THE GEOMORPHOLOGY OF SOUTHWEST UGANDA

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Introduction

The relief of southwest Uganda (Fig. 1) has inspired considerable interest in its geomorphological evolution. Indeed, its rift valley, volcanoes, and its history of drainage reversal has given this area a world-wide reputation (Cooke, 1958; Wayland, 1929, 1931, 1934).

The main relief units

There are three important and yet quite different ways in which the relief of southwest Uganda may be sub-divided. Firstly there is the sub-division of the area into regions based on their morphology (Fig. 2), or surface form. This is a standard practice in many regional studies and is frequently fundamental to any subsequent geographical analysis.

The second means of sub-division which is employed here is one which involves the recognition of distinct relief horizons (Fig. 3). For example, the floor of the rift valley is so far below the landscape which lies to the east, and outside the rift valley scarp, that the two may be separately described on this basis alone. In the same manner more subtle distinctions between different relief horizons within the area between the rift valley and Lake Victoria can be drawn. These differences are discussed in greater detail below.

Because of the peculiar geological history of southwest Uganda a third way of sub-dividing the relief of the area may be proposed. (Fig. 4). Whilst the rift valley was being formed, the whole of the area between the rift and Lake Victoria was being warped. Parts of it were raised by tectonic deformations, whilst others were being lowered in relation to the areas around them. This tectonic history allows a tectonic sub-division of the relief of southwest Uganda. In this third approach, an account of the effect which the tectonics had on the relief and drainage of the area may be included to provide a comprehensive understanding of the geomorphological background to the geography of southwest Uganda.

The major morphological regions

Between Lakes Edward and George in the west, and Lake Victoria in the east, the main division is between the Western Rift Valley and the whole of the area to the east (Fig. 2). Yet, this neglects the tremendous variety in the relief of the area to the east of the rift valley. Within that area a distinction may be made on morphological grounds between the mountain areas and the lowland areas. In many places the lowlands are surmounted by relatively high, frequently flat-topped hills, such as those which characterise the Buganda landscape around the western and northern margins of Lake Victoria, and these areas are of a transition type between the lowlands and the mountains.

The extremely subdued and rounded lowland hills need distinguishing from hilly areas where exposures of granite and gneiss provide inselbergs. Although inselbergs are to be found in many parts of the lowlands they sometimes occur in such dense clusters that they give rise to rocky, and sometimes even rugged, landscapes which may be separately defined as inselberg regions.

Lakes provide an important element in the geomorphology of southwest Uganda. Not only do they occur in the floor of the rift valley, and most impressive of all, as Lake Victoria, but they also occur nestled in amongst the mountains of the area. The smallest lakes are to be found within the floor of some of the
Fig. 1 A generalised relief and location map of south-west Uganda.

volcanic craters which occur within, and near to, the rift valley. A completely distinctive region is to be found along the shore of Lake Victoria. In the past Lake Victoria occupied a belt of country which is now exposed. This area, marginal to the lake, now consists to a large extent of raised beaches and old cliffs, raised swamps, sand and shingle bars, and large areas of alluvial material.

It is one of the peculiarities of the volcanic field of Banyaruguru that it not only occurs within the floor of the rift, but it also straddles the line of the rift scarp and continues on to the shoulders of the rift valley, some 800 feet or so, above the rift floor.

These then are the major morphological divisions of southwest Uganda. Although a detailed sub-division can, and indeed must, be made if local studies within the southwest are to be undertaken. However, the differences within the major groupings shown in Figure 2 are far smaller than the differences which occur across the boundaries between them.

The major height horizons

An analysis of the height horizons of the area can only be appreciated by reference to the cross-section provided in Figure 3. If the relief of southwest Uganda is studied along a line from Lake Victoria in the east to Lake Edward in the west, it becomes apparent that the landscape can be sub-divided into a limited number of quite distinct relief horizons. The highest of the main levels is the upland horizon, or mountain top horizon, which has been called the upland landscape (see Doornkamp and Temple, 1966, which includes a distribution map
Fig. 2 *The major morphological regions of a part of south-west Uganda. (Roads and place names are the same as Fig. 1).*

of these landscape horizons. From the shores of Lake Victoria to the edge of the rift valley scarp, the highest summits are nearly always subdued in form, and they are frequently extensive in area. From any viewpoint across the hill tops of the Rwambara Mountains, west of Gayaza, for example, whether one looks to the east or to the west, one’s eye is carried from one hill crest to the next, along a single, undulating relief horizon. This is not to say that this relief horizon everywhere has the same absolute height, for a glance at the relief map (Fig. 1) clearly indicates that it does not. The reasons for this will be touched upon in the next section.

Brief mention must be made of two hill masses in the Buhweju Mountains, southwest of Ibanda. These two masses are known as Singiro (Fig. 1) and Marangara. They carry a relative relief which is considerably in excess of that which is found on the upland landscape horizon, above which they rise, as residual masses by as much as 1000 feet (Figs. 2 and 3).

In most areas the edge of the upland landscape coincides with the edge of the mountain regions defined in Figure 2. In addition, the upland landscape may be recognised in the flat-topped, or gently undulating hill crests of the transition areas. The level of the upland landscape is frequently well above that of the surrounding lowland landscape horizon. In the east, near Lake Victoria, the difference in height is only about 300 feet, but in the west, closer to the rift valley,
it may be as great as 1500 feet (Doornkamp and Temple, 1966). The latter difference in height is even greater than the relative relief obtained by the rift scarp as it passes through southwest Uganda.

The lowland landscape, as a relief horizon, coincides in its distribution with the lowland areas of the morphological regions (Fig. 2).

The inselbergs, which sometimes occur in dense concentrations within the lowland regions, will, usually stand above the general level of the lowland landscape (Fig. 3), but they are always below the level of the adjacent areas of upland landscape. This suggests, therefore, that a discrete horizon in the level of the summits of the inselberg areas can be recognised.

![Diagram](image)

*Fig. 3 The relief horizons of south-west Uganda. (The heights refer to a cross-section between Masaka and Katunguru.)*

The valley floors of the rivers which drain the lowland regions are almost invariably filled with alluvium and papyrus swamps. Yet, in a large number of cases, these valley floors are set between steep banks which separate them from the general level of the lowland landscape. This is particularly so in the east. These alluvium-filled valley floors merge with the extensively alluviated margins of Lake Victoria (Fig. 3). Thus, a landscape horizon, below the level of the lowland landscape is recognisable which marks the level of these features of intense alluviation. This has been called the infill landscape (Doornkamp and Temple, 1966) but is perhaps more accurately defined as an infill horizon.

In part, this sub-division of the area into relief horizons coincides with the sub-divisions made on a morphological basis. This is not entirely the case, for the summits of the transition regions belong to the same upland landscape horizon as the summits of the mountain regions. On the other hand the lowland regions have been divided into three separate relief horizons, namely, the inselberg horizon, the lowland landscape, and the infill horizon.

The volcanic features of the area do not make a landscape horizon, for they are restricted neither to the rift valley floor nor to the area east of the rift scarp. *The major tectonic influences*

The rift valley is the major feature formed by tectonic activity in southwest Uganda. At the same time as the rift valley was being formed, many other events took place which have had a very pronounced effect on the topography of the area (Fig. 4).

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Fig. 4 Some aspects of the tectonic geomorphology of south-west Uganda.

The volcanic activity which accompanied the formation of the rift valley has not influenced a very large proportion of the total area, but it is nevertheless unmistakable in its influence on the topography. Very few lava fields exist within the volcanic area. In Bunyaruguru the volcanic field is composed of over 130 steep sided, and frequently very deep craters. Some of these craters carry lakes, others may also have done so in the past, but these now have flat, sediment-filled floors (Combe, 1933, 1934, 1937; Reece, 1953, 1961). In the extreme southwestern corner of Kigezi there are not only small craters, on the scale of those in Bunyaruguru, but there are also the three major peaks of the Mufumbiro Range. The latter rise to 13,540 feet on Muhavura (Fig. 1), which is some 6,500 feet above the surrounding Kisoro lowlands.

These features of volcanicity are easily detected in the landscape, but there are still other, in themselves unseen, tectonic influences on the area. To the east of the rift valley scarp, and running roughly parallel to the direction of the scarp, there is a marked axis of upwarping (Fig. 4) along which the surface was uplifted. This arching introduced new gradients to the landscape. The upland landscape horizon, although it once had a regional slope to the west, now only slopes westwards on the rift valley side of this axis (Fig. 3). To the east of this axis the upland landscape horizon now slopes, in general, down towards Lake Victoria.
It was the arching along this axis which, after a period of deep drainage incision, brought about the reversal of the drainage of southwest Uganda. Whilst the upland landscape horizon had a regional slope to the west the drainage was able to maintain its original flow westwards; indeed it did so during the evolution of the lowland landscape as well. The time came, however, when the arching was taking place so rapidly that the rivers could no longer continue their westward flow. During the later part of the middle Pleistocene (Bishop and Posnansky, 1960) the arching reversed the gradient of the beds of the main westward flowing streams, and these then proceeded to flow ‘backwards’. The accumulation of these reversed streams, and notably the Katonga and Kagera, within the upper part of their old valleys brought about the formation of Lake Victoria (Doornkamp and Temple, 1966). The western shore of Lake Victoria has, since its formation, taken up positions which have been successively further east (Bishop, 1959; Temple, 1966). This has left behind the extensive areas of sedimentary material now to be found on its western side. As the lake shore retreated eastwards, streams on its western side, such as the Kagera, extended their courses eastwards and cut their beds down to new levels to conform to the drops in base level afforded by the falling level, and retreating position of Lake Victoria. This incision has produced rapids and small waterfalls along the course of the Kagera.

Lake Victoria was not the only lake to be formed by the reversal of the drainage. Lake Kachira, Mbugo, Nakivali, and Kijanebalola were formed by the reversal of the drainage which once flowed westwards and then southwards, through the Oruchinga valley, to the Kagera. In fact, it is likely that the general downwarping towards Lake Victoria, from the axis of upwarping near the rift valley, did not occur in the form of a simple inclined plane. It is more likely that the downwarping may have been more intense in some localities than in others. A careful examination of the distortion of the upland landscape horizon suggests that there may be a slightly excessive downwarp in the vicinity of Lakes Kachira and Kjanebalola (Fig. 4). If this is the case it will help to explain why these lakes have persisted in the landscape despite the cutting of an outlet at the southern side of Lake Kijanebalola. In other words, these lakes are probably trapped in a tectonic hollow, or basin.

The reversal of the Ruizi formed a temporary lake to the west of Mbarara (Mottram, 1963, Doornkamp and Temple, 1966) which has been drained by its overflow eastwards across an old divide (Fig. 4).

One of the major contrasts between Kigezi and the area to the north, within Ankole, is that in general Kigezi stands at a much higher level. This difference in height, between Kigezi and the rest of southwest Uganda, is a major factor in the geomorphological background of the area. The reason why this is so is probably tied, once again, to the behaviour of the axes of uplift which occur on the shoulder of the rift valley. It is probable that these axes are not horizontal along their length. In fact they slope down from the south to the north. Arching was much more intense in the south, and there it produced a higher uplift of the upland landscape horizon. As a result the hills tops of Kigezi are much higher than their Ankole counterparts (Combe, 1932).

At the points at which the Katonga, Ruizi, Oruchinga and Kagera rivers were reversed there now exist very low divides. These separate the reversed, eastward flowing, streams from those portions of these rivers which still maintain a westward flow (Fig. 4). In each of these cases the old valley walls of the westward
flowing through-valley still exist. In fact the new divides, within these valley floors, are so hard to discern that it is difficult to tell whether a particular patch of water will drain westwards to the rift valley or eastwards to Lake Victoria. These zones have been referred to on many occasions as ‘swamp-divides’.

Conclusion

There are three ways in which the relief (Fig. 1) of southwest Uganda can be considered. It can be considered (1) solely on a morphological basis and provide a regional sub-division into morphological regions (Fig. 2); (2) it can be subdivided into relief horizons (Fig. 3), within each of which there are certain common morphological characteristics, or (3) it can be analysed on a basis of its tectonic evolution (Fig. 4). In many ways each of these analyses is incomplete when taken on its own. It is only when the interrelationships between each of these are examined that the nature of the geomorphological background to the geography of southwest Uganda can be fully appreciated.

References

Combe, A. D. 1932 ‘The geology of south-west Ankole and adjacent territories with special reference to the tin deposits,’ Geol. Surv. Ug. Mem. 2
Reece, A. W. 1961, ‘Explanation of the geology of sheet 76 (Buhweju)’, Geol. Surv. Ug. Rept. 4

Note

Readers are urged to examine the geomorphological map, compiled by Dr. P. H. Temple, to be found in the second edition of the Uganda Atlas.