24th WEDC Conference Islamabad, Pakistan, 1998

SANITATION AND WATER FOR ALL

Cleaning up of an oil spill

A.I. Rugumayo, Uganda

AN OIL SPILL occurred on the 19th September, 1995 when on oil fuel tanker overturned on its way to Kasese at Lake Nkugute, Bushenyi District Western Uganda. Three people were killed including the driver, the turnboy and another passenger. The first visit was made by officials from the Ministry of Natural Resources on 28th September, 1995 and an initial report was prepared.

Initial visit

I was assigned the duty of coordinating the clean up exercise. I made my first trip on 10th - 11th October 1995, accompanied with a water quality analyst and a technician. We liaised with the District Water Officer, Bushenyi who was to be the field officer in charge of the exercise.

Prior to the field visit a meetings were held with GAPCO, the oil company, the owner of the oil. Initially Government accused GAPCO of being the polluter, but as GAPCO explained, the transporter was the polluter, since he was in possession of the oil at that time and it was not a GAPCO tanker. However, GAPCO, being interested in keeping the environment clean, would participate in the clean up exercise. Furthermore, Government did not have an emergency relief fund and so had to rely on the goodwill of the oil company to facilitate the cleaning up.

On arrival at the scene of the accident, District and Local Council leaders had been mobilized and a meeting was held to explain the purpose of the visit which was to get a first hand impression of the situation and to work out with them, the best way of alleviating the problem.

Observations

The following observations were made as a result of the visit and reference should be made to fig. 1 .

- As a result of the accident, half the contents of the 15,000 litre tanker with furnace oil spilled on the opposite side of the road the Lake. At the time of the visit the oil tanker was being removed, and the remaining oil spilled from the tanker.
- According to GAPCO, the oil tanker was carrying furnace oil 125. Furnace oils are heavy fuels which have a boiling range of between 315 and 540^{0}C, are dark in colour, more viscous than water, have an asphaltic odour and have specific gravities of between 0.88 and 1.05. The fuel carried contained 3.7% wt of sulphur
- Lake Nkugute is partially fed by surface runoff from all the hills in the area, groundwater seepage and by a protected spring, 50m across the road. Surface runoff from the hills and seepage is transmitted by two culverts at km 88+00 and km 87 +90 in addition to direct runoff from the road. The water from the lake flows over a weir 20m long downstream. In the weir wall there is a 100mm intake pipe placed which, feeds the Bunyaruguru water supply scheme. This pipe extends 15 metres behind the weir wall and is approximately 1.5m deep in the water.
- As a result of the spill, the furnace oil polluted the area near the culvert at km 88+00 leading to the lake and water from both the spring and water seepage were carrying the furnace oil to the lake through the culvert. The pollution was to such an extent that all the water entering the lake was full of this soil.
- At the time of the visit, grass and leaves had been placed at the lake inlet to prevent more oil entering the lake, this helped, but to only a small extent.
- There was a thin film of oil covering the surface of the lake particularly near the shores. In addition, it was observed that oil had covered the vegetation on the shores surrounding the lake whose perimeter was approximately 10km long. However, no death of aquatic organisms was reported.
- At the weir site we were informed by the residents nearby, that the water quality which previously had a high concentration of oil had improved. Soon after the accident the water was not being used for bathing, but at that time it was already being used for bathing and washing. This indicated that the water quality had improved possibly due to two reasons:-
  - A Very large dilution factor, the volume of the furnace oil spill compared to the total volume of the lake.
  - The vegetation on the lake shores took a large quantity of the oil as a result of the air currents across the lake.
- Furthermore, it was observed that the back of weir wall was covered with a layer of black furnace oil which was approximately 150mm height, similar to the layer of furnace oil that covered vegetation round the lake.
- The Bunyaruguru Gravity water supply scheme is basically as follows:-
  The intake pipeline feeds two tanks of capacity 8000 litres at the treatment works and another two tanks at Rugazi (195 m^3 each) and another tank further downstream at (195 m^3) giving a total of five tanks. The supply has pipelines 30km long and caters for 50,000 people.

All these tanks were affected by the spillage. An immediate measure taken by the Health Inspector was to close down the water supply scheme. At that time the residents were using alternative sources. During this visit water quality samples were taken at the following locations:-

- the protected spring which flows into the lake.
- the culvert at km 88+00 near the oil spill.
- the inlet to the lake.
- the second culvert at km 87+90.
- the intake weir for the water supply at km 89+45
- the treatment works for the water supply at km 89+95
- River Kyambura which is just before the escarpment.

Recommendations

As a result of the visit, the following recommendations were made.

- A new channel should be excavated to divert the spring flow.
- The soil in the contaminated area should be removed and disposed off safely and fresh soil from a cut should be brought and compacted.
- GAPCO should provide a solvent for dissolving the oil.
- The contaminated vegetation around the lake should be removed.
- The culverts and water supply, pipes and tanks should be flushed out with a solvent or detergent. The cost estimates for removing the soil were US $ 20,000, the alternative of using a solvent was not possible.

Mobilization

After the required actions were agreed upon, a trip was made from 9th to 10th November to initiate the actions. Fortunately, all the residents had been mobilized by the local council official and were willing to work. Earlier on a request had been made to the Ministry of Works Transport and Communication for a backhoe type of excavator. This was not immediately available and the excavation was therefore done by hand. A trip had to be made to the fishing village of Katunguru 20 kms away to hire fishermen with their canoes to assist in the clearing of the contaminated vegetation around the lake shores along the 10km perimeter. Clearing and removing the vegetation took one week.

The tanks, the weir and all the pipes were flushed out with detergent. The culvert had to be scrubbed with the help of young boys who went inside.

Disposal site

Care had to be taken to identify a suitable disposal site for the soil contaminated with furnace oil. Three sites were found nearby . Two murram pits were eliminated from the choice, because of the possibility of further contamination by seepage. The third site was a disused stone quarry at Ndekye 5kms away. This had hard and impermeable rocks and the possibility of further contamination was limited. Discussions were then held with the residents and local council officials and they all agreed to this site and finally, the Chairman of the Church Committee, which owned the land gave his consent. After depositing the contaminated material the disposal pit was then covered with soil so that in future it could naturally be colonized by vegetation. Most of the contaminated soil and vegetation and the spilled oil was transported to this site by a tipper provided by the Ministry of Works. The murram pit where the gravel was to be obtained was less than 1km from the incident.

Conclusions

The cleaning up exercise continued for two weeks after the initialization of activities. A subsequent follow up trip was made in early December. In early January 1996, a trip was made to collect water samples over a 24 hour period. It was observed there were hardly any traces of oil film on the lake and there was no oil entering the lake through culvert No. 1.

Based on the water quality results which showed no traces of oil, water supply was restored to the community. This was achieved on January 25th 1996. The final report recommended additional excavation as shown on fig. 1 under 2 and the construction of humps along the curve where the accident occurred to reduce speed along the highway.

It further recommended the sources should be monitored for one month. It proposed that Government should establish an emergency disaster fund to deal with natural calamities like earthquakes, floods so that immediate action be taken. It further proposed that a workshop to be organised to discuss the capacity building funding, skills and personnel required for disaster preparedness. It further recommended the sources should be monitored for one month. It proposed that Government should establish an emergency disaster fund to deal with natural calamities like earthquakes, floods so that immediate action be taken. It further proposed that a workshop to be organised to discuss the capacity building funding, skills and personnel required for disaster preparedness. In this exercise I was assisted by two senior environment officers from the Ministry of Natural resources.

The above report illustrates the constraints experienced in disaster management in Uganda. It took us a period of four months to clean up the water source contaminated by 1500 litres of finance oil. The following discussion brings out the issues at the institutional level in disaster management and proposes a way forward.

Current situations

Under the Ministry of Labour, there is a Department of Disaster Management, whose mission is to alleviate human suffering inflicted by disaster and to facilitate disaster victims to re-establish their normal patterns of life. Its mandate is to give emergency relief assistance to persons affected by natural and man made disaster and resettle

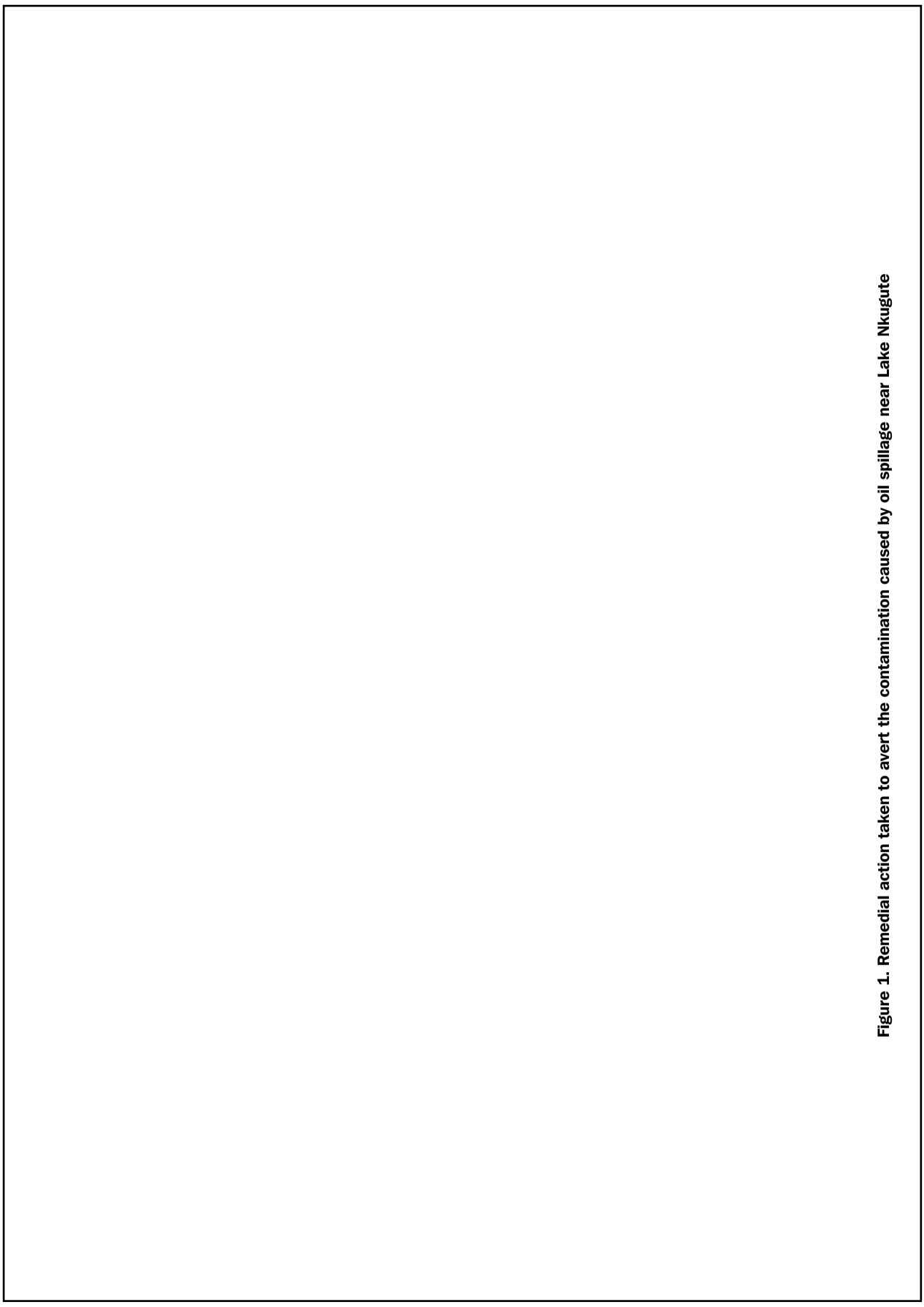

Figure 1. Remedial action taken to avert the contamination caused by oil spillage near Lake Nkugute

internally displaced communities. Article 249 of the new Constitution establishes a Disaster Preparedness and Management Commission. This has not yet been constituted.

The Department of Disaster Management has been unable to carry out its functions because of:

- lack of a comprehensive disaster management policy.
- lack of a regulatory framework
- a low position the public administration hierarchy which makes it difficult for it to serve as a focal point of integrating disaster issues into sectoral strategies.
- inadequate staff
- inadequate funding
- several sectoral bodies NGOs involved in the management. The sectoral approach in particular leads to;
  - lack of coordination,
  - increased rivalry between institutions.
  - duplication of efforts and resource constraints.

Uganda's experience in disasters has been in the following areas.

- Famines - Famine and food shortages affected 1.8 million people in 16 of the 45 districts in 1993/94 primarily caused by a drought.
- Displacement - In 1986/87 over 2.7 million people were displaced. Currently over 300,000 are displaced due to internal conflicts and insurgency.
- Earthquakes - In 1994 an earthquake of intensity 6.2 on the Richter scale affected over 50,000 persons.
- Epidemics - In the recent past, we have had epidemics like cholera, meningitis and HIV/AIDS. These are often conceived as sectoral.
- Industrial/Technological - as the above oil spill and the Lake Victoria ferry disaster, which killed 600 persons.
- Landslides - these occur in the seismically active area of Western Uganda.

The way forward

The key issues that need to be considered in preparing a sustainable disaster preparedness and management programme are:

- the policy framework
- the institutional framework
- the financing.

The policy framework should try to achieve the following;

- harmonize the sectoral and cross sectoral policy objectives
- develop an integrated multi - sectoral approach to resource planning
- develop an implementation strategy with appropriate legislation
- include a strategy for raising public awareness, gender and community participation
- develop management information systems and include monitoring and evaluation
- involve NGO's and the Private Sector.
- establish disaster protection standards
- ensure disaster preparedness as an integral part of education.
- ensure liaison with international agencies
- ensure plans are prepared at the National and district level.
- develop appropriate capacity building at all levels.

The institutional framework is provided by the Disaster Preparedness and Management Commission whose membership should include professional, experts, NGO's, Government and the Private Sector. Financing should be by Government and International donors.

References

Final Report on Remedial Actions taken to alleviate the effects of an oil spill at Lake Nkugute, Bushenyi District, Western Uganda. Directorate of Water Development, Ministry of Natural Resources. January, 1996.

Concept Paper on the National Disaster Preparedness and Management Policy Framework Development Process for Uganda. Ministry of Labour and Social Services. November 1996.

ALBERT RUGUMAYO, Consultant.