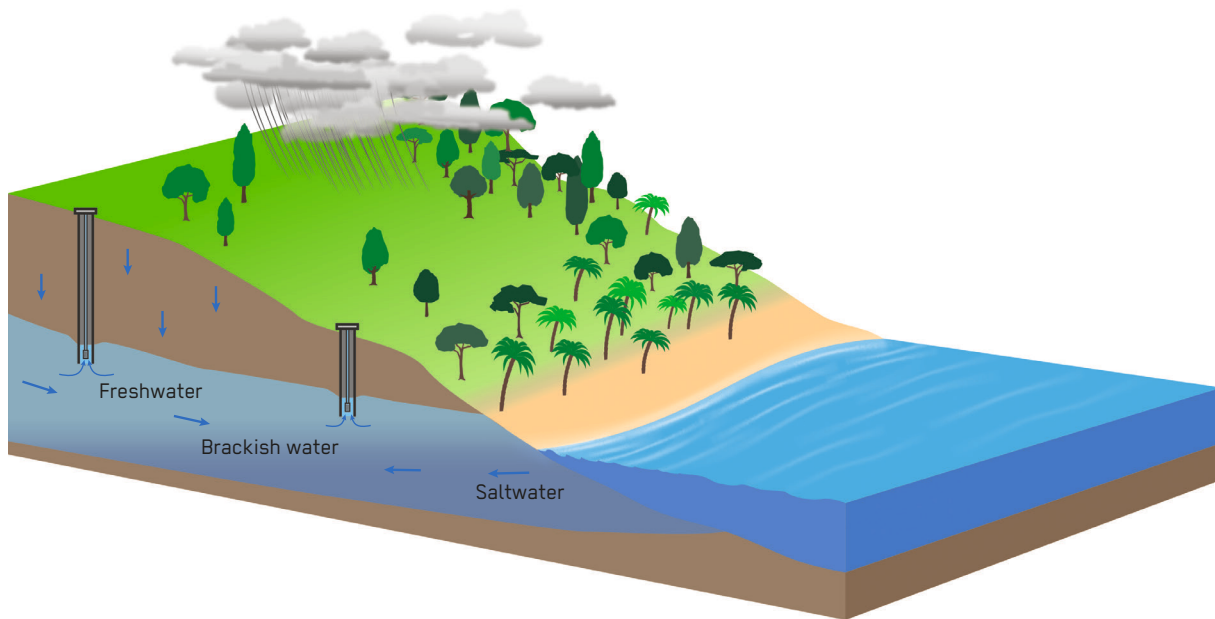


## Brackish Water, Seawater



Brackish Water has a higher salinity than freshwater, but it is not as saline as Seawater. It occurs naturally where Seawater (salt water) and fresh water mix, as in estuaries or in brackish fossil aquifers. In an emergency, Brackish Water might be the only available source, and it is possible that it is already in use, or in the case of Seawater, it might already be used as part of a pre-existing desalination plant.

Brackish Water can be found in surface water bodies near the sea (where Seawater mixes with fresh water found in estuaries) or inland (where a high evaporation rate concentrates minerals in the water). It can also be found in coastal aquifers (resulting from saline intrusion) or fossil groundwater (where rocks in the aquifer have a high mineral content that leaches into the water). Seawater has a total dissolved solids (TDS) content of >35,000 mg/L, while Brackish Water has TDS values between 1,000–10,000 mg/L (compared to <1,000 mg/L for fresh water).

The decision to desalinate Brackish Water depends on local acceptability levels. If it is being used and is accepted in general and poses no health risk, it can be considered an acceptable water source for an emergency. Where it is not accepted, such as when moving internally displaced people into a new area, the first option would be to look for alternative, less saline, water sources before considering treatment. Where treatment is the only option, then different desalination technologies are available (e.g. Reverse Osmosis, **T.15**) that can produce fresh water with a very low concentration of salts and other minerals from saline water. The specific water quality characteristics of the proposed water source and the volume and quality characteristics for the treated water are required for a cost-effective and reliable water production plan, as a range of conditions may cause large changes in water quality (e.g. water temperature ranges, rain seasonality months and algae bloom events). The pre-treatment processes and capacities will then be selected based on the range of source water quality.

**Applicability:** In coastal areas where other fresh water sources are scarce or not (readily) available, Seawater or Brackish Water may already be used. For Seawater, there would need to be a pre-existing desalination treatment plant. Brackish Water, by comparison, is sometimes used by communities that have no other alternative.

**Operation and Maintenance:** Fresh water is less dense than Brackish Water and floats on the surface (which is quite common close to the sea). To protect water quality in coastal aquifers, it is essential to control abstraction rates from shallow groundwater to limit saltwater intrusion into the groundwater. All other O&M requirements tend to be related to the type of desalination technology used. These tend to be complex and require high level technology, so ideally should be avoided if possible (i.e. look for alternative water sources first).

**Health and Safety:** Seawater and Brackish Water contain high levels of dissolved minerals. While Seawater will not be drinkable without treatment, Brackish Water may be the only water source available to some communities. While the water can have a salty taste, it may not have any negative health impacts – meaning that if the water is generally accepted, then there is no need for action. However, specific chemicals known to directly affect human health (e.g. fluoride, arsenic, nitrate), may be cause for concern. Here, alternative sources should be found, or when there is absolutely no option, the water needs to be treated.

**Social and Environmental Considerations:** There are communities that consume water with high levels of TDS because there are few other options available, meaning that acceptability is context specific. In contrast, desalinated water with a low TDS can taste “flat” due to the absence of minerals, which can result in low consumer acceptance. Where desalination technologies are used, the removed salts and minerals concentrated in the brine need to be disposed of carefully.

**Strengths and Weaknesses:**

- ⊕ Serves as abundant water source (in the case of Seawater)
- ⊕ Can be easy to access
- ⊖ Has high treatment costs for freshwater production and brine management
- ⊖ Might require re-mineralisation of produced fresh water
- ⊖ Expensive and complex treatment might be needed if users do not like the Brackish Water and there are no alternative sources

→ **References and further reading material for this technology can be found on page 212**