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Artificial recharge in arid zone- Example from the Arava Valley- Israel

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In arid zones direct recharge from rainfall is negligible. The indirect recharge like recharging of flood water is the principal source of water of the alluvial aquifers in arid environment. Flooding of ephemeral streams occur as a consequence of the rain intensity and its pattern, the basin size and the geomorphic settings as slops, vegetation and soil properties.
In the Arava Valley there are several reservoirs that act as diversion levees. They were constructed on few ravines for two reasons. (1) to store large volumes of floodwater for direct use in nearby agricultural fields. (2) to enhance the recharge to the local alluvial aquifers.
Since flood duration is relatively short compared to the infiltration (percolation) rate, it was assumed that by storing the water in the reservoirs it will increase the recharge volume because of higher water head, longer resistance time and larger surface area available for infiltration.
Unfortunately, accumulation of silts and clays in the reservoirs clogged them to direct infiltration. The accumulation of silt and clay in the reservoirs is typically to arid zones where lack of vegetation cover creates a very high erosion rate and transportation of large amounts of sediment at the duration of the water flowing on the stream channel bed.
To bypass the problem of reduction in the direct recharge inside the reservoirs because of clogging, and to continue the artificial recharge into the aquifer, two kinds of artificial recharge system are operating in the Arava Valley. In one site we use a system that is similar to the conventional spreading ponds system. The big reservoir is using to store the flood water and as a settling pond. The clean water is diverted to three infiltration ponds. In the rest five reservoirs we construct a drainage pipeline close to the bottom of the levee that allow us to release the clean water (after settling of the fine particles) downstream in a slow rate that is much more efficiency for artificial recharge than in high velocity.
Monitoring after the recharge water is very important and in some cases very problematic. In cases where the groundwater is shallow (10-20 m' depth) the response to the recharge is quickly and takes few days (rising in water level and or decreasing in the salinity). But in cases where the water level is very deep (about 60-110 m' in most of the area) the response to the recharge can takes few months. At this condition, it is impossible to distinguish whether the rising in the water level and or decreasing in the salinity is a result of the artificial recharge or it is a result of natural lateral flow in the aquifer itself.