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'Luwero Triangle' emergency water programme, Uganda

INTRODUCTION

In recent years the rising toll of world disasters has increased alarmingly. Tragically, the trend continues. This paper describes an emergency water programme in Uganda in order to share the experience gained which it is hoped may be of value in similar relief programmes in the future.

BACKGROUND

The emergency

In September 1983 the Government of Uganda launched an international appeal for assistance in the disturbed areas immediately north of Kampala of Luwero, Mpigi and Mubende Districts (referred to as the "Luwero Triangle" after more than a year of armed conflict in the region. Over 75,000 people (rising later to 100,000) had been displaced into makeshift camps after losing most of their belongings. It was estimated that 25% of the affected population were young children accompanied mostly by women. Children and adults alike suffered from malnutrition, measles, diarrhoea, malaria and skin diseases. Consequently the needs were for food, water, shelter and medical services.

Co-ordination of the programme

From the outset co-ordination of the relief effort was very good and, although co-ordination meetings took up valuable time, they proved useful and constructive resulting in positive co-operation between agencies. The Government of Uganda designated the Office of the Prime Minister to be responsible for the co-ordination and administration of the relief supplies under a Relief Administrator.

The need for improved water supplies

At the beginning of the relief operation it was apparent that mortality and morbidity was caused by inadequate water supplies. Due, in part, to the recent history of Uganda, rural water supplies in many regions of the country are inadequate and in need of rehabilitation. For the displaced people this need was further increased and seen as an emergency for the following reasons:

i) Concentrations of large numbers of people in makeshift camps. The camps tended to be based on existing villages or small towns which at the onset had poor water supplies. These supplies became overused and totally inadequate for the ever increasing numbers of people.

ii) The generally poor state of health of people arriving at the camps and worsening on arrival due to the high prevalence of water related diseases such as diarrhoea, dysentery, scabies, etc.

iii) The relative neglect of the region due to insecurity over previous years which resulted in a continued deterioration of existing water supplies.

iv) The urgent need for provision of water at health centres, hospitals and the supplementary feeding centres.

Complementary to the need for improved water supplies was the need to improve sanitation. The ICRC (Red Cross) took responsibility for the digging of pit latrines, control of rodents and insect vectors and health education in the camps, in addition to supporting the water programme.

THE OVERALL PROGRAMME

Borehole rehabilitation

The Uganda Water Development Department (WDD) supported by UNICEF were and still are involved in a national programme of borehole rehabilitation. Boreholes that had been drilled from the late 1940's onwards had been fitted with hand pumps that had performed well but had been neglected in more recent years. A decision had been made to replace these pumps with the India Mk II hand pump (renamed in Uganda the U-Two Pump) At the beginning of the emergency operation the process of pump replacement had just started. A Save the Children Fund engineer was appointed to work alongside the Drilling Section based in Kampala to hasten the repair and rehabilitation of existing boreholes nearby camps, health centres and the hospitals. This involved the deployment of a Dando 200 percussion servicing rig mounted on a Bedford lorry. The procedure was to dismantle what was left of the old pump and plinth, clear the borehole, install the pump pedestal, cast the borehole surround, run-off and soak pit before returning later to install the pump and commission. This proved a very satisfactory method of rapid rehabilitation. One borehole could be rehabilitated over a period of about 10 days.

Springs and wells

Not all camps and emergency centres, however, had a borehole conveniently located nearby. In the absence of equipment to drill new boreholes attention was turned to springs and wells.

The local conditions did not give rise to many springs and where they did they were not always accessible to the camp residents. However, over the years some springs had been protected and there did exist a structure through which requests for spring protection was passed to the District Health Inspector (DHI). The DHI employed a spring fundi or mason whose job it was to provide the skilled labour required for the "masonry" work. Due to the conflict in the area much of that structure had been disrupted but as an additional aid to longer term rehabilitation it was a policy to work through existing structures where possible, however fragile, and to utilise local skills and expertise. To this end, supervising technicians were recruited within WDD and the spring fundi for Luwero District located. In normal times the procedure would have been to organise self-help labour through the village chief and the DHI or his appointed health assistant. In the camps this was organised through the camp chairman and where villlage communities still held together, through the village chief. Men would normally provide the labour for digging, mixing concrete, collecting and puddling clay. Women and children would often collect and carry hard core.

Where springs were protected they proved effective and popular. They are easily maintained and they are relatively quick as an emergency measure with the advantage of a considerable life byond the emergency.

Where there were no boreholes and no convenient springs to protect, then the solution was a hand dug well. Being an emergency programme, the siting of the wells had to be such that the well could be sunk and adequately protected quickly. This usually meant choosing a site close to a swamp, reaching the water table, on average, about 1.5 metres below ground level. It may be argued that this was not sufficient to prevent pollution from surface water percolation but it was felt in the circumstances that quickly obtained improved quantities of water of improved quality but not necessarily to WHO standard was the best strategy to adopt. As a consequence the wells were relatively shallow of 4m to 8m depth. At most sites the soil conditions dictated the use of precast concrete well lining rings to caisson into the water table. Due to the security situation it was not possible to cast the rings on site, which would have been the ideal. A casting section was therefore established in Kampala to cast reinforced concrete rings of 1m internal diameter and 1m depth. The reinforcement was necessary only to improve strength during handling and transportation to site. As is often the case with hand dug well construction, the main problem encountered was keeping the well rings vertical as they were sunk. It was quickly appreciated that the slightest misalignment had to be immediately corrected.

Where it was possible to complete the work, the wells were finished with a concrete apron shaped to fall to a drain and soakaway. Two wells were capped with a reinforced concrete slab through which a Pulsa 3 hand pump was installed. The other wells were left for drawing of water by rope and bucket. Whilst this did not afford the best sanitary arrangement, it did maintain the policy of providing water quantity albeit at diminished water quality. These wells were still a vast improvement on the grossly polluted waterholes.

Rainwater catchment

Rainwater catchment schemes were only viable at a few sites. Whilst many of the buildings in the area once had good galvanised steel roofing unfortunately buildings had been partly destroyed and many of the corrugated steel roofing sheets looted. It had been customary, where people could afford it, to collect rainwater in corrugated galvanised steel water tanks. However, many of these had fallen into disrepair or had also been looted. The collection of rainwater could in any case only have been a supplementary water source in most situations.

Only at the two hospitals was rainwater catchment seriously considered. In Kampala there were thriving small industries fabricating gutters and tanks from imported galvanised steel sheet. These were purchased locally and installed at the hospitals. Local semi-skilled labour was hired to lay foundations and plinths for the tanks.

Water tanker

UNICEF provided a Bedford lorry mounted with a 6000 l steel tank for the transport of Kampala mains water to the camps. Due to the geographical distribution of the forty or so camps the tanker could normally make only one delivery per day. If drinking water consumption is calculated at 3l/person/day, the tanker could supply 2,000 people a day with drinking water. It was decided to deliver to five main centres a week where there were supplementary feeding centres for moderately and severely malnourished children. UNICEF also supplied plastic collapsible water tanks of 5000 l capacity for each centre. The water from the tanks had to be used sparingly and rationed for use in making up oral rehydration solutions etc. The tanker played a vital part in the programme but it can be seen that it was totally

unrealistic to use a tanker for the supply of all the camps except for the special cases.

Pumping schemes

Motor driven pumps were avoided wherever possible. In the special circumstances of the emergency, the insecurity, looting, and the difficulties in servicing and refuelling, even the medium term running of motor-driven pumps would have been erratic and unreliable. The only sites where it was possible to consider pumping schemes were at the hospitals where staff could run and service them.

At Nakaseke the original scheme pumped water from a valley tank situated about 1.5 km from the hospital. It passed through a pressure sand filter to a storage tank of approximately 36,000 l capacity. Prior to the hostilities the hospital received electricty but the supply had been disrupted. In addition, the pump electric motors together with all the switchgear and cabling had been looted. It was decided to install a diesel drive for one of the two Blake double-acting piston pumps which still remained. Both pumps were overhauled, a diesel installed and the pump house repaired and secured. Holes in the backwash storage tank were plugged and the main tank at the hospital cleaned and bitumen coated internally.

However, as an example of unexpected events regularly encountered in the programme, the day of re-commissioning was a big disappointment. The route of the rising main passed through an army detachment. It was common practice for each detachment to dig fox-holes for cover around their base and in this digging the rising main had been ruptured in five different places. This was not noticed, however, until pumping re-started and the first fox-hole was flooded. Great diplomacy was required that day and the pvc pipe was eventually repaired.

Nakaseke hospital had been completely looted. This included taps, wash basins, pipes and other sanitary ware. Full credit should go to the WDD team who re-plumbed the hospital which allowed the flushing of toilets and the use of washing facilities.

The next problem was the fear of flooding due to drain blockages. This was a common problem at both hospitals. Unfamiliarity with flush toilets and blockages due to consolidation of sediment over the years necessitated control over the use of toilets and a concerted effort to throughly clear all drains.

Water quality and yield

Attempts were made to analyse water samples but it was not possible to compile comprehensive records. The field test kit for bacteriological tests utilised the "membrane filtration method" which necessitated incubation at a set temperature. Unfortunately, the kit was unable to maintain the critical steady temperature and hence the results were unsatisfactory.

As an aid to rapid assessment on site, test strips for the identification and semi-quantitative determination of nitrate ions were used. These dip sticks indicated nitrate levels in protected springs of from 0-20mg/l. In one case a well was condemned when it was found to have a nitrate level approaching 45 mg/l which was due to bad siting of pit latrines.

Yields were fairly academic since any improvement was never enough. To give some indication, typical yields were as follows:

Springs	5 - 14 l/min
Wells	10 - 25 l/min

Insecurity

Insecurity was a major problem. At the beginning it had been hoped the camps would be gradually disbanded, people would be able to go back to their shambas and the nature of the programme would change from emergency to rehabilitation. However, insecurity continued throughout the programme and the manner in which to approach the relief work was under constant re-assessment. The relief effort was regularly interrupted by events which necessitated the temporary halting of travel within the area.

For a time Nakaseke and Kiboga hospitals were used as bases which considerably reduced travelling times. The period spent on site was vital because very often it was the only time work was actually done. Although labour was supplied from within the camp, residents had other tasks to carry out. The skilled work of lining a well or constructing a spring wall also required a supervisory presence. These factors contributed to the many delays experienced on the programme.

Costs

The programme was supported by a number of agencies, each of which had ongoing programmes elsewhere in the country and therefore the apportioning of overheads is fairly arbitrary. However, the direct costs of typical units can be estimated to give some indication of the expenditure involved. The estimates for a typical spring and well are given in the table. In normal circumstances the provision of sand, aggregate and hard core might be wholly or partly contributed by the local community. In the camps it was often impossible for people to be free enough to collect hard core and in any case it would have been adding to the people's burden rather than aiding their situation

to urge more involvement than it was sensible to request. The emergency nature of the work also meant that any time spent in organising community labour, where this was possible, could have delayed the improvement of water supplies. Self-help community labour has got to be kept in realistic perspective. Therefore, after initial trials of predominantly self-help labour the work became mostly paid at an appropriate local rate.

Decline of the programme

During April and May 1984 relief was limited to just several "transit centres" close to the main roads. The majority of the camps were being disbanded. From July to September the scope of the relief effort became considerably limited because of the deteriorating security situation. Work was carried out only at sites on the main roads. Additional sites were identified closer to Kampala of a non-emergency nature in order to maintain the momentum of the work and keep a team together capable of reacting to a change in circumstances within the "Triangle". However, hostilities returned to the level of a year and a half previously; the situation had come full circle.

It was therefore decided to cease OXFAM's involvement in the water programme and since OXFAM had assumed the role of lead agency this meant the termination of the majority of the water relief programme. At the end of the programme, all three remaining transit centres had adequate water supplies; there were no longer, to OXFAM's knowledge, any concentrations of displaced people in camps; the insecurity in the region would have made any continued relief effort hazardous.

CONCLUSION

Lasting effects

Over the period of the emergency water programme 76 boreholes were rehabilitated, each fitted with a U-Two hand pump; 21 wells were dug; and 19 springs protected. In addition, extensive work was carried out on the water supply, internal plumbing and drainage of the two hospitals at Nakaseke and Kiboga. During this period the borehole maintenance section had maintained and repaired hand pumps which had suffered heavy useage. The WDD borehole teams were available to continue this repair work, if they judged the situation safe, and through a scheme funded by UNICEF a "Luwero bonus" for work in the disturbed areas was continued.

The sinking of hand dug wells prior to the emergency was relatively rare and there is now the knowhow and capability within WDD to recommence this work in the "Triangle" when possible, and to continue in more settled areas.

It is to be hoped the region can soon return to normal and benefit from longer term development projects such as the UNICEF/WDD national water development programme.

Table of summarised direct construction costs.

A typical 5m deep hand dug well:	
Materials for 6 No. 1m dia x 1m deep, 1:2:4 mix concrete rings plus apron surround, filter and drain.	£206
Labour (Supervisor, mason, diggers)	£120
Fuel (2 Bedford trips to site)	£ 45
Total	£371
A typical 2-pipe outlet protected spring:	
Materials for floor slab, spring wall, access steps, filter and pipes.	£210
Labour (Supervisor, masons, assistants)	£ 90
Fuel (4 Bedford trips to site)	£ 90
Total	£390