	Impala	157.0	117.0	104.3	88.0	63.8	52.6	68	46	61
5.	Kudu	518.0	405.0	474.7	344.7	268.0	227.0	58	54	56
6.	Bushbuck	-	70.0	-	70.0	-	43.0	-	-	61
7.	Wildebeest	683.0	533.0	519.6	442.2	294.6	241.8	60	49	56
				544.4	459.8	282.0	250.0			
8.	Buffalo	1497.0	1180.0	1465.0	1123.0	611.5	485.5	46	41	42
9.	Giraffe	1566.0	-	1566.0	-	980.0 (Head off-gutted)	-	-	-	63
10.	Warthog	186.0	128.0	156.7	112.4	88.0	64.8	75	56	61
11.	Zebra	803.5	757.0	555.6	456.5	223.0	412.0	54	45	51
12.	Ostrich	-	182.0	-	-	-	-	-	-	-

* This is a composite table. The data presented here should be interpreted only as indications of what to expect. In certain calculations for each species few individuals are involved. Based on the number of individuals the upper figures for wildebeest and the impala data are most reliable.

Table 2. Wounding rates, Gwaai Forest Reserve, Southern Rhodesia, February through October 1964.

Species	Cropped ♂	Cropped ♀	Wounded ♂	Wounded ♀	Total	Total Wounded	Wounding Percent
Eland	93	148	12	11	264	23	9
Sable	101	25	13	1	140	14	10
Reedbuck	16	2	1	0	19	1	5
Duiker	108	156	8	17	289	25	9
Steenbuck	38	55	1	5	99	6	6
Buffalo	1	0	0	0	1	0	0
Kudu	4	0	0	0	4	0	0
Wild Pig	1	2	0	0	3	0	0
					819	69	8.4

HOW TO OVERCOME THE CONFLICTS BETWEEN A UTILIZATION OF WILDLIFE AND OTHER FORMS OF RATIONAL EXPLOITATION OF LAND

by Dr.Dr. H.H. Roth

1. Since 1960 the rational exploitation of natural game stock in dry bush savannahs has made sweeping headway on private estates in Southern Rhodesia. In 1964 the Department of Wildlife Management released 32.400 pieces of game, mainly antelopes and zebras, for killing within the scope of systematic exploitation on 42 ranches of an area of approximately 18.000 square kilometres. This total quota of killing, based on biological and ecological individual inquiries, represents a slaughtering weight of approximately 3,8 mill.lbs of meat of taking into account the raw skins produced - an economic value of approximately 3 mill. DM. Owing to technical deficiencies, however, only 60-80 % were converted into money. No allowance was made on the other hand for the fact, that licenced sport hunters produced another 500.000 lbs of game as well as a market value of more than 1/2 mill. DM. All in all the potential value of the game production may be estimated for 1964 at least at 4 to 5 mill.DM. It would be possible to include another area of at least 7.000 square kilometres in the game production, hereby increasing the capacity even more.

So even though utilization of wildlife today is definitely an economic factor, the fact remains, that it is at issue with agriculture in a partly vehement content, which is still in full swing. I took part in this debate myself, from a purely scientific standpoint at first on behalf of agriculture and veterinary medicine and then in connection with my present executive position within the Department of Wildlife Management in Rhodesia. I therefore believe to be in

a position to judge impartially the conflicts between management of wildlife on the one hand and cattle-breeding on the other. I must admit, however, that anybody, who has the survival of primeval African fauna and vegetation at heart, cannot possibly claim to be entirely unprejudiced. We propagate a rational exploitation of game, because in our opinion it is the only appropriate way to preserve big game in many parts of Africa.

In this address I shall try to analyse the reasons for conflicts between gamekeeping and other forms of rational exploitation of land, entering all the while into the ways and means to overcome the conflict in question.

II. Despite the fact, that agricultural and veterinary circles in Rhodesia today are more or less willing to accept, that utilization of wildlife is theoretically sound and superior to extensive cattle-breeding, they are often apt to contest the expediency and technical practicability of exploiting the potential of albumen in game from a general economic angle. As I have already mentioned, this argument is conducted on an absolutely personal and even emotional level and for this reason we have to distinguish carefully between genuine points of conflict and other arguments, that are without any scientific foundation. This, however, does not bar the fact, that we have to deal with both categories, if we want to find ways and means to overcome these conflicts in general.

Let us first consider the genuine conflicts:
The biggest obstacle to extending the utilization of wildlife is the fact, that African game stock must be considered as a potential reservoir for all kinds of morbific agents. Some of these contagious enzootics are of supreme and vital significance for cattle-breeding such as cattle-plague, foot-and-mouth-disease,

African hog cholera, fever of the East Coast and Nagana, only to mention a few of these diseases. The significance of these diseases from an economic point of view, however, does not only consist in an actual deficiency in beef production, but mainly in the fact, that the sporadic and enzootic occurrence of some of these diseases not only makes any export of animal products impossible but also practically excludes the export of agricultural products on grounds put forth by the veterinary police. The game is held responsible for these constantly reoccurring and pernicious epidemics - and in many cases unfairly without doubt. Since there is no exact information available as to the actual significance of wildlife as a centre of epidemics, the game which is prolific in many areas, represents an unknown quantity in connection with all measures undertaken by the sanitary police to fight off epidemics and remains an uncontrollable factor. Therefore it is easy to understand, that the veterinary officials, whose duty it is to encourage agriculture, face wildlife with a strong sense of uneasiness and even with outspoken hostility.

At this point I must reproach the veterinary officials for not having urged on veterinary research in the field of wildlife pathology, although they had realized the significance of African wildlife for agriculture. Only two years ago- during the course of arguments which had arisen over gamekeeping - the first office was installed for an official veterinarian, who is to devote himself entirely to the problems of wildlife. Instead of which the veterinary system has turned into a proponent demanding a general eradication of wildlife; and even today there is a widespread official idea prevalent, that the best way to solve the wildlife problem would be to separate wildlife and agriculture as a general principle and to establish them in territories apart. This dangerous thesis bypasses two facts, which

have been verified scientifically:

In the first place it is hardly possible from a technical and biological point of view to exterminate wildlife entirely in bush savannahs and in many agriculturally developed areas there is more wildlife left today than ever before, although the game has been hunted for over a decade.

Secondly it would undoubtedly interfere with the ecological equilibrium, if the mixed game stock were removed from the tropical and very labile savannahs to be replaced by cattle and would in the long run lead to irreparable damages such as steppe formation and erosion. There are several striking evidences of this fact in Rhodesia.

Besides dreading the vital significance of game as a centre of epidemics, the representatives of agriculture are in fear, that the disease-germs dormant in game might spread by migration and dealings in game products and so repeatedly give rise to new epidemics in sanitated areas. Not only do they deeply mistrust all dealings in game products, but they also object against a rational utilization of wildlife categorically on the grounds, that it would give full play to the spreading of epidemics.

In dealing with the solution of these conflicts of the sanitary police it is best to consider the two components separately, i.e. the "reservoir of epidemics" and the "spreading of epidemics". Veterinary officials in the whole world have to resign themselves to the eventuality, that game might be a potential carrier of epidemic germs, without being able to postulate the extermination of wildlife for this reason. To a large extent it would be possible to eliminate the epidemic danger, which potentially of course is prevalent - by keeping the game stock healthy and resistant, hereby

preventing the latent germs from becoming active. The only way to achieve this end, however, is by controlled management and in this connection a rational exploitation of wildlife on an ecological basis. By reducing the stock by selection and encouraging the growth of grass at the same time by applying fire judiciously, we could counteract the danger of malnutrition, which so frequently is a consequence of surplus game stock and aridity. Wildlife management also makes it possible to encourage an increase of certain desirable kinds of game and to restrict other species, which are less compatible with agriculture.

Game will of course always be the basis of subsistence for tsetses in the regions infested by these flies - an area of more than 10 mill. square kilometres - and so remain a reservoir for the trypanosomes transmitted by these flies. Neither this problem nor the problem of epidemics in other areas can be solved by a massacre of game, which so frequently is practised without rhyme or reason. The only consequence of this measure is to create zones temporarily void of wildlife, into which the game will migrate anew and permit the tsetses to advance again.

The technical possibilities of utilizing wildlife on the other hand allow to analyse and judge the problem of tsetses from a purely economic angle. There is usually no comparison between the enormous costs involved in the extermination of game and tsetses and the economic efficiency of established cattle-breeding. Properly controlled game would produce a much higher economic effect in many areas - without involving heavy costs - than paltry cattle-breeding. In the light of wildlife utilization the necessity for preventing tsetses becomes a mere matter of arithmetic in many regions.

Wildlife management is also the most efficient way to solve the conflict between wildlife and agriculture as regards the spreading of epidemics, having proved to be the only technical and psychological measure possible against poaching and illegal dealings of such game products, which are so detrimental from the point of view of the sanitary police. On the other hand it is possible to fully adapt the trade and dealings in products originating from a technically developed game production to the requirements of the sanitary police as well as to those of the Health Administration, which I shall discuss further down. According to demand and local conditions it will be necessary to concentrate on different meat-processing methods. In Rhodesia the production of fresh meat at present is predominant, being the most lucrative from an economic point of view. The game is mostly shot at night and delivered the same night to be cut up for sale and in the morning it already hangs in the refrigerating chambers. Fresh meat is either offered for sale in local butcheries or delivered in refrigerator waggons to large consumers centres. Where there are no refrigerating plants available, only biltong is produced. Neither of these types of production, however, is able to withstand crises in as far as dealings in these products are strictly prohibited during cattle epidemics. Endeavours are therefore being made to produce sterilized products such as canned meat and meat-meal, which are not subject to restrictions by the veterinary police. In Rhodesia the first cannery is being opened at present on a Game Ranch.

Wherever game is systematically controlled, it is much easier to carry through studies to ascertain the migrations of game. For information on these migrations is indispensable to be able to fight off the spreading of epidemics. The argument used so frequently, accord-

ing to which hunting disperses the game, causes it to migrate and contributes to the spreading of diseases, is not plausible. Our experiences have shown, that hunting game in a correct and professional manner does not in the least interfere with the loyalty of wildlife to a certain location.

Next to the epidemic aspect the question is often discussed as to whether venison represents good value from a sanitary point of view. The Foods and Health Authorities rightly declare that the buyer of a certain food, of the game product in this case, expects a public guarantee as to the sanitary and aesthetic high quality of the market product. In the case of agricultural meat production public control is based on an examination of fat-stock before and after slaughtering. Since this examination is only restrictedly possible in the case of game-processing, the Health Authorities tend towards adapting a negative attitude as regards the utilization of wildlife. Again we are confronted with two components: In the first place the authorities are concerned with the properties of game products which are detrimental to health, such as a possible contamination of meat with anthrax or botulism spores and the presence of salmonella germs, trichina or bladder worms. Apart from the fact, that more information on the occurrence of these diseases in African game will probably diminish the concerns of the Health Authorities, it is easily possible to apply such hygienic conditions to the utilization of wildlife, so as to exclude these dangers. The authorities are furthermore concerned, that venison might be inferior from an aesthetic point of view, that it might not be properly exsanguinated for instance, be watery or infested with parasites. Our inquiries have shown, however, that the percentage of animals stricken with parasites is much lower in game production than in cattle-breeding and

that these animals can easily be picked out during slaughtering. We have proceeded to subjecting the permission for wildlife utilization to a control of the processing-plant by the sanitary police.

Market competition is another genuine point of conflict between game production and cattle-breeding. Although it is generally contested, the beef industry actually is apprehensive of this competition. In my opinion it is one of the most important factors in the dispute in Rhodesia and other arguments against wildlife utilization are only pled as an excuse for fear of competition. One of the big advantages of wildlife utilization is of course the fact, that it is cheaper to produce meat and meat products of high quality than by means of extensive cattle-breeding in dry savannahs. As a consequence these products immediately conquer the local markets. Markets such as these are mainly prevalent in rural districts with mining or agricultural industries, but they also exist in worker suburbs of industrial centres. Up to now they have mainly absorbed the most inferior qualities of beef. The large profits realized in these markets subsidize exports at present and enable beef of prime quality, which is not produced on rational lines, to compete in the world market. We are confronted here with a case of real competition, which, however, should occur to a lesser degree in countries, which are centrally controlled to a very large extent. Based on agro-ecological data, areas for cattle-breeding should be marked out, in which mainly beef of prime quality can be produced efficiently for export purposes. In regions, where intensive cattle-breeding is not possible, it should be primarily up to game production, to produce albumen for cheap domestic and mass consumption.

With this I have referred to the three most important and substantially founded points of conflict. Other points of friction between the preservation of wildlife

and cattle-breeding run on European lines are mainly financial and economical problems as for instance: Competition for pasture-grounds between cattle and certain species of game as well as the damage caused to pasture fences by game. As soon as a landowner derives additional and substantial profits from game he is apt to change his fence in such a way as not to infringe upon his game and he will regulate his cattle stock with due consideration to wildlife management.

The symbolic status of cattle-breeding within African agriculture presents a very difficult problem for the coexistence of both economic forms to cope with. Though venison has a food value, it has no representative value; it is well known, that cattle is not only kept for alimentary reasons, but also to reveal a given status and to be able to buy women. The first experiments to incorporate African communities in a regulated and controlled wildlife utilization are under way at present in Rhodesia, so I am not yet in a position to pass on my experiences in this field. We imagine on the other hand, that the utilization of half domesticated herds of game, such as elands for instance, could partly replace cattle-breeding within the domain of African agriculture. We therefore have set up a stock-farm, which attends exclusively to analysing this form of wildlife utilization.

To wind up my address I should like to make a few short remarks as regards the unfounded and irrelevant arguments, which are advanced against wildlife utilization as a form of exploiting land rationally:
In the first place the technical and economical practicability of wildlife utilization is often contested as a matter of principle. The technical organization of utilizing game stock must not only be adapted to the ecological but also to the local sociological and political conditions. Despite the fact, that the technical

field particularly could be improved upon as for instance by developing better and more rational hunting methods and movable processing-plants, the argument advanced against the economic practicability of wildlife utilization can be refuted.

European circles advance another and historically founded argument against utilization of wildlife instead of cattle-breeding; the first European settlers looked upon it as an ideal to organize their cattle-breeding according to European standards. Venison was always taken for granted since it did not cost anything and many of them looked upon beef as something scarce and valuable. The opinion is still widely-held, that venison is generally something inferior and must not cost anything. This is also the reason for a certain prejudice, that Africans detest venison. Our experiences have been, that these cases are exceptional and only apply, when the meat in question is taken from the totem-animal of the native concerned. Besides it is a fact, that the meat of African game is counted among the most palatable kinds of meat and is of prime quality.

The last argument advanced primarily by the representatives of agriculture against wildlife management is based on emotions. According to this argument a commercial exploitation of game will assure an extermination of all wildlife. This is countered by the fact, that the wildlife authorities in the whole world are endeavouring to arrive at a rational utilization of wildlife in the form of hunting for sport or in another form. We have noticed that landowners, who used to look upon game as an evil it would be wise to eradicate, have suddenly reintroduced certain species of game, which had already been exterminated by the advice of the veterinary authorities, so as to develop utilizable herds. Game production must be subjected of course to

a capable public control, whose duty it is, to plan and technically control wildlife management. For this purpose wildlife biologists are just as much in need for wildlife and national parks administrations as agriculturists are required for the agricultural offices.

III. You may have gathered from my comments, that it is possible on the whole to overcome the conflicts which are certainly prevailing between wildlife and the ruling conservative systems of rational exploitation of land in Africa; what is more: In areas of dry bush savannahs the most ingenious way to solve these conflicts consists in wildlife management as a productive form of exploiting land. The following measures are of importance, if we want to encourage the development of wildlife utilization in Africa:

1. In the first place it is necessary to analyse and calculate the economic capacity of wildlife in as many areas as possible and rich in game under due consideration of all ecological, agricultural, sociological and touristical factors. For this end scientific teams should be appointed, which are independent from the government.

2. Furthermore: Those countries who dispose of a similar wildlife capacity should be encouraged to create - perhaps with funds of development aid - semi-public or technical organizations based on private enterprises, so as to carry through projects for wildlife utilization according to instructions and under the control of public or purely scientific departments.

3. Those countries, desiring to develop their game-production, must be encouraged to form governmental committees on the line of the Rhodesian Game Marketing Committee, to coordinate the development and the interests of game production with those of agriculture and forestry.

4. Finally future or already pending projects for wildlife utilisation must be exploited to a higher degree in the following ways - apart from purely biological and ecological research:

   a) To analyse the pathological and bacteriological problems of wildlife as well as for meat-technological studies in the field of game-processing; in Rhodesia for instance the utilization of wildlife which is technically well developed runs to waste in this respect.

   b) To analyse questions of profitability and productivity as regards wildlife utilization in connection with purely technical ameliorations; in Rhodesia there is an enormous amount of data, which could be made use of for statistics.

OVERCOMING THE CONFLICTS BETWEEN WILDLIFE MANAGEMENT AND OTHER FORMS OF LAND UTILIZATION; WILDLIFE AND FOREST IN EAST AFRICA

by Professor Dr. H. Hesmer

Paralleling the lecture on the conflicts between wildlife management and domestic cattle breeding, this lecture will deal with the conflicts currently on the increase in East African countries between wildlife management and forestry and requiring solutions.

Game in Savannah Areas

Game in large numbers has adverse effects on the timber vegetation of savannah regions, though this is not as disastrous as in the case of domestic cattle. Since trees in savannah areas are of no or only small value, these adverse effects produced by game are of no commercial significance, but they do provide important indications of the effect that may be expected from game on more valuable and particularly on cultivated forest areas.

If trees are in places very scattered in savannah areas where site conditions are not extreme and where domestic cattle cannot be presumed to have had influence but where there are, on the other hand, large numbers of game, then it must be presumed that the heavy game population has had an adverse effect on the timber in the area. This is especially the case when patches completely bare of trees are found amid treed savannah whose trees are to a certain extent fire-resistant and could therefore hardly have been destroyed by fire alone. Patches of this nature are frequently found in wildlife reserves with high game populations.

In open savannahs elephant frequently destroy trees by breaking or uprooting. It is remarkable that even the

strongest savannah tree in East Africa, the baobab (Adansonia digitata) can be seriously damaged by elephant. I noticed repeatedly all the way from South Africa to Kenya that baobab are more frequent in areas outside wildlife reservations than in adjacent reservations with large elephant populations and that the bark of the few remaining baobab in the reserves had often been seriously damaged by elephant.

Game in Coniferous Afforestation Areas

During the last few decades all the countries in Africa south of and including Kenya have undertaken extensive coniferous afforestation in upland areas with sufficient rainfall, and these programmes continue to be extended. Two Mexican tree species are preferred: Pinus patula, which yields low-quality timber for construction and for cellulose production purposes, and Cupressus lusitanica, which provides high-quality timber.

In site locations where devastation has taken place or where the trees and bushes are commercially valueless, ~~the~~ land intended for coniferous afforestation is often used for agricultural purposes for a few years before and after afforestation, once the final felling and burning of the natural timber has been completed. If such areas of combined forestry and agricultural cultivation adjoin or are surrounded by woodland, they naturally attract the game from these adjoining or surrounding areas, and the game causes damage. Big game - elephant, buffalo and rhinoceros - cause damage by biting and trampling the new growth in cultivated forest areas and natural regeneration areas alike. Smaller game species such as above all the bushbuck nibble at the trees in cultivated forest areas and damage the bark of the saplings, though fortunately not as severely as our roebuck when rubbing their antlers. Since the wild animals cause even more damage

to the agricultural and vegetable products grown in the areas than to the forest crops, the people carrying on combined forestry and agricultural cultivation on government-owned land erect fences from which forestry profits as much as does agriculture. Where bamboo is available in the uplands of East Africa the fences are most skilfully made. It is obvious that fences of this kind are no protection against strong big game, and the farmers therefore also either live on the site or guard the areas in order to frighten away the animals.

When they are at the pole stage, pines and cypresses are frequently stripped by elephant. Extensive research carried out in Kenya has shown that Pinus radiata and Cupressus lusitanica are stripped between the ages of 14 and 18, and Pinus patula between 12 and 14. Older trees are stripped far less frequently. Sometimes stripping only takes place around the edge of the stand, but elsewhere it is also found well inside the stand. In Kenya it has been observed that a single elephant can peel five trees in one morning. The large wounds in the bark do not heal over, with the result that the peeled parts are infested by insects and fungal diseases.

Trees are of course particularly attractive to game when they have been artificially trimmed, a measure often applied to pines and cypresses for the purpose of improving the quality of the timber.

Buffalo damage the bark of coniferous trees by rubbing their horns on the tree trunks. They also sometimes kill or injure forestry officials and forest workers.

The problem of damage done by big game in coniferous stands is becoming increasingly urgent, since more and more coniferous stands are being planted and the density of big game populations in the uplands is growing. This latter is partly due to the increasing disturbance of

game in low-lying areas caused by the growth of the human population and a corresponding increase in domestic livestock breeding and game hunting as well as frequent fires in grassland and savannah areas. In addition there is continuous or periodic immigration from neighbouring heavily populated wildlife reserves.

It is possible to achieve a certain reduction in the amount of damage done by elephant and buffalo in coniferous stands by leaving corridors of indigenous deciduous trees along their known habitual tracks. On the other hand it is not an advantage to leave isolated patches of deciduous trees within coniferous stands, since big game favours these as resting places, doing damage to the surrounding coniferous trees. As big game regularly returns to salt springs and other spots used as licks, doing extensive damage in their neighbourhood, it is not expedient to carry out coniferous afforestation near such places.

One means of combatting damage done by elephant is to shoot the animals, giving preference to particularly destructive specimens. But in thick mountain forests this is often difficult and the trophies to be won usually inferior. Some of the afforestation areas are within wildlife reserves. Buffalo are sometimes driven out of threatened woods by beaters with dogs.

According to a report on extensive experiments in Uganda, the employment of electric fencing was successful against buffalo but not against elephant, except in one case, though in this one case the success led to a hitherto unsurpassed growth of young deciduous trees. Maintenance costs for electric fences in the tropics are high because of frequent breakdowns due to lianas and falling branches (£5* a month per mile* and £40 per mile installment cost). Attempts to employ electric fencing in Kenya

* £1 = 11,20 DM; 1 mile = 1609 m.;

have been given up since it is ineffectual. A circle of eucalyptus trees planted closely at intervals of 3 1/2 feet* around a coniferous stand can, once it has successfully been grown to a uniform height, prevent big game from penetrating into the stand. The danger from big game can also be reduced by surrounding plantations of pine and cypress with Araucaria angustifolia and cunninghamii or with the deciduous Vitex keniensis and Croton megalocarpus, which are left relatively unmolested by big game once they have reached sufficient height.

In Kenya effective protection against elephant is achieved by the construction of ditches many miles long surrounding whole afforestation areas and covered with logs and brushwood. Through age-old experience with pit traps, with which they have been hunted for thousands of years, elephants are said to be more afraid of covered than of uncovered ditches. These ditches are usually 6 ft. wide and 4 ft. deep, and 6 ft. deep across tracks and at other points favoured by elephant. The cost per mile is £200 and £270 respectively. Paths across the ditches must be unpassable for game. Since large coniferous afforestation areas protected by ditches nevertheless usually contain smaller species of game, the areas of combined forestry and agricultural cultivation within them are protected by temporary fences as well.

In some places coniferous plantations are threatened by elephant and other big game from planting right until they reach the pole stage. This means that constant precautionary measures are necessary and it is thus expedient to reduce costs by planning concentrated areas of coniferous afforestation. Isolated small afforestation areas surrounded by thick natural mountain forests with large game populations are particularly exposed to damage and continued protection would be far too costly. Coniferous afforestation stands are safest in areas without forest and therefore with sparse game populations.

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* 1 foot = 0.3048 m.

An extremely unpleasant problem is presented in some afforestation areas by monkeys who cause considerable damage to the top of the trunk and the crown of cypresses and pines. Stripping by Sykes monkeys usually commences when the saplings are about five years old and this leads to serious damage often resulting in windfall. The chief method of combatting monkeys is by trapping. The fact that 3.000 Sykes monkeys were caught in a cypress grove of 200 hectares in the Ragati Forest District in one year gives an idea of the multitudes of monkeys that can congregate in coniferous afforestation areas.

In Kenya it has been found that the very prickly Araucaria angustifolia, which in Brazil provides the valuable Parana pine wood, is proof against damage by monkeys. As this tree is also avoided by big game and since its growth rate is good, its cultivation deserves to be increased.

Game in Deciduous Forests

Elephant can also do damage in natural deciduous forests. The forest can even be totally destroyed in areas where elephant are particularly numerous, for instance in the neighbourhood of salt springs and licks. And even where conditions are not exceptional damage done by elephant in deciduous forests can be considerable.

It is reported from Uganda that an average of 81 % of Lovoa trees ready for felling are severely damaged; 25 % of the trees had been totally stripped of bark. The damage to new growth of Lovoa, Pterygota and Carapa was so great that well-formed trees for timber could no longer be expected to develop. There is hardly any new growth in mature forests of valuable East African Ocotea usambarensis, since elephant are particularly partial to this tree. For reasons of profitability it is usually not possible to use ditches for the protection of deciduous forests against elephant. It is also not so easy to con-

centrate naturally regenerating deciduous forests for the purpose of joint, cheap protection measures.

Vitex keniensis, which does not suffer unduly from damage by game and provides valuable veneer timber, is cultivated extensively in the vicinity of Mount Kenya; in the Ragati Forest District alone, for instance, more than 100 hectares annually are planted.

Conclusions

Since both wildlife management and forestry are in future to be carried on intensively in East African countries, their respective needs must be co-ordinated.

The surest way of avoiding conflicts is to undertake coniferous afforestation in areas far distant from regions with heavy game populations. This has already been done in several cases and there are further plans for the future. In these areas forestry will permanently have priority over wildlife, even in countries in which the Game Department is responsible for wildlife management in all areas, including state-owned forests.

Where cultivated forests are situated in areas with heavier populations of damage-prone game but outside and not immediately in the neighbourhood of wildlife reserves, the forestry administration will also have to be granted the right to protect forest areas with ditches or by other means. If only for cost reduction purposes, forestry planning will have to insist that coniferous stands threatened by game and therefore in need of protection must be concentrated as far as possible. Concentration also facilitates the shooting of game causing damage. And in addition it is expedient for wildlife management, since it means that wildlife need not be restricted over too large an area.

On the other hand, where forests are situated in areas within or directly adjacent to wildlife reserves or where they are of essential importance as supply or escape areas so that forestry is only possible if protection measures seriously detrimental to wildlife management are taken, the forestry management should of its own accord volunteer to shift over to extensive management or desist from undertaking coniferous afforestation altogether.

Mutual recognition of the areas in which one or the other of the two forms of land utilization should have precedence and mutual agreement in areas utilized by both should not be too difficult to achieve, since a large proportion of wildlife reserves, particularly in low-lying areas, are anyway unsuitable for forestry and since it is usually possible for the forestry authorities to utilize areas other than those reserved for wildlife.

Apart from large-scale planning along these lines for the reduction of the differences between wildlife and forest utilization, the forestry authorities should also make efforts to reduce the susceptibility of forests to damage by game through the practical arrangement of sites and the application of suitable forms of management. They should also conduct research on new tree species less likely to be damaged by game and increase the cultivation of those of this kind already known. In addition they should develop and adapt further effective and cheap protective methods suitable for conditions in the tropics. I am of the opinion that these tasks facing both forestry and wildlife management in connection with reducing the tension between them should be included in technical assistance programmes.

RESPONSIBILITIES OF THE GOVERNMENTS OF DEVELOPING COUNTRIES IN THE FIELD OF WILDLIFE UTILIZATION

by Thane Riney

Introduction

The following paper discusses briefly government responsibilities regarding the planning, organization and execution of wildlife management. From other papers presented, it is clear that governments have certain ethical, administrative, legislative, educational and research responsibilities and these are mentioned in the present paper as a basis for discussion.

Ethical responsibilities

Wildlife as a natural resource is not ours to destroy but to use wisely so that future generations will have the resource from which they may profit in various ways as they chose and as a source of national pride and personal inspiration. Regardless of the special combination of uses - tourist, hunting, utilization schemes, etc. - there should be a moral obligation to pass the renewable resources on to future generations and wildlife is no exception.

Once a government accepts the principle that a renewable natural resource should not be eliminated, many other associated responsibilities follow as a logical consequence. This particularly applies to the formation of a policy, appropriate legislation and arrangements for administering the resource.

The government policy

As for any other resource, there is a government obligation to form a policy with regard to the permanent utilization and development of the resource. This involves the initial formation of a policy and its periodic revisions in the

light of new developments. A further consideration for developing countries is the need to integrate the planned development of the wildlife resource with other renewable natural resources.

Although there is no one way of meeting these obligations, it is clear that for each of the three aspects mentioned above, it is possible to secure some kind of outside help: With the initial formation of a policy, with the making of periodic revisions and with the integration of the development of several or all renewable resources.

Where a clear policy has not been formed, it may be useful for a country to request help in the form of an initial survey to determine at their present stage of development the possible uses and limitations of the wildlife resource that may be consistent with other present or planned forms of land use and with other development goals.

Legislation

Four major aspects of legislation are important to consider in formulating adequate wildlife legislation for newly developing countries. Thus wildlife legislation should be adequate and appropriate to:

1) Prevent the resource from disappearing and to provide for its renewal under appropriate management. To complement the national policy, this will normally at least provide for an adequate administration and will include game wardens and control officers and provide for sections on penalties, taxes, etc. to be strictly applied;

2) provide for its rational exploitation, either as a source of production of protein or other commercially important by-products such as skin, tusks or musk, or as a tourist attraction, or for hunting in various forms;

3) safeguard the health of domestic animals and finally

4) protect human health.

Legislation is, of course, normally subject to revision in the light of new findings and should be appropriate to the present stage of development of the country. In this connection, it is interesting to mention the question of "ideal" vs. "practical" legislation that was raised in 1960 at a joint meeting of the Directors of Game Departments for Malawi, Zambia and Southern Rhodesia. The Malawi delegate emphasized that it was useless to institute legislation protecting every song bird, simply because it was done in a European country when Malawi Game Department finances could not then adequately enforce even the legislation protecting large rare mammals. His point, which may be of interest to discuss further, is that such detailed "idealistic" legislation may have the effect of fostering contempt for unrealistic laws and that, in principle, laws should be created with an eye to the present stage of development in terms of most urgent national priorities and to the potential capacity for enforcement.

The legislation should further recognize any special problems caused by the special character of the wildlife and the extent to which it interferes with existing or developing patterns of land use. Thus, in Africa special conflicts arise between wildlife and agriculture when baboons, monkeys, bush-pig, warthog, quelea finch or plagues of rodents damage crops, or when predators seriously interfere with stock-raising or human life. Conflicts arise on forest lands when ungulates or rodents interfere with regenerating trees or elephants seriously interfere with the production of poles and harvestable timber.

Developing countries in Africa have special problems associated with the recognition in the legislation of existing customary rights on the one hand and on the

other hand sport and tourist hunting. Special problems involving conflicting legislation sometimes arise, as for example blanket legislation allowing tribal hunting in large regions that include National Parks, forest lands or game reserves for tourists hunting and in which special legislation is necessary to safeguard investments in and management of these special areas.

The Legislation Research Branch in FAO is engaged in an analysis of wildlife legislation for Africa and this analysis will be available in 1965, not only to developing countries but to countries or organizations supplying men who may be required to help with the formation of new legislation or with the revision of existing legislation.

Administrative responsibilities

To accomplish the task of taking care of the wildlife resource, governments normally form some system of administration whereby responsibility is principally assumed by one or more government departments. It is important to note that no single system is so vastly superior that it can be recommended as a model for all developing countries. It is obviously important to obtain qualified and capable men in charge of the administrative organization and this is apparently of much greater importance for effective handling of the resource than the precise form of administration. Some effective National Park services are run by government controlled special departments, some are a part of the Government Forest Service and others, equally effective, are controlled by non-governmental advisory committees. The Game Department of one country not only survived but continued to be effective for a few years under a Department of Native Affairs.

In spite of ready examples of efficient organizations operating under many different administrative schemes, it is useful to note that government polic- and administra-

tive organization can influence the development of certain types of wildlife management problems as well as the ease with which they may be resolved. As an example, it is useful to compare certain aspects of French speaking West Africa with English speaking East and East-Central Africa.

Although largely under one or two ministries, the French speaking West African countries normally have but four different governmental organizations that concern themselves in some way with wildlife: The Department of Eaux et Forêts et Chasses is normally the major controlling organization, issuing licences, administering the fish and game laws, the fishing and hunting areas and National Parks. The Tourist and Publicity Department is usually interested from the touristic aspect and the Veterinary Department and agriculture organizations become interested insofar as wildlife forms a problem interfering with the several patterns of animal crop production.

Like the French pattern of administration, the English ministries concerned with wildlife may be few in number but the chief difference in the organizational pattern is that several more organizations are involved. Although there are large differences between English speaking countries, the following organizations may take an active interest in wildlife: Lands and Water Department, Forest Department, Fisheries Department, Game Department, National Parks Department, Veterinary Department, Tourist and Information Department, Agricultural Department, Tsetse Control Department.

For wildlife the significance of this proliferation of organizations in English speaking Africa is important insofar as the more organizations that are involved the more difficult it becomes to avoid competition, duplication of work and conflict in policy. There is, therefore, a greater need for separate attention toward coordination of conflicting activities and interests. The second

important implication is that since several of the English speaking departments are responsible for administering land, the pattern of land use in these countries typically resembles a patchwork quilt. If a developing country starts along this line, it is well to recognize that certain wildlife problems will almost inevitably arise as a result of National Parks being placed adjacent to farming and grazing lands.

In French speaking West Africa, it is normal to have a strict protected game reserve, or National Park, surrounded by a zone of limited hunting (usually including an area featuring tourist hunting). Areas of general hunting, forest exploitation, grazing and arable lands are normally outside these two inner zones. Since the wildlife is administered by the Forest Department which has control over the major wildlife areas, many potential problems involving wildlife in conflict with other forms of land use are thus minimized. It is here suggested that at least one of the two most expensive activities associated with wildlife, the questionable practice of fencing, could comparatively be inexpensively solved and in some cases eliminated if some modification of the French system of zoning were adopted. Trends have already started in this direction in several parts of East and Southern Africa.

These considerations emphasize the need for the careful formation of a national wildlife policy and for special efforts toward integrating the wildlife resource with the development of other renewable natural resources. This in turn leads to consideration of suitable means for over-all long term planning of all developing natural resources with due consideration to economic and sociological requirements, a discussion of which is outside the scope of the present paper.

Education

Adult education, public relations and extension work are

an important part of the education process and absolutely essential for the protection of the present stocks of wildlife from various forms of over-utilization and mismanagement.

The training of appropriate technicians and general public education is necessary for the effective development of the wildlife resource. This is clearly another basic responsibility of individual governments. Although for several years they may have to depend on other countries for assistance it should be recognized that each government must eventually assume this responsibility, for education outside the country, or by expatriates brought in for the purpose, is rarely specially designed for the specific needs of the developing country.

Training is needed in the field of administration and in all phases of management, including management for increasing animal populations as well as management to reduce populations or to minimize or eliminate special animal-land use problems. The developing country has the responsibility of introducing instruction in the sensible use of the wildlife resource into whatever spectrum of schools the country has. Training in the special national values of the resource should be initiated at primary school level, continue through secondary school and be included in university curriculum.

Research and development

Developing countries can rarely be largely self-sufficient with respect to their own research, but they have the responsibility of recognizing that eventually they must train their own men to see and to solve their own problems. Low budgets are not always an excuse for no action. Desirable trends can at least be considered and it is possible sometimes to initiate desirable trends even on a low budget. For example, the use of private capital in stimulating

private organizations - under the supervision of the Game Department of Southern Rhodesia - is obviously a practical and initially successful step in this direction, and National Park facilities - operating under strict regulations laid down by government departments - have been built and are operating in many parts of Africa at no expense to the governments concerned.

In a recent Africa-wide survey of the wildlife resources of Africa, a FAO team has discovered that many countries already gain a significant income from animal products although several of these countries are only just starting to form an effective wildlife organization. This raises the question of the desirability of adequate staffing to protect wildlife at its present value to government and the need for government recognition of increasing profits from wildlife when it comes to allocating money for operating the administering department.

International responsibilities

Wildlife legislation and administration should not conflict with that of a neighbouring country where hunting areas or national parks have international boundaries and it is important for each country to avoid such conflicts. Likewise each country has a responsibility to arrange the exports and imports of animals in conformity with international law and with the recommendations of international conventions which they have signed.

Government responsibilities in asking for appropriate aid

Developing countries in the present decade realize they are not alone. In the field of wildlife management help can be obtained from private foundations, or through bilateral aid or international organizations of several types. Help may come in the form of equipment, consultants or advisors and be associated with large or with small projects.

It is suggested that, as aid granting organizations, we can do a service to developing countries by encouraging them to see specific requests for help against the perspective of their present development plan, their national wildlife policy and their own special wildlife problems of development or of conflict. As mentioned above, if such a perspective is not available, an initial survey to determine potential uses and limitations of the wildlife resource within the framework of the other aspects of development is suggested as a legitimate request.

THE TASKS OF EDUCATION, TRAINING AND RESEARCH

by F.F. Darling

Ideally, education in wildlife management in any country should begin while wild life is plentiful and where a conscious appreciation of aesthetic, ecological and practical values of this natural resource is apparent. Actually, we are faced with almost the opposite situation, in that wild life is rapidly diminishing, the habitats which are so necessary for the survival of wild animals are being destroyed, carved into, or made untenable. Migration routes of such large animals as elephants are being thoughtlessly cut across, numbers of people are increasing alrmingly and it is difficult to change the ethos quickly in largely illiterate populations where there has never been any notion that the wildlife resource was not limitless and self-regenerating without human care. We are faced with the necessity for crash programmes in situations where rapid dissemination of knowledge and imposition of restrictive rules of behaviour are very difficult indeed.

Education of the peoples of under-developed countries is generally accepted as a prime aim, though it is well to remember that universal education is not all gain. There comes a tendency to lose the power of acute observation and to depend on the written word for facts which are better verifiable from actual inquiry. We may also suspect that a great deal of education so called is extraordinarily clumsy and inept, an imposition from another culture without roots in the experience of those being educated. At such a level the fruits of education are just a new magic not related to reality or the intellectual needs of emerging personality. We should also remember how generally lacking in consciousness of the need for wildlife and habitat management is the average person in what I like to call the over-developed countries.

To be aware of the difficulties we have to face and of our own profound ignorance may make us the more modest in our approach. First we must set down the levels for which educational curricula and materials must be gathered together, and be sure that while we do not get levels and curricula mixed, there must be definitely a smooth continuity from kindergarten to post-graduate university level, remembering that the vast majority of children will not get beyond secondary education. An awareness of the organic environment is perhaps all that can be imparted at the kindergarten level, but at the elementary stage there is an insatiable curiosity to be satisfied and education should proceed from things known into things unknown. Dr. Paul Brandwein, my colleague in the Conservation Foundation and our Director of Education, has taken conservation as the central point of teaching science, that from knowledge of the natural resources around the child and their care - which is just plain survival training - deeper knowledge of scientific principles and different sciences follows naturally under good teaching. The Bantu boy who has spent many hours with his fellows catching bush rats knows that these animals occupy abandoned cultivated ground for ease of burrowing and the presence of an abundance of seed from annual plants which are the beginning of the new successional journey back to forest. He knows that the colonies of bush rats change their place even as his parents change the patches of cultivated ground. He knows the kind of ground favoured by his parents for clearing and something of the distinctive vegetation. This is a basis for imparting an awareness of the ecological principle of interdependence, and that there are sciences of life, of earth structure and of matter.

The high-school level should develop these formalized sciences from the eagerness which should have been engendered in the elementary classes of learning from the native environment. At this level, I can see little

necessity for difference in type and quality of education from that of the best of fully civilized countries, except that the native environment should still be used for initial reference before leading on to other habitats and communities.

We must keep in mind before passing this level of education that at this moment we are also faced with the necessity of an immense amount of adult education, of men who are active physically in making or marring their environment. They are probably illiterate and conservatively steeped in tradition and practice of exploiting their environment. Because of the crisis for survival of many kinds of habitat and wild life, education of this active adult stratum of society cannot be neglected on the grounds that youth will be educated and active with the new ethos in ten years; habitats and their wild life cannot wait that length of time for proper conservation. It is at this point that good audio-visual aids can give their greatest service. My colleagues, Mr. George Brewer and Mr. Jack Gibbs in the Conservation Foundation have produced many film strips for teaching conservation at the elementary level. These consecutive still colour cartoons are almost too simple for even a lightly sophisticated audience, but for the very young and the unsophisticated adult who knows nothing of what the projector can show, the one simply stated idea , the very simple coloured drawing and the time given for the image to sink in - for these the film strip is an invaluable aid. Naturally, it should be produced ad hoc and the mistake should not be made that the same film strip can travel over two thousand miles of continent.

This brings us to the obvious aid for all levels, the cinematograph, but again the teacher must be highly selective. I have found even in a western country that a person unaccustomed to the cinema or television is easily confused by rapid montage. Any western editor of a

film will impress the necessity of not showing long shots: All right; but most western editors are quite unable to imagine the degree of unsophistication of the primitive mind. The message of such films for education in wildlife awareness, conservation and management must be simple in construction, long in the camera shot and repetitive of the idea being got over. The itinerant film projector in the African bush is almost integral in education and not least in education in wildlife management. I may add that the African who has never seen such magic before is delighted and excited by moving pictures of wild life. He is ready to identify himself with the film and listen to a message in his own language.

Coming now to higher and specialized education we can say that research is integral at this level. Good wildlife management is the result of research and teaching must always admit that which we do not know and lead the student towards further inquiry. The College of African Wildlife Management at Mweka in Tanganyika is designed to produce African game wardens after a two-year course. This great venture, initiated by an American gentleman Judge Russell Train and his African Wildlife and Leadership Foundation, but supported by a host of private and public bodies, including the West German Government, has as its principal a research ecologist of the first rank, Dr. Hugh Lamprey. The students have the entrance standard of the English General Certificate of Education. Perhaps a fifth of them will be of such high standard that they will go on to the University, where they will begin with a decided advantage, but those who will go into posts as game wardens will have had a course in which the idea of research is implicit. There is so much to find out, and no course which involves a good deal of field work can possibly go through without some new fact being discovered. Research is discovery with a disciplined mind. Mweka could serve as a model for more such colleges elsewhere.

Lastly, the university, an institution of humane dignity, one which is springing up in so many of the less developed countries. A department of wildlife management is as sensible in such countries as a department of marine architecture and engineering at Glasgow or Liverpool or Hamburg. But do we award degrees in wildlife management? I think not. This subject involves as much botany as zoology and a sound knowledge of geology is needed, with a strong call for knowledge in soil science, meteorology and even agriculture. The student's first degree must be a sound one in the fundamentals whether of botany or zoology, but wildlife management should properly come into the ecology courses of the third year. If the student stays for the fourth-year honours course, the subject of wildlife management should be one of the possible choices. All members of the staff, from head of the department to junior lecturer should be a part-time research worker and the honours graduate should emerge with the notion of research as a continuing part of his life. Research in wildlife management in the less developed countries has in the past been the chosen task of individuals and of some game departments, but we can hope more and more that it will be closely linked with the new universities working in close co-operation with the game departments of the several countries, for these generally old-established departments have an immense store of local knowledge and of field conditions, and such liaison would obviously be economical and mutually enriching.

Finally, let me ask for some education the other way on - that grant-giving bodies and agencies for international aid to underdeveloped countries should learn that the conservation of a country's wild life is as important an educational field as the more obvious formal and technical subjects to which so much attention is presently being given without regard to the fate of the wildlife resource.

POTENTIAL CONTRIBUTIONS OF THE DONOR COUNTRIES IN THE FIELD OF EDUCATION AND RESEARCH

by Professor Dr.Dr.h.c. Wolf Herre

The structures of life on this earth are intermingled in various ways. This applies to the relations between fauna and flora as well as to the relations of the different animals to one another, and also the relationship between animals and man. Interference in our days, especially by man, causes a disturbance in the balance of nature. Wildlife utilization - in the sense of hunting - represents such kind of disturbance, and knowledge of the ecological conditions and relations is required in order to judge its effect and avoid disturbances. Scientific biological research is a basic requirement for wildlife management. Research must provide the basis for further measures. Such basic research must, therefore, be well-directed towards a special purpose. Technical assistance can be developed and organized only on this basis.

The general level of research and education is lower in the developing countries than in the donor countries. On the other hand knowledge of the basic problems of wildlife management in the developing countries is still small in the donor countries, due to the fact that there are a great many special aspects of specific ecological structures which require more detailed research on the spot. It is impossible to merely adopt experience and measures from other continents, or even to apply the knowledge gained in one part of a continent to another. The donor countries, therefore, have a great responsibility in this respect.

If the intention is to utilize wildlife, in particular large mammals, and this appears to be the right policy for the broad regions of Africa, planning and control

are necessary. Such planning must be based on biological research, at least in principle, and the biological findings must be incorporated into a larger project. I want to stress this very emphatically. Agriculture, veterinary services, etc., are very important links. Control requires trained personnel. Research and education should, therefore, work hand in hand.

If we put the question what types of personnel should be trained, if wildlife management is to be successful we will find that the following are required:

1. Personnel for outdoor work, whom I should like to call game rangers. Such persons could be selected mainly from local personnel in the country itself. Training centres such as that at Moshi, Africa, require instructors from the donor countries. These instructors should have received an excellent scientific and practical education. This would be real technical assistance.
2. Technical managers who can supervise the organization of wildlife management. It will probably be advisable to draw these from the personnel for outdoor work. In this case, training must be intensified and extended. This requires advisors such as biologists as well as scientists from other fields who have had administrative experience. It is clear that lawyers, veterinarians and experts on agriculture and forestry are required in the administration, and it must be emphasized that a new field, such as wildlife management, also requires biologists. This also falls under technical assistance to be provided by the donor countries.
3. It is impossible to do without research workers. They must serve as instructors and must also investigate and study habitats, food habits, biological factors, population structure, etc., in respect of the different species to be managed in order to help determine the utilization quotas. Furthermore, the general ecology must be analysed and the physiological character-

istics of the game species must be established and studied in order to provide comparative data for agriculture. I consider it necessary to emphasize this relation to agriculture, as want to make possible an economically important contribution to protein production. Further studies are required in other fields of science, as e.g. in the field of parasitology where zoologists and veterinarians should co-operate, and also in the fields of pure veterinary science, market research, etc.

It is my opinion that in principle the utilization of biological objects presupposes as large a reservoir as possible of well-founded biological knowledge in order to ensure lasting success, produce a base for calculations and provide sufficient protection of the species, which, in turn, will permit permanent utilization. There is no doubt that the donor countries will have to educate research workers for this purpose. The request for such research workers has become very urgent. Research workers can acquire knowledge which is fundamental to wildlife management in various ways.

1. By long educational stays for the purpose of working on a clearly outlined research programme. For such study trips general biological experience is presupposed, in order to ensure that the research work will be carried out with good prospects of success. As a rule, therefore, only older scientists can be entrusted with such projects. Such study trips have provided important knowledge in the past; today important knowledge is still gathered in this same manner, and such work will also be very useful in the future. Therefore, such projects should be promoted by the donor countries. It will have to secure the co-operation of scientific organizations if there is to be the certainty that only qualified scientists are sent out. Very often only material and experience

are gathered on these expeditions to the developing countries. The evaluation of the material, for which work relevant literature and comparative data must be consulted, takes place in the donor countries. The number of biologists who are willing to take the burden of such an expedition upon themselves will always remain small. And the fault of this procedure is that many problems cannot be tackled because laboratories are not available and because the scientists cannot remain on the job for a sufficient length of time, having other professional commitments in the donor countries. In order to secure permanent wildlife management the working base must be extended. We must attempt to arouse the interest of younger persons. These are needed. We must go to the source of these younger persons, i.e. to the universities, and awaken interest there in our problems.

2. In order to interest younger people in the problems of wildlife management, young research workers should be sent out to the developing countries. They could be assigned special tasks by experienced scientists or work on problems on behalf of special organizations, such as national park administrations. Some first results have already been achieved in this manner, and further useful work is being done. Such a limited range of activity makes it difficult to obtain a general view to the extent required for really judging the problems of wildlife management on a large scale. This means that it is doubtful whether this scheme will produce persons who are truly qualified as managers.

   In order to give young people a broader base of knowledge courses on nature conservation and wildlife management are being organized. The first of these courses has just ended at Salisbury University; others will start at Pretoria, and more will probably be

organized elsewhere. The programme of wildlife management training in the USA has inspired and served as model for these courses. Similar training is also being given in the USSR.

By the means of such courses we shall obtain persons from the donor countries with knowledge and experience of the basic problems of wildlife management in the developing countries and development aid can then make use of these persons. But very soon new problems arise: How can it be ensured that these younger people are employed in a sensible and useful manner, and what direction should their future career take?

Assignments for a limited period are often possible on a scholarship basis. But experienced research workers or even those with little experience do not want scholarships, they want a salary. If the future work of such scientists is to be of value they must broaden their knowledge and experience in the developing countries. They should not serve in a project as experts only, since this entails the danger of biased judgment. They should also not be absorbed by administrative problems. It is important that they keep themselves informed on scientific developments and current publications. Above all, they must evaluate and publish their findings. Their professional career prospects must then be made clear to them.

Such preconditions can seldom be fulfilled by the developing countries and the donor countries have no agencies that could take remedial measures. No assurance can be given that these young scientists will be offered positions in developing countries upon completion of their assignment. They therefore prefer to return to their home countries and seek employment there, with the result that the valuable fund of knowledge and experience they have acquired is hardly

ever fully exhausted. It is therefore necessary that the donor countries bring about a change in organization. This should be initiated by development aid, and other institutions should be encouraged to co-operate. This is the only possible way to carry out long-term research studies involving experimental laboratory work. These problems already exist and others will arise; solutions must be found. It would be possible to find solutions if closer contact with the universities could be established also in the donor countries. In Europe such ideas have been discussed on several occasions, to my knowledge at Oxford and also in Germany.

3. These considerations stem from the idea that in view of the rapid progress being made in the developing countries and especially in view of the population growth it will become necessary to establish a clear distinction between wildlife, in the sense of nature conservation and wildlife management, and the measures required to promote agriculture - in the first line animal husbandry. This, however, requires broad knowledge of the distribution of a species and its causes, ecology, physiology, genetics, population structure, bioenergetics, etc., in respect of both wild and domestic animals. Impartial decisions free from emotional bias that will serve both protein production and nature conservation can only be made as a result of such comparative observations. In the near future conflicting situations will no doubt become more pronounced.

   In South America, e.g. in Patagonia and in the High Andes, the great importance of the decision as to whether wildlife management should be preferred to the keeping of domestic livestock became amply clear to me. And not seldom the decision was made in favour of wildlife management.

In Africa these decisions play a much more important role, owing to the fact that the game potential is much larger. The variety of game species in Africa - with very often a great density of populations - leads to closely interlaced ecological relations. These require studies of the basic biological problems if interference in the form of productive wildlife management is to be carried out, and when bioenergetic factors and economic calculations must be considered before making a choice between game or domestic stock. In the long run persons from the developing countries themselves must receive the training necessary to carry out inventory research projects, and prepare documents which can then serve as a reliable base for decisions when new problems arise. This will surely be the case if the population growth continues as expected. I believe that scientific data regarding game species in Africa are now available to a certain extent but the structural relationship between the various animal species as well as the relationships between the species and the vegetation and other environmental conditions are still very unclear. It is no doubt the duty of the donor countries to concern themselves intensively with these fields of research if they are to give advice on wildlife management. Biological research must therefore help to create the essential foundation. It would be wrong to overlook this fact and to neglect it in favour of more topical problems requiring decision.

Summarizing, I can only state that wildlife management will be of great and long lasting economic importance to the developing countries. I am convinced that, provided the right balance is found, nature conservation will also be served and the right relationship to the agricultural sector will be found. But the work that must be accomplished, the planning that is required can be successfully executed only if scientific biological

research is undertaken on a broad enough basis and at the right time. I therefore recommend the following:

1. The establishment of a vertebrate research station in a developing country financed by a donor country in connection with a university. This research unit would carry out research work connected with projects in the developing countries, employing persons from the donor country and instructing and educating persons from the developing countries. The research should be free and oriented towards the basic biological problems of wildlife management.

   I believe that this would be the most effective point of departure and the most valuable form of assistance. I should like to compare a research station of this nature with a clinic in which individual patients are cured but where at the same time public health conditions of a country are studied.

2. Experienced scientists should be delegated from the donor countries to the developing countries for work on special research projects which will break new ground. These persons must be granted leave for a longer period of time and sufficient funds must be earmarked for this purpose. The project should be critically evaluated from a scientific point of view.

3. The further training of younger scientists from the donor countries in the developing countries. They could attend training courses or be assigned particular tasks by authorities such as national park administrations or game departments or by older scientists. Here again these tasks should be examined critically from a scientific point of view.

4. The training of technical personnel for wildlife management. These technical assistants should be recruited from the developing countries and trained by scientifically and technically trained personnel from the donor countries.

POTENTIAL CONTRIBUTIONS OF INTERNATIONAL ORGANIZATIONS TO EDUCATION AND RESEARCH

by Dr. Fritz Vollmar

1. Introduction

The activities of international organizations constitute the subject of my lecture. This introduction must therefore immediately serve to limit the vast scope inferred by the title in two respects:

Firstly, it would be quite impossible for me to deal with the activities of all or even of the most important international organizations concerned in some way with wildlife in the developing countries, be it in matters of research, enlightenment of the population, education and training, or in the financing or practical realization of wildlife utilization projects. FAO, UNESCO, and the United Nations Special Funds may be mentioned as examples. I am neither authorized nor competent to discuss the activities of with these organizations quite apart from the fact that some of them are represented at this conference. I shall therefore limit myself to informing you on the two international organizations, one might call them sister organizations, which have their headquarters in Morges, Switzerland, namely, the World Wildlife Fund (WWF) and the International Union for the Conservation of Nature and Natural Resources (IUCN), which acts in an advisory capacity to WWF on scientific and technical matters. I shall mention the activities of other organizations only in so far as they are directly connected with those of IUCN and WWF.

The second limitation is imposed upon the theme of my lecture by the fact that I shall be speaking about these two organizations not as a scientist, but as an

administrator; that is, I shall be dealing with the organizational and financial activities of these organizations.

Turning now to the subject of my lecture, I shall commence for reasons of seniority and comity with the activities of IUCN and deal later with those of WWF.

2. The activities of the International Union for the Conservation of Nature and Natural Resources (IUCN)

IUCN was founded in 1948 at Fontainebleau and was then known under the name International Union for the Protection of Nature. Its chief activities were at first concerned with preservation tasks in the traditional sense, i.e., preservation of nature, soil and water reserves; establishment, operation and expansion of national parks, nature and wildlife reserves; protection of endangered animal and plant species; promotion of legislation on the preservation of nature; education towards wildlife awareness and so on. And all this of course on a basis of scientific and especially ecological research. It was not by chance that IUPN convenced the first truly international conference on nature preservation at Lake Success in the United States of America as early as in 1949, at the same time and at the same place as the Scientific Conference for the Conservation and Utilization of Resources organized by the United Nations. One of the topics on the programme of the IUPN conference was "Basic Problems of Ecological Research in Relation to the Conservation of Natural Resources", and in the minutes and reports of this conference frequent mention is already made of "multiple use" and "planned enterprise". These are indications of the future development and expansion of nature preservation efforts on an international level made manifest in 1956 by the change of

name from International Union for the Protection of Nature to International Union for the Conservation of Nature and Natural Resources. This change of name was far more than a mere formality. It was a milestone, one might even say a turning point, in the history not only of IUCN but indeed of nature preservation on a global scale. Conservation as opposed to protection includes not only the preservation of nature in all its manifestations - landscapes, soil, water, flora and fauna - but also rational, economic utilization of natural resources based on ecological research and remaining within the limitations set by nature. Very many people and especially those connected with nature conservation still have difficulty in understanding this in the true traditional sense of the words. A statement made by a former secretary-general of IUCN should be sufficient to dispel all doubt:

> "In the countries where population density is in the process of outskipping the food production from a worn-out soil, the better techniques of practical conservation become essential to human survival itself."

It can be said that international organizations did not begin to take concrete interest in the field of wildlife ecology until about ten years ago or even not until the beginning of this decade. Before 1960 there were not more than a few scientists investigating questions of wildlife utilization in connection with their studies, chiefly in Central and South Africa. Some of these are present at our conference today and they may well be described as pioneers in the field of ecology. They drew the attention of wider circles to the possibilities waiting to be tested in this field, possibilities whose realization lay not only in the economic interest of humanity but also in the interest of the preservation of richly abundant wild-

life reserves and of the very soil. Around 1960 all the larger international organizations concerned with the regenerative natural resources of the earth came almost simultaneously to realize the importance of wildlife as a potential source of food and to recognize possibilities of economic utilization of these resources. The possibility of applying the principle of continuous utilization - long since generally recognized and applied in forestry - to other natural resources and particularly to wildlife, which had hitherto hardly been regarded as a resource at all, was suddenly realized. This possibility was one of the central themes discussed during the first session in 1960 in Ibadan, Nigeria, of the African Forestry Commission which functions under the auspices of FAO. The preservation of wildlife by means of controlled continuous utilization was declared a task to be tackled by the developing countries of Africa.

Since 1960 IUCN, both on its own and in collaboration with other international organizations, has played a leading part in further developing the idea of rational wildlife utilization and in putting this idea into practice. During the IUCN General Assembly in Warsaw in 1960 the importance of the management of freely roaming herds of wild animals was emphatically stressed. This assembly also launched the extensive scientific programme known as the FAO/IUCN African Special Project (ASP) which came to be realized in the following years. One of the statements in the programme runs:

> "Conservation in this sense applies to water, soils, vegetation, and wildlife. (although) special attention will be given initially to the large mammals which provide an important natural resource, but which are seriously endangered in many areas. This project will be focused primarily on the wild habitats, in-

cluding national parks, faunal reserves, nature reserves, and also other areas of wild land which, under management, are capable of producing crops of animal protein and other wild products on a sustained yield basis."

During all three phases of ASP, which was implemented during 1961-1963, "conservation" was understood and propagated as meaning the wise use of natural resources and particularly of wildlife on a scientific basis and under scientific control. During the conference on the "Conservation of Nature and Natural Resources in Modern African States" held at Arusha in September 1961 and introducing Phase II of ASP, 11 of the 60 papers presented dealt with the utilization of wildlife reserves through the development of tourism and through the ranching of wildlife resources. And a prominent place was given to recommendations concerning the utilization of wildlife, which is regarded as an important regenerative natural reserve, in the reports of ASP experts who visited a total of 17 African countries during Phase III of the project in 1962 and 1963. Since that time IUCN has participated in an advisory capacity in the elaboration of several concrete wildlife utilization programmes.

Finally, to complete the picture, this brief sketch, which is intended to demonstrate the growing realization of the importance of wildlife utilization in connection with the preservation and use of the natural resources of the earth, should include mention of the conference on the "Organization of Research and Training in Africa in Relation to the Study, Conservation and Utilization of Natural Resources" held in July and August 1964 in Lagos, Nigeria, under the auspices of UNESCO. I should like to quote the two final paragraphs of the report:

"The purpose of conservation - a term that is not identical with preservation - is to prevent the deterioration of man's entire biological environment: A suitable rhythm must be found in exploiting the components of the environment."

"Care is necessary to ensure that wild species of fauna and flora which, under the present conditions of rural economy, are not systematically used by man, do not disappear, since throughout history man has selected and adapted wild species to meet human needs, which now constitute sources of food and even of raw materials for industry."

The above also demonstrate the relationship of IUCN to the two United Nations Specialized Agencies already mentioned several times, UNESCO and FAO. This relationship was once described by the Director-General of FAO:

"With regard to conservation of resources, the Union (IUCN) must serve as a link between the scientific and educational work of UNESCO and that of FAO, which concerns itself with world agriculture and nutrition."

3. <u>The Activities of the World Wildlife Fund (WWF)</u>

I now come to the second part of my lecture, in which I should like to describe the position and activities of WWF in relation to the theme of this conference.

The World Wildlife Fund was described by its founders as "an international organization to save the world's wildlife and wild places." It is the sister organization of IUCN, founded 13 years later in the autumn of 1961 out of the need to create an additional organization to relieve the well-functioning IUCN, which had become

expert in handling the broad technical and scientific sides of wild life conservation on a world-wide level, of the difficult task of raising funds for financing the more important wildlife conservation projects. It is easy to understand that the same persons or circles acted as godfathers to the new organization three years ago as had founded IUCN in 1948. From the start, therefore, WWF was not intended as a rival institution to IUCN or other existing organizations but rather as a necessary supplementary institution, as an instrument for the financing and promotion of nature conservation all over the world through propaganda and the exertion of influence on the public and on official circles in as many countries as possible, and perhaps also as an instrument for co-ordinating the many varied and differentiated efforts towards nature conservation. Thus there was no need for WWF to establish technical and scientific commissions, which had already been done by IUCN and other organizations. Instead it was able to concentrate on its true function, namely, the raising of funds and the considerably more congenial task of distributing the available means for concrete nature conservation projects undertaken on the basis of expert research carried out by its technical and scientific advisory organizations and in a particular order of priority. As Secretary-General of this organization, however, I must be honest and admit that as yet WWF has only been able to enter in a very limited fashion its intended role of "world bank for the preservation of nature." There are several reasons for this. In the first place hardly three years have passed since its foundation, and this is a relatively brief space of time.

In the second place it had originally been intended that WWF should tread an independent path in its fund-raising efforts and make means available to nature con-

servation from sources that had not as yet been exploited, i.e., from private firms and individuals but not from the public purse. These self-imposed restrictions have limited the supply of funds that has been available so far. A few figures will be of interest. Out of the funds provided by its national promoting organizations in Great Britain, the United States, the Federal Republic of Germany, Holland and Switzerland WWF financed a number of nature conservation projects. About one quarter of this sum was based on loans. On the other hand the projects implemented through the influence of WWF on the different governments without direct recourse to its own funds already amount in value to many times what it has itself been able to supply and so it can on the whole be proud of what it has achieved during the brief space of its existence.

WWF is pledged by charter to world-wide conservation of fauna, flora, forests, landscapes and water reserves and all other forms of nature, conservation being here understood in its modern sense as including the economic utilization of these resources. In these circles it of course goes without saying that this utilization must be based on scientific knowledge and must not lead to exhaustive use of any or all natural resources. In a declaration published already two years ago by the Chairman of WWF on the motives behind conservation we read:

> "Economics: Wildlife is a major tourist attraction. It can also be a source of protein from schemes for cropping the surplus animals without endangering the breeding stock. National parks and nature reserves can be the most economical as well as the most enlightened use of land."

This attitude was expressly confirmed last week by the Founders' Council of WWF in view of this conference. It was stated that wildlife ecology and indeed all forms of utilization of natural resources should be supported on condition that they were based on scientific knowledge and remained within the bounds of conservation in the widest sense of the word, thus being concerned not merely with the preservation of certain species but with the conservation of existing ecological conditions in a certain area or their restoration where destruction had already set in. On the other hand utilization projects threatening to produce negative or known but as yet unstudies reactions in the order of nature should be regarded with scepticism. Finally it was declared that on no account should wild life utilization be practised in areas declared to be strict nature reserves, since these should be set aside for scientific work and research.

Should anyone ask me what WWF had actually done hitherto in the way of financing and realizing wildlife utilization projects I should at first be at a loss for an answer. Indeed the answer is "nothing" or certainly not much more than nothing if what has been achieved is to be measures according to its monetary value alone. This sobering statement must be qualified, however, by the fact that of all the 150 applications for support for nature conservation projects received by WWF hitherto there was only one directly concerned with wildlife utilization. This was a project of research into the possibilities of the commercial utilization of eland in Southern Rhodesia, now shortly to be financed by the Special Fund of the United Nations with which WWF has not yet dared to compete. Apart from this WWF has been given no opportunity to consider or finance concrete wildlife utilization projects. It should, however, be mentioned that WWF has

contributed indirectly to the realization of the FAO/IUCN African Special Project through its annual contributions to IUCN and has supported the training of African game wardens in the field of the economic utilization of wildlife reserves through its annual contributions to the College of African Wildlife Management in Mweka, Tanganyika. Finally, very recently suggestions concerning wildlife utilization programmes have been submitted to WWF by some African countries as a result of suggestions made by ASP experts.

In conclusion I would like to indicate the possibilities of WWF co-operation in the financing of wildlife utilization projects in the future. Since the financial position of WWF is anything but secure, let alone flourishing, it seems unlikely at present and probably for some time to come that WWF will be able to participate in such projects to any great extent. The means available are too limited and the applications for support for other to some extent urgent projects too numerous (e.g., research, training, reservation or species protection projects). Certain practical possibilities do, however, seem to be taking shape, whereby such projects would be tackled in collaboration with the appropriate government departments of different European countries and financed according to special agreements stipulating considerable financial support from the governments in question. It is not my task here to go further into the prospects existing in this field in the Federal Republic of Germany No doubt more competent representatives of the appropriate departments in the German government will deal with this subject. But as a delegate from Switzerland I should like to say that for instance the Service for Technical Co-operation of the Swiss Federation in Bern considers co-operation with WWF in this field possible. Quite recently a respresentative of this service wrote:

"Should the wildlife utilization project under discussion promise to lead to an improvement of the meat supply for the population, it may be possible to consider a contribution on our part."

However, the best prospects of successful co-operation between WWF and the various government departments in carrying out wildlife utilization projects in the developing countries exist without a doubt in the Federal Republic of Germany. I should therefore like to close with the wish that this co-operation may grow to the satisfaction of both partners and may soon lead to positive results in the long-term interest of nature conservation and the preservation of natural resources and particularly of wildlife in the developing countries.

B. W O R K I N G P A P E R S

THE DEVELOPMENT OF WILDLIFE MANAGEMENT IN THE AFRICAN COUNTRIES WITHIN THE FRAMEWORK OF THE TECHNICAL ASSISTANCE PROGRAMME OF THE FEDERAL REPUBLIC OF GERMANY

by Dr. Dr. H.H. Roth

I. Introduction

With the progress of agricultural research and the practical development of the European methods of agriculture in Africa it has become increasingly apparent that in many parts of Africa, especially in the lower lying dry forest or bush savannahs, the carrying capacity of the vegetation is in the long run not sufficient to support even a very extensive pastoral industry, let alone intensive grazing. The Agro-Ecological Survey of Southern Rhodesia, and official investigations carried out with great care, showed that e.g. 25 % of the total area of Southern Rhodesia was unsuitable for the cultivation of useful plants or intensive grazing. Rough grazing (ranching) in Africa is based mainly on primitive mixed breeds which, although hardy and climatically well adjusted, have a poor carcass weight and little resistance to various diseases and poisonous plants. Agriculturalists are attempting to achieve greater productivity in these areas by introducing large-scale, expensive irrigation projects on the one hand and by seeking to improve breeding stock on the other. The aim of such breeding is to produce a domestic breed adjusted to local condiditons and resistant to contagious diseases which will yield more protein even under extensive farming. These attempts have so far failed to produce satisfactory results and approximately 4 million square miles, including more than half of the area of

Tanganyika, are unfit for cattle breeding, due to the fact that domestic stock is susceptible to Nagana disease transmitted by tsetse flies. Animal breeders overlook the fact that the qualities they wish to breed into the non-indigenous cattle are already present to the highest degree in numerous indigenous wild ruminants, and that this game is a natural and profitable source of protein which needs only to be utilized and managed on a proper farming basis.

Scientific investigations have shown that especially the labile dry savannahs of Africa can carry game populations which have a greater animal liveweight per unit area than game herds in Europe and which produce considerably more protein than the best possible domestic stocks do. The greater productivity of game in certain parts of Africa is due to the fact that the various species have different food habits, are very often less dependent on water, and feed within a larger radius. In this way the vegetation is utilized to a greater extent in a much more evenly distributed, natural and less damaging way than would be possible with cattle. Furthermore, the dressed carcass weight of most herbivores is considerably greater than that of cattle; they are also highly resistant or immune to most contagious diseases.

The planned management and further utilization of African wildlife on an ecological basis is therefore a most promising field. At present the basic ecological and technical problems of wildlife management are being studied at various places in Africa.

II. The Various Bases of Wildlife Management in Africa

The fundament of all wildlife management must be a knowledge and understanding of ecological relations and structures in the area concerned. Wildlife manage-

ment planning, therefore, can and must be undertaken only by qualified persons with a background in biology, of whom there is a great shortage in Africa. Wildlife management planning presupposes the availability of:

a) A carefully carried out game inventory: In many parts of Africa it has not yet been possible to obtain censuses on the game species, owing to the lack of efficient working methods to date. However, wildlife management can in most cases be carried out on the basis of relative figures and botanic-ecological surveys. The latter are absolutely necessary if the ecological trend is to be properly taken into account in planning. The dynamic adaption of wildlife management measures to the observed development makes regular controls indispensable;

b) a technically experienced and well-equipped organization for cropping and dressing;

c) a sales organization and appropriate marketing channels.

Wildlife management must therefore in principle depend on the interplay of a planning and controlling authority and a technical executive authority. Only in this way can there be certainty that the large game populations in Africa constitute and will remain a constant economic source at the disposal of the country concerned. Properly managed wildlife in the areas outside the national parks also plays an important role and prominent experts on nature conservation are convinced that herein lies the only hope of retaining unique African big game. For this reason we support the commercialization of wildlife, notwithstanding all its disturbing concomitant aspects.

III. Technical Organization of Wildlife Management in Africa

The technical organization of wildlife management varies

from case to case, depending on the prevailing ecological, sociological and political conditions. In principle, however, we can distinguish two basic forms:

a) Management of natural game populations which fit harmoniously into the ecological system by establishing large-scale hunting units. Depending on local conditions and the ecological trend, such management on a unit basis may be geared to either one or many species (elephant, giraffe, buffalo, zebra, antelope, jumping hare).

b) Management of natural herds which are raised on large fenced-in ranges for the purpose of meat production. Cropping takes place in limited areas according to game quotas based on the rate of reproductivity of the species. This form of management is very practical for eland and also for big kudu, springbuck, and bushbuck, eventually also for buffalo and giraffe.

Depending on local conditions, the responsible authorities for wildlife management may be:

a) Private landowners insofar as a game inventory taken under government supervision has indicated that the game is suitable and available in sufficient numbers. Based on this inventory, the landowner receives instructions for a cropping plan. However, the utilization of game herds for a special purpose (see b) above) is very often beyond government control, as stock increases through artificial insemination and semi-domesticated stock can be regarded as private property.

b) Private hunting and management organizations undertaking wildlife utilization on private property and on government territories under contract. The work of such organizations also comes under government control, as outlined under a). Private wildlife

utilization organizations can be fully mobile, using the most modern hygienic equipment, and in Africa they constitute the most effective means of economic utilization in respect of certain game species.

c) Local municipal administrations or tribal authorities carrying out specific local game management projects (elephant and hippopotamus) under government control.

d) Government institutions such as national parks and game and forestry departments. Because of the definitely commercial character of wildlife management, government institutions are very often not suitable organs for the execution of wildlife management projects. It is therefore desirable to place private organizations under contract to implement and execute such projects, as is done in the field of forest management. In Southern Rhodesia this practice is followed by the Forestry Administration; a distinction is made between wildlife management on general government territory and management in national parks. As administration and management in the national parks are guided exclusively by ecological considerations and by principles of conservation, cropping is left to the government institutions.

Game is used for the production of the following products:

a) Fresh meat (where cold storage facilities are available at the slaughterhouse and for transport)

b) dried meat (biltong, charqui, etc.)

c) meat meal

d) meat preserves (where central canning plants are in operation in large cropping areas)

e) bone meal

f) soap

g) skins

The kind of production again depends on local conditions and available markets. In Southern Rhodesia and in South Africa, where there are large cities, the most lucrative product is fresh meat, followed by biltong (spiced dried meat). The first game meat canning factory is now starting up operations in Southern Rhodesia with the purpose of rendering game management less dependent on the market. Meat meal is of special importance in rural areas of Africa where it is sometimes necessary to overcome prejudices of a mystic nature against certain species.

IV. Development of Wildlife Management in Africa and Technical Support

The technical promotion of wildlife management in African countries should cover the development of a planning and controlling authority as well as the creation of an executive organization.

1. Planning and control of wildlife management projects should be politically neutral to the degree possible and should be carried out on a strictly scientific basis. It would therefore be preferable to establish a special institute expressly for this purpose. An institute of this nature could be affiliated to a German university; it should have a staff of scientists equipped to carry out the necessary game inventories with the assistance of local labour and to study the possibilities of wildlife management in specific areas. A continuous improvement in the agro-ecological working methods could also be striven for.

   Wildlife management projects to be elaborated must base on the following:

a) Determination of the game potential from both the biological and the economic side;

b) market research;

c) recommendation of specific forms of utilization;

d) recommendations for the technical and administrative execution of the wildlife management project.

Elaborated management projects will be recommended to the governments concerned; the institute should be located in a place where it could serve all the countries of East and Central Africa. If a project is then carried out, it will be an important function of the institute to exercise control in respect of management measures and to suggest appropriate changes when necessary in co-operation with the local game departments.

2. The form of technical organization adopted by the authority responsible for implementation will be determined to a large extent by the requests and intentions of the government concerned. But perhaps the attempt should first be made to set up special private or semi-private mobile utilization organizations similar to the private Wild Life Utilization Services Ltd. of Southern Rhodesia. Such organizations could be supported financially and supplied with equipment by the Federal Republic of Germany via the institute as the advisory authority. The practical work of such utilization services should be guided by the institute which could then assist these services in undertaking scientific investigation and improving hunting methods, cropping hygiene, and meat processing.

In this respect it is important that the control institute have veterinarians on its staff responsible for matters of meat technology and meat hygiene.

These veterinarians would work in close co-operation with the hunting and sales organizations. It would be even more advantageous if work in this field could be concentrated either at a stationary processing plant (canning factory) located in a central cropping area or undertaken by a mobile processing unit, which should also be provided under technical assistance and placed under the control of the main institute.

Eventually, after wildlife management has become a permanent institution in the young African countries, the Institute for Wildlife Management can be taken over by the university of the country concerned. The most favourable location for an institute of this nature would be Zambia (Northern Rhodesia). The Government of Zambia is very open to all problems of wildlife management and conservation and several interesting projects of this kind are already being carried out with the support of the UN Special Fund. Apart from this, the largest unutilized game areas - these are not suitable for agricultural purposes - are the bush savannahs in West and South Tanganyika, in the Luanwa Valley and the Kafue Flats of Northern Rhodesia and on the Kalahari Desert south of Upper Zambesi in Bechuanaland.

Prominent scientists are convinced that the management of large game populations in Africa - especially in the tsetse regions - constitutes the only real possibility of covering the food requirements of the rapidly growing population of Africa in the future. In light of this knowledge the technical development assistance provided by the Federal Republic of Germany for the development of wildlife management in Africa is fully justified.

WILDLIFE MANAGEMENT IN DEVELOPING COUNTRIES AS A SUBJECT OF TECHNICAL ASSISTANCE, AN OBJECT FOR THE CONTRIBUTION TOWARDS SOIL CONSERVATION AND THE PROTECTION OF WILD PLACES

by the Federal Ministry for Food, Agriculture and Forestry
of the Federal Republic of Germany

I. Economical reasons determine measures for soil conservation and the safeguarding of wildlife

Measures for land- and wildlife conservation are - in Europe - mainly thought to be necessary for ethical reasons. This leading thought is in itself insufficient as far as technical assistance is concerned. Above all it does not take into account the actual situation of the indigenous peoples who live with and on wild game. The following premises should be considered:

1. In large parts of Africa and Asia, which were formerly thinly settled or still are so today, and which are more or less barren and fairly regularly unproductive, wild game is one of the rare gifts of nature.

2. A balanced exploitation of game as well as its rational utilization as food contribute to better nutrition of the indigenous population, give the initial momentum towards rational development and, for instance, by supporting tourism, alleviate the chronic lack of foreign exchange.

3. Controlled wildlife exploitation would simultaneously permit the objectives of both nature - and soil-conservation to be attained, by banishing the grave threat to the fertility of whole regions and the subsequent extermination of its wildlife,

particularly there where certain species are already endangered.

II. Situation in the (former) game areas of Africa

The description refers to the following countries: Kenya, Tanganyika, Uganda, Somalia, Nyasaland (Malawi since July 6th 1964), Bechuanaland, Northern Rhodesia, Aethiopia, Nigeria, the Tschad, Dahomey, Senegal and the Upper-Volta. Important sections of these countries which are still entirely economically undeveloped are excluded. In those parts the populations live in the most primitive conditions and hunting is one means of providing food. Here neither the land nor the game are in any danger.

In those regions however where economical development has begun and which were formerly exclusively populated by wild game, the situation can be described as follows:

1. Through haphazard colonization and the uneconomical exploitation of land, the best grazing for game has been eliminated. Thus the supply of game (as food) for the indigenous population becomes precarious. In view of pertaining climatic conditions such upsets result in catastrophic consequences for the fertility of the soil and subsequently for the whole agrarism economy.

   In this way, for instance, soil fertility is unbalanced to a considerable extent by shifting cultivation. These destructive methods are then repeated from year to year at other places.

   A further threat to the existence of wild game is provided by the increase in domestic animals-cattle. During periods of drought this threat increases still further through heavy concentra-

tion of game and cattle in better watered areas. An additional danger is then provided by communicable cattle diseases.

Intensive cattle grazing - and migration destroy the grass over, endanger soil fertility and result in soil erosion of considerable amplitude. Furthermore the grazing capacity of territories formerly used by wild game alone is now insufficient to guarantee profitable cattle rearing. Research has demonstrated that game makes a more rational use of the available fodder and thus could provide a higher overall meat yield than cattle.

2. Rational exploitation of game is becoming impossible because of so-called "subsistence-hunting" and in certain instances its very existence is threatened by senseless slaughter as a result of economic expansion.

Former colonial governments had begun to establish National Parks and Game reserves, either to protect game directly or to exploit it rationally. This in itself is insufficient; often too the parks are badly run and even in such protected areas game is not safe from the indigenous population. In Kenya for instance, only 60 % all protected territories is really available to wild game.

In the unprotected regions the former colonial governments had frequently established hunting areas. They insisted on controlled game hunting, fought the poachers and organized safaris. These hunting stations have been frequently abandoned or have not yet been staffed with qualified personnel. Uncontrolled hunting, particularly in the vicinity of roads, endangers existing stock.

Still more dangerous is poaching for commercial reasons, because only ivory and similar trophies are sought, whilst the game itself periches uselessly.

III. Project planning

The axiom of "technical assistance" may fundamentally be applied in implementing the improvement of wildlife management. Certain difficulties may arise from local conditions and the varying educational level of the population. The following objectives are especially worthy of support.

1. Government discussions which refer to the following measures:

   a) The re-grouping, or at least the co-ordination of all existing organizations interested in wildlife protection, for the purpose of unifying measures on a regional or super-regional basis.

   b) Strenghening of a government game department, both with personnel as well as financially.

   c) Re-organization of the managing of national parks and wildlife reserves.

   d) Statutory laws on the use of firearms.

   e) Participation or regional management in the revenue resulting from the exploitation of game and of national parks.

   f) Increase of protected areas.

   g) Training of personnel for purposes of control (inspection) and protection.

   h) Establishment of research stations on wildlife.

   i) Organization of the actual exploitation of game once killed.

2. Educational centres, demonstration areas and hunting areas for the following purposes:

a) Planned hunting and subsequent surrender of the game in question.

b) The processing of game, its conservation and use of all by-products (skins..)

c) Promotion of tourism.

These ideas would be a novelty for all African countries. They require the collaboration of experts trained in the ways of wildlife, veterinarian science and economics, who in turn would require support by adequate research. Beginning with the urgently needed training of game wardens such an undertaking would be highly desirable.

IV. Summary

The furtherance of the objectives of the WORLD WILDLIFE FUND -GERMAN NATIONAL APPEAL concern territories, which are beginning to develop economically under tropical or sub-tropical conditions. The ethical point of view on the conservation of wildlife should not lead to unilateral measures.

The last Commonwealth Forestry Conference - Nairobi 1962 - did in fact admit that the preservation of Africa's fauna was a matter of universal interest to all mankind. But it also came to the conclusion that the immediate cost of wildlife conservation and of the restriction to which the African populations would have to submit, ought to be born by one and all, but primarily by the highly industrialized nations.

The conservation of wild game is above all a question of economical planning. Questions of nature, technical and economical problems are important. Deci-

sions will have to be made by the politicians. As long as political decisions about these territories which are to be retained for wildlife protection have not been made, one should refrain from supporting individual undertakings.

Worthy of support are those measures which give promise of a remunerative wildlife management scheme or which serve the purpose of instructing local populations about such schemes.

C. SUMMARY

1. While the tasks of game management have been considered jointly on the occasion of other meetings and conferences, e.g. by IUCN in the framework of utilization and conservation of natural resources, this meeting held by the German Foundation for the Developing Countries was devoted for the first time to this problem with regard to development assistance.

2. This meeting has been particularly significant since it underlined the economic importance of game populations for the development of many areas in many developing countries, particularly in Africa, and accomplished the preliminary work for the solution of a great number of organizational and technical problems relating to game management and utilization. The recommendations given by the participants of the meeting will be the basis of work for a working session of FAO to be held in 1965 (cf. recommendations).

3. Adapted to local conditions, game management may persue different aims. Meat production might contribute to improved nutrition in areas where the population suffers from a lack of protein; this would imply the utilization of the available skins, bones, ivory etc. which offers possibilities of work followed by exports, the outcome of which are foreign exchange earnings.

4. Game populations mean also a center of attraction for tourism. Referring to examples in different African countries, the possibilities of organized visits by photo tourists and the arrangement of hunting safaris are being considered. In planning national

parks, it is necessary to associate ecological principles with the requirements of visitors.

5. Due to its more careful soil treatment as compared with other cultivation forms systematic game management can contribute to the conservation of the fertility of marginal soils in particular and can thus be of decisive importance for the protection of the landscape in an economic way.

6. In projects of game management the principles of development assistance can be realized. The meaning of "conservation" implies that the projects lead to a conservation of landscape and game by economic measures. Protection and conservation without economic effect is not considered to be a task of development assistance.

7. The task of utilizing the available game population in a systematic way has been recognized only partly by developing countries. In the field of game management and utilization in tropical zones the South African Union and New Zealand have obviously made the greatest progress. In Africa the South African and East African developing countries seem to have promoted the task. In West Africa only insignificant approaches are to be noticed. The exemplary organization of the national parks and of game protection in the Congo has not yet been re-established.

8. Due to different natural conditions technical know-how of the industrial countries cannot be adapted to tropical regions, not even from one region to another within developing countries. The lack of safe knowledge should, however, not be a motive for not carrying out practicable measures.

9. The condition for all measures is a decision on the limits between game management and other forms of land use. A basic measure will be the survey on the game population, for which satisfactory methods are known which should, however, be employed in an individual way. Another basic measure will be the analysis of meat consumption by the population.

10. The form in which game management - district system of licenses - should be carried out is being discussed. The advantages of private management by which developing countries are being exonerated is being underlined. General game management in national parks is being denied considering the different aims of these establishments.

11. The task of game utilization is of a complex nature. It can only be fulfilled in co-operation by experts of the different disciplines. Applied research, e.g. on the relations between game diseases and epidemics in connection with pilot projects and market analyses is necessary.

12. Technical training and applied research serving the requirements of practical projects play a considerable role. Since developing countries themselves cannot yet contribute much to this end it represents an important task for development assistance.

13. It has been discussed which measures could be carried out by the industrial nations in their capacity as donor countries and what might be done by international organizations. It became obvious that hitherto only approaches have been made which are, however, promising and successful, and that it might be wise to concentrate future assistance on this.

14. Active co-operation by the developing countries themselves is indispensable. In carrying out and safeguarding systematic game management governments are faced with numerous responsibilities, last but not least with the education of the population to make them understand the conservation and reasonable exploitation of the natural resources of their country, including game and its systematic management. Appropriate measures to realize this aim have been pointed out to.

D. RECOMMENDATIONS

The participants of the conference agreed on the following recommendations:

I. Preamble

(1) Governments should feel a moral obligation and basic ethical responsibility to pass on to posterity their renewable natural resources by implementation of politics of conservation. To do this and to ensure a rising standard of living for our peoples, we must recognize and solve the problem of our increasing human populations.

(2) An overall development should imply balanced and comprehensive utilization of all natural resources.

(3) In many developing countries wildlife is a natural resource of high potential value - in some areas it is the main resource available. This has not been recognized sufficiently in the past.

(4) Therefore it is not only justified but necessary to include wildlife utilization as an integrant part of development activities. The decision regarding the specific form of wildlife use most appropriate for a given area is in itself an important question for which governments may want to seek outside assistance.

(5) The efforts of the United Nations (UN), the Food and Agriculture Organization of the United Nations (FAO), the United Nations Education, Science and Culture Organization (UNESCO),

the Economic Commission for Africa (ECA) and the International Union for Conservation of Natural Resources (IUCN), as well as the resolutions of conferences of African states regarding the utilization and conservation of natural resources should get worldwide support.

II. Utilization of Wildlife

(6) In planning wildlife utilization for economic development one should consider the following possibilities:

- game as food and important protein supply for human populations,
- wildlife as a tourist attraction,
- wildlife, by-products and various forms of export goods,
- wildlife management as a tool for maintenance of the fertility of land and as a contribution towards total production,
- wildlife management as a means to minimize the disease transmission hazard and for the maintenance of good health of domestic stock and as a means of reducing conflicts with agricultural, pastural and forestal activities.

In addition wildlife management can be important as a single practice leading to economic utilization of large areas. It is also necessary for wildlife protection and the preservation of landscape.

(7) The management of the resources requires an adequate technical and administrational organization to assist in implementing wildlife management programmes.

III. Wildlife Management Techniques

(8) The six essentials of wildlife management

- establishment of hunting or management units,
- determination of the critical or "key" areas within each hunting unit,
- game inventories,
- law enforcement and predator control,
- removal of surplus game and
- habitat development

(as described in a conference paper presented by W. Leslie Robinette) are applicable not only to hunting areas but also to game utilization areas.

(9) The essentials of management pertaining to the organization of the management areas, the selection of "key" management areas, the routine inventory and the law enforcement work are as important for national parks as for other management areas. However, in national parks, to conform with their more specific management objectives, modification of habitat factors is kept to a minimum consistent with the objectives of maintaining an undisturbed area as possible and surplus game is removed only under the most extreme conditions and when other methods of solving the problem have failed.

(10) With respect to utilization schemes special techniques are involved. These include harvesting, handling, preservation and marketing of healthy meat and by-products.

(11) It should be appreciated that the basic biological data required for the successful operation of a game cropping scheme is similar to that required for the successful management of a national park. Duplication of research effort should therefore be avoided and maximum co-operation between research workers should be encouraged. National parks and wilderness areas are a valuable source of such data which is not always obtainable under game cropping conditions.

IV. Wildlife as a Basis of Tourism

(12) The tourist industry holds out great promise of becoming a major source of scarce foreign exchange. There are many examples of countries in different stages of development where tourism rapidly contributed to the national economy.

(13) Wildlife is a tourist attraction of great economic importance. Assistance should be given for better basic organization of tourism, if the developing countries cannot develop this by themselves.

(14) Mass-tourism (photo-safaris and sightseeing-tours) is a proper aspect of optimum wildlife utilization, especially in respect to foreign exchange revenues.

(15) Strictly controlled big game hunting safaris are a part of tourism.

(16) National parks and equivalent areas are especially important for tourism, therefore management plans should be devised with long range objectives in mind, i.e. the development of tourist facilities must pay due respect to the maintenace of the natural values of the parks.

(17) Efforts should be made to pr[illegible]ide educational guidance in appreciating the natural value of the national parks.

V. Training and Research

(18) The study of wildlife should be included in curricula at all levels to stimulate the awareness and understanding of the organic environments. Audio-visual aids are an important tool to this.

(19) For effective management of the wildlife resources there is a need for appropriate training at all levels from game-guard to university graduate.

(20) Handbooks and other printed material for all educational levels should be listed, exchanged and their production promoted.

(21) There is a further need for the subject of wildlife to be included in training programmes for veterinarians, agriculturists, foresters and administrators in developing countries.

(22) Facilities for training in wildlife management should be established for expatriate officers and overseas scholarships (in the fields of biology, veterinary science, agriculture, forestry and administration) in the donor countries. Practical experience should be gained through assistantships - financed by the governments - under the leadership of experts in developing countries.

(23) Research should be closely linked with universities and other existing research organizations in developing countries. They should work in close co-operation with departments concerned.

(24) Increased knowledge of wildlife management is necessary to cope with the new problems with which we are faced. There is an increasing need for research on a broad front. Studies are urgently needed in ecology, economics, sociology, veterinary science, agriculture, forestry science and public health as they relate to wildlife management. Team approach should be encouraged.

VI. Development Aid

(25) International co-operation is required to assure efficient development of wildlife utilization. This is of special importance with respect to progressive exchange of information of wildlife programmes and in the appropriate distribution of the results of conferences of mutual interest.

(26) Foreign assistance is possible if the special requests comply with the governmental conditions of assistance. Capital expenditure and technical aid are appropriate forms of assistance.

(27) Capital aid should support the creation of wildlife utilization schemes and of national parks. It should be supported by means of technical assistance in order to assure the proper management of capital investments and to facilitate its development as an economic activity.

(28) Technical assistance should be granted mainly on education by means of demonstration schools and applied research training. In principle schools and other training institutes should, in so far as possible, be designed to serve several countries on a regional basis to increase the effectiveness of the expenditures of donor countries.

(29) Social security for expatriate experts should be assured against their return to donor countries.

E. PROGRAMME OF THE CONFERENCE

Sunday, 6 December

Arrival

Monday, 7 December

9.30 a.m. — Opening of the Conference and welcoming address
Director General of the German Foundation for Developing Countries

1st Working Session:

Basic problems of wildlife planning

10.00 a.m. — Discussion on

The importance of wildlife as a marginal form of land use in developing countries

Introduction:

Th. Riney, Food and Agriculture Organization of the United Nations (FAO), Forestry and Forest Products Division, Rome

11.30 a.m. — Discussion on

Wildlife as a basis of tourism

Introduction:

Prof. Dr.Dr.h.c. Bernhard Grzimek, Zoologischer Garten, Frankfurt/Main, Germany

3.00 p.m. — Short lecture:

Technical assistance and wildlife

Ministerialrat Dr.Willy Ehmann, Federal Ministry for Economic Cooperation, Bonn, Germany

Oberlandforstmeister Dietrich von Hegel, Federal Ministry of Food, Agriculture and Forestry, Bonn, Germany

Tuesday, 8 December	2nd Working Session: Wildlife planning and management
9.30 a.m.	Discussion on Survey of wildlife resources Introduction: Prof.Dr.A.de Vos, Lusaka, Zambia
10.30 a.m.	Discussion on Possibilities of wildlife management in hunting areas Introduction: W.L. Robinette, Wildlife Research Center, Denver, Colorado, USA
11.30 a.m.	Discussion on Possibilities of wildlife management in national parks Introduction: Prof. Jean-Paul Harroy, Université libre de Bruxelles, Institut de Sociologie, Brussels, Belgium
3.00 p.m.	Discussion on Wildlife utilization schemes in developing countries Introduction: H.P. Ledger, East African Forestry and Agriculture Research Organization, Kenya
4.00 p.m.	Discussion on Experience in wildlife utilization in South-Rhodesia Introduction: Dr. Archie S. Mossman, Zoology Department, University College of Rhodesia and Nyasaland, Salisbury, South Rhodesia

5.00 p.m.

Discussion on

Solutions of the conflicts between wildlife and other forms of land use

Introduction:

Dr.Dr. Harald H. Roth, Assistant Director, Department of National Parks and Wildlife Management, Causeway, South Rhodesia

Prof.Dr. Herbert Hesmer, Rheinische-Friedrich-Wilhelms-Universität, Bonn, Germany

Wednesday, 9 December

9.30 a.m.

Discussion on

Responsibilities of the governments of developing countries in the field of wildlife utilization

Introduction:

Th. Riney, Food and Agriculture Organization of the United Nations (FAO), Forestry and Forest Products Division, Rome

3rd Working Session:

Training and research in the field of wildlife utilization

10.30 a.m.

Discussion on

The tasks of education, training and research

Introduction:

Dr. F. Fraser Darling, Vice President, Conservation Foundation, New York

11.15 a.m.

Discussion on

Potential contributions of the donor countries

Introduction:

Prof.Dr.Dr. h.c. Wolf Herre, Christian-Albrechts-Universität, Kiel, Germany

12.00 a.m. Discussion on

Potential contributions of international organizations

Introduction:

Dr. Fritz Vollmar, Secretary General, World Wildlife Fund, Morges, Switzerland

Afternoon without programme

Opportunity of a visit to the Zoological Research Institute and Museum A. Koenig, Bonn, Koblenzer Strasse 150

7.30 p.m. Reception given by the Board of Directors of the German Foundation for Developing Countries at Hotel Godesburg

Thursday, 10 December

10.00 a.m. Final Session

Discussion of the recommendations

End of the conference

Friday, 11 December

Departure

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