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THE AGORO SYSTEMS OF IRRIGATION

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Historical

THE inhabitants of the Agoro Valley (River Okura), in the Acholi District, appear to be divisible into two distinct groups, the Ngaro and Pobar groups. It is, I think, to the former community that the introduction of irrigation into this area is due. Tradition states that the Ngaro clan (I use this word for want of a better) migrated from the northern or Sudan side of the Imatong Mountains from a place called Lukorongwo, where there still dwell to this day two clans, the Talango and Lolibai, who are culturally closely allied to the Ngaro. On their first arrival at the head waters of the Okura River system, they occupied the area known as Lapule from which they were able to obtain excellent views down the valley and early warning of approaching hostile bands. Their first irrigation trench, named after their village Lapule, was constructed on the hillside below the settlement. I think there is little doubt that this trench is the earliest irrigation work in the neighbourhood and although only a modicum of engineering skill was required to tap the Lomidonyo stream (an upper tributary of the Okura) in order to initiate the flow in the Lapule dyke, it now runs automatically and is thus a good guide to the extent of the original undertaking.

The Pobar group, tradition relates, originally migrated from the Madi District under a leader named Geya who died during the journey eastwards. His son Odi however shouldered the responsibility of leadership and, not without blows and turmoil, finally brought his people to Agoro where, pleased with the fertility of their surroundings, they finally settled down.

The names of the hereditary Pobar chiefs are well remembered by the ancients of the clan. Odi was the father of Nye; who was the father of Togo; who was the father of Ludang; who was the father of Litok; who was the father of Oye; who was the father of Lugube; who was the father of Omoi. At this juncture, about 1917 I think, the Administration introduced a foreigner, Ibrahaim Puchura, to take over the chieftainship. This man was subsequently murdered and the whole of the Agoro community was then transferred to Paloga for ease of administration and thus it was that the Paloga River saw its first irrigation channels. Kawo, of the 'royal line', followed Puchura on the return of the people to Agoro, but a foreigner, Fadimulla, shortly afterwards took his place. The hereditary line was reinstated with the appointment of Ngala and later Jabuloni Irube.

The Pobar, it is said, on their arrival at Agoro, found the Ngaro already ensconced in their refuge at the head of the valley with their huts on the hill sides and their irrigation channels below. If this is true and if the genealogical

[1] I am greatly indebted to Mr. Lolobo, Assistant Agricultural Officer, Kitgum, for his kindness and assistance in conducting me round the irrigation works and also for putting at my disposal his own notes on the agricultural methods of the Agoro community.—[J.M.W.].

tree of the house of Pobar is to be relied upon, it is fairly safe to say that the Ngaro have been in occupation of this valley for at least 150 years.

But the question as to how and when the Ngaro first learnt the art of irrigating their land remains unanswered. There are no authentic chronicles of this part of central Africa of even 150 years ago. Sir Samuel Baker and Emin Pasha with his Egyptian garrisons are all too recent. It may even be that irrigation first found its way to the Imatong Mountains by the same north-western route as has been suggested for the introduction of maize and bananas into the region of the Great Lakes.

There is considerable evidence to show that the Agoro people (I now combine the Ngaro and Pobar) were, if they are not still, characterized by their primitive culture and industry. Some of them were expert in the art of smelting iron, the ore being obtained from Olima between Paloga and Agoro. Near the river Okura, where it skirts the east end of Lagile Hill, there is a coffin-shaped block of stone on which is incised a system of parallel grooves, each groove, about half-an-inch deep, running the length of the stone. The molten iron was run into these moulds and when set was then in a convenient shape to beat into bangles and other ornaments. There are few traces left of this industry to-day.

To ward off attack, their houses were built on the sides of the numerous hills which stud the Agoro valley. Stone-terraced platforms were laborously erected—some of these terraces are nine feet high—to provide sufficient level space on which to construct their huts, while the cattle were confined in stone-walled compounds. By 1935 all the hillsides were deserted; the danger of sudden raids being past, the need to occupy these inconvenient heights no longer existed. But the stone terraces remain as a monument to their industry and to anyone familiar with the Palestine scene, the view of the east end of Agoro hill will remind him of the terraced hillsides of that country.

Irrigation Practice

Cropping. I strongly suspect that irrigation was used much more extensively in the past than during the last few years. I cannot believe that such a complicated system of dams and channels was inaugurated merely to ensure a satisfactory harvest of the second rain-crop should that of the first rains fail. However, it is idle to speculate and latterly its chief function has certainly been that of a stand-by, to be used only in an emergency.

The chief irrigated crop is a red-grained sorghum known as *Nawera.* It is planted in September and October and is ready for harvest about four months later. A small acreage of this crop was grown under irrigation in the 1944–5 season. I understand that normally it is only necessary to supply the crop with water three or four times, after the initial first soaking of the ground, during the period of its growth. Mr. Lolobo has successfully grown crops of finger-millet, sweet potatoes and maize under irrigation but with the possible exception of maize none of these crops was normally grown thus in the past. He considers that the increasing popularity of cassava and sweet potatoes is removing the danger of food shortage and with it the incentive to irrigate.

Dams and channels. Lapule, the top channel of the Ngaro system, is fed by a very small stream and a bank of sods is sufficient to turn water into it. Lower down, however, where the river bed is considerably deeper, a more complicated dam (*atetek*) is required. Piles are driven in two rows, the rows being about two feet apart, across the river. Logs, grass and rubbish are then rammed in between the two rows of poles, the whole forming a substantial barrage which is further strengthened and rendered watertight by the addition of bamboo mats fastened to both sides of the structure. This is completed by a coat of mud. The height of the dam will depend on the distance between the bed of the river and the floor of the irrigation channel. The Kichipi channel of the upper Ngaro system requires only a three-foot dam to supply it with water whereas the Obe-Romo channel of the Pobar system requires a six-foot dam. In the Paloga system dams of ten feet and above are necessary. The entire flow of stream is turned into the channel and it is not possible to supply more than one channel at a time. The lowest channel of the system receives water first. As the Ngaro and Pobar are not run in conjunction, there is frequent friction and unpleasantness between the cultivators of the two clans during years when irrigation is necessary.

The main furrows, one or two of which are considerably over two miles in length, are some two feet wide and six to twelve inches deep, and are of course permanent. The subsidiary channels are merely hoe-made furrows. The water is thus diverted from the main dyke, by way of subsidiary furrows, onto the field, across which it is allowed to trickle until the soil appears saturated. The water is not held up by any system of bunds so that it actually stands on the field, as is the usual custom in many countries where irrigation is practised.

The primary soaking of the ground, which is carried out before the field is cleared for planting, is the most thorough and normally takes about twenty-four hours. Water is applied to standing crops for a shorter period: six hours was mentioned to me.

Plot size, etc. The size of plot varies according to the wealth of the cultivator, but I should imagine that the range lies between a quarter acre and one acre. Three or four rows of plots are usual below the main channel and the plots in the lower row receive water first. A considerable number of plots can be irrigated at the same time from the main channel.

The every-day affairs of the cultivators are discussed and settled at village meetings. A strong community spirit is very necessary for the smooth running of the scheme and a slow worker must obviously prove an unmitigated nuisance. The opening of the channels is conducted with appropriate rites and ceremonies.

Notes on Some of the Irrigated Areas

(a) *Upper Ngaro.* This consists chiefly of the Lapule Dyke (possible ½ mile in length) which taps the Lomidonyo River. This system, together with the lower Ngaro channels, it undoubtedly the parent from which the Pobar and Paloga schemes originated. The area west of Witur Hill is, I think, too steep for permanent irrigation without some form of protective bunding. How-

ever, the old furrows, many of which are still running, show no real sign of scouring and appear well protected by a strong growth of *chloris gayana*.

(b) *Lower Ngaro*. This consists of four main channels:

(i) Lari, skirting the base of Witur Hill, is said to be about three miles in length. It empties into a dry nullah and eventually finds its way back to the main river. Many of the plots irrigated by this furrow are very steep and there are signs of surface wash and scouring of the channels.

(ii) Kichipi. As far as I could judge, the grade of this channel is very fair. It is over a mile in length and empties into,

(iii) Achori, which in its turn opens into,

(iv) Lokirobi which, forming an arc, finds its way back to the Okura River. I found it extremely difficult to appreciate this when I had left one channel and was following another. The alignment and grading of the Kichipi channel from the point where it leaves the deep river bed, along the side of the heavily wooded bank and out to the field above, is a work of no little ingenuity. There is nothing comparable in skill to this either at Pobar or Paloga.

(c) *Pobar*. This system appears to be of more recent date. Only two of the channels have received names (Ode-Romo and Olam-Abiro). Owing to the nature of the ground little skill is required to lift the water from the river-bed to the fields. Except in the case of the upper channels, large dams are not required. When the main outer channel Ode-Romo was first constructed the water refused to flow down (or possibly up) it. This hitch was speedily overcome by the sacrifice of a strangled sheep at the head of the channel after which act the water flowed freely. The dykes form a system of arcs which leave the Okura and rejoin it again at a lower level.

Tradition states that the river was first tapped at a point about half-a-mile above the old rest camp site by a furrow which has, in the course of time, become the main river, while the old river-bed has disappeared. I can scarcely give credence to this as I inspected the area and was unable to see even a slight depression where the old river is reputed to have flowed. I was told that the Okura River has its origin in the mountain lake Kipyai, from which also a stream flows north to the Sudan. My informant said that in size it was about equal to "four football fields" and that more water found its way to the Sudan because the Okura outlet was blocked by a ridge of rock. This latter feature was largely responsible for retarding the flow in the dry season.

(d) *Paloga*. This scheme was commenced by the Agoro community on their arrival at Paloga in 1917. Subsequently the Administration permitted the Agoro to return to their valley but the local inhabitants of Paloga, appreciating the value of the Agoro methods, still continue to follow their lead and irrigate what fields they can when necessity demands.

The Paloga River possesses a greater flow than the Okura and is less prone to dry up during the hot weather. The reason for this is not far to seek. The long Cwarlyech swamp acts as a reservoir for the Liri irrigated area. The soil of Liri is a rich black swamp-type with a high content of humus and

at present supports a vigorous growth of *Sorghum arundinaceum* (*Lutiriwiny*) and, on old plot sites, a large handsome red 'cockscomb' (*Obuga*). At the time of my visit much of the area was water-logged and those birds usually associated with grassy swamps (especially the Abyssinian Yellow Bishop Finch) were much in evidence.

Tradition states that the present river through Liri, which flows at the bottom of a ten to fifteen-foot channel, was originally an old irrigation trench. This may be true as it is difficult otherwise to explain why there is no well-defined channel in the Cwarlyech through Liri, and yet there is a miniature canyon with a waterfall at its head.

Very large dams, behind which it may take twelve hours to bank the water to a sufficiently high level, are required to work this scheme. Some six main dykes are discernible, but these have not been in use since the 1943–4 season. By digging a canal into the swamp above the waterfall, Mr. Lolobo has been able to obtain an excellent flow of water without recourse to large dams. His trench runs along the entire east boundary of Liri (about one and a half miles) and appears extremely well-graded when it is remembered that no instruments were employed in its construction. It is probable that the whole irrigated area could be supplied with water from an enlarged modification of this dyke, thereby eliminating the use of large cumbersome dam-structures on the main channel.