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**During the 1990s events in the Balkans, the ex-Soviet republics, Afghanistan and Northern Iraq have demonstrated that human disasters are not limited to tropical regions of the world. In cold or mountainous regions, relief workers are faced with particular technical challenges, such as the prevention of damage to pipes and equipment caused by freezing**

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## Locally made water storage tanks

- Tank designs should take into account
  - the likelihood of water freezing over; and
  - the amount of damage that this causes.
- Heat lost to the air increases the likelihood of stored water freezing over. The surface area to volume ratio of the tank will affect the rate of heat loss. So:
  - a large tank will take longer to freeze over than a small one;
  - a round tank will lose heat more slowly than a rectangular one of the same volume; and
  - straight sides are better than corrugated sides as they have a smaller surface area.
- If possible, some form of insulation should be used, e.g. spray-on polyurethane foam.
- Valves can be protected by being covered and insulated where possible.
- Heat loss to the ground can cause structural instability if the frozen ground starts to thaw. Mounting the tank on an insulating concrete, or gravel, base will reduce heat transfer.
- Tank roofs should be designed to cope with extra loads arising from snow falls. Steep-angle roofs, for example, allow the snow to slide off.
- Designs should take account of rising and falling surface ice within a tank, which can cause damage to internal fittings (e.g. ladders). Internal fittings should be avoided if at all possible.

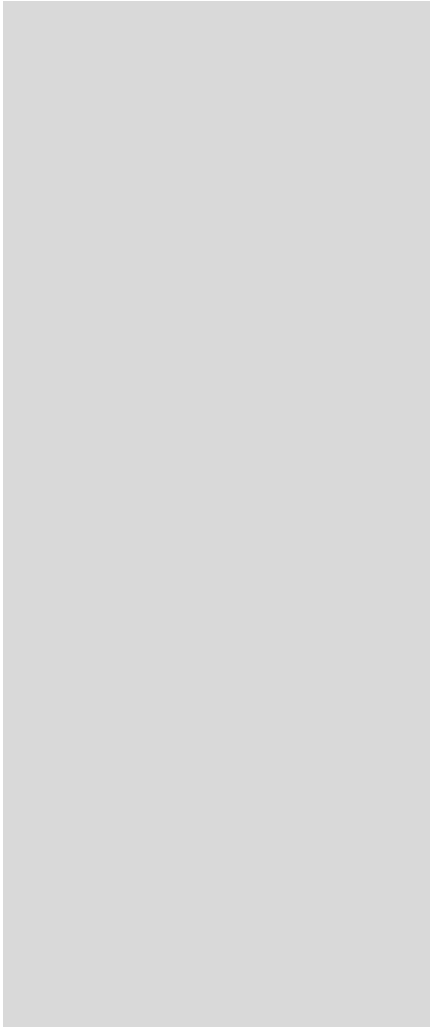


**Figure 1. Temporary water storage tank, showing useful features for cold regions**

## Water treatment

Low temperatures affect the rates of





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