Soz Präventivmed 1995; 40: 18–26

0303-8408/95/010018-09 $ 1.50 + 0.20/0

Yves Etienne, P. Giorgio Nembrini

Medical Division, International Committee of the Red Cross, Geneva

Establishing water and sanitation programmes in conflict situations: The case of Iraq during the Gulf War

Summary

In armed conflicts, health and technical assessments made before initiating emergency water and sanitation programmes are hardly ever complete and accurate. Obstacles and constraints inherent in the initial assessment phase have an inevitable impact on the selection and ranking of priorities. The emergency phase of a programme calls for short-term objectives: the first activities are already under way as problem identification proceeds. Frequently updated assessments are an integral component of ongoing programmes, so as to ensure continous readjustment of short-, medium- and long-term objectives and an appropriate response to needs. In this article, as an example, we describe the various stages in assessing water and sanitation problems, first in Baghdad and then in southern and northern Iraq, between February and May 1991. Our aim is to explain the background that led to the implementation of the programme in the Iraqi capital and the provinces.

A final evaluation is always done in the last stage of health programmes initiated during armed conflicts. At that point it is often difficult to understand why certain decisions were reached at the outset of the operation; the reason is that one often forgets to replace those decisions within their original context.

In any conflict situation, the phase in which problems are identified[1] involves a certain number of constraints. Some of these constraints are specific to war situations, while others occur also in the event of natural disasters. They all have an impact on the planning and implementation of health programmes – particularly water and sanitation programmes, which are often the topmost priority.

In conflict situations, continuous problem identification and analysis and the establishment of priorities are essential components of the first part of a programme, and operational objectives are constantly readjusted as a result.

A major factor in the assessment phase is the extension of the geographical area covered and of the foreseeable duration of the programme. This will require a gradual increase in logistical and financial resources. It is therefore essential rapidly to distinguish between short-, medium- and long-term activities and to make sure that resources are available in time.

From 17 January to 28 February 1991, Allied bombing and military operations in Iraq gave rise to a flow of often contradictory information on the country's health conditions. Some sources assumed the worst[2] while others, such as CNN, conveyed a more reassuring view of the situation. An ICRC* team remained in Iraq during that whole period but was unable to move around freely. It therefore had only a limited vision of the problems at hand, and the fact that it could not verify any of the information in its possession made it extremely difficult to plan an assistance programme. As soon as the team became more mobile, from 23 February on[3], an ICRC sanitary engineer went to Baghdad to make his own assessment of the situation. A water and sanitation programme was launched immediately after his mission.[4]

When the Shiite uprising in the south and the Kurdish uprising in the north were over it became possible to assess the cirucumstances in those areas, too.

* International Committee of the Red Cross; paper published under the auspices of the Diploma of Public Health, University of Geneva.

This case study of the situation in Iraq in February and March 1991 clearly shows the difficulties involved in initial problem assessment. The various constraints described below led to a whole number of risky decisions. The ICRC was compelled to take them, however, on account of the urgency of the situation.
This article explains the difficulties involved in problem identification and in setting up the ICRC water and sanitation programme.

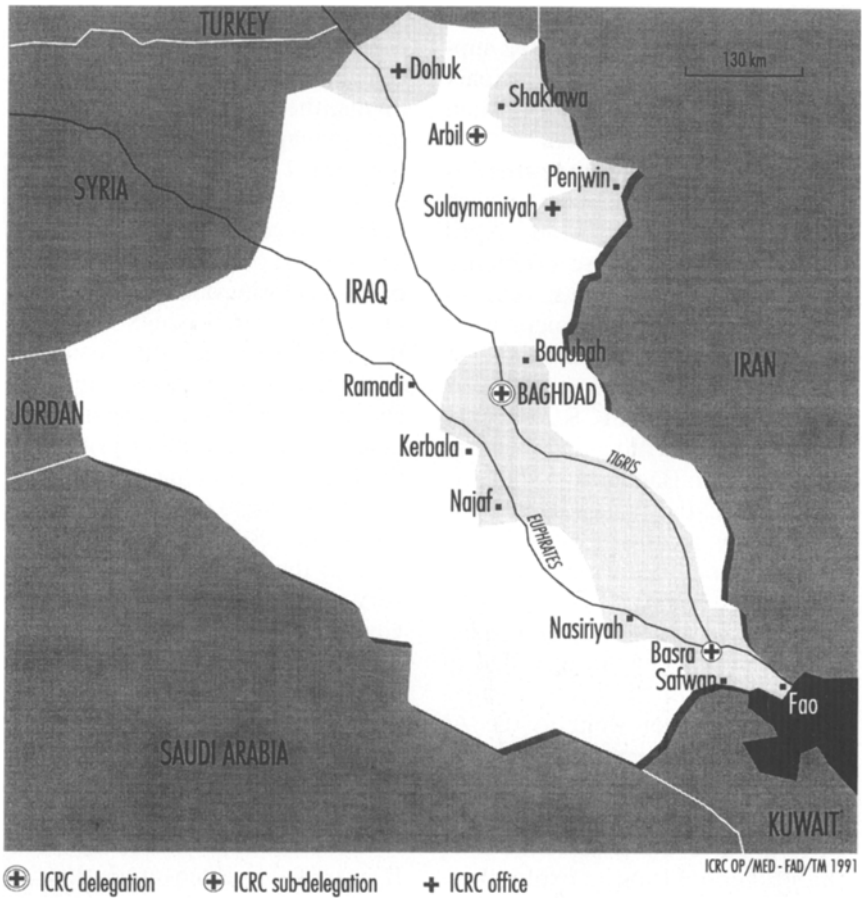

Figure 1

Planning the programme

Sources of information

An accurate identification of problems requires reliable sources of information. In February 1991, the following sources were available:

- The media (in particular CNN), as soon as the conflict broke out.
- Written reports sent in by the ICRC doctor and the rest of the team in Baghdad, as from 20 January. The data received were inevitably incomplete as the team had difficulty moving around the city.
- Oral reports from the first ICRC staff returning from Baghdad from 20 January on.
- The report by the first sanitary engineer who had assessed the situation in Baghdad between 23 and 28 February.
- The BSWA (Baghdad Water Supply Administration) engineers, and subsequently their colleagues working in the rest of the country.
- ICRC sanitary engineers who carried out specific assessments in Baghdad and then on the outskirts of the city.
- Other agencies and organizations working on water and sanitation projects, in particular UNICEF and OXFAM, with whom weekly meetings were rapidly organized.

As information grew increasingly reliable, it became easier to understand the problems at hand. This obviously required a continuous readjustment of the programme's objectives. The programme itself was launched as soon as the first data were confirmed and problem identification actually began.

Problem identification

The Iraqi water pumping, treatment and distribution facilities and sewage system were not directly targeted by the Coalition forces[5]. They were, however, adversely affected by four direct consequences of the conflict:

- the overall shortage of electricity and difficulties in operating the emergency systems;
- the lack of water treatment chemicals and the fact that these were no longer being produced locally;
- the inadequate maintenance of installations because of the chronic shortage of spare parts, compounded by import restrictions;
- the lack of qualified personnel following the departure of foreigners and the mobilization of some Iraqi staff working for the various water services.

As a result, hospitals and the civilian population were subjected to severe water shortages, and in some parts of the city the water supply was completely cut off. There was also a significant drop in the quality of the water.
Although the ICRC team itself did not find any evidence confirming

the media's pessimistic reports of widespread epidemics, water supply problems had a definite impact on the health of the Iraqi civilian population[6–11].

Moreover, difficulties that arose as a result of the Shiite and Kurdish uprisings in March and April further amplified those problems: some of the installations, vehicles and maintenance equipment were targeted as facilities belonging to the Iraqi State.

On 25 February, an ICRC sanitary engineer carried out a first exploratory survey in Baghdad.

Soon after the programme was under way in the capital, initial assessments could be made in other parts of the country:

On 8 March and 12 March respectively, the ICRC team travelled to the outskirts of the capital, and a sanitary engineer went to the Al Tash civilian internee camp near Ramadi.

On 21 March, a sanitary engineer carried out a rapid assessment of the situation during an exploratory mission to Nassiriyah, Basrah and Amara in the south, where the team discovered the consequences of the Shiite uprising.

A few days later, on 23 March, assessments were carried out in the holy cities of Kerbala and Nadjaf.

On 14 April, northern Iraq opened up. A sanitary engineer went to Dohuk, and soon after a team visited the Kurdish cities where civil disturbances had broken out.

After these initial surveys, sanitary engineers and technicians maintained a constant presence in all the above areas. By mid-April, the ICRC water and sanitation programme was staffed by several dozen expatriates. Every day new problems emerged and led to a regular updating of programme objectives.

Lack of drinking water being directly caused by electricity shortages, one of the topmost priorities of the programme became the operation and maintenance of emergency generators. Designed to supply two thirds of the energy produced in normal times by the Iraqi plants, these generators did not in fact manage to cover more than one third of the actual needs because of lack of fuel and poor maintenance of the generating sets. The embargo and the closing down of Iraqi chlorine and aluminium sulphate production plants had rapid repercussions on the country's water treatment stations. Supplying chemicals and essential spare parts quickly became another priority of the ICRC programme.

Problems varied in urgency according to the region and over time in each of the regions, which made it very difficult to gain an overall view of the situation, especially in the initial stages of the programme. Priorities were therefore constantly reassessed during the first part of the operation.

Setting priorities

It was soon discovered that all needs could not be covered by a single organization and that the most urgent tasks had to be shared among the various humanitarian agencies present.

The initial priority was to supply as much drinking water as possible to sectors most severely affected by the shortage, i.e., hospitals, orphanages and homes, schools and city sections cut off from the main water supply. The programme began in Baghdad and was then extended to several towns in the provinces. As needs were so considerable and widespread, the ICRC opted to focus on cities where it had decided to open delegations.

The programme later expanded to cover certain rural areas where internal disturbances had broken out and which therefore came under the ICRC's mandate[3]. The activities carried out there are described under the heading *Short-term objectives and activities.*

Constraints

The implementation of health programmes in war situations is fraught with difficulties that arise systematically, albeit in varying

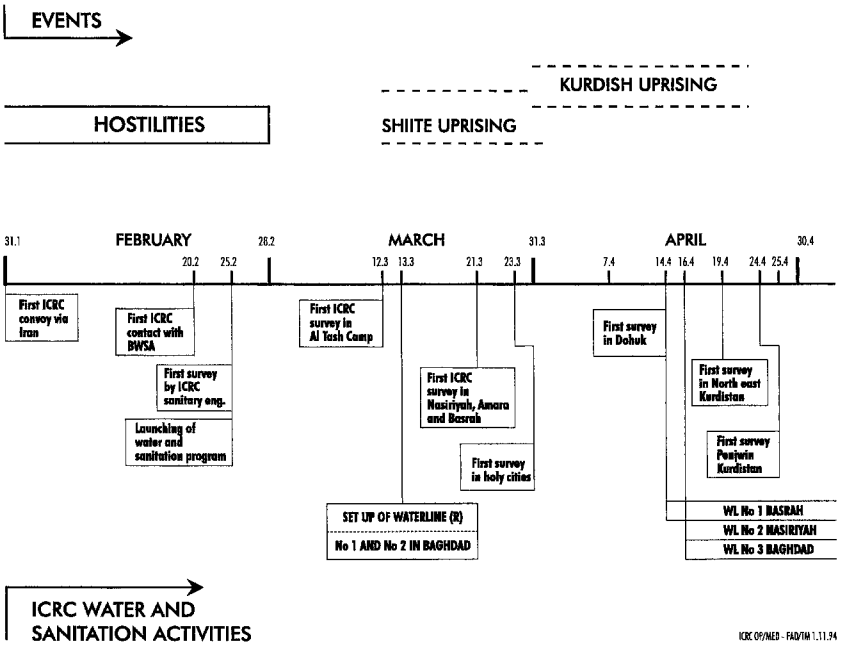

Figure 2

numbers and degrees, in all conflicts. Having to deal with constraints constitutes one of the characteristics of this type of operation – three aspects of which may be affected:

Scope of the programme

Rumours must never be underestimated. What often happens at the outbreak of a conflict is that initial rumours are, partly at least, unfounded. This generally does not concern the nature of the events but rather orders of magnitude, such as the number of dead and wounded, the scope of an epidemic, etc.
Mobilizing the proper resources at the outset of an operation requires careful checking of all background information. This may take time but will avoid the dispatch of too much or inappropriate material and personnel to the field.
When in doubt as to the right decision to adopt, always consider the beneficiaries' interest: it is better to do too much than too little.

Speed in implementing the programme

The speed with which a programme gets under way depends on a number of factors – one of the most crucial being the pressure exerted on planning staff. The media (and consequently their audience), donors, political or religious groups and even the victims themselves unconsciously press for humanitarian organizations to intervene at once. "Action at all costs" may prevail over proper planning of an operation. Humanitarian organizations must therefore devote considerable attention to informing, explaining or sometimes even reassuring these groups as to what they are doing or intend to do. This inevitably takes time and requires specialized staff when a programme is being developed.

In Iraq, the water treatment units producing the one-litre bags used to distribute the water made the headline news. These units were quickly put into operation, which reassured people that something was being done for them. In fact, however, the large tank trucks were supplying many more victims of the shortages – but being less "photogenic" they did not attract as much attention.
The emergency factor is also a source of pressure that may prompt over-hasty decisions. When official services are overburdened, disorganized or their staff impossible to reach, this creates an impression of general chaos. But the real extent of the emergency can generally be determined by taking a little time to assess the effective operational capacity of those services. The staff running the Baghad Water Supply Administration, however, remained remarkably active throughout the conflict. The ICRC's cooperation with them was excellent at all times.
Another major disruptive factor typical of conflict situations is the disorganization or destruction of internal and external communication networks: these include telephone and radio communications, which are essential in any effort to mobilize and organize the transport of relief supplies, and communication by land, sea or air, without which movement is impossible.
All these communication networks were seriously disrupted by the conflict in Iraq in 1991. When setting up its programme, the ICRC obtained permission from the Iraqi authorities to establish its own external (satellite and HF) and internal (VHF and HF) communication facilities, on 6 and 20 March respectively.
As regards land and air communications, the first road convoy of supplies from Tehran arrived on 31 January, and the first sent out from Amman arrived on 3 March. The very first ICRC flight landed in Iraq on 15 March.

A final factor that slowed down the implementation of the programme was the embargo and restrictions on imports into Iraq. All materials brought in by the ICRC were subject to consideration by the United Nations Sanctions Committee – which incidentally always gave its approval. Permanent contact was maintained with the Committee throughout the conflict. Some countries on the other hand took time in granting export permission to some of the ICRC's suppliers.

Geographical area covered by the programme

The geographical aspect of health programmes is mainly influenced by security considerations, which fall into the following two categories:

- physical safety of beneficiaries (combat zones, bombing, mines, etc.);
- State security (strategic areas, military operations, etc.).

These considerations restrict or slow down movements and access to certain areas and require prior negotiation with the authorities. Security problems are moreover a constant threat to the continuity of health programmes.
All the constraints described above played a considerable part in determining the feasibility of activities and defining the overall objectives of the water and sanitation programme.

Programme objectives and activities

The primary goal of the ICRC's programme was to protect the health of the Iraqi civilian population. The first part of the operation was divided into short-, medium- and long-term objectives, and all three were pursued simultaneously. The staggered launching of activities in the provinces led to an overlapping of certain phases: while

teams were coping with emergency needs in the south, semi-sustainability and long-term goals were already being discussed in Baghdad. The objectives and activities outlined below cover Baghdad and its outskirts; cities in the southern provinces; cities and rural areas in the north (Kurdistan); and southern rural areas.
This paper covers activities carried out in Iraq itself, but it should be emphasized that the programme could not have been completed without the tremendous effort of an extensive staff working in Europe.

Short-term objectives and activities

This part of the programme focused on providing emergency aid to the water distribution services in all assisted areas and on helping to restore the sewage system in Baghdad. Activities included:

- supplying the local services with some of the chemicals needed to run the water treatment plants;
- providing drinking water, packaged in one-litre bags, to hospitals, institutions, schools and city sectors most severely affected by the shortages;
- establishing temporary distribution systems in quarters cut off from the city water supply;
- helping to evacuate accumulated sewage.

To achieve these goals the ICRC had to:

- buy, transport (via Iran and later through Jordan) and ensure delivery of chlorine and aluminium sulphate to the services concerned (first delivery made on 11 March);
- select, transport and install water treatment and packaging units (Waterline (R) units producing one-litre water bags); the first two became operational on 13 March;
- transport and install water treatment units as close as possible to city sections cut off from the main water supply;
- establish temporary distribution points by building storage tanks (OXFAM storage kits) and connecting them to distribution racks;
- lease (in Jordan, then in Iraq) tank trucks supplying the temporary ICRC distribution points in Iraq, clean them and mark them with the Red Cross emblem;
- import liquid fuel for the programme;
- provide generating sets to help supply pumping stations cut off from the mains;
- assess new problems and continuously update ongoing activities.

Medium-term objectives and activities

Medium-term goals included:

- helping to restore one third of the pumping and treatment plants' production capacity in all assisted cities;
- providing bags of water to hospitals and dispensaries with oral rehydration programmes;
- supplying and maintaining the temporary water distribution networks already set up by the ICRC, until the main water supply system could be permanently restored.

This phase involved the following main activities:

- itemizing, ordering and delivering some of the spare parts needed to operate Iraqi plants and their emergency generators, and when necessary helping to install them;
- assessing new problems, concluding emergency activities that had become superfluous and reassigning left-over equipment.

Long-term objectives and activities

The programme's long-term goals and activities focused on achieving semi-sustainability, in other words on restoring Iraqi services to their normal level of activity. This phase involved putting installations back into operation and dismantling temporary emergency structures.
The overall objective was to help the pumping and water treatment stations in all assisted cities to function independently and on a semi-sustainable level (minimum 12 months), by ensuring that they were provided with essential spare parts. Activities included:

- helping foreign experts to come to Iraq and advise on work required on existing installations, facilitating their exploratory surveys and activities and showing them around the sites selected;
- deciding, jointly with Iraqi engineers, which spare parts were needed to keep the plants in operation;
- ordering, transporting and ensuring proper delivery of these spare parts;
- dismantling equipment at the end of the initial phase and seeing that it was ready for use in other emergencies.

All these activities were completed successfully thanks to impressive logistical arrangements made by the ICRC throughout the operation. Excellent cooperation with all the Iraqi engineers and permanent coordination with the other humanitarian organizations present (in particular UNICEF) were instrumental in ensuring the success of the programme and avoiding any overlapping with other programmes.

Discussion

A number of points mentioned in the article warrant further discussion.

R. Pineault and C. Delavuy[12] have devised a circular chart of the health planning process, which successively shows the identification of problems and needs, their analysis and the conception of a programme, the implementation of activities and, to conclude the cycle, the evaluation of the programme.

In conflict situations, the process is complicated by the fact that it is difficult to gain an immediate overall view and assess the true nature of the problems at hand. Such difficulties are compounded by the continuing emergence of new needs, which may prove sufficiently important and urgent to require priority action.

Figure No. 3 shows an adaptation of the cycle to the situation in Iraq. Needs increased in number and magnitude as new regions became accessible. It was impossible to foresee the amount of resources – and particularly the number of staff – required until problems had been accurately identified. Engineers and technicians were placed on early stand-by in Europe pending a specific assignment. It is interesting to note that the number of expatriate staff working on the water and sanitation programme had already reached its peak (43 on 23 April) in the middle of the problem identification phase. The reason was that the first emergency activities (producing water bags and installing raw water treatment plants) required a large number of specialized staff, whereas subsequent phases of the programme, geared to restoring national services, relied more heavily on Iraqi qualified staff.

The rapid and massive increase of problems also made it hard to foresee how much equipment would actually be needed[4]. It was essential not to over-anticipate requirements but to cover only those that had already been properly identified: the risk in having excessive or inappropriate emergency supplies is that too much equipment may be deployed or that it may be put to improper use.

The long-term objective of the ICRC programme was to restore Iraqi facilities to their pre-war capacity, by repairing the pumping stations and water treatment plants. This was the only way to ensure the semi-sustainability of the programme and its impact on the health of the civilian population. Before that goal could be achieved, however, the topmost priority was to deal with short- and medium-term needs revealed by ongoing surveys.

The simultaneous implementation of activities to cope with varying degrees of emergency in different regions required considerable flexibility in coordinating the programme and readiness to adapt to new situations.

Further complications added to the difficulties facing the water and sanitation teams in Iraq.

The sheer diversity in the nature and complexity of problems demanded considerable adaptability on the part of engineers carrying out the assessments: some of the Iraqi water treatment stations were fitted with the latest technology and were therefore complicated to

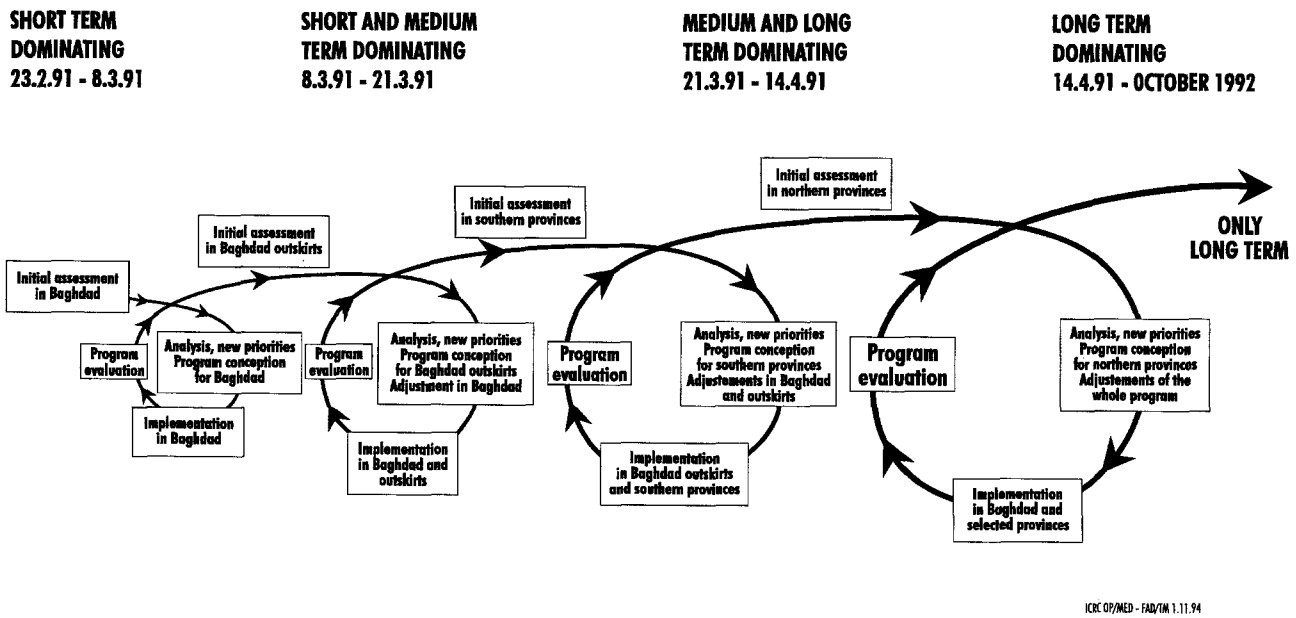

Figure 3

operate, whereas in rural areas facilities were more rudimentary. Field staff had to be experienced enough to deal both with highly technical issues and with simpler problems.

Climatic extremes were also a major factor in developing programme strategies. Needs observed at the end of a cold winter had to be projected into the hot summer months to come. Water consumption obviously varies considerably with radical changes in temperature. The city of Baghdad has a double water supply network, providing both raw water and safe water. It was accordingly decided to work also on the raw water pumping stations to save drinking water for the summer season.

Inability to foresee exactly when certain services would be restored to their full operating capacity made it extremely hard to plan ahead with any degree of accuracy: a case in point was the reestablishment of the electrical network which normally supplied a number of water pumping stations. Because decisions had been taken on the basis of average forecasts as to the restoration of the water supply system, several activities became superfluous before they had been completed. This is what happened with a temporary water distribution point set up on a parking lot in the centre of Baghdad. The most optimistic forecasts had not expected the Iraqi electrical network to be restored as quickly as it was.

Many more activities were based on the estimated time it would take to put services back into operation. Forecasting is therefore an integral component of the planning process; the use of ready-made kits for the water and sanitation programme are an apt illustration of the need to abide by this principle. All conflict situations present a number of common characteristics, but it should be remembered that each new conflict is unique and therefore requires a programme specifically designed to deal with its particular set of circumstances and problems.

A considerable variety of kits are available on the market or in warehouses belonging to humanitarian organizations. They contain all the equipment needed to respond to emergency problems. But although they may often be perfectly adapted to requirements, their systematic use involves the risk of imposing solutions that are only partly suited to specific needs. Such a risk must not be underestimated.

To emphasize one final point which is an indirect but valuable consequence of emergency programmes: the presence and the commitment of humanitarian organizations has a catalyzing and stimulating effect on local personnel, in this instance the Iraqi engineering staff.

The general state of shock induced by the Allied bombing and the civil unrest in various parts of the country created a kind of apathy among some of the staff operating the water treatment and distribution facilities. The lack of resources to keep the plants running further added to their despondency. The mere fact, however, of meeting colleagues who sympathized with them and were prepared to provide rapid and efficient assistance triggered off and stimulated a will to react to their situation. This a particularly appreciable impact of humanitarian work on services operating in a war-torn country.

Conclusions

Water and sanitation projects frequently take priority over other health programmes initiated during armed conflicts[13], because of their vital role in preventing diarrhoeal diseases. Such diseases are known to spread when a country's health structures are impaired.

Emergency planning of water and sanitation programmes in war situations poses special problems – especially in the very first stages of implementation.

In view of the complexity of factors to be considered, the problem identification phase and especially the setting of priorities are the cornerstone of the planning stage. It requires the services of highly competent engineers accustomed to working in war situations.

This article has described the specific constraints imposed on the ICRC programme in Iraq during the Gulf War. Experience has shown, however, that this was by no means a unique situation; each conflict is defined by a special set of circumstances which requires engineers to rethink the entire planning process if they are to achieve optimum results.

Solving urgent problems through efficient, short-term action will always constitute one of the essential priorities of all programmes. But from the outset one principle must remain uppermost in every programme planner's mind: that of semi-sustainability, which is precisely the way to prevent new emergencies.

Zusammenfassung

Hygienemassnahmen in Konfliktsituationen: Irak während des Golfkrieges

Bezüglich der Wasserversorgung in Kriegssituationen ist die grundsätzliche Beurteilung selten genau, obwohl bekannt ist, dass die Ausgangslage für die Prioritätensetzung eines Programmes wichtig ist. In Notfallsituationen haben kurzfristige Ziele den Vorrang, da Mittel parallel zur Identifikation der Probleme eingesetzt werden. Nur eine kontinuierliche Evaluation erlaubt es, gut gezielte mittelfristige und langfristige Ziele festzulegen. Die wichtigsten Bedürfnisse der Wasserversorgung und deren Probleme, wie sie zwischen Februar und Mai 1991 in Baghdad und später im südlichen und nördlichen Irak auftraten, sind hier beschrieben.

Résumé

L'adduction d'eau et les programmes d'assainissement dans les situations de conflits: Le cas de l'Irak pendant la guerre du Golfe

Dans les conflits armés, les évaluations faites avant le début des programmes d'urgence en matière d'eau potable et d'assainissement sont rarement complètes et précises, avec les conséquences que cela suppose sur la détermination des priorités d'action. Après les bombardements sur Baghdad, en février 1991, la situation était des plus complexes et le peu d'informations disponibles sur l'étendue des dégâts ne permettait que de constater les conséquences néfastes des coupures d'énergie sur l'approvisionnement en eau potable des populations civiles qui, de ce fait, étaient exposées à toutes les affections, parfois épidémiques, liées à cette situation. Cet article décrit les différentes étapes de l'évaluation des problèmes d'eau et d'assainissement rencontrés d'abord à Baghdad, puis dans le nord et le sud de l'Irak entre février et mai 1991 ainsi que l'implantation des programmes mis en place pour y faire face.

References

1 *Fournier P.* Généralités sur le processus de planification. In: Rougemont A, Brunet-Jailly J, dir. Planifier, gérer, évaluer la santé en pays tropicaux. Paris: Doin Editeurs, 1989:91–106.

2 *O'Byrne J.* Victims of the war zone. Nurs Stand 1991: 19:23.

3 *Michel PF.* The Gulf 1990–1991; from crisis to conflict; the ICRC at work. Geneva, Switzerland: International Committee of the Red Cross; 1991.

4 *Nembrini PG, Etienne Y.* Short and long-term approach for restoring water supplies for the civilian population of Iraq during the Gulf war. Submitted.

5 *Arkin WM, Durrant D, Cherni M.* On impact: modern warfare and the environment: a case study of the Gulf War. Washington, DC: Greenpeace, 1991.

6 *Ascherio A, et al.* Effect of the Gulf War on infant and child mortality in Iraq. N Engl J Med 1992; *327*:931–936.

7 The Harvard Study Team. The effect of the Gulf crisis on the children of Iraq. N Engl J Med 1991; *325*: 977–980.

8 *Ahtisaari M, et al.* Report to the Secretary-General on humanitarian needs in Kuwait and Iraq in the immediate postcrisis environment by a mission to the area. New York: United Nations Security Council; March 20, 1991. Document No S/22366. 13 pp.

9 *Lee I, Haines A.* Health cost of the Gulf war BMJ 1991; *303*:303–306.

10 Centers for Disease Control. Public health consequences of acute displacement of Iraqi citizens: March–May 1991. MMWR 1991; *40*:443–446.

11 *Sandler RH.* Letter from Cukurca, Initial Medical Assessment of Kurdish Refugees in the Turkey-Iraq Border Region. JAMA 1991; *266*:638–640.

12 *Pineault R, Daveluy C.* La planfication de la Santé; concepts, méthodes, stratégies. Montreal: Ed. ARC; 1986.

13 *Nembrini PG, Etienne Y.* L'eau, l'assainissment et l'environnement en situation de conflit. Schweiz Z Milit Med 1989; *1*:16–22.

Acknowledgements

We are indebted to all the Iraqi engineers who were involved in assessing and setting up the programme described in this article, to P. Lehmann, W. Moser, P. Rey, J. Widmer and all engineers and technicians from the National Red Cross and Red Crescent Societies for their participation both in the field and at the Geneva headquarters of the International Committee of the Red Cross.

We thank Dr Pierre Perrin for reviewing the manuscript, Elizabeth Copson for her translation of the French manuscript and Gérard Leblanc and Gabriela Baiko for their contribution to the drawings.

Address for correspondence

Yves Etienne, MSc, MPH
Sanitary Engineer, Medical Division
International Committee of the Red Cross (ICRC)
19, Avenue de la Paix
CH-1209 Geneva