



SUSTAINABILITY OF WATER AND SANITATION SYSTEMS



Water supply in Rwanda: from war to sustainability

Dr P.G. Nembrini, Kenya

ONLY A FEW hours after the death of Rwanda's Préзидент on 6 April 1994 an orgy of killing swept the country, reaching even the most remote hills and valleys. Systematic massacres and mounting terrors forced an endless stream of men, women and children to seek refuge in other parts of the country or abroad as Rwanda slid into chaos. Foreigners including most of the soldiers serving the United Nations Assistance Mission in Rwanda (UNAMIR), were hurriedly evacuated, and the country was left to its tragic fate. The ICRC decided that it had no choice but to stay, to try and save those who could still be saved.

Tens of thousands of people, mainly Tutsis but also Hutus suspected of belonging to the opposition attempted to escape the carnage by congregating in certain locations, both in Kigali and in the provinces.

First in the north, then elsewhere in the country, camps for displaced started springing up, and aid agencies began to organize relief for them. Beside **food, water supply and sanitation** to maintain a minimum of hygiene, were a priority.

The outbreak of cholera in the overcrowded camps around Goma dealt another devastating blow to the refugees, already weak and weary, creating overnight a new tragedy of unprecedented proportions (1). ICRC water and sanitation engineers have been working hard throughout the country to provide safe water in hospitals and in camps for displaced people.

The water supply systems in Rwanda's main cities have been disrupted as a result of the conflict. Starting in Kigali and then moving on to other cities like Ruhengeri and Gisenyi, the ICRC carried out a rapid assessment to identify the main problems within these water treatment plants and to implement an emergency programme to restore and maintain the facilities in a proper order. Water distributions for the displaced camps and for the resident populations would then be organized by trucking water from these facilities until the normal network distribution could be put into operation.

Humanitarian coordination began to take shape, many relief agencies arriving to provide emergency aid. Then, with Kigali no longer under siege, it became possible to reach all parts of the country. Considerable efforts were deployed to coordinate the work of the myriad relief agencies assisting refugees and displaced people, and working relations were established with Rwanda's new government.

This paper describes how ICRC tackled the water supply problems during the war, when it had to set up emergency programmes to restore the main supplies of the cities, until to its current task within the rural gravity water schemes, carried out with

the help of the local population and the governmental bodies, to attain a sustainable rehabilitation.

Programmes during the war.

Displaced people

The battle for the control of Kigali and the immediate control of the north-west part of the country by the former FPR army, resulted in the establishment of several displaced people camps, mainly from inhabitants who managed to leave the city. Simple emergency water supplies systems were set up to cope with the needs of about 12 displaced people camps (Ngarama, Mugango, Gatete, Ndarama, Nyange, Bushara, Mukoma, Mukarange, Manyagiro and Tabagwe), with a total population of about 250'000. Plastic collapsible storage reservoirs connected to distribution standposts were used and water was either from improved spring catchments or brought to the different sites by tanker trucks equipped with diesel powered pumping devices. These systems are widely used also by other NGo's like MSF (Médecins sans frontières) and their use have been successfully tested in several other emergencies.

These kits are essential in the very beginning of any emergency and can be set up in a few hours. Having secured a minimum water supply, the engineers could then look for other one's, and implemented more permanent schemes, either by rehabilitating existing gravity or pumped schemes, or by creating new water supplies using simple technology.

Spring protection and hand-dug wells are the more sustainable options but even if the technology involved is simple, they do require a minimum time and an amount of materials and equipment. Most of the a/m displaced people camps in N-W Rwanda could be supplied with minor repairs carried out on the gravity schemes or by catchment of new springs.

Treatment was in general **not necessary** but was carried out as a preventive measure, in case of poor maintenance of the facilities or if an epidemic (cholera) was feared.

The same approach was followed within the cities to supply facilities most in need of water, like hospitals,

health centres and vulnerable groups accommodation sites. 10 orphanages and health centres were supplied by tanker trucks. Drinking water was available from a few springs within the city of Kigali and was sufficient to cope with the needs of an almost completely abandoned city. The camp of Nyarushishi (Cyangugu), where about 15'000 Tutsi were gathering, seeking for protection, was supplied by completing a 4 km gravity fed scheme. Constant surveillance had to be given to the whole pipeline which was frequently damaged by sabotage, with engineers constantly aggressed by opponent factions.

Main water treatment plants (WTP) supplying the cities.

The main problems the WTP's of the cities had to face are listed in table I.

ICRC engineers were in a position to assess the conditions of these major WTPs (2), before they were hit by the front line, being deployed on both sides of the two factions, sometimes under considerable danger during the crossline operations.

This previous knowledge of the situation of the infra-structures enabled the ICRC to foresee most of the urgent needs, and particularly those for treatment chemicals. Immediate purchase orders were launched in an aim to decrease delivery delays, bearing in mind that most of these commodities had to be found and transported by truck either from Mombasa or from Dar es Saalam.

Only extreme urgent amounts were shipped to Kigali by plane, using ICRC but also UNAMIR logistical means. Specific damages were assessed when the frontline moved further South or North, putting most of the WTP under the control of the present governmental army.

From mid-May 1994 until end of May 1995, the ICRC delivered to ELECTROGAZ a total amount of about 900 MT of $Al_2(SO_4)_3$, 50 MT of calcium hypochlorite (HTH) and about 400 MT locally purchased lime (Ruhengeri), sufficient to cover the needs of all the WTP of the country for more than 8 months, taking into account the initial limited production capacities. Only minor damages were inflicted to the stations and the major problems the engineer had to solve was to rebuild the former opera-

tion and maintenance crews. Some of the previous managers were quickly on the spot and were of paramount importance in the setting up of new teams. Their role in the preparation of the lists of the essential spare parts, needed to carry out minor repairs and their knowledge of the modifications carried out on the treatment schemes, were essential to avoid mismanagement of some of these complex facilities.

Incentives for ELECTROGAZ workers were supported by ICRC for the Kigali and Gisenyi WTP (about 150 people) and steps were taken to determine how long the government would require assistance in this field.

4 electrical generators (total capacity 300 KVA) were flown in to operate the intermediary pumping stations of the city of Kigali, but the network distribution went back to normality only when the HV line supplying power from the Mukungwa hydroelectric power station, as well as several transformers, could be repaired by ELECTROGAZ, with the support of GTZ (German Technical Cooperation). End of October 1994 the water distribution could be considered normal in Kigali and efforts were directed to the other WTPs of the country, in coordination with other agencies.

At the end of the year most of the major WTPs were operational again. Reliability was subjected to power cuts, shortages of fuel, but the situation of the water distribution in the cities could be considered satisfactory and similar to the prewar conditions.

Rural water supplies

Most of the rural areas are supplied by gravity supply schemes. A total of about 1100 schemes are listed in the files of the Ministry of Public works (MINITRAPE). 79 of them are supplying the rural communities in the préfecture of Ruhengeri, are listed for Gisenyi, 48 for Kibuye etc. (3). As a rule of the thumb approximately 1/3 of these schemes were out of order, 1/3 were in a need of major rehabilitation and the rest was almost in working conditions (4). For the northern "préfectures" the poor state of the gravity fed rural water supplies was not only due to the recent war. Complete neglect of operation and maintenance started in 1990, when the first skirmishes began. In these areas the war has enhanced the degradation of the systems but even in other "préfectures" the neglect was significant.

The system prevailing before the war, assuring that "water taxes" paid by the inhabitants of a "commune" would support the "fontainier" (water guard) in charge to carry out maintenance and to buy spare parts, like taps and pipes, was not working satisfactorily.

Lack of understanding of the functioning of the systems and particularly downstream impacts of upstream damages, gender aspects of water with women and children fetching water, men in principle in charge of surveillance and operations and sometimes poor design of the systems, were the main reasons for the continuing degradation. To that we should add that there wasn't a

Table I. Main problems within the major WTP of the country.

- o personnel was absent
- o transport facilities were lacking
- o funds to pay salaries were not available
- o HT electrical power lines were cut and emergency power generators were insufficient
- o chemicals to carry out treatment were lacking (aluminum sulfate, chlorine HTH)
- o most of the maintenance tools were looted
- o fuel was not available

genuine feeling of the responsibility for the water supply systems, enhanced by the lack of social stability, by uncertainty of the future caused by growing conflicts and the presence of "newcomers".

Beginning of September the ICRC began to rehabilitate some of these gravity flow systems, in the region located between Ruhengeri and Ruhondo. 15 gravity flow systems were completely rehabilitated (5), with the objective to provide as much water as possible, as fast as possible, to as many people as possible. The need for a sustainable repair was stressed, and the programme was extended to the préfectures of Ruhengeri, Gisenyi and Kibuye. 3 teams were set up from personnel recruited through the American, Swedish and Australian National Red Cross Societies.

A socio-economist was added to the engineer in charge of the technical problems, with the aim to establish a dialogue with the users and with the newly appointed authorities, in order to raise awareness on the crucial issues of maintenance, water taxes and how to attain sustainability.

In the Ruhengeri préfecture the 45 km long Mutobo system, supplying water to the communes of Mukindo, Kigombe, Kinigi, Nkumba and Kidaho and the 35 km long Ruhondo system, supplying water to the commune of Ruhondo, have already been rehabilitated, with about 70'000 people depending on these two WSS for their needs of water.

In the préfecture of Gisenyi the WSS of the commune of Rwerere (6 km of new pipes), Mutura and Kanama (Bizizi sector) have been rehabilitated. The two WTP of Mizingo and Yungwe, supplying the primary distribution network, received technical and financial support.

In the Kibuye préfecture, on 14 targeted existing WSS, those supplying water to the communes of Biramba (12'000 p.), Rubengera (10'000 p.), Muhororo (5'000 p) and Kibuye town have also been completed.

Sustainability

Beginning of 1995 the Rwandan administrative structure began to function again. The natural counterpart in the rehabilitation, operation and maintenance of the WSS is

the Ministère des Travaux Publics et de l'Energie (MINITRAPE) and more specifically the "Direction Hydraulique" in Kigali. A working agreement was signed with the MINITRAPE and the ICRC, specifying the nature of their partnership in relation with the local relevant authorities, with the aim to compromise the traditional **rapid intervention approach** and the corresponding **visible short term progress** with basic educational process aimed to strengthening local capacities to solve maintenance issues in the future.

Much time and effort has been spent with local bourgmestres, "conseillers", school authorities and plumbers (fontainiers). As a result we observed a quite significant commitment for voluntary communal work and provision of locally available materials, including pipes.

The final objective of this medium term work is to re-establish a local management committee and a payment system, in agreement with MINITRAPE policies.

War has disrupted the normal organisation of the country and emergency programmes have been launched to bring it back to previous standards.

ICRC and other NGO have taken the burden of the necessary assistance to run the WTP and to repair the rural water supplies and this in a way to give to the affected communities a potential chance to reach, soon, a sustainable water supply.

References

- 1 Public health impact of Rwandan refugee crisis: what happened in Goma, Zaire, in July, 1994? *The Lancet*, Vol. 345. February 11, 1995.
- 2 G.J. Allison. Status report on the water treatment plants of Rwanda. ICRC. May-October 1994.
- 3 Inventaire National des Adductions d'eau Potable. République Rwandaise. 1992
- 4 Coopération autrichienne. Evaluation et besoins d'urgence au secteur Eau Potable et Assainissement dans la zone démilitarisée et la zone FPR. République Rwandaise. PNUD, mars 1994.
- 5 Q. Roell. Rural water supply rehabilitation in the NW of Rwanda. ICRC-TWB Benelux Cons. Eng. December 1994.