

Tanzania as a nation and what it stands for, will be reflected in Dar es Salaam, in as much as the capital city may mirror the major accomplishments of the nation.

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## LANDSCAPE STUDY IN GEOGRAPHICAL TEACHING

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It is unnecessary here to justify the importance of landforms in the study of geography and the claim that their full understanding requires careful field observation. What is true of geography as a discipline is vital in its teaching. This is the essence of the problem of good geography teaching, for it can be taught with textbooks and chalkboard, but to be successful these must be supported by skilful use of visual materials and field work, both of which make great demands on the time and energy of the teacher. Without them the student is equipped with a mass of factual material, a poor foundation for further academic study and only a small contribution to his real education. He may understand the mechanics of the earth's structure or the processes of denudation and yet be incapable of recognising the consequences of these on the landscape or a map. Such dangers in unimaginative formal teaching are numerous, and the concentric approach, working from the known to the unknown, and sample studies, while not complete answers in themselves are attempts to provide a basis in comprehensible features. At the same time there has been a commendable increase in fieldwork in schools which is the best way to bring reality and understanding into geographical teaching.

Ideally the teacher supplies the material and guides the student in its analysis and even the synthesis needed to present a regional picture. This is only possible with the time and resources that few schools can afford. The local environment is available to all with the energy and enthusiasm to organise its study. Here can be found features, distributions and relationships which in their study yield methods and principles which have a wider application. However, unless the student is an active participant the effort is not worthwhile and to remove the classroom out of doors does little more than increase the distractions. It is the process of observation and analysis which is so valuable in education and not the final product of the efforts. To place the student in a position to observe and to direct his interpretation is a considerable task in itself and the success rests more with this organisation than with the ability of the student.

### *Landscape Sketching*

Landscape sketching is one technique which can be readily applied to field study and provided the purely technical problems of drawing can be taught satisfactorily it can be used effectively at any level of geographical training. The geographer is not concerned with the colour, tone values or the composition of the landscape but rather with extracting geographical features and by drawing representing them in the most effective manner. However, like the artist, he must suppress irrelevant details which would confuse the drawing and obscure the essential forms and lines. In Figure 1 the plain extending to the foothills of Elgon is covered with an open savanna vegetation broken by scattered settlements with their patches of cultivation and occasional banana groves. To have included this

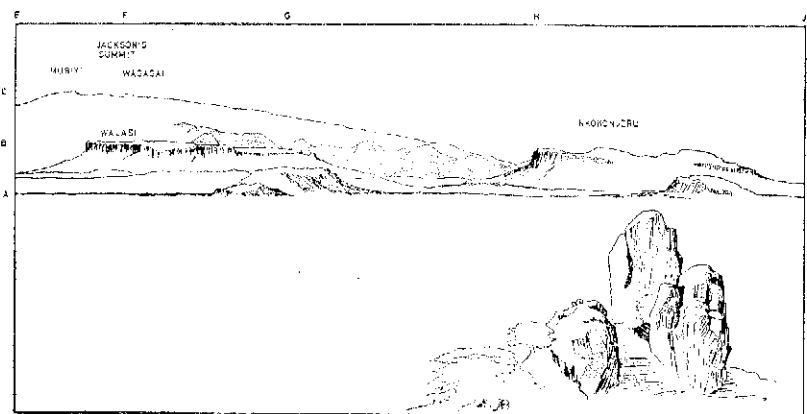


FIGURE 1. ELGON FROM KAPHIMBALA

detail would have interrupted the plain and made its relationship with the inselbergs and the mountains less clear. The recognition of the form of the inselbergs rising abruptly from the gently sloping pediments and the details of the weathered granite of which they are composed is the first and vital step in the appreciation of the theories of their evolution.

The features of Mount Elgon are expressions of its geomorphological history. Most of this great mass was built up in Miocene-Pliocene times on top of the granatoid rocks of the pediments now being re-excavated as erosion proceeds. The agglomerate from the volcano's eruptions is arranged in almost horizontal sheets with well developed vertical joints, which have been worn back to form the striking cliffline of Nkokonjeru and Walasi. The cliffs of Nkokonjeru are higher than elsewhere around the edge of the volcano as they rest on platforms of sediments attributed to deposition in lava dammed lakes around the perimeter of the rising cone. The more gentle slope below the cliffline is developed on these sediments. The serrated ridge rising behind Nkokonjeru is part of the base of the volcano for here the horizontal agglomerates have been removed by erosion. In the embayments behind Walasi consequent streams have persisted throughout the growth of the volcano, preventing the accumulation of explosive debris and ash. Dissection has isolated the mesa-like hill of Walasi from the main mass of Elgon whose smooth surface of volcanic ash and tuff rises gently to the crater rim.

A student can be trained to select features like these even though their interpretation may be impossible. Using a duplicated outline, perhaps traced from a photograph he can search the landscape for features and transfer the information to the outline sketch. For example, the cliff of Walasi or the limits of cultivation in Figure 2B can be drawn in the appropriate place on the sketch. However, such exercises are only the beginning and the next step, the teaching of draftsmanship is more difficult. The exact limites of the landscape to be drawn must be decided. Here the angle of view and the breadth of the landscape needed are important considerations. In Figure 2B a narrower view might give a false impression of the form of the hills. A break in the line of hills to the left of the highest point gives a clear profile of the slope which is again seen in the extreme left where the hills come to an end and give a view of the plain beyond. A steep line of hills or an escarpment should be viewed at about 45° as this enable the profile to be shown as well as its horizontal extent. Again in Figure 3 the full width of this sketch is needed to show the form of the bay, the granite floor of the arena and the steep sides of circle of hills, composed of schists with bands of resistant quartzite. These preliminary decisions need a great deal of care for they are most important in the effectiveness of the final sketch. Drawing should proceed in easy stages, general forms and outlines first and detail and shading later. Select first a horizontal line, the base of Elgon in Figure 1, the horizon in 2A or the level of the lake in 3. Using this as a reference line distances can be judged vertically from it.

In Figure 1 the line AA was drawn horizontally. Holding a pencil in a closed fist at arms length distances were 'measured' by moving the thumb up and down the pencil. The heights of Walasi and Nkokonjeru above AA were estimated as AB. The scale at which AB was drawn determined the limits of the view. AB was found to be 1/5th of HJ, the distance from the left limit of Nkokonjeru to the extreme right of the view and HJ is 1/3rd of the view to be drawn. Drawing can now proceed rapidly by dividing AA into three parts at G and H and drawing AB 1/5th of HJ. The distance AB can now be used to establish any number of points above or below AA. For example AD is 4AB and AC is 2AB. Horizontal

distances are easy to estimate by reference to one or two landmarks. The division of AA into 3 parts gives H, the cliff edge of Nkokonjeru, G the dip in the ridge behind Walasi, as well as the position of the inselberg on the plain. Wagagai is positioned by making AC equal to EF. The number of points which need to be estimated in this way depends on experience, but this procedure is the only sure way of avoiding the most common error in drawing, the exaggeration of the vertical scale and it partly resolves the problem of perspective. The production of a rapid and effective sketch takes much experience, but an adequate drawing, no matter how laboriously executed, is not beyond the reach of anyone. A useful sketch is as much an indication of good observation as of drawing ability and to train a student to observe is the beginning of all field work in geography.

Care with the main outlines gives accuracy to the final drawing and detail can be added with confidence. However the use of shading is important as this can accentuate forms and depict subtle variations in slope. Figure 2A is a view of three volcanic centres of Bukusu, Tororo and Sukulu, representatives of the Pre-Miocene alkaline volcanoes common to eastern Uganda. Magma reacting with the granitic country rock formed the carbonatite cores which have proved resistant to erosion so that Tororo and Sukulu rise steeply from the plain. In fact the break of slope marks the junction between the intruded and replaced volcanic rocks and the granite. Bukusu presumably owes its prominence to another carbonatite core but is capped by agglomerate from the more recent Elgon eruptions. Magmatic pressure causing circular fractures and the intrusion of ring dykes rich in silica was responsible for the ring of hills encircling Bukusu. Down slope shading is employed here to show the form of the ring of hills while the granitic plain around the complex and extending to the horizon is shown by a few horizontal lines. The closer shading of the hillslopes emphasises their steepness while open shading and expanses of white on the plains give a visual impression of flatness. In a panoramic view of this kind distance obliterates detail and the problem of selection is less difficult.

In Figure 2B, a view within the ring complex of Bukusu, the aim is different. More detail is needed to show the land use of this pocket of phosphate-rich soils within the barren ring of hills. The extensive groves of bananas, grown as a cash crop, form a continuous carpet. Only a few pen strokes are used to suggest this while the edge of the area is delimited by more careful drawing. The gardens with crops in the right foreground present a smoother surface. The contrast is achieved here by using straight line shading. The trees rising above the banana crowns were usefully employed to give the impression of distance across a monotonous surface and prevent the illusion of foreshortening. In the middle distance the land rises gently behind the banana plantation to the hills. On this slope scattered settlement is suggested by a few huts and trees, but the introduction of a few lines, drawn down-slope, preserves the sloping nature of the ground. The cultivated area is sharply defined from the bush covered hills, whose surface is suggested by broken and more dense shading.

Figure 3 is an example of how shading can be used to show the textural variations in a landscape of different vegetation types. The papyrus swamp at the edge of the bay is light in tone while the wooded land behind is made dark, showing every tree would not be expedient. Viewing a landscape through half-closed eyes will give a good idea of the detail needed in the final sketch. The hills in the right background are partly clothed with belts of trees which contrast with the deforested slopes, and the open grasslands of the hill top fragments of the Buganda surface. Here the forest areas are blocked in evenly. However, in the

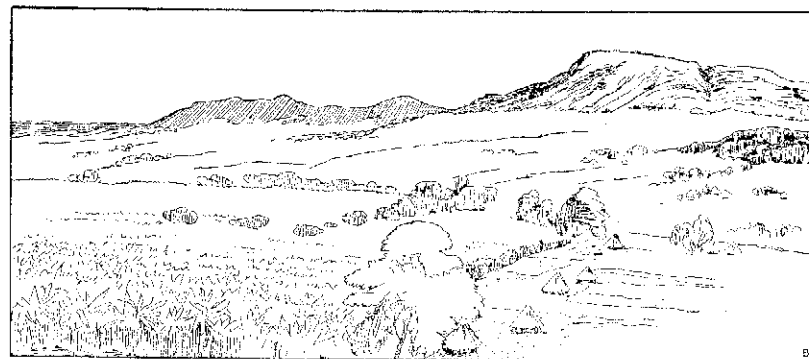
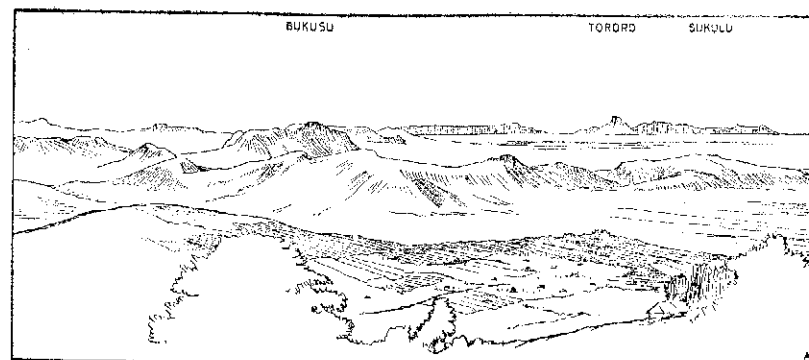


FIGURE 2. A VIEW SOUTH FROM NKOONJERU OF THE RING COMPLEX OF BUKUSU, TORORO AND SUKULU  
B. NANGALWE, THE CENTRE OF THE RING COMPLEX OF BUKUSU

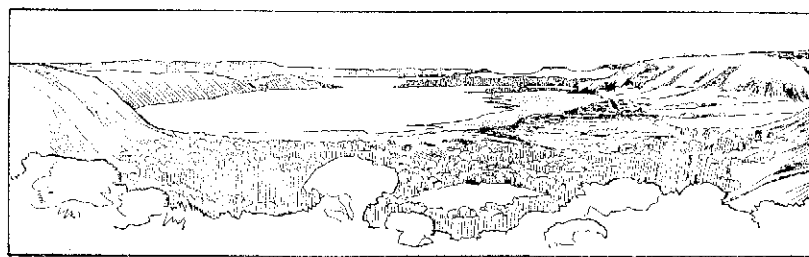


FIGURE 3. GRANT BAY, A GRANITE FLOORED ARENA



*Conclusion*

Landscape drawing and the making of block diagrams are approaches to landscape study which can be of value in the teaching of geography. The examples used here are not intended to be representative of the landforms of Uganda but rather illustrate methods of study of the local scene in the hope that they will prove useful in other areas of East Africa.

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## THE MWEA-TEBERE RICE IRRIGATION SCHEME CENTRAL KENYA

The Mwea-Tebera rice irrigation project is a child of the Mwea Development Scheme which had been started to restore land which had been eroded and degraded as a result of overstocking. It is situated about 70 miles northeast of Nairobi in Kirinyaga district of the Central Province of Kenya, on the dry plains to the southeast of Mt. Kenya. Standing at about 3,500 feet the area receives an average of about 30 inches of rain which is particularly unreliable; thus there was 23 inches in 1960, 50 inches in 1963 and 29 inches in 1965. It is an area of impervious, heavy, black cotton soil which overlies a weathered trachyte bed. The scheme had its birth in 1952, when experiments on irrigated crops, notably rice and tobacco, were tried. Tobacco experiments failed and the scheme is now known chiefly as a rice irrigation scheme. The constructional works went ahead with unskilled and unwilling labour with no previous experience of irrigation. But despite this, by 1960, most of the major building works had been completed. The tenants, with landlessness as the only qualification, were drawn from the Mau Mau detainees many of whom happened to be Kikuyu from the 'land-hungry' districts of Kiambu, Murang'a and Nyeri. Rightly or wrongly agricultural skill was not tested as an essential qualification for tenancy. In 1964, however, a new qualification was introduced that all the future tenants would be drawn from Kirinyaga.

Each tenant is allocated four one-acre holdings, each holding surrounded by bunds two or three feet high. Intensive research on rice varieties has continued and by 1957 over 90 varieties, originating from Tanzania, Sierra Leone, Malaya, Ceylon, Siam, Malawi, Persia, Surinam, Japan, India, U.S.A., Nigeria and Austria had been tried. To date no variety has proved outstanding enough to justify its ousting Sindano as the standard variety in the area.

The tenants themselves provide labour for weeding, transplanting, reaping and threshing while the management provides mechanical cultivation, collects the bagged paddy, dries it to 13% moisture content, cleans and rebags it ready for transport to Sagana for raiting to the mills at Thika, Nairobi and Mombasa. There is only one unrotated transplanted rice crop during the Short Rains. Up to the present no crop has been found that could grow under the same conditions as rice which is grown under water and on a very level surface. If such other crops as maize or cotton were to be rotated with rice it would be necessary to convert the holdings into forms suitable for the growing of such a crop. This would mean that the level nature of the holdings would have to be dismantled. In 1957 an attempt was made to grow crops of maize and beans on this black cotton soil, during the Long Rains (March to May); but these crops failed due to lack of proper drainage and had to be ploughed in and holdings prepared ready for the next Short Rains crop in October-December.

Rice grown during the Long Rains has yielded poorly giving an average of 18 bags per acre as compared to 30 bags per acre during the Short Rains. With these lower mean yields from the Long Rains crop, resulting from what has been termed the 'Empty Heads' (a physiological disorder of unknown cause but thought to be due to the cold conditions prevailing during that season), the management has decided not to continue growing rice during that season.