



SECTION 2: MAMMALS



Mountain Gorilla, an endemic subspecies. A.J. Plumptre, WCS

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2.1 SUMMARY

A total of 402 species of mammal (excluding humans) have been recorded in the 35 sites of the Albertine Rift for which we could obtain records. This is about 39% of all mammals found on mainland Africa. There are 34 species thought to be endemic to the Albertine Rift and 12 near-endemic species whose distribution extends into the Ituri forest in eastern DRC. Three endemic subspecies were included in the analyses because of the way in which they are managed as distinct populations: mountain gorilla (*Gorilla beringei beringei*) and Grauer's gorilla (*Gorilla beringei graueri*) and the golden monkey (*Cercopithecus mitis kandtii*). The Virunga National Park in DRC has a recorded list of 196 species of which 79 are large mammals and in both cases is the richest of the protected areas in the Albertine rift. Kahuzi Biega and Bwindi Impenetrable National Parks with 136 and 135 mammals recorded respectively are the next most species rich of the sites. Virunga National Park and Bwindi Impenetrable National Park contain 21 and 20 Albertine Rift endemic species respectively with Rwenzori Mountains National Park third with 18 endemic species. Kahuzi Biega National Park has 14 threatened species (CR, EN or VU) with Virunga National Park (13) and Rwenzori Mountains National Park and Itombwe Massif (10) as the next most abundant sites. If all IUCN red listed species are counted then Virunga National park contains the highest number (42), Kahuzi Biega National Park comes second (39) and the Itombwe Massif ranks third (24). Of the 18 sites with relatively complete lists of mammals, 8 are required to protect over 90% of all mammals at these sites. Nine sites are required to protect all the endemic and threatened mammals at these sites. Larger mammals have been more completely surveyed and reasonable lists existed for 24 sites. Only four sites are required to protect over 90% of large mammals with 98% of endemic and threatened species

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protected by these four sites. Only five sites are required to protect all 46 endemic and threatened large mammals.

*Au total, 402 espèces de mammifères (les humains exclus) ont été enregistrées dans les 35 sites du Rift Albertin pour lesquelles nous avons pu obtenir des données. C'est environ 39% de tous les mammifères du continent Africain. On compte 34 espèces supposées endémiques au Rift Albertin et 12 espèces proche de l'endémisme qui s'étendent jusqu'à la forêt d'Ituri à l'Est de la RDC. Trois sous espèces endémiques ont été incluses dans les analyses à cause de la manière dont elles sont gérées comme populations distinctes: les gorilles de montagne (*Gorilla beringei beringei*), le Gorille de Graueri (*Gorilla beringei graueri*) et le Singe doré (*Cercopithecus mitis kandtii*). Le Parc National des Virunga en RDC a enregistré une liste de 196 espèces parmi lesquelles 79 sont de grands mammifères et dans les deux cas, il est le plus riche de toutes les aires protégées du Rift Albertin. Le Parc National de Kahuzi-Biega et le Bwindi Impenetrable National Park respectivement avec 136 et 135 mammifères enregistrés sont les suivants. Le Parc National des Virunga et le Bwindi Impenetrable National Park respectivement ont 21 et 20 espèces endémiques du Rift Albertin avec le Parc National de Rwenzori, troisième avec 18 espèces endémiques. Le parc National de Kahuzi Biega a 14 espèces menacées (CR, EN ou VU) avec le Parc National des Virunga(13), le Rwenzori Mountains National Park et le Massif d'Itombwe(10) comme autres sites abondants. S'il faut considérer tous les critères de la liste rouge des espèces de l'UICN, le Parc National des Virunga contient le nombre le plus élevé (42), le Parc National de Kahuzi-Biega est le deuxième (39) et le Massif d'Itombwe, le troisième (24). De tous les 18 sites avec des listes des mammifères relativement complètes, 8 nécessitent la protection de plus de 90% de tous les mammifères de ces sites. Neuf sites sont importants pour protéger tous les mammifères endémiques et menacés. Les grands mammifères ont été complètement inventoriés et les listes acceptables existaient pour 24 sites. Quatre sites seulement nécessitent la protection de plus de 90% de grands mammifères avec 98% d'espèces menacées et endémiques protégées (par ces quatre sites). Cinq sites seulement sont nécessaires protéger tous les 46 grands mammifères endémiques et menacés.*

2.2 INTRODUCTION

Mammals are often the first taxa to be listed for a site and consequently reasonable lists exist for many of the sites in the Albertine Rift. At least this is true for the larger mammals down to the size of primates. However lists of nocturnal species (genets, civets, mongooses) and small mammals (shrews, bats and rodents) are rare and often incomplete. One of the problems with the lists that exist is that a fair number are based on information from the first half of last century. Mammals are hunted by man for bushmeat and their skins and, as a result, are usually the first taxa to decline where man is having a significant impact on a protected area. Since the first half of last century most of the countries in the Albertine Rift have experienced war and civil turmoil and many large mammals have been hunted to very low populations or to local extinction. An attempt was made to remove species that are known to be extinct from sites to reflect the current reality rather than historical data.

2.3 INFORMATION SOURCES

A variety of sources were used to compile mammal lists for the 31 sites where surveys had taken place. These are listed below by country. The authors of this chapter have also contributed many records.

Uganda

The main source for Uganda was the checklist of mammals of the national parks (Wilson, 1995) and the small mammal surveys undertaken by the Uganda Forest

Department (Howard and Davenport, 1996). Additional data for large mammals came from Kingdon (1971-1983) and for small mammals from Kerbis Peterhans *et al.* (1996), Kerbis Peterhans and Austin (1996), Kerbis Peterhans (1997) and van der Straeten and Kerbis Peterhans (1999).

Rwanda

Dowsett (1990) produced a list of mammals for the Nyungwe Forest Reserve and this was combined with unpublished sightings from the Wildlife Conservation Society project in this forest and Hutterer *et al.* (1987). A list for the Virunga Volcanoes was produced using de Witte (1938), Wilson (1995) and Hutterer *et al.* (1987)

DR Congo

De Witte (1938) reported on extensive surveys by Belgian scientists in the Virunga National Park. Muhlenberg, Slowik and Steinhauer (undated) provided a list for Kahuzi Biega National Park and Omari *et al.* (1999) provided a list for Itombwe Massif.

Burundi

A list was obtained for Kibira National Park (Peace Corps and INECN undated).

Tanzania

Lists were obtained for Gombe from the Gombe National Park website, for Mahale from Anonymous (1985) and for Mbizi from David Moyer.

Zambia

Lists for Sumbu and Mweru-Wantipa National Parks were generated from the distribution records given by Ansell (1978).

Endemic species lists were based upon those drafted by Conservation International (T. Brooks *et al.* unpublished) and revised with contributions from various specialists, particularly Julian Kerbis Peterhans.

2.4 RESULTS

2.4.1 Species richness

A total of 402 species of mammal were identified as occurring in the 35 sites for which data were compiled. This is 39.3% of the total number of mammals found on the mainland of Africa (totals from WWF database). Virunga National Park has the highest number of mammals with 196 species or 48.8% of the total number of mammals from these sites in the Albertine Rift. Kahuzi Biega National Park with 136 species, and Bwindi Impenetrable National Park with 135 species, rank second and third (Table 2.1). Several sites have few mammal species listed and have not been well surveyed, particularly for small mammals (rats, bats and shrews). Larger mammals (primates, felids, canids, mongooses, genets, ungulates, large rats, hyraxes and squirrels) tend to be identified and listed at more sites than small mammals and hence these poorly surveyed sites were analysed separately. A total of 24 sites were considered sufficiently surveyed for large mammals and only 18 sites sufficiently surveyed for all mammals (Table 2.1).

2.4.2 Endemism

A total of 34 endemic mammals were identified with 12 near endemic species (Table 2.2). The near endemic species range into the Ituri forest from the Albertine Rift but for the most part of their range they are confined to the Albertine Rift. Three subspecies were also considered; 2 endemic and one near-endemic. Both Virunga National Park (21) and Bwindi Impenetrable National Park (20) had the highest numbers of Albertine Rift endemic species followed by Rwenzori Mountains National Park (18). If near-endemic species are included, Virunga National Park ranks highest (28) with Bwindi Impenetrable National Park (26) and Rwenzori Mountains National Park rank (22) second and third (Table 2.1).

Table 2.1 The total number of species compiled, number of large mammals (excluding rats, bats, shrews and nocturnal primates), number of Albertine Rift (AR) endemic species, number of near-endemic species, number of threatened species and total number of IUCN listed species. Virunga Park is divided into five sectors due to its size and numbers are given separately for each sector as well as the total. *= reasonably surveyed for all mammals;

Site	SPP no.	No. Large mammals	AR endemic species	Near endemic species	Threatened CR,EN, VU	IUCN listed species
Murchison Falls NP *	109	54	0	1	5	21
Bugungu WR	9	7	0	0	1	1
Karuma WR	57	27	0	0	4	7
Budongo FR *	95	27	0	3	5	10
Bugoma FR	38	15	0	0	4	7
Kagombe FR	14	6	0	0	3	5
Kitechura FR	17	3	0	1	1	2
Ibambaro FR	2	2	0	0	0	0
Matiri FR	12	2	1	2	0	0
Itwara FR	18	4	0	1	0	2
Semliki WR	69	35	0	1	4	12
Semliki NP *	86	27	1	2	5	16
Rwenzori Mountains NP *	102	26	18	4	10	20
Kibale NP *	115	59	5	3	7	21
Kasyoha-Kitomi FR *	47	15	2	5	3	7
Kalinzu-Maramagambo FR *	58	18	1	3	3	7
Kyambura WR	37	24	0	0	3	8
Queen Elizabeth NP *	97	62	0	2	6	21
Bwindi Impenetrable NP *	135	43	20	6	7	18
Mafuga FR	20	2	3	1	1	4
Echuya FR *	24	3	7	2	1	5
Virunga Volcanoes	86	34	18	3	6	16
Virunga south	26	19	4	0	5	6
Virunga central	66	39	1	1	5	15
Virunga north	46	24	1	1	4	13
Virunga Rwenzori	44	16	7	0	3	11
PNVi total *	196	79	21	7	13	42
West of Lake Edward	8	6	0	0	1	1
Nyungwe NP *	86	42	14	4	3	16
Kahuzi Biega NP *	136	67	15	6	14	39
Kibira NP *	71	34	8	3	7	16
Bururi FR	9	8	1	0	1	1
Itombwe Massif *	72	54	4	3	10	24
Gombe NP	19	18	1	0	4	7
Mahale Mountains NP *	52	49	1	0	6	14
Mbizi FR	21	6	1	0	2	7
Sumbu NP *	61	43	0	0	6	13
Mweru-Wantipa NP *	50	35	0	0	7	15

Table 2.2 The endemic and near-endemic species of mammal that occur in the Albertine Rift with their IUCN threatened status. Three subspecies are included (see text). IUCN threats: CR=Critically Endangered; EN=endangered; VU=vulnerable; DD=data deficient; LR/nt=near threatened. AR=Albertine Rift endemic; NE=near-endemic species.

Family	Species	Common name	IUCN	AR endemic
Bovidae	<i>Cephalophus rubidus</i>	Rwenzori Duiker		AR
Cercopithecidae	<i>Cercopithecus hamlyni</i>	Owl-faced monkey	LR/nt	NE
Cercopithecidae	<i>Cercopithecus lhoesti</i>	L'hoest's monkey	LR/nt	NE
Cercopithecidae	<i>Cercopithecus mitis kandti</i>	Golden monkey	EN	AR
Cercopithecidae	<i>Piliocolobus oustaleti</i>	Red colobus	EN	AR
Cricetidae	<i>Delanymys brooksi</i>	Delany's Mouse		AR
Cricetidae	<i>Dendromus kahuziensis</i>	Kahuzi Climbing Mouse	LR/nt	AR
Cricetidae	<i>Dendromus kivu</i>	Rwenzori climbing mouse		AR
Galagonidae	<i>Galago matschiei</i>	Spectacled Galago	LR/nt	NE
Hominidae	<i>Gorilla beringei beringei</i>	Mountain gorilla	CR	AR
Hominidae	<i>Gorilla beringei graueri</i>	Grauer's Gorilla	EN	NE
Muridae	<i>Dasymys montanus</i>	Montane Marsh Rat	VU	AR
Muridae	<i>Grammomys dryas</i>	Montane Thicket Rat		AR
Muridae	<i>Hybomys lunaris</i>	Rwenzori striped mouse		NE
Muridae	<i>Lophuromys cinereus</i>	Brush-furred Rat	DD	AR
Muridae	<i>Lophuromys medicaudatus</i>	Brush-furred Rat	LR/nt	AR
Muridae	<i>Lophuromys rahmi</i>	Brush-furred Rat	LR/nt	AR
Muridae	<i>Lophuromys woosnami</i>	Woosnam's Brush-furred rat		AR
Muridae	<i>Mus bufo</i>	Western Rift Pygmy Mouse		AR
Muridae	<i>Pelomys hopkinsi</i>	Papyrus Rat	VU	NE
Muridae	<i>Praomys degraafi</i>			AR
Muridae	<i>Praomys montis</i>			AR
Muridae	<i>Thamnomys kemp</i>	Kemps' Forest Rat		AR
Muridae	<i>Thamnomys venustus</i>	Kemp's Forest Rat		AR
Rhinolophidae	<i>Rhinolophus hilli</i>			AR
Rhinolophidae	<i>Rhinolophus ruwenzorii</i>			AR
Rhizomyidae	<i>Tachyoryctes ankoliae</i>	Mole rat/Desmol	VU	NE
Rhizomyidae	<i>Tachyoryctes ruandae</i>	Mole rat/Desmol		AR
Sciuridae	<i>Funisciurus carruthersi</i>	Carruther's Mountain Tree Squirrel	VU	AR
Sciuridae	<i>Heliosciurus ruwenzorii</i>	Montane Sun Squirrel		AR
Soricidae	<i>Crocidura kivuana</i>	Musk Shrew	VU	AR
Soricidae	<i>Crocidura lanosa</i>	Musk Shrew		AR
Soricidae	<i>Crocidura maurisica</i>	Northern Swamp Musk Shrew		NE
Soricidae	<i>Crocidura montis</i>			NE
Soricidae	<i>Crocidura niobe</i>	Rwenzori Musk Shrew		AR
Soricidae	<i>Crocidura stenocephala</i>	Musk Shrew	VU	AR
Soricidae	<i>Myosorex babaulti</i>	Mouse Shrew		AR
Soricidae	<i>Myosorex blarina</i>	Rwenzori Mouse Shrew	VU	AR
Soricidae	<i>Myosorex schalleri</i>	Schaller's Mouse Shrew	CR	AR
Soricidae	<i>Paracrocidura graueri</i>	Grauer's Montane Shrew	CR	AR
Soricidae	<i>Paracrocidura maxima</i>	East African Montane Shrew		AR
Soricidae	<i>Rwenzorisorex suncoides</i>	Osgood's Montane Shrew	VU	AR
Soricidae	<i>Scutisorex somereni</i>	Hero shrew		NE
Soricidae	<i>Sylvisorex granti</i>	Least long-tailed Forest Shrew		NE
Soricidae	<i>Sylvisorex lunaris</i>			AR
Soricidae	<i>Sylvisorex vulcanorum</i>			AR
Tenrecidae	<i>Micropotamogale ruwenzorii</i>	Rwenzori Otter Shrew	EN	AR
Viverridae	<i>Genetta victoriae</i>	Giant Forest Genet		NE
Viverridae	<i>Osbornicitis piscivora</i>	Aquatic Genet	DD	NE

2.4.3 Threatened species

Two categories of threatened species were analysed: 1. threatened (including critically threatened, endangered and vulnerable) and 2. all IUCN listed species (CR, EN, VU and lower risk and data deficient species). A total of 36 mammals are threatened and 89 are IUCN-listed in the rift. Kahuzi Biega National Park has the highest number of threatened species (14) followed by Virunga National Park (13) but the positions are reversed (39 vs 42 respectively) if all IUCN-listed species are analysed (Table 2.1).

2.4.4 Complementarity analyses

A complementarity analysis was made of both the large mammal data set (24 sites) and the total mammal data set (18 sites). The analysis selected those sites with the highest number of endemic (including near-endemic) and IUCN-listed species initially, until all of these species had been selected, and then selected those sites that contributed the most number of additional species.

Virunga National Park was selected first followed by Kahuzi Biega National Park and Murchison Falls National Park for both data sets. These three sites accounted for 82.7% of all large mammals and 67.4% of all mammals with 93.5% and 75.2% of endemic and threatened species respectively. Five sites were necessary to protect all endemic and threatened large mammals in at least one site and eleven sites were required to capture all large mammal species. Of the 18 sites that had been surveyed for small mammals, nine were needed to protect all the endemic and threatened mammals at these sites. These nine did not include 11 species that are found at other sites that have been poorly surveyed for small mammals. Of the 18 sites, 15 were required to capture all mammals at these 18 sites (Table 2.3).

Not surprisingly the complementarity analyses select sites at both ends of the Albertine Rift (Murchison Falls NP in the north and Mweru-Wantipa and Sumbu parks in the south). What is interesting, however, is that both Virunga and Kahuzi Biega parks are the two most important sites for all mammals and large mammals (of the sites analysed) and yet these two parks are relatively close to each other within the Rift. Virunga park captures many of the mammals found in savanna and woodland habitat while Kahuzi Biega park probably captures the species that occur at lower elevations in lowland forest that are not found in the northern sector of the Virunga park.

2.4.5 Cluster analyses

A cluster analysis was performed on both the large mammal data set and also the total mammal data set. As the Virunga Park is large and extends over several habitat types it was subdivided into 5 sectors (volcanoes, south, central, Rwenzori and northern sectors) and these separate areas were included in the cluster analyses.

The clusters for the large mammal data set group into five main groups (Fig. 2.1). These are: 1. the southern end of Lake Tanganyika (Mahale, Sumbu and Mweru-Wantipa); 2. the sites of high species richness and biomass (Murchison Falls, Queen Elizabeth, Virunga park and Kibale park); 3. most of the high altitude forests (Bwindi - Itombwe), 4. central savannas and low altitude forest (Karuma – Gombe) and 5. high and medium altitude forests (Bugoma – Rwenzori mountains).

Table 2.3 Results of the complementarity analysis indicating the minimum number of sites that together would maximise the number of mammals (all species and large mammals alone) protected. *=point at which all endemic and threatened species are captured in at least one site.

All mammal species (18 sites)			Large mammal species (24 sites)		
Sites	Species added	ARE/IUCN added	Sites	Species added	ARE/IUCN added
Virunga NP	196	61	Virunga NP	79	31
Kahuzi Biega NP	49	20	Kahuzi Biega NP	17	8
Murchison Falls NP	26	7	Murchison Falls NP	9	4
Rwenzori NP	15	6	Mweru-Wantipa NP	10	2
Semliki NP	11	3	Kibale NP*	3*	1
Mweru-Wantipa	15	2	Sumbu NP	5	
Nyungwe	6	2	Rwenzori NP	1	
Itombwe	3	2	Mahale Mts NP	1	
Kibale NP*	3*	1	Karuma WR	1	
Bwindi	12		West of L. Edward	1	
Sumbu NP	9		Nyungwe FR	1	
Budongo FR	5				
Kalinzu-Maramagambo FR	2				
Mahale Mt NP	1				
Kibira NP	1				

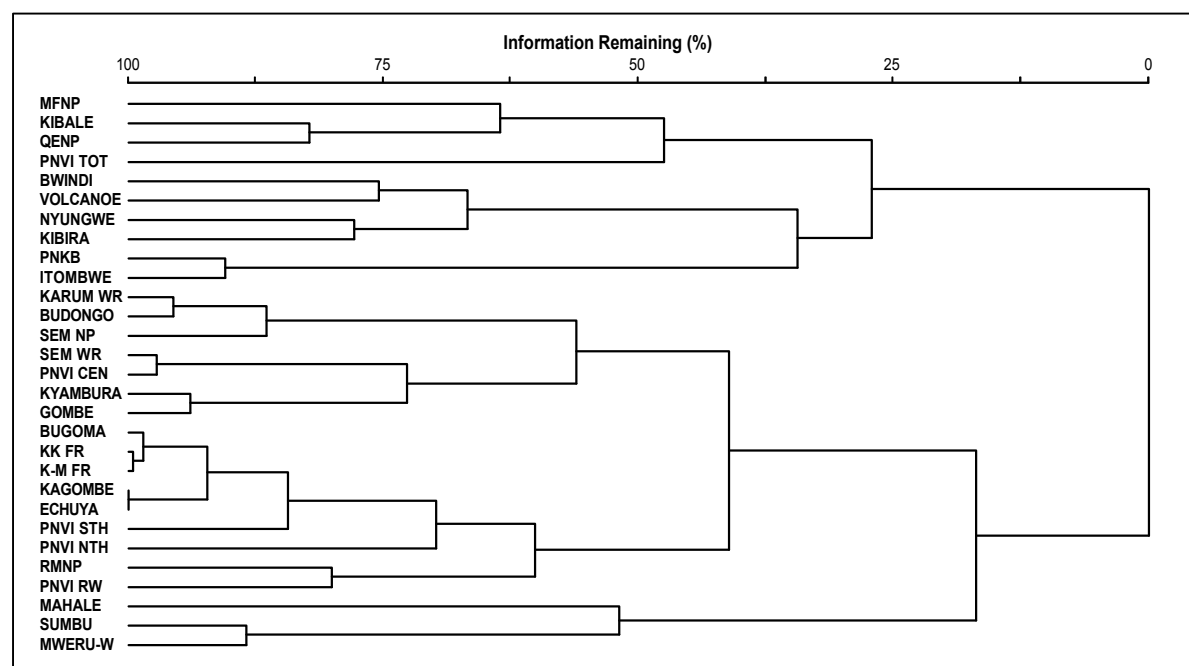


Figure 2.1 A cluster dendrogram for the large mammal data set. The Virunga Park (PNVi) is separated into five subsectors (Volcanoes, south – PNVi sth, central – PNVi cen, north – PNVi nth and Rwenzori – PNVi RW). MFNP=Murchison Falls park, QENP=Queen Elizabeth park, PNKB=Kahuzi Biega park, SEM=Semliki, KK=Kasyoha-Kitomi Forest Reserve, K-M=Kalinzu–Maramagambo forests, RMNP=Rwenzori mountains park.

The cluster analysis for the total mammal list for the 18 sites (and 5 sectors of Virunga park) shows a similar classification although not quite the same (Fig. 2.2). Mahale, Mweru-Wantipa and Sumbu are now clustered with the central Virunga park; Queen Elizabeth, Murchison Falls, Kibale and Virunga park (total) now cluster with Itombwe and Kahuzi Biega; at the bottom half of the dendrogram are high altitude forests apart from Virunga northern sector; and the lower altitude forests (Budongo-Kalinzu-Maramagambo) form a cluster.

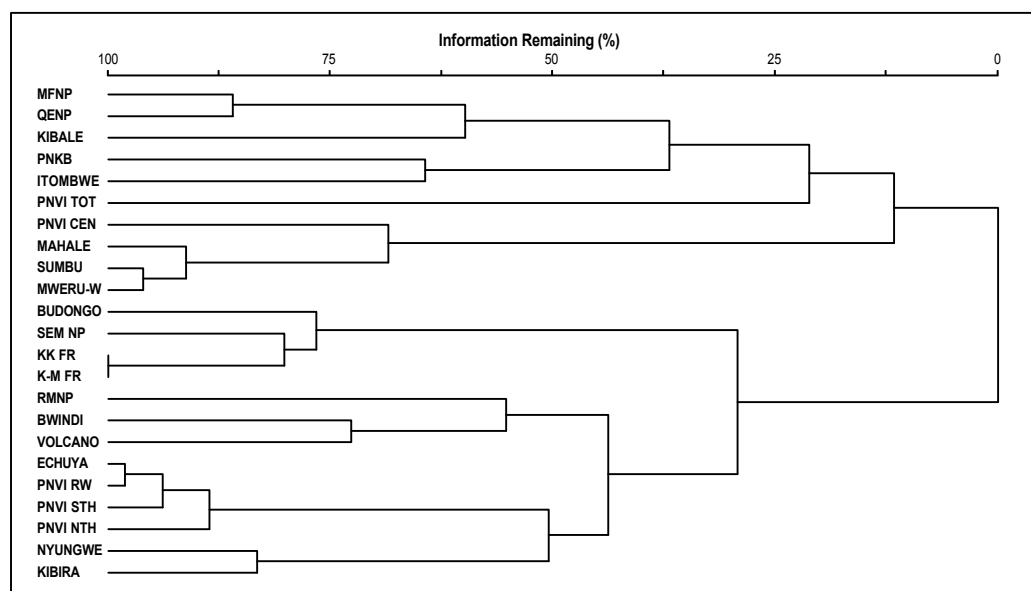


Figure 2.2 Cluster dendrogram for the sites with reasonable lists of all mammal species. For codes see legend to Fig. 2.1.

2.5 DISCUSSION

These results show that the Albertine Rift is particularly rich in mammal species. A total of 402 species occur in this part of Africa of which 8.9% are endemic and 22.1% are listed under IUCN criteria (8.7% threatened). The data compilation also highlights that there are many sites where information on the nocturnal and smaller mammals is lacking and there is a consequent need for surveys. Of the 36 terrestrial sites mapped in figure 1.3, only 18 were considered to have reasonable total lists of mammals and of these only 24 also had reasonable lists of large mammals. It is likely that lists could be compiled for some of these sites from museum records given significant input of time, since most specimen localities have been entered into georeferenced databases. However, it may be more feasible, and even cheaper, to actually undertake new surveys in these sites if the security and access are good. Particular areas that need further work include: Gombe Stream National Park (Tanzania), Marungu Massif (DRC), Mt Kabobo (DRC), Itombwe Massif (DRC), Karuma and Bugungu Wildlife Reserves (Uganda), and Semliki and Kyambura Wildlife Reserves (Uganda).

The cluster analyses show that Mahale and the two sites in Zambia have distinct mammal faunas (particularly of large mammals) and does question whether these sites should be included in the Albertine Rift. However their small mammal fauna does link them to the central Virunga Park and represents communities of dry savanna and woodland.

Virunga and Kahuzi Biega National Parks rank most highly in mammal diversity and in numbers of threatened and endemic species. Although Virunga Park was reasonably well surveyed in the 1930s it would probably be possible to increase the species list considerably. For example the Rwenzori Mountains Park, which is contiguous with Virunga, has many more species of mammal listed than the Rwenzori section of the Virunga Park. Similarly Kahuzi Biega has not been surveyed very intensively for rodents, shrews and bats so the list could probably be easily increased with more effort. Ultimately what this shows is that there is still a real need for basic mammal surveys at many of the sites in the Rift, particularly focusing on the small and nocturnal species.

Figure 2.3 (a-d) summarises the results in a geographical information system (GIS). Total and large mammal species richness is generally evenly spread along the Rift with no clustering occurring in any clear pattern. Endemic species tend to be clustered in the central portion of the Rift between Bwindi Impenetrable National Park and Itombwe Massif. Threatened species are most abundant in two clusters; one around Rwenzori Mountains-Semliki-Kibale National Parks in Uganda and the other around Kahuzi Biega National Park and Itombwe Massif.

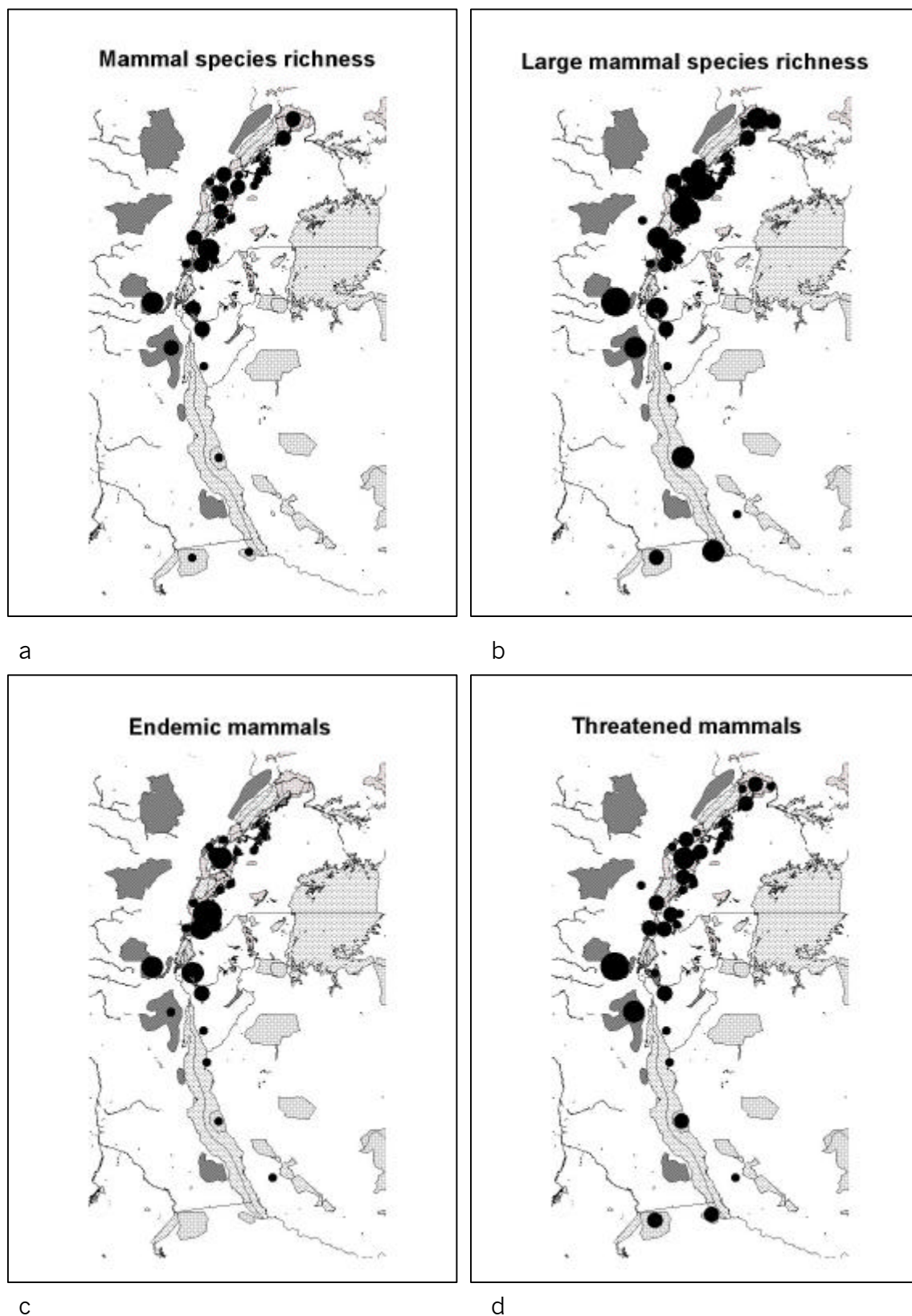


Figure 2.3 A summary of the results for the mammal data represented geographically. Each site that has non-zero data is represented by a circle of varying size depending on the number of species. a) Total mammal species richness; b) Large mammal species richness; c) endemic mammals; d) threatened mammals (CR, EN and VU).