Suggested Procedure for Priority Ranking of Black Rhino Populations

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Preamble

Systems for establishing priorities for action to conserve remaining black rhino populations have been developed at the Hwange (1981) and Nyeri (1987) meetings of AERSG. These systems are worthwhile in that they lead those who are assessing priorities through a systematic process in which due consideration is paid to a full range of relevant factors. In order to produce final rankings, each area is given scores for the various factors that are considered relevant (e.g population size, genetic rarity, ecosys-tem diversity) and the scores for an area are then added to produce a total score to represent that area's priority in continental black rhino conservation initiatives.

A central problem with these systems is that weightings for the factors have arisen in an arbitrary way. Rigorous methodology for establishing the weighting (importance) of one factor relative to another, for the whole range of conservation situations within the species' range, has not been developed. In view of this, an alternative procedure for establishing rhino conservation priorities — with more flexibility in incorporating subjective value judgements — is proposed.

The information on rhino populations is derived from that presented at the 1987 AERSG meeting, at Nyeri, Kenya (the proceedings of the meet-ing are currently being published by IUCN).

Reasons for ranking

The design of a system for establishing the priority areas for rhino con-servation is obviously dependent upon the objectives of the desired con-servation action. These objectives are seen as:

- To build up numbers of black rhinos in Africa as quickly as possible;
- To maintain the existing genetic variability within and between the remaining black rhino populations in the wild.

If these objectives are accepted by international conservation agencies that are able to allocate funds, expertise and other assistance to support rhino conservation efforts in Africa, then a role of AERSG is to indicate, to these agencies, which rhino populations should be the first ones to receive attention in order to meet the objectives.

Main factors to consider in the ranking system

The most important feature of each population (with regard to both objec-tives outlined above) is simply its size. The current population should be considered together with the likely population that will be present in that area in several years' time, following additions due to natural increase and reductions due to poaching. A five-year time horizon seems reason-able when considering rhino conservation initiatives for particular areas, given the uncertainties associated with poaching activity, government action and land-use changes within Africa. Where rhino populations are expanding in small areas, consideration must be given to carrying capacity; but if it is expected that carrying capacity will be exceeded within five years this need not be regarded as a negative feature since the excess rhinos can be translocated, to restock other areas.

Black rhino contemplating the camera man.

The contentious issue of the likely effectiveness of aid provided by external agencies is best tackled by letting the record speak for itself, i.e. if local rhino conservation efforts have been inadequate (for whatever reason) and therefore do not give grounds for optimism that putting more money in will achieve much, then this will be reflected in the rhino population trends. Since it is one of AERSG's functions to monitor population trends, we can present reasonable estimates of the decline due to poaching in each area over the last five years, and extrapolate with this trend and with the estimated current population to indicate what the population may fall to in five years' time if no additional conservation effort is made.

The assumption that poaching in a large wildlife reserve will continue at the present rate is possibly questionable. For one thing, as the density of rhinos decreases, the ease with which the remaining animals can be found by poachers may diminish. However, as the rhino density decreases, it also becomes more difficult for the animals to maintain breeding contact, and so the natural rate of increase will also diminish thus one effect offsets the other. Even if the estimates of future poached rhino populations are unreliable, this is not a crucial deficiency because the object of the exercise is primarily to present a reflection of the prevailing social/political/economic climate for conservation in each area.

Genetic rarity is obviously an important factor to consider. The diffi-culty of assigning weightings to the postulated races/subspecies of black rhinos may best be circumvented by allowing the judgement of the genetic rarity value of one rhino group versus another to remain an intuitive process including the opinions of all AERSG members so that a group consensus emerges without need for questionable numerical manipulations.

A major weighting factor in the previous ranking systems has been the "conservation importance", or "ecosystem diversity", of each area. This is obviously an important consideration for conservation funding agencies, since they are concerned with the protection of complete ecosystems containing key species in addition to the black rhino. How-ever, it is perhaps best not to confuse too many issues; if AERSG can present a priority ranking simply for black rhinos, other groups in SSC/ IUCN, WWF or other agencies can then attempt to mesh this list with the priorities for other organisms. There may well be a degree of "double counting" if the AERSG rhino priorities include some consideration of ecosystem diversity, other rare organisms, etc., and these factors are again automatically considered at a later stage when the list of top rhino areas is compared with the lists of areas that are important for other African species, as is presumably done when funding bodies decide where to put their money.

To give initial consideration to the ecosystem diversity aspect, it is suggested that the classification that emerged in the IUCN survey of phytochoria in the Afro-tropical realm is simply shown for each area (where possible) once the final priority ranking has been derived.

The importance of establishing closely-managed rhino sanctuaries in several areas, as a safeguard against the loss of further large wild populations, is becoming increasingly evident. The strategic value of these sanctuaries must be weighed against their high costs and management problems (including the need to avoid future genetic problems); some conservationists may believe that an established or proposed sanctuary has higher priority for support than some efforts to conserve larger populations in poorly protected areas. Allowance should be made for the incorporation of such views within the ranking system.

The suggested procedure

1. List all the areas in Africa which have 5 or more black rhinos (Table 1, column 1). For each, establish the areal extent (col. 2), the current rhino population (col. 3), and the population 5 years ago (col. 5). Indicate the reliability of this information (col. 4 and 6), using the following codes:

1 count of known individuals;
2 estimate from rhino survey carried out within the previous 2 years;
3 estimate based on non-specific survey, or rhino surveycarried out over 2 years previously;
4 informed guess.

2. From the estimate of the current population and that of the population 5 years ago, calculate the percentage decline in the population due to poaching over this period (col. 7).There may be a few exceptional cases in which a population has declined due to reasons other than poaching e.g. Hluhluwe/Umfolozi and these may require explanation in footnotes to the table.

3. Apply the rates of poaching to the current population estimates to obtain estimates of the population levels in 5 years, if poaching continues at present levels (col. 8).

4. For each population, obtain an estimate of the rate of natural increase, r (col. 9). This will vary according to habitat quality, and especially according to rhino density, being low at very low and probably very high densities, and at its highest when populations have not yet reached the carrying capacity of the areas within which they are confined. (If the rate of increase is 5% per year, r=0.05).

5. Calculate the population of 5 years hence (col. 11), presuming that poaching Ceased immediately and the population

Table 1: Basic demographic data (as known in 1967)

1 Population	2 Area km2	3 1987 Pop.	4 Rel.	5 1982 Pop.	6 Rel.	7 Poa-ching crease 5yrs	8 Poa-ched Loss	9 Natural In- 5yrs	10 Carrying Capacity r	11 Natural Pop. in 5yrs
Zambezi	13000	750	3	1000	4	25%	560	0.07		1050
Sebungwe	10000	650	3			5%	618	0.07		912
Etosha	22270	350	3	275	3	0	(447)	0.05		447
Hwange/Mat	18400	300	3			0	(401)	0.06		401
Umf./Hluh.	900	220	2			0	(220?)	0	300	220?
Selous	55000	200	4	2000	4	90%	20	0.03		232
Tsavo	20200	150	4	300	4	50%	75	0.03		174
Kruger	19485	140	2			0	(205)	0.08		205
Kaokoveld	70000	90	2	50	4	?	(115)	0.05		115
Solio	62	75	1			0	(110)	0.08	40	110
GonareZhou	5000	75	3	100	3	25%	56	0.06		100
Luangwa	16600	75	4			70%	23	0.04		91
Mkuzi	251	70	2			0	(94)	0.06	70	94
Aberdares	700	60	4	132	3	55%	27	0.05		77
Laikipia	350	47	1			0	(63)	0.06		63
Ndumu	100	42	2			0	(56)	0.06	40	56
Nairobi	120	40	3	20+	3	?	(56)	0.08	40	56
Mnt. Kenya	700	40	4	40?	4	?	(46)	0.03		46
Itala	297	35	2			0	(47)	0.06	60	47
Cameroon/Ch	5000	30	4	100	4	70%	9	0.02		33
Pilanesburg	500	27	2			0	(38)	0.07	120	38
Ngorongoro	25	4	50		4	50%	12	0.05		32
Rubondo	460	25	4			?	(32)	0.05		32
Nakuru	140	20	1				(27)	0.06	40	27
Kasungu	2300	20	4	30	4	33%	13	0.03		23
Kafue	22400	20	4			70%	6	0.02		22
Masai Mara		19	1	30	3	37%	12	0.03		22
NgengValley	500?	18	2			50%	9	0.04		22
Addo	80	17	1			0	(25)	0.08	30	25
Akagera	2500	15	4			?	(18)	0.04		18
Lewa Downs	20	11	1			0	(15)	0.06	15	15
Amboseli	400	11	1	17	1	33%	6	0.05		14
East. Shores	800	10	1			0	(14)	0.07	40	14
Iwaba	98	8	1				(11)	0.07	30	11
Ol Jogi		7	1			0	(9)	0.06		9
Weenen	49	6	1			0	(8)	0.07		8
Aughrabies	650	5	1				(7)	0.07	30	7
Meru	870	5	4	30	4	80%	0	0.04		6
Manyara	320	5	4	10	4	50%	0	0.04		6
Mwabvi		?								
Angola		?								
Mocambique		?								
Ethiopia/Sudan/ Somalia		?								
TOTALS		3713					+/-3500-			+/-4880

Information on 1987 populations from AERSG meeting, Nyeri, May 1987.

expands at the natural rate. The equation is:

$$N5 = No\ (1+r)^5$$

where N5 is population in 5 years
No is Current population
r is rate of natural increase.

6. For each area, establish what the ranking is for its current population, for its future population with unabated poaching, and for its future population with natural increase (Table 2). Add the three ranks together. Rerank the areas according to the sum of the three subsidiary ranks (ranking areas from lowest to highest totals). This effectively ranks the areas on the basis of their current populations with moderation according to possible natural increases and current poaching pressures.

Table 2: Ranking of areas for population importance

Population	Rank for current population	Rank for 5yr Poached population	Rank for 5yr Natural	Sum	Overall rank
Zambezi	1	2	1	4	1
Sebungwe	2	1	2	5	2
Etosha	3	3	3	9	3
Hwange/Matetsi	4	4	4	12	4
Umfolozi/Hluh.	5	5	6	16	5
Selous	6	20	5	31	9
Tsavo	7	10	8	25	7
Kruger	8	6	7	21	6
Kaokoveld	9	7	9	25	7
Solio	10	8	10	28	8
Gona-re-Zhou	10	12	11	33	11
Luangwa	10	19	13	42	13
Mkuzi	11	9	12	32	10
Aberdares	12	17	14	43	14
Laikipia	13	11	15	39	12
Ndumu	14	12	16	42	13
Nairobi	15	12	16	43	14
Mount Kenya	15	14	18	47	16
Itala	16	13	17	46	15
Cameroon/Chad	17	27	20	64	20
Pilanesburg	18	15	19	52	17
Ngorongoro	19	25	21	65	21
Rubondo	19	16	21	56	18
Nakuru	20	17	22	59	19
Kasungu	20	24	24	68	22
Kafue	20	30	25	75	25
Masai Mara	21	25	25	71	23
Ngong Valley	22	27	25	74	24
Addo	23	18	23	64	20
Akagera	24	21	26	71	23
LewaDowns	25	22	27	74	24
Amboseli	25	30	28	83	28
Eastern Shores	26	23	28	77	26
Iwaba	27	26	29	82	27
Ol Jogi	28	27	30	85	27
Weenen	29	28	31	88	30
Aughrabies	30	29	32	91	31
Meru	30	31	33	94	32
Manyara	30	31	33	94	32

7. In plenary session, classify the areas, in their order of importance, into three categories according to their need for external assistance: urgent, moderate and low (Table 3. If any participant disgrees strongly with the classification for a particular area, the general opinion should prevail as the individual will get an opportunity for his/her viewpoint to be taken into account at a later stage.

8. Produce a simple analysis of the current classification system that has been adopted by AERSG to separate the various populations into “subspecies”/races/ecotypes/evolutionarily significant units (or whatever terminology is thought appropriate to describe interpopulation genetic variability), indicating the current numbers, and possible future numbers in 5 years, of rhinos belonging to each conservation unit (Table 4).

9. Give each participant a copy of Tables 1, 3 and 4. He/she is then asked to list the areas in order of importance, taking into account either the group’s or his/her own viewpoint on each area’s actual requirement for assistance, the need to maintain interpopulation genetic variability, and the need to develop sanctuaries rather than placing continuing emphasis on populations in large“protected” areas. If the participant disagrees with any of the figures in Table 1, or any of the procedures, then this stage gives him/her an opportunity to produce an independent ranking.

In other words, the analysis so far serves as a guide to the individual’s decision-making, and need not be regarded as the final statement. If the participant is in fact satisfied that population size is the most important aspect, that the figures in Table 1 are reasonable, that consideration of poaching pressure has effectively side-stepped the thorny question of deciding whether it is worth putting money into an area (with current levels of anti-poaching performance), and that the assessment of requirements for external assistance is acceptable, then all he/she needs to do is to moderate Table 3 according to considerations of genetic rarity.

10. Once each person has produced a listing, all the ranks given to each area can be added and the areas reranked according to their total scores (as in stage 6).

11. This new listing can then be circulated for participants to once more review the ranking that has emerged from the group as a whole and change the order if they feel it is appropriate to do so.

12. The ranks can then again be added and a final listing produced, which represents the overall opinion of the group as to where international conservation agencies should direct their money, etc. for rhino conservation. The IUCN phytochorial classification can be shown for those areas to which it has been applied. For each area, existing or planned national or externally-supported rhino conservation intitiatives (or other projects that would help the rhinos) should be outlined, so AERSG can specify the kinds of activities and level of funding that are still required.

Notes

1.The procedure in stages 9-12 is an application of the Delphi process used in business decision-making. This process of iterative review has been found to be extremely successful in reaching a group consensus on issues where value-judgements are involved, and where one or two vociferous or authoritative individuals would otherwise tend to dominate the development of a group’s viewpoint. It provides a means of blending the group’s reasonably factual knowledge on the status and trends of rhino populations, and potentials for population expansion, with the subjective aspects (requirements for funding and considerations of genetic rarity).

2. While this may seem a lengthy process, the time taken in plenary session is relatively short: the generation of the raw data in Table 1 (although ideally this would be simply a review of data obtained from recent questionnaire returns, and collated prior to the meeting), the classification of areas according to their requirements for external assistance, and the final review of the ranking. The ranking of areas by individuals (stages 9—11) can be carried out during breaks in the meeting. If time is short, these stages could be side-stepped by the Chairman simply producing a priority list (stage 9) and presenting this to the group for endorsement or modification. To carry out the exercise entirely by correspondence would be a feasible, if somewhat protracted process.

3. The system can be refined if more information becomes available on the relationship between poaching offtake and density of rhinos, under different levels of protection (thus enabling

a more accurate assessment of likely rates of poaching over the next 5 years). Also, if we know what range is occupied by rhino in each conservation area, what the existing

Table 3: Requirements for assistance from external agencies

Pop rank	Urgent	Moderate	Low
1	Zambezi		
2		Sebungwe	
3			Etosha
4			Hwange/Matetsi
5			Umfolozi/Hluhluwe
6			Kruger
7	Tsavo		
7	Kaokoveld		
8			Solio
9	Selous		
10			Mkuzi
11	Gona-re-Zhou		
12		Laikipia	
13			Ndumu
13	Luangwa		
14			Nairobi *
14		Aberdares	
15			Itala
16		Mount Kenya	
17			Pilanesburg
18	Rubondo		
19		Nakuru *	
20	Cameroon/Chad		
20			Addo
21	Ngorongoro		
22		Kasungu	
23		Masai Mara	
23	Akagera		
24	Ngeng Valley		
24		Lewa Downs	
25	Kafue		
26			Eastern Shores
27			Iwaba
28			Amboseli *
29			Ol Jogi
30			Weenen
31			Aughrabies
32	Meru		
32	Manyara		

* Takes into account high levels of external assistance already being provided and/or high tourism development which should generate sufficient revenue to protect spectacular animals.

levels of anti-poaching effort are (in monetary terms: expenditure per square kilometre) and what the level of tourism development is, we can start to put significant brakes on the poaching declines anticipated in the problem areas.

4. Funding agencies can easily review the requirements for assistance (Table 3); if they disagree with the AERSG assessment, they can modify rankings accordingly.

5. By requiring estimates to be made of specific rates of reproduction and poaching rates, AERSG can improve its understanding of these aspects, when projected populations are compared with actual populations in years to come.

6. The assessment of likely population levels, taking natural increases and poaching attrition into account, assists in setting realistic population targets for the continental rhino conservation effort. Targets that might be set for the next 5-year period are population increases to the following levels:

Western Central Africa	–	50 (this would require translocations and intensive management).
South Western Africa	–	550
South Central Africa	–	3,000
Eastern Africa	–	650
TOTAL		4,250 in 1992.

Table 4: Provisional genetic grouping of black rhino
(Following recommendations of Cincinnatti Rhino Workshop, 1986)

Conservation Unit	Current Population	Natural Pop. in 5yrs	Poached Pop. in 5yrs
West-Central Africa			
Cameroon/Chad	30	33	9
South-Western Africa			
Etosha	350		
Kaokoveld	90		
Aughrabies	5		
	445	569	500?
South-Central Africa			
Zululand to Southern Tanzania	2648	3524	2390
Eastern Africa			
Northern Tanzania—Kenya	590	754	542

Note: Where possible, viable rhino populations should be conserved in the different major ecological zones within the above broad conservation units, in order to maintain adaptations to local conditions; e.g. it is desirable to maintain the Tsavo population as a separate subunit in the Eastern Africa unit provided there are sufficient founders to prevent inbreeding rather than immediately mixing them with the other Kenyan populations (which are probably not large enough to be managed without genetic mixing, or have already been mixed).

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