SECTION 1: THE ALBERTINE RIFT

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1.1 SUMMARY

The Albertine Rift has been identified as a region of great importance for conservation by several priority-setting studies. It is an 'ecoregion', 'biodiversity hotspot' and an 'endemic bird area'. Species lists were compiled for as many sites in the Albertine Rift as we could obtain data for six different taxa: mammals, birds, reptiles, amphibians, butterflies and plants. In addition the species richness of fish in the lakes in the rift were compiled from existing publications. Each of the following chapters summarises the results for each of these taxa.

Le Rift Albertin a été identifié comme une région de grande importance pour la conservation par diverses études de prioritisation. C'est une "écorégion", "biodiversity hotspot" et une "région endémique d'oiseaux". Les listes des espèces ont été dressées pour les sites dans le Rift Albertin pour autant que les données pouvaient être obtenues pour les six taxa: les mammifères, les oiseaux, les amphibiens, les reptiles, les papillons et les plantes. En complément, la richesse en espèces icthiologiques (poissons) dans les lacs du rift ont été compilées sur base de la documentation existente. Chacun des chapitres ci-après résume les résultats pour chacun de ces taxa.

1.2 INTRODUCTION

The Albertine rift extends from the northern tip of Lake Albert down to the southern tip of Lake Tanganyika and encompasses the rift valley, the lakes in the rift and the natural vegetation on the escarpment above the rift (Fig. 1.1). This region has been independently identified as an 'Endemic Bird Area' by Birdlife International (Thirgood and Heath, 1994; Stattersfield et al, 1998), an 'Ecoregion' by the World Wildlife Fund (Olson and Dinerstein, 1998), and recently it has been made a 'Biodiversity Hotspot' by conservation International (T. Butynski pers. comm.; Myers et al, 2000). As such it is recognised as an area of global importance for conservation. Each of the three definitions of the Albertine rift differ somewhat with some concentrating primarily on the montane forests while others focus on a broader definition. For the purposes of this study we adopted a definition that would be as inclusive as possible of all natural vegetation within the region of the rift valley and includes the freshwater lakes. As

such we defined the rift as including all natural vegetation within about 100 km of the border between the Democratic Republic of Congo (DRC) and the neighbouring countries. In DRC where natural vegetation is relatively continuous the 900-metre altitude boundary was selected as the limit while in the other countries where human density is higher we included all the protected areas within about 100 km of the international border. As such this definition is as inclusive as possible and further work can select subsets of the data from different vegetation types.

1.3 Analyses of the biodiversity of the Albertine Rift

1.3.1 Prior studies

Several studies have highlighted the importance and unique characteristics of African mountains. Frank White (1983) highlighted that the African mountain forests contained a unique flora that made them distinct from the surrounding vegetation and Jonathan Kingdon (1989) showed this applied to both the fauna as well as the flora.

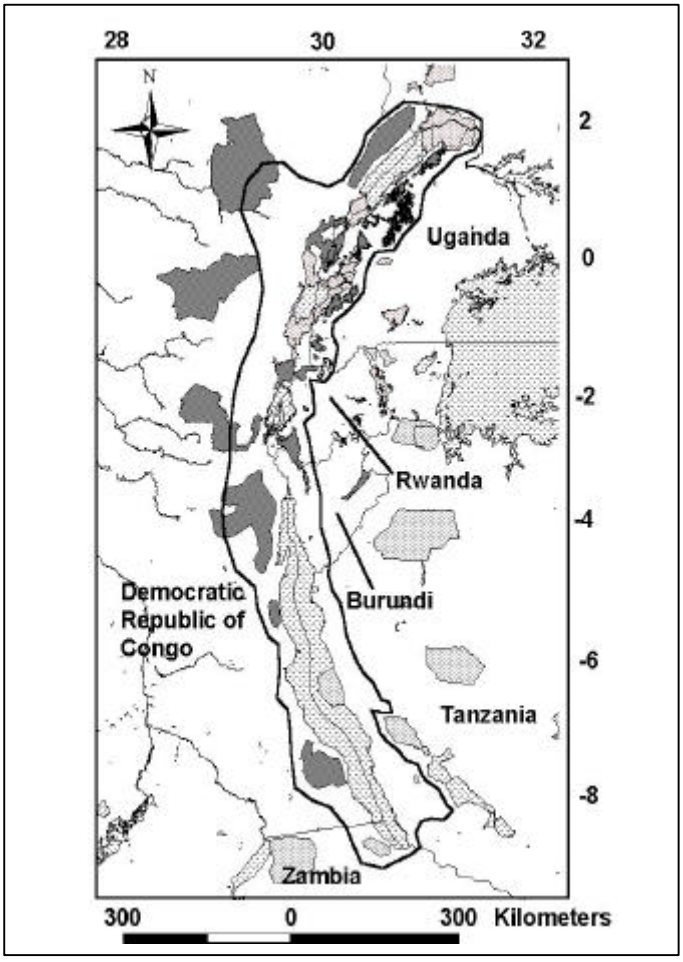

Figure 1.1 Map of the Albertine Rift showing existing protected areas or regions referred to in this study and the approximate boundary of the Albertine Rift (dark line). The Latitude and longitude around the map are labeled in degrees.

An analysis of centres of plant diversity highlighted several montane sites within the Albertine Rift as being regional centres of endemism (Davis et al., 1994). Birdlife International provided one of the first global analyses of endemism in a taxa with their definitions of endemic bird areas of the world (Stattersfield et al., 1998), although this built upon previous work on the distributions of birds in Africa (Diamond, 1985; Prigogine, 1985).

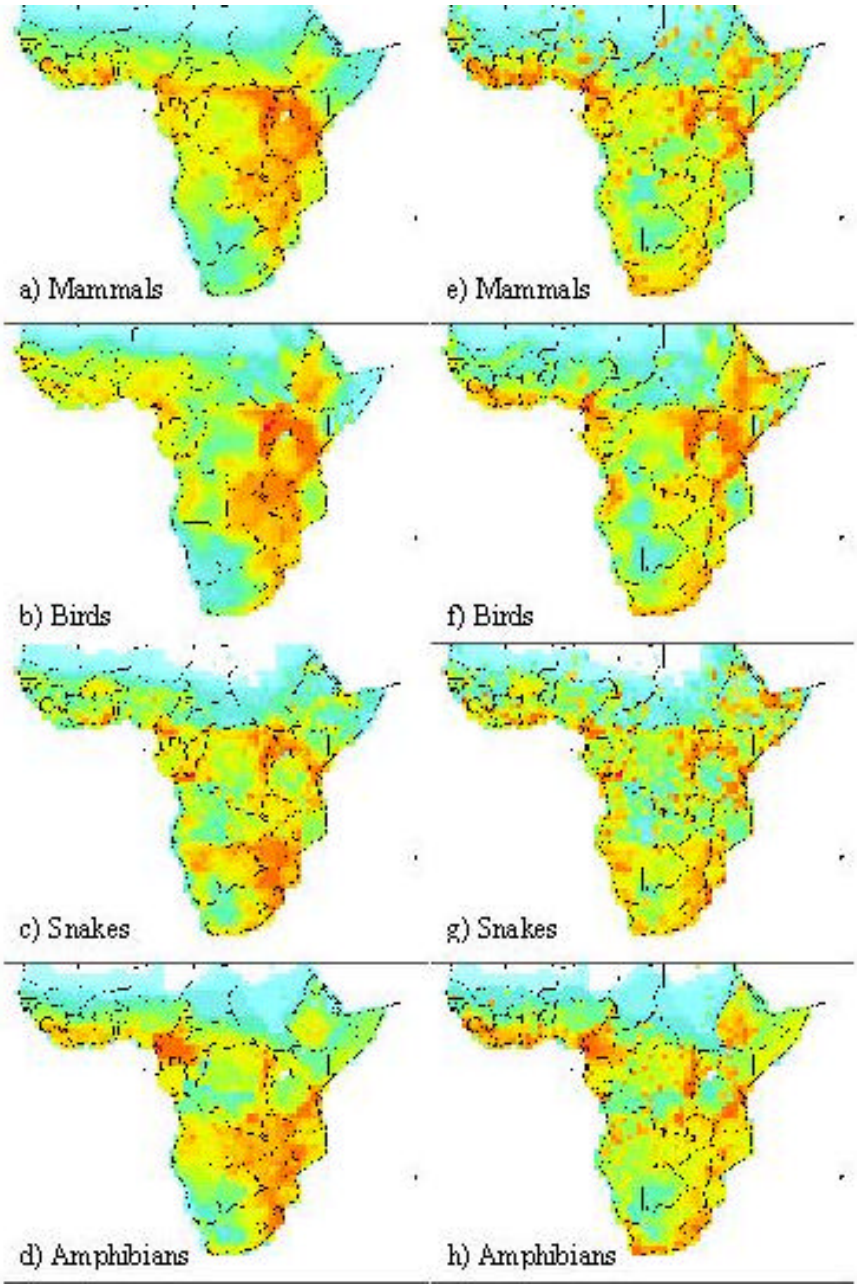

Figure 1.2 The species richness (left maps: a-d) and number of endemic species (right maps: e-f) for mammals, birds, snakes and amphibians. Colours run from red (high numbers) to blue (low numbers). From Brooks et al. (2001)

These analyses showed that the Albertine rift was particularly rich in total numbers of bird species and numbers of endemic bird species, with 36 endemic birds and an additional six in the contiguous eastern Zairian lowlands endemic bird area. Given that these two areas are contiguous and are simply a separation by altitude we decided to include both endemic areas within the analyses presented here.

More recently still analyses of the diversity of vertebrates across Africa show that the Albertine Rift is very rich in total numbers and numbers of endemic species for

mammals, birds, snakes and amphibians (Figure 1.2). Both mammals and birds have highest species richness in the region around the Rwenzori mountains. The data used to analyse these distributions was compiled by the Zoological Museum of the University of Copenhagen and are located spatially at a scale of 1-degree latitude/longitude grid cells (Brooks et al., 2001).
This is appropriate when analysing cross continent patterns of species distributions but of less value when focusing on a smaller areas. This report pulls together similar information at a finer scale to allow comparisons to be made between protected areas within the rift.

1.3.2 Surrogacy and scale

It is costly and time consuming to measure the diversity of all species at any one site let alone at many different sites. The only surveys of the Albertine Rift that even approach the level of intensity required were the surveys made in the 1930s and 1940s of the Virunga National Park in eastern DRC. These surveys not only collected vertebrates but also all plant species, many orders of insect species, other invertebrates and even microorganisms (Mollaret, 1961). We therefore have resorted to analysing the distribution of a subset of the possible taxa that could have been assessed. The taxa we selected are those that have good keys and hence tend to be readily identified and which are of interest to many people and hence which have better distribution records than obscure taxa. The taxa selected were mammals, birds, reptiles, amphibians, butterflies and plants. These taxa we hope will act as surrogates for other biodiversity that have been poorly studied in this part of the world. At large scales across continents this is generally true where it has been studied (ICBP, 1992; Balmford and Long, 1994) and on the whole at medium scales of protected areas (Howard et al. 1998) but generally does not hold at smaller scales such as habitats (Pomeroy, 2000). This is in part due to the affects of the species-area relationship, which predicts more species in larger areas (Rosenzweig, 1995).

In terms of conservation in the Albertine Rift we are constrained by the fact that human density is very high in this region. In fact there is a correlation between biodiversity richness and human population density across Africa (Balmford et al., 2001). For the most part the existing protected areas with proposed protected areas are likely to be all that we can protect in the future. Only a few sites in DRC and Tanzania have the potential to be included as new or expanded protected areas. Consequently the analysis here is less interested in comparing the effects of scale because for the most part the boundaries of the protected areas analysed are already fixed and most conservation action focuses on protected areas. As conservationists we are primarily interested in which protected areas have the most species, the most endemic or restricted-range species and the most threatened species as identified by IUCN (Hilton Taylor, 2000).

In this study we collated presence/absence information for species at the scale of protected area apart from two sites, which were subdivided due to their large size. These two were Kahuzi Biega National Park and Virunga National Park in eastern DRC. Kahuzi Biega was divided into the highland and lowland sectors of the park because the species composition varies greatly with altitude. Virunga National Park was subdivided into the Virunga volcanoes, southern, central, Rwenzori and northern sectors because of its long shape and large size. Where scale is more appropriately taken into consideration is where protected areas are contiguous across international borders. In the last section of the report we analyse the diversity of contiguous units of protected areas to highlight the diversity of these landscapes.

1.4 DATA COMPILATION AND ANALYSES

1.4.1 Compiling species lists

The data summarised in this report were compiled by collecting published species lists for each of the various protected areas and taxa of interest. We were particular that for the most part we did not use generalised distribution maps to compile species lists but only used data from surveys that had taken place. For certain sites such as the newly created Tayna Community Reserve in DRC there is a likelihood of a high number of species given the numbers found in the neighbouring Kahuzi Biega National Park, however surveys have not been made for many taxa here and we therefore have not included it as a site we have looked at. The only generalised distribution data we used were those from amphibian and reptile studies in eastern DRC and western Tanzania and for mammals in northern Zambia where the resolution was sufficiently fine to be able to state that the species came from a particular site. Surprisingly there are quite extensive lists of species for sites in the Albertine Rift, particularly for birds. Where possible we collated the data from the original publications rather than relying on references. This involved extensive checking of names, particularly for DRC where many of the publications data from over 50 years ago. We also attempted to contact many of the experts working on the various taxa to add records and also check the lists we were producing. Many of them gave considerable time to commenting on the lists for which we are extremely grateful.

The protected areas and ungazetted regions where data were available for at least one taxa are mapped in figure 1.3. It is clear that the northern end of the rift has many more small protected areas as compared with the southern end. The southern end is poorly explored with few records from the southern highlands in Tanzania, the Marungu Massif, Mt Kabobo and Itombwe Massif in DRC and Sumbu National Park in Zambia. The taxon with most complete data for this region is birds, although it is likely that more species would be discovered if these areas are surveyed further. The northern end of the Rift has had more intensive surveys with the detailed surveys by Belgian scientists in Virunga park in DRC in the 1930s and 40s, and the Forest Department (Howard and Davenport, 1996) and National Park species lists (Wilson, 1995) in Uganda which come from the compilation of records provided by many people. Each of the taxa chapters that follow details the sources of the records. As there was great variability in the intensity of the surveys in different areas both between taxa and within taxa we scored the survey effort as follows:

1. When was survey made: 1990-present = 3; 1975-1990=2; before 1975=1.
2. Sampling time: brief visits< 1 month=1; long visits (same observer)=2; repeated visits by several people=3.
3. Area surveyed: 1-25%=1, 25-50%=2; 50+%=3

These scores were summed for each site to give a ranking of the survey effort. This was made separately for each taxa surveyed. This scoring is important when comparing sites because the more time that is spent at a site the more species that are likely to be encountered. This is particularly true for wide-ranging species such as birds of prey and migratory species. For this report we have not separated species that remain at a site and species that probably pass through. Ideally we would probably only include those species that breed or reproduce at a site rather than all species seen but there has not been time to list these separately. However it is primarily the bird taxa where this issue is a common problem. Most analyses were based on sites where the combined effort score was 6 or greater.

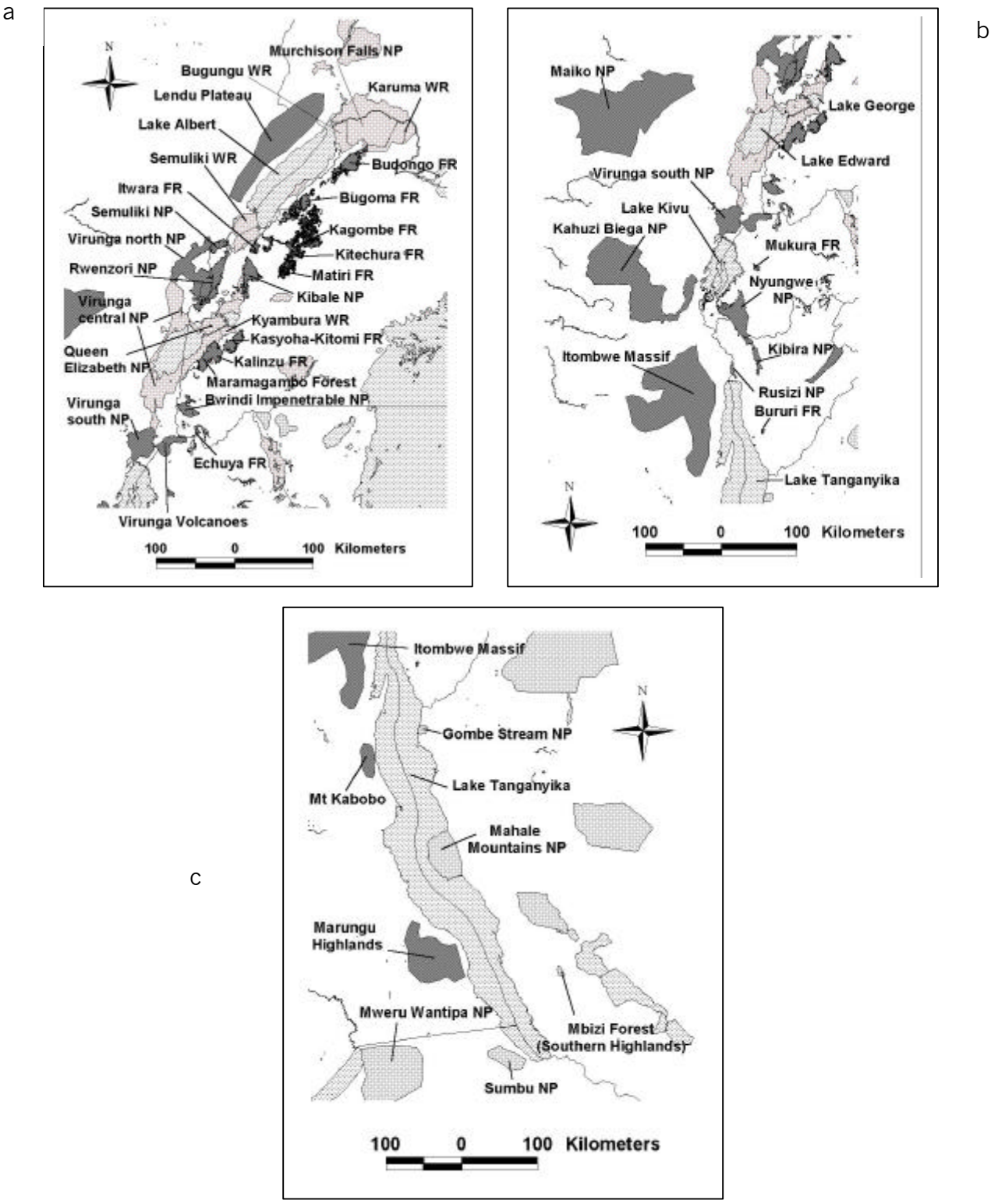

Figure 1.3 The northern (a), central (b) and southern (c) portions of the Albertine Rift showing the locations of the various protected areas (NP=national park; FR=forest reserve; WR=wildlife reserve) or ungazetted areas with species data (no NP/FR/WR). Darker shaded areas are forested and lighter areas are savanna grassland or woodland.

Any list will become out of date as soon as it is published because new species are constantly being added. We believe however that we have managed to compile reasonably complete lists for these protected areas where surveys have taken place at several dates and by different people. This report is considered by the authors to be part of an ongoing process to provide more complete lists of these sites and provides a good 'first cut' of the biodiversity of the Albertine Rift and the priority sites for conservation.

1.4.2 Analyses

For each species list for each taxon a list of endemic species was made using existing literature or in the case of reptiles, amphibians, butterflies and plants through examining species distributions and creating new lists. Tom Brookes at Conservation International kindly provided a draft list for several taxa which helped at the start of the project. Danny Meirte at the Royal Museum of Central Africa in Tervuren (Institut Royal des Sciences Naturelles de Belgique) helped create reptile and amphibian endemic lists from their database on species collecting localities. Tim Davenport created a list of butterfly endemics from his collection of literature and in collaboration with Steve Collins, Colin Congdon and Alan Gardiner. The plant list was developed as a collaborative effort within the Wildlife Conservation Society by Ewango Ndomba, Paul Ssegawa, Gerald Eilu and Andrew Plumptre with help with checking of lists by botanists from the Royal Botanic Gardens at Kew.

Similarly lists of threatened species for each taxon were compiled using the IUCN red list (Hilton-Taylor, 2000) for most taxa but using Birdlife International's analysis for birds (Birdlife International, 2000) and a draft updated list for amphibians kindly provided by Simon Stuart at Conservation international. For each site the number of threatened species ('critical', 'endangered' or 'vulnerable' under IUCN criteria) and the total number of IUCN-listed species (adding 'lower risk' and 'data deficient' species to the threatened list) were calculated.

A cluster analysis (Ward's method) was performed for each taxa for the sites where the score of survey effort was equal to or greater than 6. This analysis highlights the similarities and differences between sites and can identify whether there are clusters of communities for each taxa.

A complementarity analysis was also performed for each taxon. This analysis identifies the minimum number of sites needed to protect all species in the taxa. It starts by selecting the site with the highest number of species and then selects the site with the highest number of new species and continues this process until all species are accounted for. For the analyses presented here we weighted this analysis by the number of threatened and endemic species such that the sites selected first contained the most number of threatened and endemic species until these are all accounted for and then additional sites are added based on the largest number of species they add.