Simple measures make all the difference

By Toby Gould

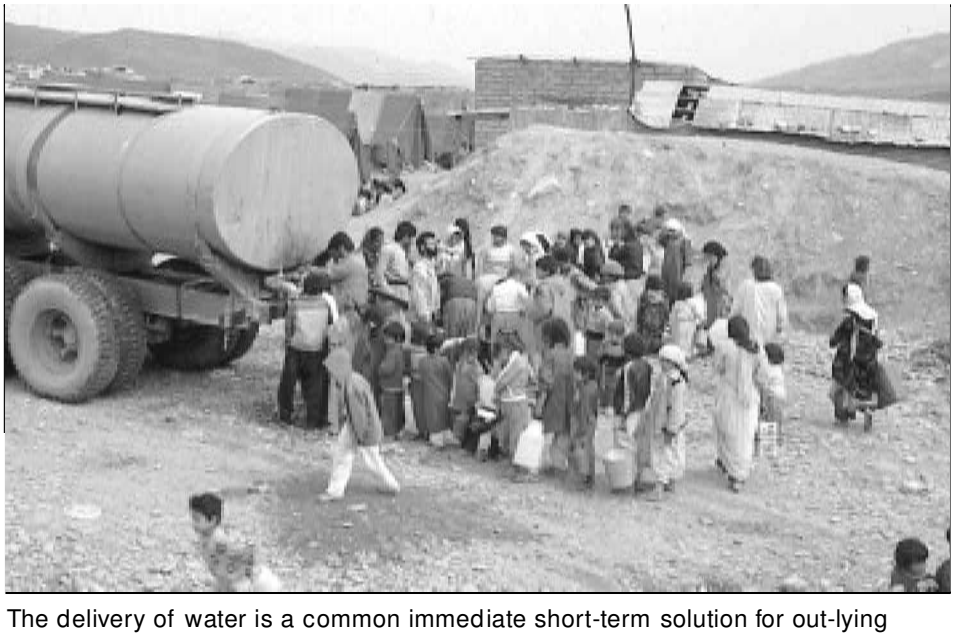
With global warming threatening more extreme climatic conditions it is now time for those countries content with a mild winter to take notice. The simple measures that make substantial differences in the coldest of conditions may not be obvious to all. The following case study offers practical advice for the steps that need to be taken when faced with a sudden temperature drop.

Winter in Kosovo and Macedonia last year saw temperatures drop to –25° Celsius and snow more than a metre deep. Although almost all the refugees in Macedonia and Albania had returned to Kosovo following the cessation of bombing, in Kosovo there were still collective centres for those who did not finish rebuilding their houses in time for winter. There was also a camp for 1,000 Roma who were unable to return to their homes. To add to the pressure of poor weather conditions, many of the villages and parts of towns did not have a reliable water supply, either directly due to the effects of the war or due to poor maintenance of the previous decade. The task of providing water and sanitation to many of these people was in the charge of Oxfam GB. This article provides case study material to identify the problems Oxfam faced and the measures used when faced with such a chilling winter.

'To add to the pressure of poor weather conditions, many of the villages and parts of towns did not have a reliable water supply, either directly due to the effects of the war or due to poor maintenance of the previous decade.'

Earlier in June as the refugees returned to their homes, Oxfam and other organizations set up a water trucking service to small villages, schools and parts of towns throughout Kosovo where there was no other reliable and clean source of water. This activity continued well into the winter months and has now (over one year later) been handed over to the Municipal Authorities to continue. It has taken time for alternative solutions to be found and what was envisaged as a short-term solution persisted, with many of the water storage sites proving unsuitable for the winter weather.

In retrospect, it can be argued that consideration should have been given to the forthcoming winter. All sites should have been chosen for their appropriateness for winter and that tanks, pipes and tapstands should have been winterized from the start. As it was, the need for trucking water changed month by month: non-Governmental Organizations (NGOs) and others were able to improve the water supplies to some while new demands were being made elsewhere. It did mean that as winter approached there was a sudden rush to winterize all remaining water points. The worsening of the weather also meant that there was a risk that trucks would not be able to reach some outlying rural sites and these became priorities for finding other solutions.



David Williamson

The delivery of water is a common immediate short-term solution for out-lying villages, yet it is not adequate for the long-term

Winterization in this case study refers to the prevention of water freezing, causing blockages or bursts. The most vulnerable were taps and where good drainage was possible, these were placed indoors. Outside, boxes were built around tapstands and yard taps, in Kosovo these were filled with earth, in Macedonia a small heat source (such as a paraffin lamp) was

put inside to prevent freezing. Valves were more difficult to access and affected large populations if they froze: if above ground, they were surrounded with a foam-lined box or put underground in valve chambers, below the depth to which the ground froze.

Pipes were also vulnerable to freezing, especially if the water was not moving for any length of time. Pipes with small diameters were more at risk as were metal or thin-walled pipes. Local engineers suggested a minimum trench depth of 60cm would be enough to prevent freezing, but a depth of 1m was used as this was in keeping with Oxfam's guidelines on trenches. In several health centres and hospitals it was not possible to bury all the pipes or keep them inside buildings and therefore insulation was needed. Choosing the right pipe material helped: HDPE and MDPE pipes (high and medium density polyethylene) are thick walled pipes with relatively low thermal conductivity and so are better than metal or thin walled PVC pipes (PVC pipes are also brittle at low temperatures)[1]. The pipes were insulated by boxing them in with lagging material inside such as spray polyurethane foam or polystyrene beads, it was made sure that the insulation reached all round the pipe and that the pipe did not rest on the ground. Odd diameters of pre-insulated pipe were available in small quantities, but as their quality was unsure they were not used. At the water truck filling points, where there was a guard stationed, the pipes were out in the air but were drained when not in use.

Like pipes, pumps were kept inside wherever possible and the pumps were drained when not in use to prevent the water inside freezing and cracking the chamber. It was known that at night the temperatures dropped below the point at which diesel fuel can gel, blocking fuel pipes and filters. Admixtures can prevent this as can lighting a fire under the pump (only for diesel not petrol pumps); the local solution was to add small quantities of petrol to the diesel which prevented it gelling but ran the risk of ruining the engine if too much was added.

Water storage was a major problem. Bladder or pillow tanks that had been used in the summer at water points would not have survived freezing when full and insulation was difficult as they are so flexible. Oxfam dealt with this by placing its bladder tanks inside heated buildings; where this was not possible it replaced them with tanks that could be insulated. In many schools the bladder tanks were replaced with locally available plastic tanks that took up less ground space and so we were able to fit them inside the schools. They were placed next to external walls with the taps outside over a well-drained area.

One alternative to the plastic tanks were the Oxfam tanks. These were made of corrugated steel sheeting and a rubber liner; they are robust but poorly insulated and have PVC roofs that cannot carry the weight of snow. Insulation was carried out in several ways: in Kacanik health centre, where the tank was on an open verandah covered by a roof, a wooden box was built around the tank which was then filled with sawdust (not the best insulator, especially when wet but it worked). Other solutions included fitting polystyrene boards between the rubber liner and the sheets so that they bent to fit the curve of the tank, chamfers in the boards were needed around the outlets so the liner fitted snugly to the valve. Another option that was discussed but finally not used, was to sink the tank into the ground: they are robust

1. Buttle, M. and Smith, M. (1999) Out in the Cold: Emergency Water Supply and Sanitation for Cold Regions, WEDC, Loughborough University.

'It was known that at night the temperatures dropped below the point at which diesel fuel can gel, blocking fuel pipes and filters.'

David Willaimson

Pillow tanks such as these being constructed in Ethiopia are not suitable for the harsh winter conditions experienced in Kosovo

Andrew Fox

The weight of the snow on short-term facilties such as this tent is a consideration that must be taken seriously

enough if the ground conditions permit. Again the PVC tarpaulin roofs would not beable to bear the weight of the snow. It was possible to make a special order from the manufacturers for steel roofs which could carry the weight of snow; they cost about double the price of the PVC ones and should be ordered as a matter of course for emergencies in cold countries. With the help of a British contractor constructing the British Army base nearby, we were able to find a local metalworker who was able to fabricate similar metal roofs much quicker and cheaper than had we ordered them from the UK.

In the Roma camp and collective centres, Oxfam was working more directly with people in providing water, sanitation and health education. These centres were generally government buildings: the Roma camp was an old barracks; others were council flats, schools or unused warehouses. This meant that existing sanitation was typically flush toilets; showers and washing facilities were included but often in a poor state. An important addition was water heaters, making washing and showering more attractive, reducing the likelihood of skin diseases and transmission of faecal-oral diseases. Where there were not enough toilets, pit latrines were dug. As winter approached these became less popular, even though in most rural houses these are the only option, and the interior flush toilets were overused. Specific health promotion activities included the regular provision of cleaning materials and soap, an education campaign to keep the toilets clean, based around what should and should not be put down the toilets. This proved to be partially successful in reducing the number of blockages.

The work undertaken by Oxfam during this freezing winter highlighted the need for information when planning emergency activities in such cold climates. The minimum amount of information that was vital for Oxfam's work in Kosovo include:

- How long would the winter last for and what are maximum, average and minimum temperatures?
- What would be the snowfall and depth of snow on the ground (to ensure your structures can survive the weight of snow)?
- What areas would likely be completely cut off by the weather and what areas difficult to reach?
- To what depth would the ground freeze?

As construction and logistics became much more difficult in freezing temperatures, programmes reflected this. Assessments, planning and training were prioritized during these times.

In the early stages of the emergency, during the summer months, it was envisaged that the winter would cause problems on a massive scale in Albania, Macedonia and Kosovo. In reality the scale was not as large as feared and the major problems faced were more in common with emergencies throughout the world: the ability to provide sufficient water of adequate quality and ensuring sanitation solutions encompass cultural behaviour.

about the author

Toby Gould works as a trainer for RedR (Register of Engineer's for Disaster Relief) as a freelance engineer.
He can be contacted via the Editor.