

## **An Assessment Tool for Aquifer Storage and Recovery in Stratified Coastal Aquifers**

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### **ABSTRACT**

The major benefit of aquifer storage and recovery in a coastal, saline aquifer is well known: it may be an efficient approach to store available freshwater so that it can be used when needed. There are two possible problems with the storage of freshwater in saline aquifers. First, the freshwater tends to float up and form a thin pancake at the top of the aquifer that cannot be recovered; additional recovery problems may be caused by horizontal head gradients that may transport the stored freshwater away from the recovery well. Second, the quality of the freshwater may change, either through mixing with the salt water or through chemical reactions. In this paper, we present a simple approach to assess the significance of the first problem for the storage and recovery of freshwater in stratified aquifers containing salt or brackish water and no significant horizontal gradients.

The main purpose of the approach is to perform a quick assessment of the feasibility of aquifer storage and recovery of freshwater in a saline aquifer given the following information:

- The thickness, hydraulic conductivity and porosity of the strata of the stratified aquifer,
- The density difference between the freshwater and the saline water,
- The recharge rate during freshwater storage,
- The expected time periods for injection, storage, and recovery,
- The position of the well screen in the aquifer.

Application of the approach answers the question whether it is possible to store and recover freshwater under the given circumstances and whether further investigations into the effects of horizontal gradients, mixing and chemical reactions are justified.

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