3). The channel bed is very irregular. It is punctuated along its length by hummocky sand bars, elongated parallel to the channel. These sometimes lie central to the channel (Fig.4) but more commonly lie against one or other margin. Stretches of the channel are characterized by these bars alternating on opposite sides with a depression representing the former thalweg, (deepest part of channel) winding between them (Fig.5). The margins of bars flanking the thalweg are usually steep while the upstream and downstream slopes tend to be more gentle. The sinuous thalweg depression is of variable depth and the deeper portions typically contain shallow pools of seepage water. The maximum topographic relief between depressions and bar tops exceeds two metres.

The margins of the channel are invariably raised with one margin usually higher than the other, particularly where a bar flanks the margin (Fig.6), with a distinct depression in between, representing the former thalweg. Both channel margins are normally elevated relative to the surrounding area.

Sinuous, sandy mounds, usually originating in elevated channel margins, extend away from the channel into the surrounding area (Fig.7). These undoubtedly represent former small side branches to the main channel. At their intersection with the main channel, the crests of these mounds may rise a metre or more above the burnt out peat flanking the channel, but elevation gradually decreases away from the channel and the mounds ultimately merge with the surrounding terrain (Fig.8). These former side channels are of variable length, occassionaly exceeding two hundred metres. They are usually highly sinuous. Sometimes they form a complex network (Fig.9), separating from the main channel, connecting with other similar mounds, sometimes rejoining the main channel or simply terminating in a number of separate branches.

The main channel and the lateral mounds are composed of well sorted, white sand. However, much of the channel sand is draped in a layer of dark grey silt, no more than twenty centimetres thick. The transition from sand to silt may be quite abrupt or it may be gradational in that the sand becomes progressively finer upwards over several centimetres eventually passing into silt.

The channel as a whole and its side branches are elevated above the surrounding area of burnt out peat except for the deeper depressions in the former thalweg. The degree of elevation varies, depending on the distribution of bar forms. The surrounding area is completely flat and featureless (Fig. 10) except for the occasional anthill. The substrate consists, at surface, of a dark grey silt, identical to that occurring as drapes on the channel sands. At depth, however, the substrate changes to a hard, pale brown, porous material, often containing impressions of plant material.

The channel and surrounding areas are completely dry, except for occassional stagnant pools in the deeper depressions. However, towards the upper end of this abandoned section of the Nqoga, where it merges with the flooded area, pools of standing water become more common both in the channel and in the surrounding areas (Fig. 11) until ultimately the water is continuos.

Discussion

Historical records indicate that the section of the Nqoga under discussion was transformed over a period of forty years from a typical channel such as shown in Fig 2,to complete dryness. The immensity of the transformation is perhaps best visualized with the aid of Fig.4; prior to the blocking of the channel, the person in this photograph would have been standing in mid-channel, probably at least chest deep in water, with papyrus culms towering above his head.

The evolutionary history of the abandoned Nqoga channel is recorded, at least in part, in the sediment substrate. Prior to blockage, sand would have been moved actively along the channel bed, forming bars. There is, however, a net influx of sand into the Okavango Delta (Wilson and Dincer, 1976) which deposits on the beds of active channels, causing aggradation. This aggradation would be matched by upward vegetation growth in the areas flanking the channels. The root zones of plants would trap silt and clay from through flowing water. In time, this aggradation of the channel and its flanking areas would result in the channel flowing on a belt of sand, flanked by accumulated peat containing silt and clay, as shown in Fig 12a. Historical records indicate that flow gradually declined and the Nqoga began to block with vegetation (Wilson, 1973). This decline in flow was most probably caused by aggradation, which reduced hydraulic gradients along the channel. Because of the decline in flow, larger sand particles would no longer be moved, and sand bars formed earlier at times of higher flow would remain unchanged, but would become draped with fine sand. As flow came to a near complete standstill, a silt layer would have settled and covered earlier channel deposits.

Subsequent desiccation of the area would have had a profound effect on areas underlain by peat, as these would tend to compact, while sand would remain unaffected. The subsurface fire would have enhanced compaction of the peat by destroying the organic matter. The net result was a collapse of the areas flanking the channel, causing the 'belts' of sand which underlay the original channel and its branches to stand as ridges (Fig.12b). Apart from a certain amount of lateral spill at the edges of the channel, the original morphology of the channel beds has remained essentially intact. The peat fire would not, of course, have destroyed silt trapped within the peat. Today, this forms the clayey soil in the areas flanking the old channel, which locally is underlain by the pale brown residue left by the burning of the organic fraction.

The amount of collapse of the channel flanking areas is difficult to estimate but most certainly exceeds two metres. It might be asked why the waters of the Nqoga have not reflooded this area, considering the extent of the collapse which has taken place. In the absence of hydrological and topographic information, we can only speculate on this point. Probably most important is the fact that the quantity of water available at the top end of the collapsed section of the Nqoga is limited because the Maunachira and Jao/Boro channels have taken a substantial proportion of the Nqoga's water. With the reduction in inflow, it is probable that subsurface water flow rates are sufficient to prevent surface water accumulating, so that the area remains dry. However, the water table remains close to surface, producing occassional seepage ponds. The amount of collapse would be determined in part by the extent of depth of the peat fire, which, in turn, would depend on the groundwater regime. It is possible that the upstream areas of the abandoned section of the Nqoga were not affected by the peat fire or even by the desiccation which preceded the fire, and hence form a barrier to surface water.

Conclusion

In this section of the Nqoga, there is now a well documented account of a channel system which evolved from one of vigour to total dryness in less than one century. These processes have presumably operated time and again in the past, and are perhaps responsible for much of the morphology of the delta. While the processes have recurred, there appears to have been variation in scale. In wetter times in the past channel systems may have been much larger than the Nqoga (e.g: Cooke, 1976, Shaw, 1985). Indeed, cursory examination of aerial photographs of the delta reveals that the sinuous, sandy ridge left by the abandoned Nqoga has many larger scale counterparts which today form island chains in many parts of the Delta.

This article adds another chapter to the fascinating story of the Nqoga blockage begun by Wilson (1973). The story is far from complete, however, and much detail could still be obtained by careful study of the record of events preserved in the subsurface sediments.

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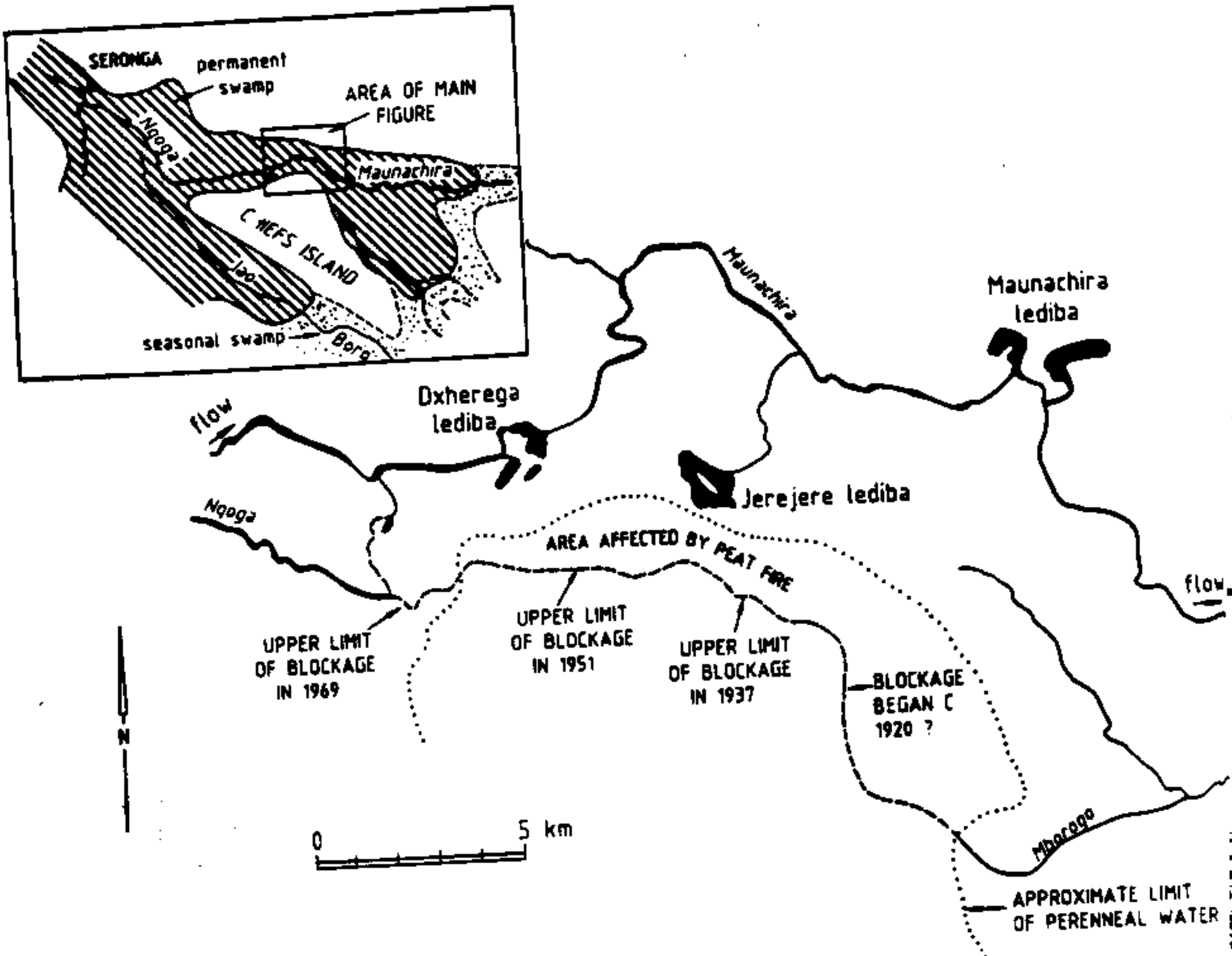

FIGURE 1:
Map of portion of the Delta showing the area affected by blockage and subsequent peat fire

FIGURE 2:
A typical channel in middle reaches of the delta.

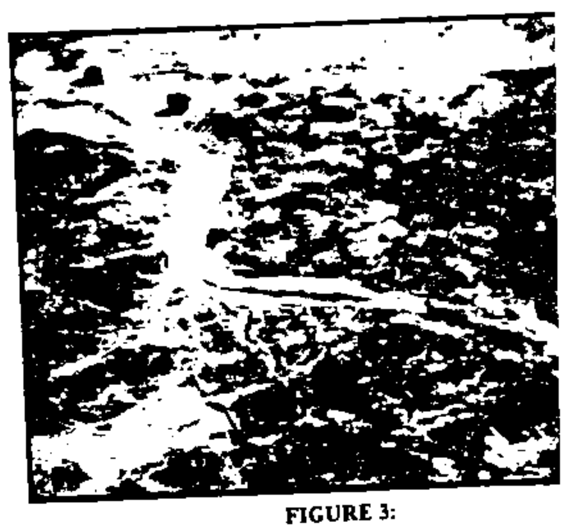

FIGURE 3:
A section of the old Nqoga channel from tl

FIGURE 4:
Sand bar in the centre of the old Nqoga channel.

FIGURE 5:
Side bars in the old Nqoga channel. The thalweg runs from left to right between alternating marginal bars.

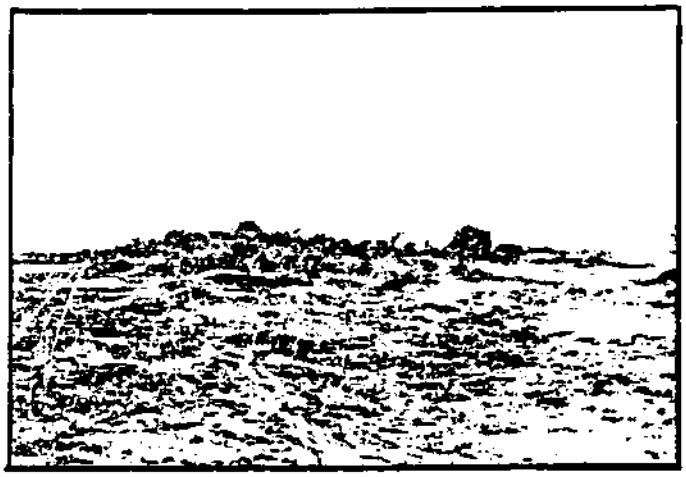

FIGURE 6a:
Raised channel margin — thalweg on the right

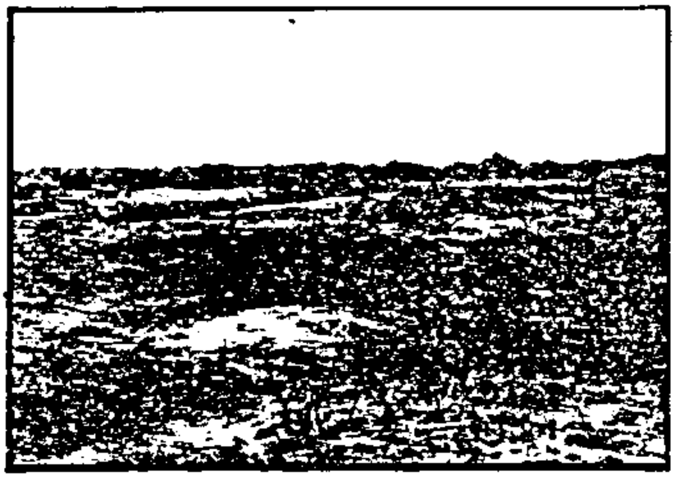

FIGURE 6b:
View down the channel showing raised margins

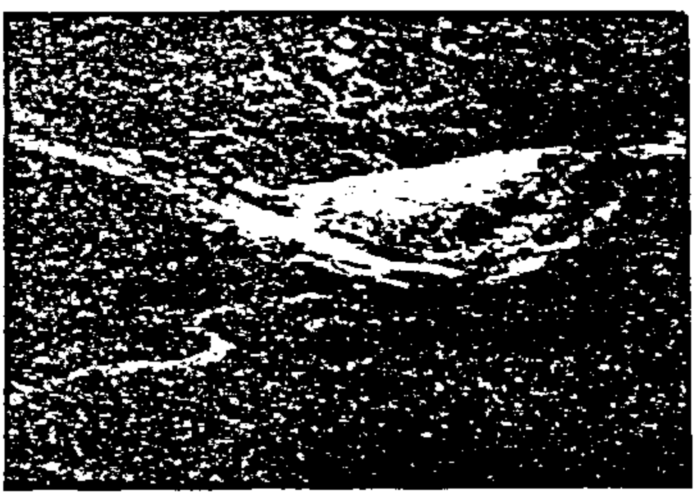

FIGURE 7:
Sinuous marginal channels flanking the Nqoga channel

FIGURE 8:

Marginal channel to the old Nqoga, represented by a sinuous, raised sandy mound

FIGURE 9:

Marginal channels in the upper section of the abandoned Nqoga channel. Note the standing water at the left of the photograph.

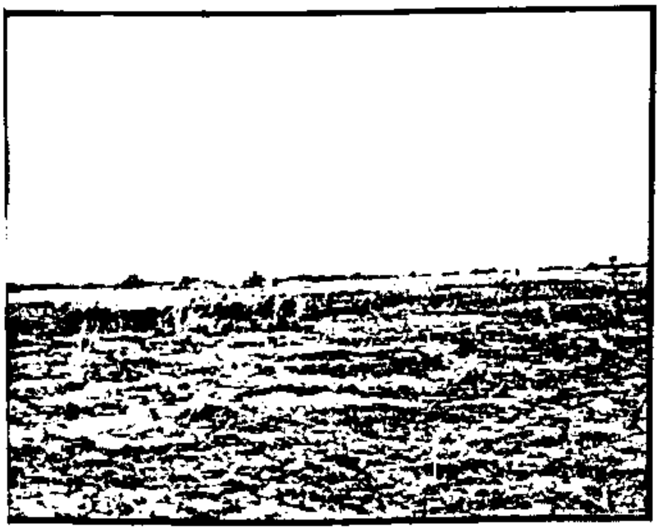

FIGURE 10:
A view of the area flanking the old channel

FIGURE 11:
Standing water in the upper portion of the old Nqoga channel

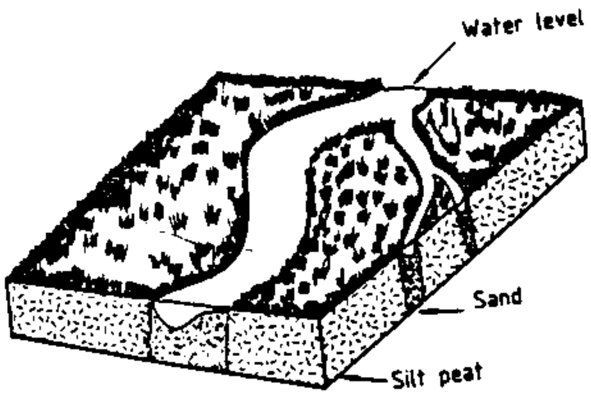

FIGURE 12a:
A block diagram showing a section of the channel at its prime

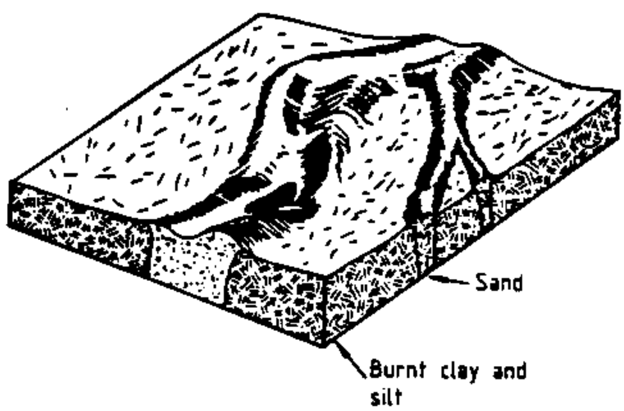

FIGURE 12b:
A block diagram showing the channel section of Fig 12a after a peat fire has collapsed the areas flanking the channel.