

Wildfire risk doesn't read in the sky. It reads in the soil.

Did you know the way we build access roads can deepen the water stress that fuels the next fire?

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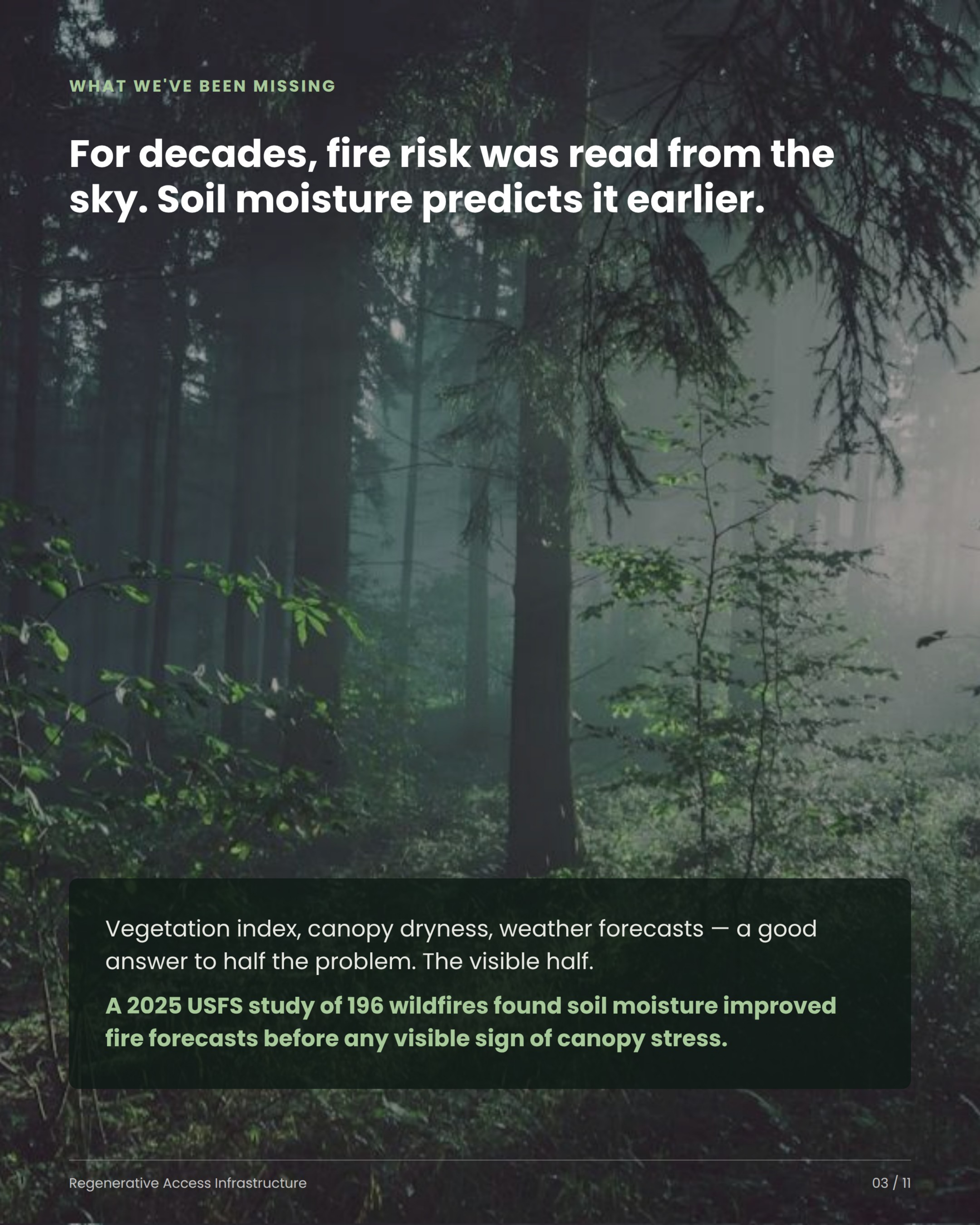


THE PATTERN WE KEEP REPEATING

Fire after fire, we stay on the defensive.

We detect, suppress, rebuild — then wait for the next one. I've watched a “green” forest burn like tinder, because the soil beneath it had already stopped holding water.

What if prevention started months earlier — underground?



WHAT WE'VE BEEN MISSING

For decades, fire risk was read from the sky. Soil moisture predicts it earlier.

Vegetation index, canopy dryness, weather forecasts — a good answer to half the problem. The visible half.

A 2025 USFS study of 196 wildfires found soil moisture improved fire forecasts before any visible sign of canopy stress.

KEY DATA

+8–9%

gain in burn-probability accuracy when soil moisture was added to the model.

Across roughly 5,400 fire-behavior maps built from 196 wildfires (2012–2021), the ground signal outperformed canopy-only indicators.

Source: Holden et al. 2025, Geophysical Research Letters (USFS).

SOIL UNDER STRESS

Same drought. Two microbial responses.

**Bacterial
growth rate**

–48%

under sustained drought

**Fungal network
activity**

stays active

hyphae keep functioning in dry soil

Push that stress far enough, though, and the shift can become permanent — persisting even after the rain returns.

A fungal network binds the soil together.

Mycorrhizal hyphae and glomalin-related proteins hold soil aggregates together — in normal conditions and in drought. Damage that network, and the ground loses its structure exactly when it needs to hold water most.

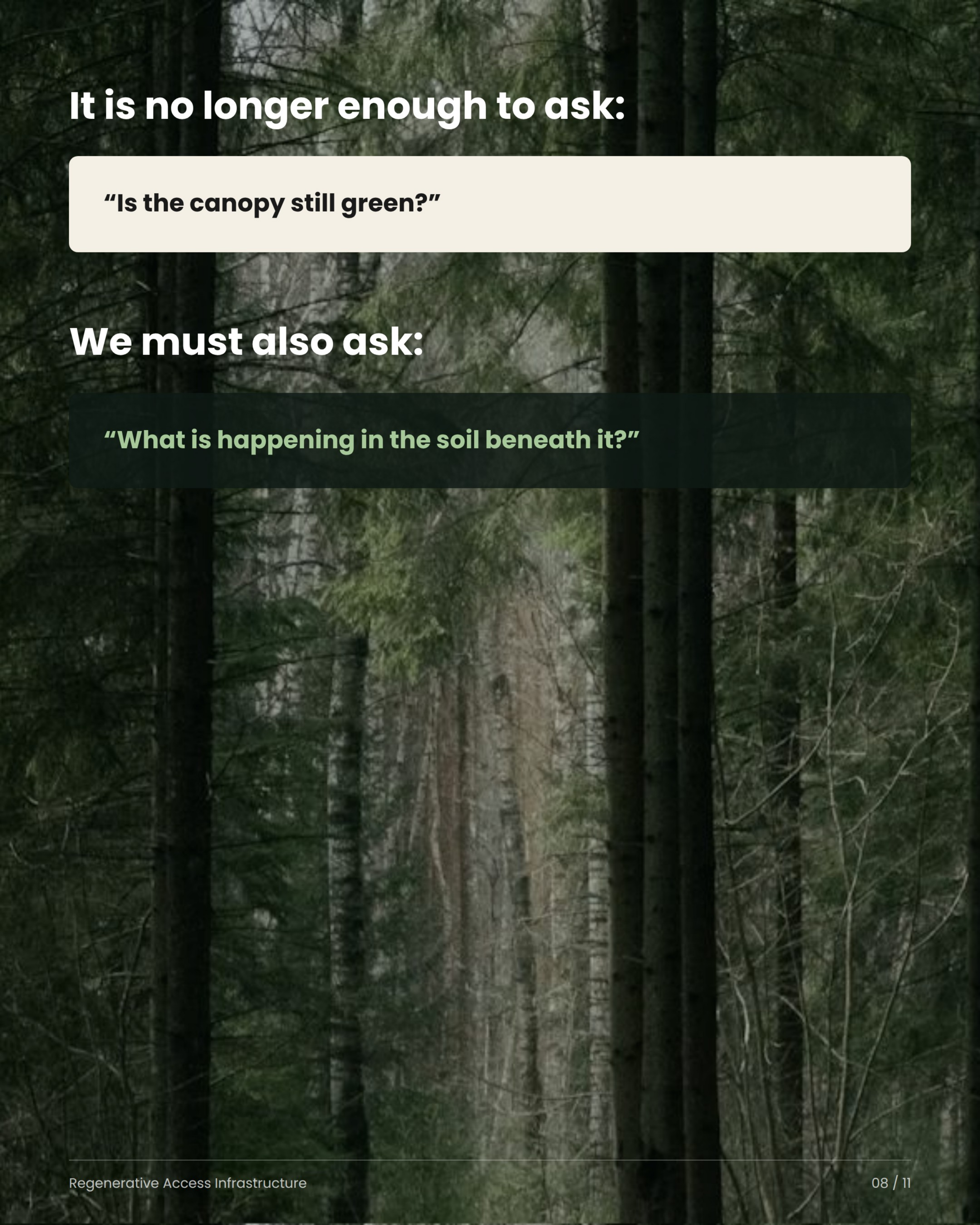
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Roads don't just cross the land. They drain it.

Ditches, culverts and compacted surfaces can act as a second drainage network layered onto the watershed — moving water out faster than the land would on its own.

Less water in the soil weakens the life that holds it together.

A weaker soil then loses even more water in the next drought.



It is no longer enough to ask:

“Is the canopy still green?”

We must also ask:

“What is happening in the soil beneath it?”

Stop evacuating the water. Start retaining it.

Retain · infiltrate · protect the microbiome

Existing roads can be retrofitted at strategic points — regrading ditches, decompacting shoulders, replacing pipe culverts — so they stop channelling water out of the land they cross. New corridors should be designed the same way from day one.

OPEN QUESTION

What if we stopped managing fires one at a time — and started building resilience before the season starts?

Foresters, hydrologists, emergency planners: when was the last time a fire-risk assessment looked at soil moisture, not just canopy cover?

Full articles: [English](#) · [Français](#) — links in the first comment.

To go further

Full references and links are included in the long article.

1. Soil Moisture is a Stronger Predictor of Forest Fire Spread Potential Than Weather

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2. High Intensity Perturbations Induce an Abrupt Shift in Soil Microbial State

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3. Soil Fungi Remain Active and Invest in Storage Compounds During Drought

www.nature.com/articles/s41467-024-54537-y

4. Increasing Aridity Reduces Soil Microbial Diversity and Abundance in Global Drylands

www.pnas.org/doi/10.1073/pnas.1516684112

5. Mycorrhizal Hyphal Networks and Glomalin Jointly Promote Soil Aggregation

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