

Distribution of large mammals in relation to human settlement and implications for the viability of meat cropping in Lunda Mkwambi Game Controlled Area

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Introduction

As one option for natural resources management, the Ruaha Ecosystem Wildlife Management Project (REWMP) is investigating the feasibility of using large wild mammals for meat in Lunda Mkwambi Game Controlled Area (LMGCA), adjacent to Ruaha National Park (RNP) - see the maps. The project has received from Wildlife Department a quota of 45 game animals which can be cropped this year.¹

In September the project conducted a small "oral history" study, which involved interviewing senior residents in several villages about their memories of changes in wildlife and wildlife utilisation (mostly hunting and honey collecting) since the 1940s and 1950s. This year the project has carried out two aerial surveys of the Rift Valley section of RNP and LMGCA - the surveys were undertaken in July and November and the areas covered are shown on the maps attached.

These exercises provided information on the historical and current status of wildlife in the area. The information is incomplete but it suggests that at present there is only limited potential for game cropping in LMGCA. The purpose of this paper is to set out in more detail the information produced by the survey work and it is hoped that the points raised will stimulate discussion of the current situation and suggestions for the best way forward.

Village oral histories

The study suggested that there was a long tradition of use of large mammals by the people in the project area. Commonly mentioned species were buffalo, kudu and eland, though the generic term swara was used a lot and some villagers said that they ate anything they could get! Most probably, which species were used depended on local availability.

¹ In these village lands, game viewing and tourist hunting have little potential at present, for various reasons.

Most villagers who assisted with the oral history study pointed to a decline in wildlife densities around villages since the 1950s. They suggested various reasons why this had happened and these are set out below - the scenario is a familiar one which happens whenever human population densities rise:

In the 1950s:

- few people in small dispersed homesteads
- lots of animals around them - because of a different distribution but not necessarily a bigger population?
- general disturbance was low so hunting could be near the community
- few hunters per village - offtakes low and hunting disturbance low
- meat had no commercial value and a low exchange value
- offtake was limited to what people could eat in the village

Since the 1950s and 1960s:

- settlements are bigger and more populous
- the area of cultivated land is greatly expanded
- increased general disturbance (e.g. cultivation, burning, livestock) has caused wildlife to move away from villages
- legal and illegal hunting must therefore be done further from the community - usually close to RNP
- meat has a commercial value so hunting can be a business
- gun licences and hunting licences are more expensive and harder to obtain for villagers - most hunters are outsiders.
- offtake is limited by anti-poaching activities and would probably be unsustainable if protection were removed.

Most of the villagers who expressed an opinion felt that although there is now much less game around the villages this was because the animals had moved into RNP and not necessarily because of a decline in the size of the total population.

It seems very plausible that many areas in LMGA have become inhospitable to wild animals because of the level of human disturbance - general disturbance such as the large areas of irrigated and rain-fed cultivation, influx of pastoralists and large numbers of livestock, firewood collection and other forms of habitat-modifying economic

activity. Also the special disturbance arising from hunting, both legal and illegal, must play a role. (Some pest species may have been favoured).

The oral history suggested there was still a strong demand for game meat but this was largely unsatisfied because of the lack of animals and the difficulty in maintaining firearms and hunting licences. It is believed the level of illegal offtake of large mammals is low, or at least sustainable, but we need more information on this important aspect.

Aerial surveys in July and November 1994

Against this broad background of a general decline in wildlife densities around the villages we can set the results of the recent aerial surveys. These give us an impression of current status. The surveys were carried out by SRF at a nominal height of 250 feet, nominal speed of 150 kph and nominal strip width of 250m.

Distribution of all wild mammals

The wildlife distribution maps show that most large mammals appear to be concentrated in the park. Those outside the park are mainly near the park boundary. As the hunting/cropping season is between June and December although we have not yet done any wet season surveys we can assume these dry season ones tell us what we need to know about where the usable game populations are.

Look at the distribution of the animals which are listed on the project quota - the animals on the quota are buffalo, impala and hartebeest. This map shows clearly that these species occur in just a few areas outside the park - where they do occur they are usually near the park boundary. The number of hartebeest is very low and probably could support only an insignificant offtake.

From the map it would seem that a village area like Malinzanga in Mlowa would be most suitable for cropping these animals. Potential for other villages looks limited.

Numbers of animals

Having seen the distribution maps, what can we say about numbers of animals? The following table gives population estimates for the important species on the quota, including a rough split between RNP and LMGCA parts of our survey zone.

Animal	Popn estimate	RNP	LMGCA
buffalo	3300	3000	300
impala	4340	3800	500

The buffalo population estimate is unreliable because of the aggregated distribution of the animals. Based on this estimate the population could be as high as 6000 or as low as 1000 - i.e. plus or minus 90%! The impala estimate is more precise (21%). Also remember that these are not absolute numbers but indices of abundance - however they are the best we have.

It is important to note that little is known about the way animals move between RNP and LMGCA - e.g. are there resident populations in LMGCA or are the animals there an overflow from the Rift Valley part of RNP?

In the oral history study some people maintained that animals like buffalo in LMGCA move in and out of the park. They go into the park if they are disturbed. Whether we are dealing with one large population of each species or several discrete small ones has implications for the level of harvest which can be sustained.

Resource issues - supply and demand

We now move into the realm of supposition i.e. how much meat do we need to provide and can the wildlife resource support this level of offtake?

E.g. how much meat would be needed if we wanted to make a significant contribution to diets in five villages? How much is enough? Some back of an envelope calculations are given below:

If we provided each of 1000 people in five villages with 100kg of buffalo meat it would require an offtake of 340 buffalo per year (average dressed weight of buffalo 300 kg). This may seem a lot but one villager in Mahuinga estimated that to provide everyone in his village with enough buffalo meat an annual offtake of 200 animals would be needed! For five such villages we would need to harvest 1000 buffalo a year. Perhaps more realistically, some villagers said they would be pleased to receive meat from just a few animals a year because at least it would be better than nothing.

Under the current circumstances it seems unlikely that large numbers of animals can be cropped. Applying a simplistic model of logistic growth to some of our population estimates (e.g. buffalo and impala) suggests some sustainable yields. The model makes many assumptions but perhaps the most important of these is that animals in LMGCA come from RNP and that they continue to disperse into LMGCA where they are cropped.

If our estimate is about right and the current buffalo population in RNP/LMGCA is 3300, near carrying capacity (and maximum intrinsic growth rate is 20%), a sustainable yield is about 100 animals a year. In the model this would keep the population around the 3000 mark.

If the impala current population in RNP/LMGCA is at carrying capacity and maximum intrinsic growth rate is 28% a SY of about 150 animals a year would keep the population around 3,800, all else being constant?

There are obviously a lot of uncertainties in all this but it indicates that large-scale cropping of several hundred animals is not a possibility in LMGCA at present and perhaps never will be. The maximum offtakes sustainable may be just a couple of hundred animals - split between all uses - legal and illegal.

It would be interesting to compare current illegal and legal offtakes with these figures. We have looked at APU figures with a view to assessing illegal offtake but not easy to get a good idea of the numbers involved.

² These are not Maximum Sustainable Yields. To achieve MSY would require fundamental manipulation of the current populations which be unacceptable to RNP management as it would require reduction of park animal populations.

I hope there are some stats available on legal offtake. This would give us an idea of whether current offtakes are sustainable.³

Implications for management and utilisation of large mammals.

So the basic problem we have in LMGCA is that there are not enough animals. Even before we think about ways of using the animals it seem clear that their densities must be increased. How might this be done?

Why are there so few animals today in LMGCA? Is it disturbance? What is the most important form of disturbance - general (cultivation, cattle, burning, firewood, people) or hunting?

Can anything be done to raise wildlife densities in the areas of LMGCA which appear to have a few animals left - should areas be closed or access restricted? What would local people think about such an idea - just view it as an attempt to deprive them of land? Would the villagers in areas like Mlowa be willing to create a Wildlife Management Area in which they would decide what uses of wildlife were permitted?

Are the animals really just an overflow from RNP (with the exception of species like kudu, giraffe, bushpig, bushbuck)? What are the pressures, if any, pushing animals out of RNP? What effects would RNP management practices have on this? If villagers established a WMA would this encourage permanently resident populations?

In conclusion the potential looks limited for game cropping in LMGCA. Perhaps some small scale schemes using traditional methods could be started in villages near the park like Mlowa. There has not been time to address the issue of the best way of cropping the animals - a method must be developed which is sustainable i.e. it is cheap and uses appropriate technology. The best solution may be to allow appropriately qualified village hunters to do the job by traditional methods, but it is too early to say for sure.

If large mammal densities cannot be increased by some means, then any utilisation scheme will just be operating in competition with existing legal and illegal uses - there will be less to go round for everybody. Increasing the level of offtake without encouraging an increase in the game will depress the LMGCA population even more and exacerbate conflicts between users.

³The Regional Game Officer said at the workshop that legal buffalo offtake was 100 p.a.

Buffalo Harvesting in LMGCA

Variables	Year	SY	Harvest	N
Carrying capacity K	1	38	100	3300
	2	49	100	3238
	3	57	100	3186
	4	64	100	3143
	5	70	100	3107
Intrinsic maximum growth rate Rm	6	74	100	3077
	7	78	100	3051
Population N	8	81	100	3030
	9	84	100	3011
	10	86	100	2995
Sustainable Yield SY	11	88	100	2982
	12	90	100	2970
	13	91	100	2960
Maximum Sustainable Yield MSY	14	93	100	2951
	15	94	100	2944
	16	94	100	2937
	17	95	100	2932
	18	96	100	2927
	19	96	100	2923
	20	97	100	2919
	21	97	100	2916
	22	98	100	2913
	23	98	100	2911
	24	98	100	2909
	25	98	100	2907
	26	99	100	2906
	27	99	100	2904
	28	99	100	2903
	29	99	100	2902
	30	99	100	2901

Impala Harvesting in LMCA

Variables	Year	SY	Harvest	N
Carrying capacity K	2	70	150	4233
4500	3	90	150	4153
Intrinsic maximum growth rate Rm	4	104	150	4093
0.28	5	114	150	4047
Population N	6	122	150	4011
4340	7	128	150	3983
4340	8	133	150	3961
200	9	136	150	3944
Sustainable Yield SY	10	139	150	3930
315	11	142	150	3920
Maximum Sustainable Yield MSY	12	143	150	3911
	13	145	150	3904
	14	146	150	3899
	15	147	150	3895
	16	147	150	3892
	17	148	150	3889
	18	148	150	3887
	19	149	150	3885
	20	149	150	3884
	21	149	150	3883
	22	149	150	3882
	23	149	150	3881
	24	150	150	3881
	25	150	150	3880