the market) and they could experiment with making different ivory commodities such as good jewellery with African pastoralist designs. Skill and ingenuity are necessary if the industry even intends to gain a larger share of Botswana's own ivory market, over half of which is now supplied by imports from South Africa and Hong Kong.

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Esmond Bradley Martin

## Law Enforcement in Malawi Conservation

A MONITORING SYSTEM

The use of wildlife resources, plant and animal, has been basic to human ecology since the origin of man. Conservation legislation has created a new class of illegal activity, broadly known as poaching, and has swept progressively more forms of wildlife use into it, until in some areas, most are illegal. This situation has created a conflict of interests and value systems between the conservation establishment and the general public. As a result, a high proportion of all conservation effort in terms of staff and expenditure is devoted to law enforcement.

Because of the importance of illegal activity and law enforcement in African conservation areas, the Wildlife Research Unit of the Malawi Department of National Parks and Wildlife has been attempting over the last 7 years to develop a system for monitoring the quantity of illegal activity and of law enforcement effort by area and by time period. This allows us first to assess the ecological and economic significance of illegal activity in a particular area; second, to allocate-priority to funding and effort for law enforcement programmes; and thirdly to assess the effectiveness of different types and intensities of law enforcement effort.

The method is simple and involves little more than common sense. It is based on the systematic use of patrol reports produced by field staff. The system is intended firstly to quantify patrolling effort by various measures; secondly to quantify illegal activity encountered by patrols according to a set of standardized categories; and thirdly to derive indices of the amount of illegal activity recorded per unit of patrolling effort This gives a "catch per effort" index of the quantity of illegal activity.

The system is based on two assumptions: firstly that patrol reports are reliable, and secondly that in any given set of conditions a consistent relationship exists between the real quantity of illegal activity and the catch per effort index. In this respect, the system has the same features and problems as strip census methods, and under ideal conditions could be used like them to calculate actual amounts of illegal activity. However, we emphasize that the primary purpose of law enforcement is deterrence of poachers, not generating data. The recording system must not detract from the performance of the patrol by adhering to strict sampling procedures. This limits the precision of the system which provides broad indices rather than precise figures.

The first step is measuring patrolling effort. Firstly staff



Elephants, Malawi [Hugo Jachmann]

time is divided into categories according to likelihood of contacts with poachers i.e. base time, off time, placement time and effective patrol time.

Only the last category is used in calculating patrol effort, while the ratio of effective time to the other categories is a useful index of the efficiency and motivation of field staff. Effective time is defined as time spent on foot in the bush, away from roads and certain footpaths. The most useful measures of patrol effort are the number of effective patrol days and the distance patrolled.

We place great emphasis on the ability of patrol leaders to navigate and indicate patrol routes on a map. Special training in these techniques is required, and estimation of patrol distance is done by pacing if possible or by reconstruction and measurement of the route on a map. Accurate maps with many recognized place names are essential.

The second step is the recording of illegal activity encountered by patrols. We use a set of about 20 standardized categories including key animals killed (i.e. elephant, rhino etc), other animals killed, gunshots heard, armed groups seen, snares and traps, poachers' camps, sets of footprints, fishing, tree cutting, beehives, cultivation, houses, livestock, motor tracks etc. It is important that the precise method of scoring each category is standardized. For an example, we score a group of poachers as 1, although the numbers in the group are noted. In the case of key animals killed, detailed data are recorded. In the case of elephant, there are 17 items including date of death; method of discovery; cause of death; tusks present or absent; if absent whether cut or pulled out; data on ivory if present; age at death etc., etc. These data are necessary to build up a picture of the mortality pattern of the population and to provide data required for the analysis of ivory trade statistics.

The data are recorded by trained patrol staff according to a standardized format, and are extracted by senior staff from the reports and from de-briefing interviews. The active participation of senior staff in patrols, data recording and data extraction, is of course essential. The patrol route is then drawn on a map and illegal incidents inserted. The patrol effort and the score for each class of illegal activity can then be compiled by area (i.e. on a grid) and by time (i.e. by month, year, etc.) From these data is derived the catch per effort index.

The data can be used in three main ways: firstly to monitor the performance and activities of patrol groups; secondly to monitor changes in the amount and type of illegal activity by area; and thirdly to assess the impact of illegal activity on the mortality of key species and on the trade in their products. An example is given in the following table, using data from Kasungu National Park.

The period from 1977 to 1981 showed an upsurge in elephant poaching, coupled with a low level of patrol efficiency indicated by the few arrests and captures of firearms and the high percentage of placement time. In 1982, the Park came under new and active leadership; arrests rose sharply to 239 with 48 firearms, the motivation of the field force rose as indicated by the drop in placement time, and the number of elephants killed by poachers fell from 55 in 1981 to 7 in 1983. One should notice, however, that while elephant hunting has fallen sharply, the other classes of illegal activity, mainly involving minor offences, have continued to rise.

This brings us to the sociology of illegal activity. In Malawi, illegal use of wildlife resources falls clearly into two classes; firstly hunting of large animals with firearms, (mainly muzzle-loaders) by a relatively small number of "professional" hunters; and secondly, the collection of a wide variety of mineral, plant and animal products from the bush by subsistence agriculturalists including men, women and children. The former class we call "serious offences"; this class is readily susceptible to investigative techniques as in all successful anti-poaching campaigns, and is relatively easy to control. The other class of "minor offences", makes up the great majority of illegal activity, and is extremely hard to control because it is so diffuse. In a densely populated country like Malawi, minor offences can constitute a major influence on wildlife communities.

In allocating law enforcement effort, it is first necessary to decide on what level of illegal offtake is acceptable. With elephant, an annual offtake of about 3% is usually acceptable; with rhino or gorilla on the other hand, no offtake may be acceptable. In Malawi, the main species at risk is elephant, and in our conditions, we estimate that 1 Game Scout per 50km<sup>2</sup> provides adequate protection if properly led. This estimate is based on extrapolation of the catch per effort curves to their points of inflexion. Adequate protection of rhino requires higher staff densities.

Evaluation of law enforcement methods indicates that for serious offences by far the most effective method is investigation based on detailed intelligence work outside the conservation areas; for minor offences, a high intensity of patrolling in priority areas is required. An important point is that elaborate equipment, such as vehicles, radios, aircraft and even tents, can have the effect of reducing the effectiveness of a field force by reducing flexibility and mobility. This is important in assessing project submissions of this type.

Our experience in Malawi indicates that illegal activity can indeed constitute a real threat to wildlife species or communities, but that the situation is far from hopeless. Our data indicate that the people of Africa (among whom I count myself) have demonstrated both the will and the ability in conservation areas. I personally am more optimistic now, about the future of wildlife in Africa, than at any time in the last 20 years.

## Introduction

		1977	1978	1979	1980	1981	1982
1983							
Elephants killed by poachers	16	15	26	35	55	29	7
Catch per effort, all offences	0.309	0.375	0.617	0.770	0.606	0.638	*
Catch per effort, serious offences	0.078	0.084	0.140	0.122	0.229	0.136	*
Total patrol days	686	779	708	670	840	852	*
Total placement days	211	197	228	235	175	148	*
Percent placement	31%	25%	32%	35%	21%	17%	*
Total arrests	54	26	12	49	54	239	*
Firearms captured	0	0	3	6	6	48	*

\* Data not yet available