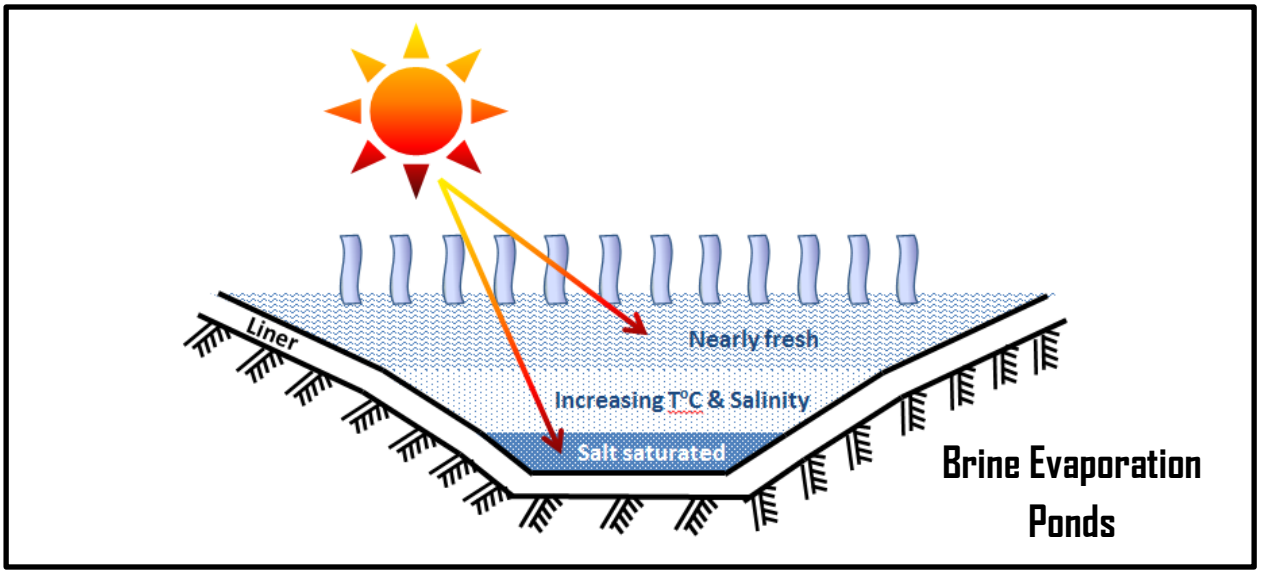

Brine is allowed to evaporate in ponds while the remaining salts accumulate in the base of the pond

Advantages (+)	Disadvantages (-)
Easy implementation and operation	High footprint and costs
Inland and coastal use	Limited to small plants

Evaporation ponds are shallow, lined earthen basins in which concentrate evaporates naturally as a result of solar irradiation. As fresh water evaporates from the ponds, the minerals in the concentrate are precipitated in salt crystals, which are harvested periodically and disposed off-site. Evaporation ponds could be classified as,

1) conventional

2) solar salinity gradient

Conventional evaporation ponds are designed solely for brine disposal, while solar ponds generate electricity from solar energy.

1. Potential Environmental Impacts

Usually quality regulations demand for the evaporation ponds to be constructed with impervious lining for the protection of underlying aquifers. If the brine contains high concentrations of toxic contaminants (e.g. high levels of trace metals), then a double-lined pond may need to be constructed.

If the ponds are not lined or the point liner is damaged, a portion of the brine may percolate to the water aquifer beneath the pond and deteriorate its water quality. So an underground leak-detection systems that are installed beneath the liner or use a minimum 3 groundwater monitoring well system, one installed up-gradient to the groundwater flow, one down-gradient, and one in the middle of the pond system with monthly readings.

2. Criteria and Methods for Feasibility Assessment

Evaporation ponds are climate dependent with higher local temperature and solar irradiation providing us with higher evaporation rates and making this brine disposal option more viable. In general solar evaporation is a feasible only in relatively warm, dry climates with,

1) high evaporation rates
2) low precipitation rates
3) low humidity

We also need a flat terrain and low land cost. This brine disposal method isn't applicable for regions with an annual evaporation rate < 1.0 m/y and annual rainfall rate >0.3 m/y (high rainfall rate reduces evaporation rates).

The higher the humidity, the lower the evaporation rate. When the average annual is >60%, evaporation ponds aren't a viable brine disposal option.

Evaporation rate decreases as solids and salinity levels in the ponds increase so minimization of brine volume is beneficial.

3. Evaporation Pond Costs

The main factors affecting the cost of evaporation ponds are,

1) the evaporation rate (local climate)
2) brine volume and salt concentration
3) land and earthwork costs
4) liner costs

Figure 1 gives a rough approach for the construction cost of an evaporation pond system as a function of the evaporation rate and the concentrate flow.

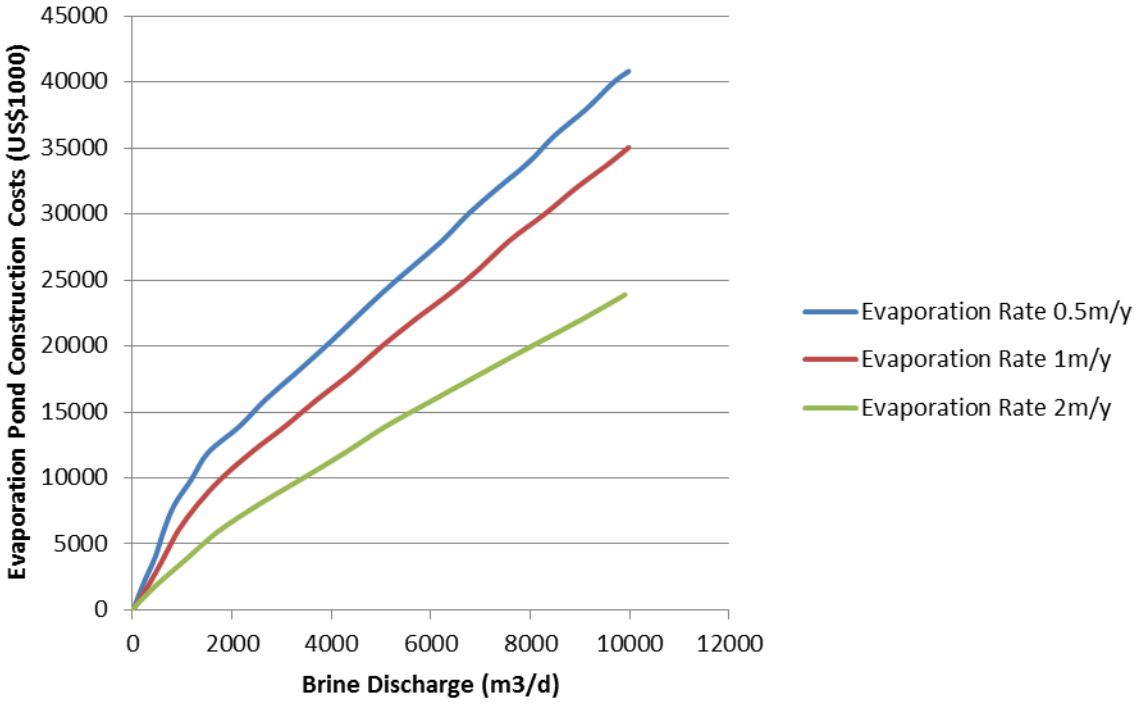

Figure 1, Construction cost for an evaporation brine disposal pond system

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