SECTION 5: AMPHIBIANS

Treefrog in Giant Lobelia. A.J.Plumptre, WCS

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5.1 SUMMARY

A total of 119 amphibian species have been recorded in the 27 sites of the Albertine Rift for which we could obtain records. This is about 19% of all amphibians found on mainland Africa. There are 34 species thought to be endemic to the Albertine Rift with an additional three near-endemic species. The Virunga National Park in DRC has a recorded list of 78 species and is the richest of the protected areas in the Albertine rift. Kahuzi Biega National Park in Uganda ranks second with 44 species and Bwindi Impenetrable and Kibale National Parks rank third with 33. Virunga National park has the highest number of endemic species (21) followed by Itombwe Massif (16) and Nyungwe Forest (15). The Virunga national Park also has the highest number of IUCN-listed species (21) with Itombwe Massif (15) and Nyungwe Forest (12) in second and third respectively. Itombwe Massif has more threatened species (CR, EN or VU) than other sites (11) followed by Virunga National Park (10) and Bwindi Impenetrable National Park (6). Seven sites can protect 40 of the 42 endemic and IUCN-listed species and at the same time protect 90% of all amphibian species recorded for the Albertine Rift. One endemic species and one near-endemic species are not found in any protected area.

Un total de 119 espèces d'amphibiens a été enregistré dans les 27 sites du Rift Albertin pour lesquels nous pourrions obtenir des données. Ceci représente 19% de tous amphibiens trouvés sur le continent africain. Il y a 34 espèce reconnues endémiques au Rift Albertin avec un supplément de trois espèces proche de l'endémisme. Le Parc National des Virunga en DRC compte 78 espèces et est le plus riche des aires protégées du Rift Albertin. Le Parc National de Kahuzi Biega en RDC occupe la deuxième place avec 44 espèces et le Bwindi Impenetrable National Parc et le Parc National de Kibale les troisièmes du rang avec 33. Le

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Parc National des Virunga a le nombre le plus élevé d'espèces endémiques (21) suivi par le Massif d'Itombwe (16) et la Forêt de Nyungwe (15). Le Parc National des Virunga a aussi le nombre le plus élevé d'espèces classées par l'UICN (21) avec le Massif d'Itombwe (15) et la Forêt de Nyungwe (12) respectivement deuxième et troisième. Le Massif d'Itombwe a plus d'espèces menacées (CR, EN ou VU) que les autres sites (11) suivi par le Parc National des Virunga (10) et le Bwindi Impenetrable National Parc (6). Sept sites peuvent protéger 40 des 42 espèces endémiques classées par UICN et protègent en même temps 90% de toutes les espèces d'amphibiens enregistrées dans le Rift Albertin. Une espèce endémique et une espèce de près de l'endémisme ne sont pas retrouvées nulle part dans les aires protégées.

5.2 INTRODUCTION

Amphibians have been collected in the Albertine Rift since the mid 1930s. However Amphibian taxonomy has changed greatly since this time and even today is in a state of flux. Consequently the names assigned to amphibians that were collected about 70 years ago are often incorrect and the original specimens need to be checked to verify which species they are. This is even true for specimens collected much more recently. It has been problematic pulling together species lists for sites in the Albertine Rift as a result. Sites within the rift have also been poorly surveyed and only 26 sites had any amphibian recorded. Few of these had very many records indicating that with more effort the number of species at most of these sites could be increased.

5.3 INFORMATION SOURCES

A variety of sources were used to compile the amphibian list for the 26 sites where surveys have taken place. These sources are listed below by country. The authors of this chapter have also contributed many records. Schiotz (1999) was used to compile lists of treefrogs from various countries for sites where locations could be fairly accurately placed.

Uganda

Drewes and Vindum (1994, 1998) and Drewes, Vindum and O'Brien (1992) provided a species list for Bwindi Impenetrable National Park and Vonesh (1998) put together a list for Kibale National Park. Many records were provided by M. Behangana from recent surveys.

Rwanda

Hinkel and Fisher (1988) was used to develop a list of species for Virunga volcanoes and Nyungwe forest. This was augmented by de Witte (1941) for the Virunga volcanoes. Dowsett (1990) also provided a list for Nyungwe Forest.

DR Congo

De Witte (1941) produced a list of amphibians for Virunga National Park but the identifications need many corrections. The database at the Royal Museum of Central Africa for amphibians is in the process of being updated to reflect current amphibian taxonomy and we used the corrected data in this database to create lists of species for DRC and to add records to sites. Laurent (1972) increased the amphibian list of de Witte for Virunga National Park and corrected some mis-identifications. Laurent (1964) was used to compile a list of amphibians for the Itombwe Massif. Hinkel in Fischer (1996) provided a list for Kahuzi Biega National Park. Danny Meirte provided corrections to the taxonomy of the older literature and also added many species from the database at the Royal museum at Tervuren.

Burundi
No data were obtained for Burundi

Tanzania
No data were obtained for Tanzania.
All species names in the old lists were carefully updated to the recent names to ensure that species were not duplicated in the database. Frost (2002) was used to check names of species and ensure the taxonomy was consistent. D. Meirte derived endemic species from the database at the Royal Museum of Central Africa at Tervuren. The 2000 IUCN red data list does not list many amphibians and Simon Stuart at Conservation International is currently revising the list. The draft revised list was used in this analysis.

5.4 RESULTS

5.4.1 Species richness

A total of 119 species of amphibian were recorded for the Albertine Rift from 26 sites. This is 19.2% of the total number of amphibians recorded for the mainland of Africa (total from WWF database). About 18 of these sites have been surveyed reasonably intensively but it is likely that additional species could be added with further effort. Virunga National Park has the highest number of amphibians with 78 species or 65.5% of the total number of amphibians from these sites in the Albertine Rift. Kahuzi Biega National Park has 44 species recorded and Bwindi Impenetrable and Kibale National Parks rank third with 33 species (Table 5.1).

Table 5.1 The total number of species compiled, 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.

Site	SPP no.	AR endemic species	Near Endemic species	Threatened CR,EN, VU	IUCN-listed species
Murchison Falls NP	14	0	0	0	1
Karuma WR	16	0	0	0	1
Budongo FR	29	1	1	1	1
Kitechura FR	15	0	0	0	0
Matiri FR	13	1	0	0	0
Itwara FR	19	1	0	0	0
Semliki WR	12	0	0	0	1
Semliki NP	21	1	0	0	1
Rwenzori Mountains NP	24	6	0	1	3
Kibale NP	33	5	1	3	5
Kasyoha-Kitomi FR	24	4	0	2	2
Kalinzu-Maramagambo FR	23	3	0	2	2
Kyambura WR	11	0	0	0	0
Queen Elizabeth NP	10	1	0	1	1
Bwindi Impenetrable NP	33	11	1	6	9
Mafuga FR	1	1	0	0	0
Echuya FR	14	3	0	1	2
Virunga Volcanoes	47	16	2	9	14
Virunga north	50	7	1	4	9
Virunga central	45	10	1	5	10
Virunga south	31	10	0	4	8
PNVi Rwenzori	54	10	1	6	11

Virunga total	78	21	2	10	21
West of Lake Edward	6	6	0	3	5
Nyungwe NP	31	15	0	5	12
PNKB total	44	13	0	4	10
Kibira NP	1	0	0	0	0
Bururi FR	4	4	0	1	2
Itombwe Massif	23	16	0	11	15
Mt Kabobo	8	7	0	5	7
Marungu	19	1	0	0	2

Table 5.2 The endemic species of amphibian that occur in the Albertine Rift with their IUCN threatened species status. IUCN threats: EN=endangered; VU=vulnerable; DD=data deficient; NT=near threatened. AR=Albertine Rift endemic; NE=near-endemic species.

Family	Species	IUCN	AR endemic
Herpelidae	*Boulengerula fischeri*	DD	AR
Hyperoliidae	*Hyperolius atrigularis*	DD	AR
Hyperoliidae	*Hyperolius ferrugineus*	DD	AR
Hyperoliidae	*Hyperolius xenorhinus*	DD	AR
Bufonidae	*Laurentophryne parkeri*	DD	AR
Hyperoliidae	*Leptopelis fenestratus*	DD	AR
Hyperoliidae	*Leptopelis fiziensis*	DD	AR
Petropedetidae	*Phrynobatrachus sulfureogularis*	DD	AR
Arthroleptidae	*Schoutedenella vercammeni*	DD	AR
Pipidae	*Xenopus ruwenzoriensis*	DD	AR
Ranidae	*Afrana ruwenzorica*	EN	AR
Hyperoliidae	*Chrysobatrachus cupreonitens*	EN	AR
Hyperoliidae	*Hyperolius leleupi*	EN	AR
Hyperoliidae	*Hyperolius leucotaenius*	EN	AR
Petropedetidae	*Phrynobatrachus asper*	EN	AR
Arthroleptidae	*Cardioglossa cyaneospila*	NT	AR
Hyperoliidae	*Leptopelis karissimbiensis*	NT	AR
Petropedetidae	*Phrynobatrachus acutirostris*	NT	AR
Petropedetidae	*Phrynobatrachus dalcqi*	NT	AR
Petropedetidae	*Phrynobatrachus versicolor*	NT	AR
Hyperoliidae	*Callixalus pictus*	VU	AR
Hyperoliidae	*Hyperolius castaneus*	VU	AR
Hyperoliidae	*Hyperolius chrysogaster*	VU	AR
Hyperoliidae	*Hyperolius frontalis*	VU	AR
Petropedetidae	*Phrynobatrachus bequaerti*	VU	AR
Arthroleptidae	*Schoutedenella hematogaster*	VU	AR
Arthroleptidae	*Schoutedenella pyrrhoscelis*	VU	AR
Pipidae	*Xenopus vestitus*	VU	AR
Pipidae	*Xenopus wittei*	VU	AR
Ranidae	*Afrana desaegeri*		AR
Hyperoliidae	*Afrixalus orophilus*		AR
Hyperoliidae	*Hyperolius discodactylus*		AR
Hyperoliidae	*Leptopelis kivuensis*		AR
Petropedetidae	*Phrynobatrachus petropedetoides*		AR
Petropedetidae	*Phrynobatrachus rouxi*	DD	NE
Hyperoliidae	*Hyperolius langi*	EN	NE
Hyperoliidae	*Hyperolius diaphanus*	VU	NE

5.4.2 Endemism

A total of 34 endemic and three near-endemic amphibians were identified for the Rift (Table 5.2). Virunga National Park had the highest number of endemic species (21) followed by Itombwe Massif (16) and Nyungwe Forest (15). One endemic (*Schoutedenella vercammeni*) and one near-endemic species (*Phrynobatrachus rouxi*) were not recorded from any of the sites for which we could find species lists.

5.4.3 Threatened species

Two categories of IUCN-listed species were analysed: 1. threatened (including critically threatened, endangered and vulnerable) and 2. all IUCN-listed species (CR, EN, VU and Near-threatened and data deficient species. The red list for amphibians is currently being revised and the draft list was used in this analysis. A total of 16 amphibians are threatened and 37 are IUCN-listed in the rift. The Virunga national Park has the highest number of IUCN-listed species (21) with Itombwe Massif (15) and Nyungwe Forest (12) in second and third places respectively. Itombwe Massif has more threatened species (CR, EN or VU) than other sites (11) followed by Virunga National Park with 10 and Bwindi Impenetrable National Park with six (Table 5.1).

5.4.4 Complementarity analysis

A complementarity analysis was made of the amphibian data set (all 26 sites). The analysis selected those sites with the highest number of endemic and 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 Itombwe Massif and Marungu Massif. These three sites accounted for 80.7% of all amphibian species and 85.7% of endemic and IUCN-listed species respectively. Seven sites were necessary to protect all endemic and IUCN-listed amphibians found at these sites and 10 sites were required to capture all amphibian species (Table 5.3). Two species that were IUCN-listed were not recorded at any of the sites but are known to be endemic or near-endemic to the rift. These were *Schoutedenella vercammeni* and *Phrynobatrachus rouxi*.

Nearly all sites that are selected to include endemic and IUCN-listed species occur in DRC. This is in part because we did not have species lists for Tanzanian sites that probably would have formed part of the selection for sites in the southern end of the rift.

Table 5.3 Results of the complementarity analysis indicating the minimum number of sites that together would maximise the number of amphibians protected.

Sites which added endemic/threatened amphibians			**Sites adding additional amphibians**		
Sites	Species added	ARE/IUCN added	Sites	Species added	ARE/IUCN added
Virunga NP	78	26	Budongo FR	3	0
Itombwe Massif	9	8	Bwindi NP	2	0
Marungu Massif	9	2	Rwenzori NP	1	0
Kahuzi Biega NP	7	1			
Semliki NP	3	1			
Mt Kabobo	1	1			
Bururi FR	1	1			

5.4.5 Cluster analyses

A cluster analysis was performed on the amphibian 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 group into five main groups. A large group is formed of the northern savanna and mostly lower altitude forest areas and includes Murchison Falls, Queen Elizabeth, Semliki, and Rwenzori National Parks and Budongo, Kasyoha-Kitomi, Kalinzu-Maramagambo and Echuya Forest Reserves and, Karuma, Semliki, and Kyambura Wildlife Reserves. Itombwe Massif is in it's own cluster indicating the uniqueness of this site. A cluster of high altitude sites includes Virunga Volcanoes, Virunga South, Bwindi Impenetrable, and Kibale National Parks with Nyungwe Forest. Kahuzi Biega National Park also forms a cluster on its own and finally four sectors of the Virunga National Park are closely related in their amphibian fauna.

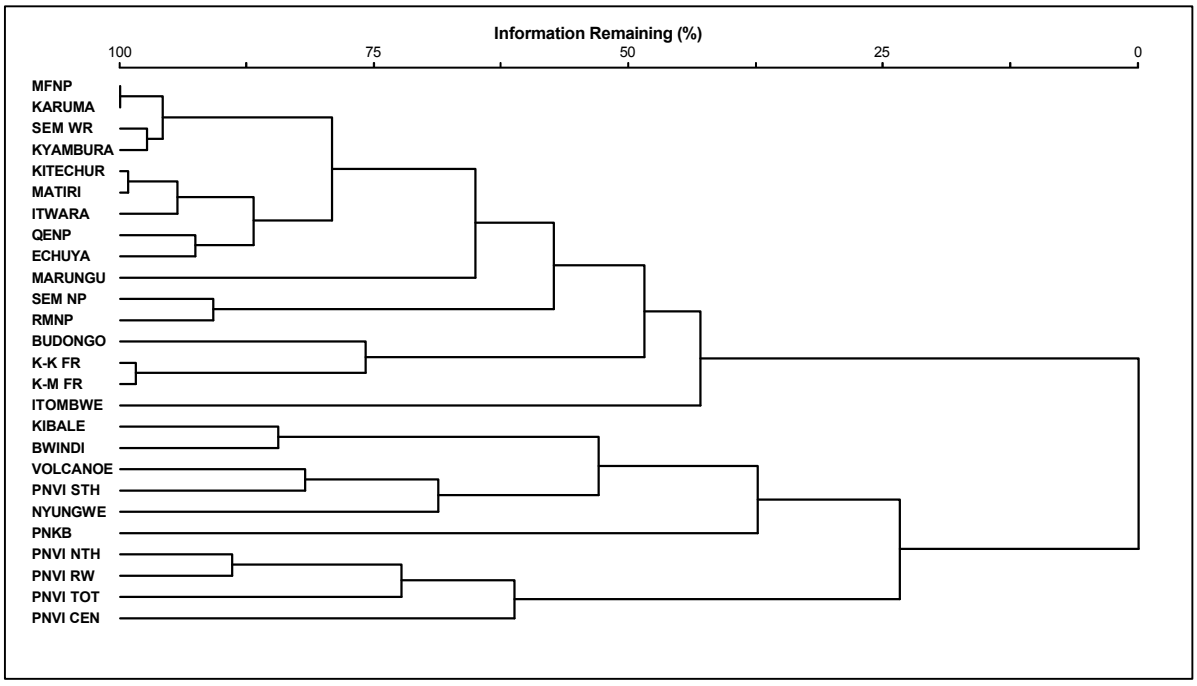


Figure 5.1 A cluster dendrogram for the amphibian data set. The Virunga Park (PNVi) is separated into five subsectors (Volcanoes, south – PNVi sth, central – PNVI cen, north – PNVI nth and Rwenzori – PNVI RW). MFNP=Murchison Falls park, QENP=Queen Elizabeth park, PNKB=Kahuzi Biega park, SEM=Semliki, KK=Kasyoha-Kitomi, K-M=Kalinzu–Maramagambo forests, RMNP=Rwenzori mountains park.

5.5 Discussion

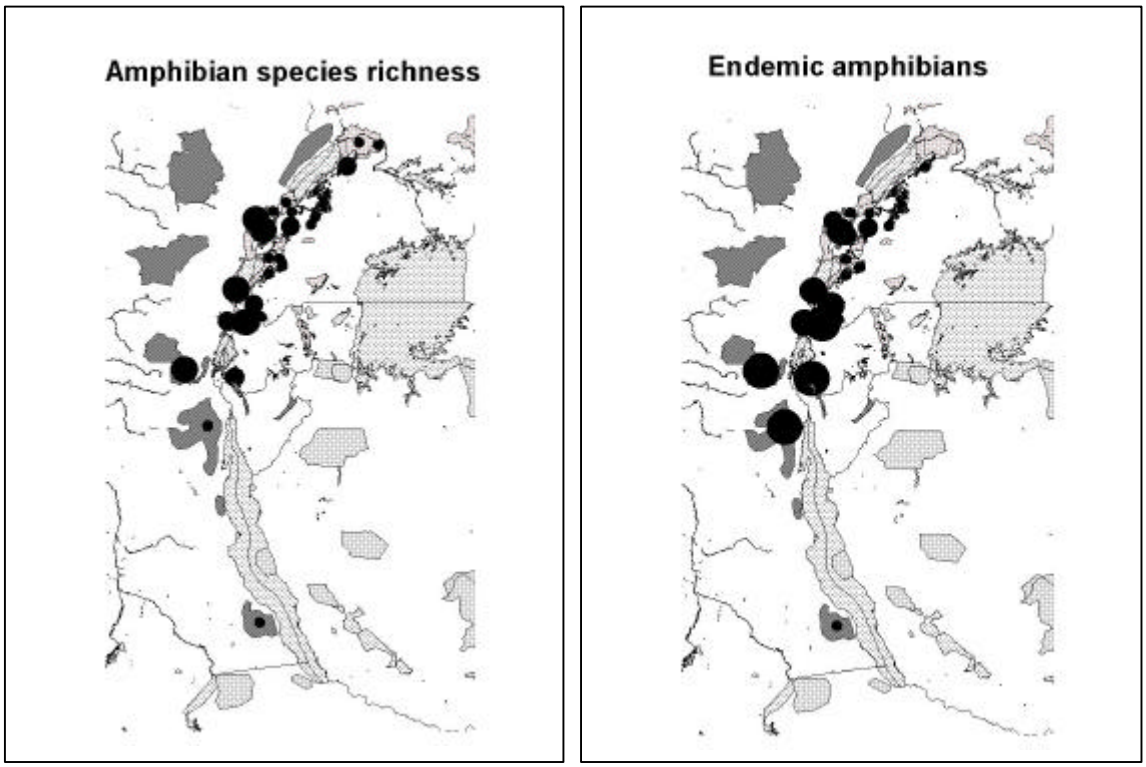
Amphibians species are relatively numerous in the Albertine Rift with 19% of amphibian species on the continent occurring in this region. This is despite the fact that many sites need further collecting and study. A large percentage of the amphibians are endemic to the Rift (28.7% of the species listed) and nearly one third of species are considered to need some form of IUCN-listing (31%). Amphibians are declining around the world and few sites are actively monitoring this taxon,

particularly in Africa. This is in part due to the difficulties in identifying species and the problems that exist with their taxonomy.

Itombwe Massif is the richest site for threatened species and yet it has no protected status. It also has not been very intensively surveyed for amphibians and it is likely more species could be found with only a little more effort. Virunga National Park once again ranks very high with whatever ranking method is employed indicating its importance for conservation in the Albertine Rift.

All sites need further survey work but areas that need particular attention should include Mahale Mountains and Gombe Stream National Parks, Marungu Massif and Mt Kabobo, Itombwe Massif, Kahuzi Biega National Park, Queen Elizabeth National Park and Semliki Wildlife Reserve.

Figure 5.2 summarises the results using GIS. Species rich sites tend to be clustered near high altitude sites or sites which show good altitudinal variation. Endemism and threatened species are generally found in the central portion of the Rift.



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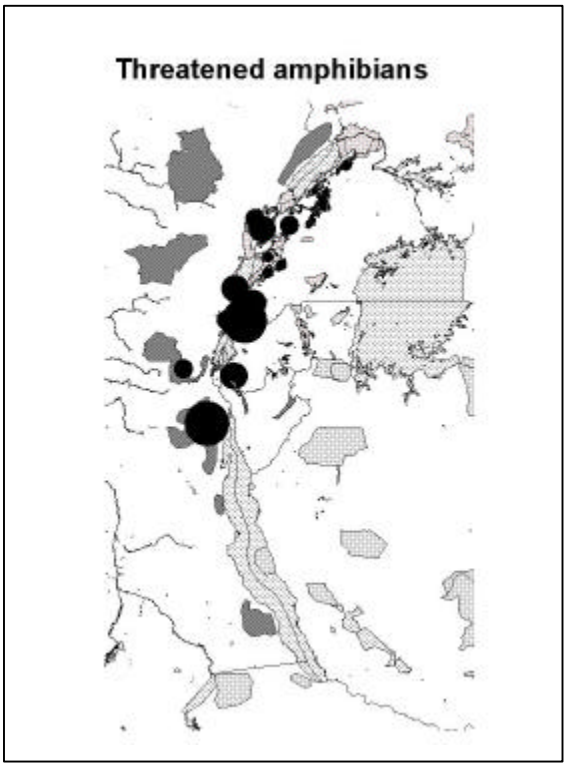

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Figure 5.2 A summary of the results for the amphibian data represented geographically. Each site which has non-zero data is represented by a circle of varying size depending on the number of species. a) amphibian species richness; b) endemic amphibians; c) threatened amphibians (CR, EN and VU).