

Human activity is choking Oman's fragile desert rivers, scientists warn

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Ephemeral desert rivers known as wadis—lifelines for biodiversity and water in some of the world's driest landscapes—are being dangerously constricted by human activity, new research has found.

A study of Wadi Al-Khoud, a major watercourse in northern Oman, led by Sultan Qaboos University, with Rothamsted's Ahmed Al-Mayahi as lead author, shows that [agricultural expansion](#) and the dumping of imported soils mixed with construction debris are reshaping the river's natural dynamics. The researchers warn the practice is narrowing channels, altering [soil chemistry](#) and sediment distribution, and accelerating erosion during flash floods.

The findings are [published](#) in the journal *Land Degradation & Development*.

Over a ten-year period between 2010 and 2020, the wadi's average width shrank by 73 meters—equivalent to nearly 96,000 cubic meters of material being dumped into the channel. This narrowing creates a "bottleneck effect" that increases floodwater velocity, scouring out more sediment and spreading contaminants downstream.

Laboratory analysis of 48 [soil samples](#) revealed striking changes in composition where alien soils had been deposited. Levels of sodium, nitrate and potassium rose by 249%, 33% and 104% respectively compared with control sites. The altered soils also contained unusually high proportions of fine silt, disrupting natural texture patterns.

The study notes that small dune-like mounds, known as nabkhas, are forming in response to the disturbances. Although their formation may be linked to human activities upstream of the wadi, their presence provides significant ecological benefits. Studies have shown that plants growing on nabkhas can enhance water infiltration into the soil, stabilize surfaces against erosion, enrich [organic matter](#), and support other processes that strengthen the sustainability of oasis ecosystems.

The authors say wadis should be treated as "natural hydraulic veins" and argue that Oman needs [legal protections](#) similar to urban landscaping

regulations to safeguard them. Without intervention, they warn, the degradation of wadis threatens to undermine ecosystems and water security across the country's rapidly urbanizing drylands.

More information: Ahmed Al-Mayahi et al, Soil Importation and Wadi Channel Narrowing for Agricultural Expansion Alter Sediment Patterns and Soil Chemistry in Arid Oman, *Land Degradation & Development* (2025). [DOI: 10.1002/ldr.70159](https://doi.org/10.1002/ldr.70159)

Provided by Rothamsted Research

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