24. Groundwater dams

Groundwater dams are artificial structures that intercept or obstruct the natural flow of groundwater and provide storage for water underground.

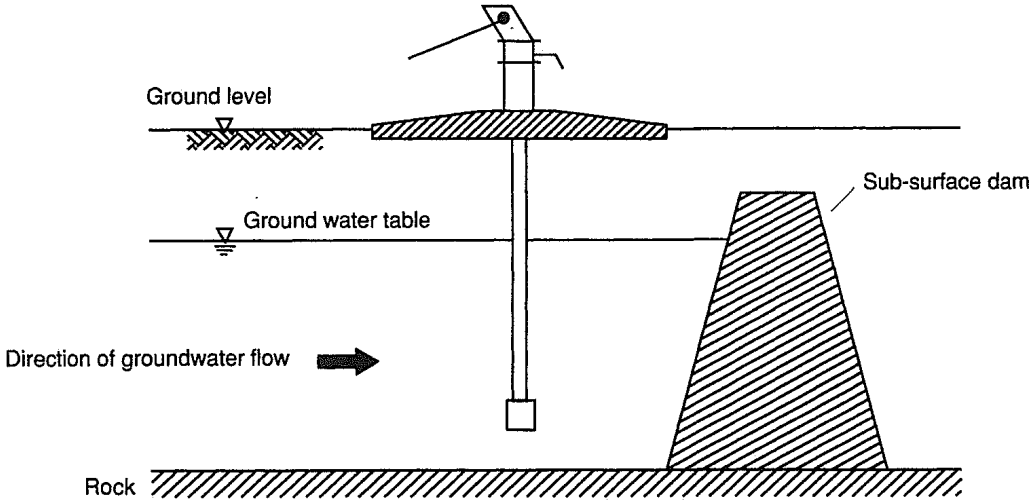
They have been in use for many hundreds of years and are used in several parts of the world nowadays. Their use is in areas where flows of groundwater vary considerably during the course of the year, from very high flows following rain to negligible flows during the dry season.

Groundwater dams provide storage to regulate the flow of groundwater and to provide constant storage for a reliable water supply. Excess water flows over the top of the dam to replenish aquifers downstream.

There are two main types of groundwater dam:

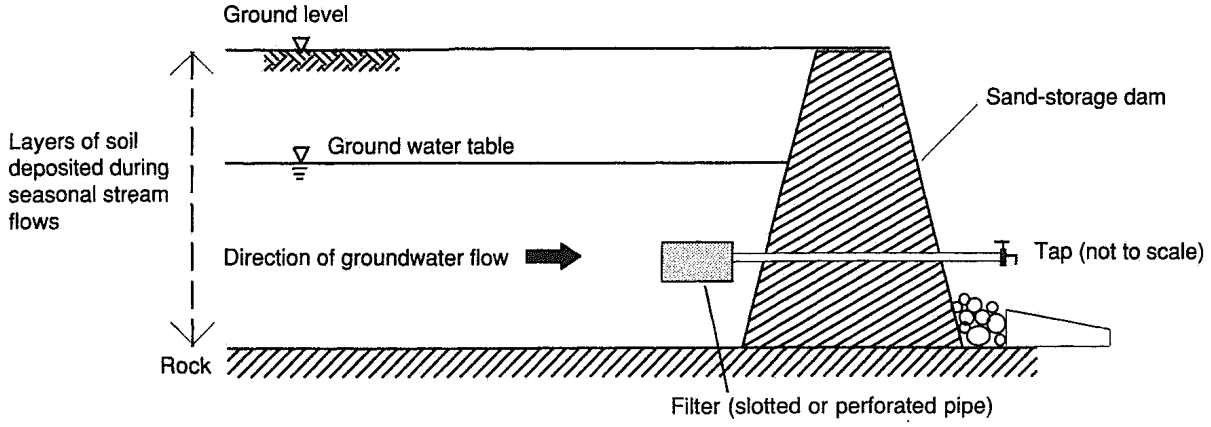
The sub-surface dam

A sub-surface dam intercepts or obstructs the flow of an aquifer and reduces the variation of the level of the groundwater table upstream of the dam.

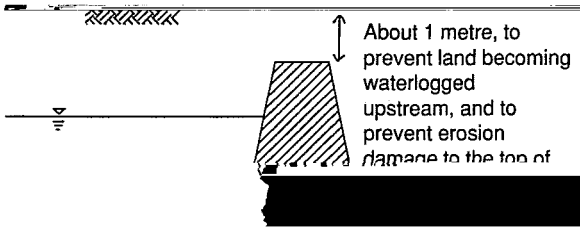


The sand storage dam

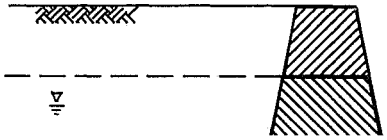
A sand storage dam obstructs the seasonal flow of water in streams. Sand and soil particles transported during periods of high flow are deposited behind the dam, and water is stored in these soil deposits.



Sub-surface dams



Sand storage dams

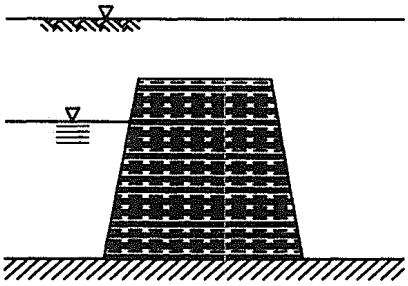


The advantages of water storage behind groundwater dams are:

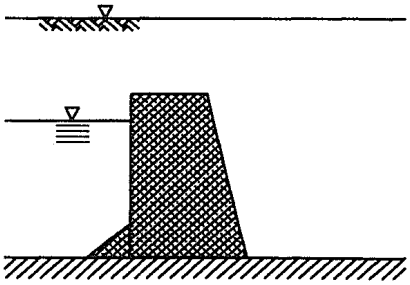
Materials for construction

Various materials may be used for the construction of groundwater dams. Some of these are illustrated. Materials should be waterproof, and the dam must be strong enough to withstand the imposed soil and water loads. Depending upon the strength of the material used for construction, dams may be from 2 to 10 metres high. The diagrams below show materials for sub-surface dams but the first four shown could equally well be used for sand storage dams.

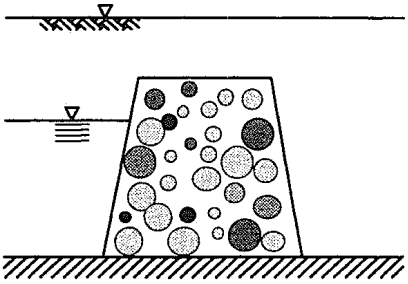
Warning: Dams need to be carefully designed and constructed if they are to safely carry imposed loads from soil and water without collapsing. Advice from an experienced engineer should be sought before construction starts on any dam.



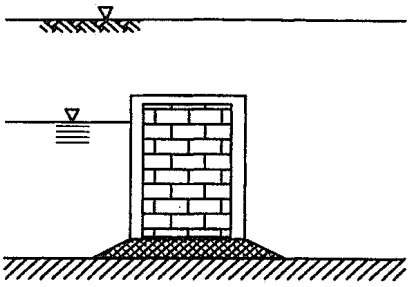
Compacted clay



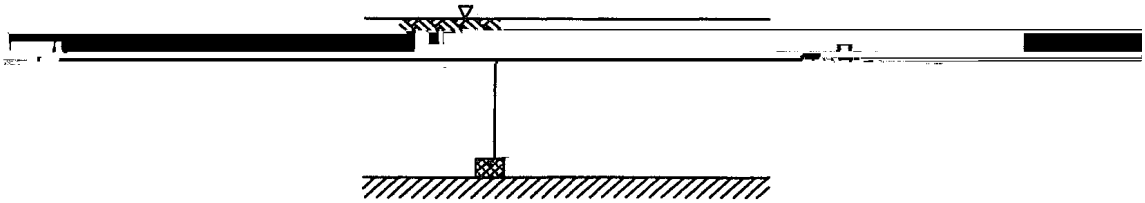
Concrete



Stones and clay



Masonry or brick wall covered with plaster on a concrete base



Impermeable sheet such as corrugated iron or PVC on concrete base (unsuitable for sand storage dams)

For further information:

Nilsson, A., *Groundwater Dams for Small-scale Water Supply,* IT Publications, 1988.

Nissen-Petersen, E., *Rain Catchment and Water Supply in Rural Africa: A Manual,* Hodder and Stoughton, 1982.

World Neighbors. *Sub-surface dams. A water catchment system built by villagers,* Filmstrip from World Neighbors, 5116 N. Portland Ave., Oklahoma City, Oklahoma 73112, USA.

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