



EVERY DROP COUNTS

A First Assessment of Restoration Impact on Soil Moisture and Water Balance in Jordan's Rangelands

In Jordan's rangeland ecosystems, recurring droughts, unsuitable agriculture and overgrazing have led to vegetation and soil degradation. The resulting surface crusting negatively affects rainwater retention and infiltration, speeding up both surface runoff and soil erosion.

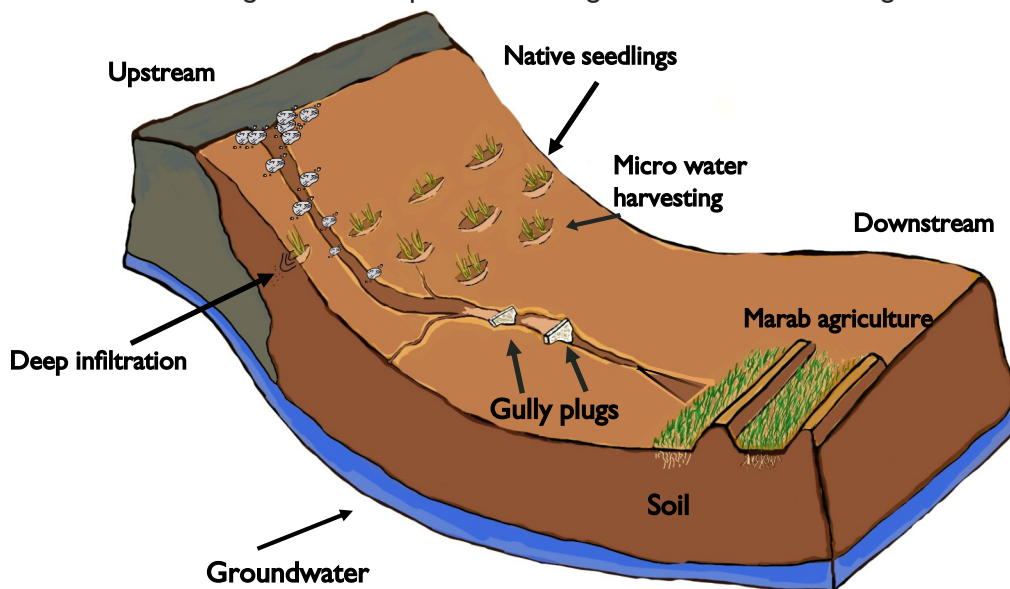
Excessive water runoff on hillslopes of Jordan has made growing crops difficult and has reduced soil water storage and groundwater recharge.



Rainfall and soil moisture technology monitors rainfall and soil water storage.

THE INTERVENTION

U.S. Forest Service restoration partners use the **Vallerani tractor plow method** to create micro-water harvesting basins that capture water and increase soil moisture. Increased soil moisture boosts the growth of outplanted seedlings and restores native vegetation across the landscape.



Downstream restoration utilizes water harvesting agriculture for the Marab lowlands, made possible by upstream runoff control. This increases biomass production and generates income for local communities.



A gully plug post rainfall, outside Amman, Jordan. Source: Stefan Strohmeier

Gully restoration focuses on treating gullies and channels with community-implemented gully plugs that reduce flow velocity and dissipate the erosive energy of the water. The practice fosters local sedimentation, increased infiltration, and reduced evaporation.



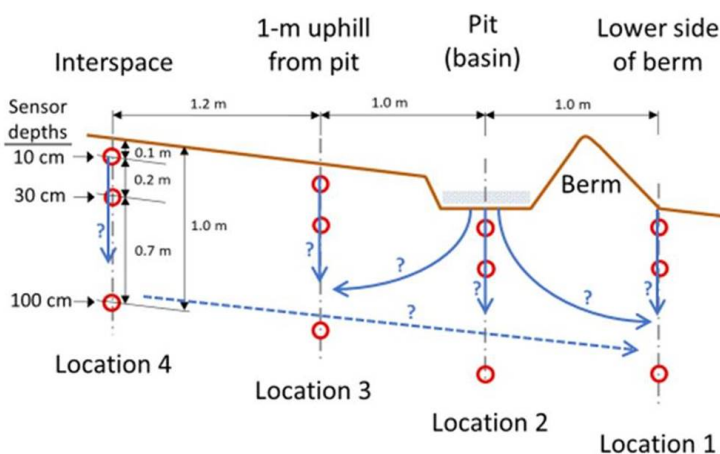
Assessment Findings



Above, ICARDA scientist Stefan Martin Strohmeier attaches sensors for measuring soil water storage. The sensors indicated by red circles in the restoration diagram below.

PRELIMINARY RESULTS

- Increased water content at 10 and 30cm depths in the basins and up and downslope
- Less fluctuation of water content, suggesting lower evaporation and greater water retention
- Water content is greater, suggesting increased potential for plant growth
- Saturation at 1m depth suggests downward movement into groundwater system during rainfall events



The diagram above and charted results below illustrate water infiltration results at the Royal Botanical Gardens restoration site, outside Amman, Jordan.

The U.S. Forest Service and partners are working to maintain more water in the drylands of Jordan. One way to do this is by restoring the process where soil once again acts as a sponge, providing water for plants, and when saturated, recharging groundwater stores (aquifers).

The diagram to the left illustrates how restoration partners are measuring their water infiltration effectiveness. The results from the sensors (red circles) are plotted below. The green line on the bottom left chart shows that water has successfully infiltrated at the greatest sensor depth within the pit (location 2). The chart on the bottom right shows continued water infiltration downslope of the berm (location 1).

