

Dilemmas of “green” extraction

irrigation H₂O contamination +
alfalfa crop productivity
at the Thacker Pass lithium mine





There's a Fortune to Be Made in the Obscure Metals Behind Clean Power

COMMENTARY • COP26

Green energy can't become a reality without critical minerals

Why Elon Musk wants Tesla to start mining lithium

SCIENCE \ ENERGY \ ENVIRONMENT

Clean energy faces its own supply chain crisis

That jeopardizes the US's climate goals

Cobalt Is the New Oil

A New York Times investigation details China's rapid acceleration of cobalt mining as countries gear up in renewable energy and battery demand.

EVs and Cleaner Energy Are Giving a Boost to Copper and Other 'Green' Metals

LITHIUM

- + used in **lithium-ion batteries**
- + extraction = **dirty**
- + 1 domestic mine, **several in development**

Thacker Pass (Peehee Mu'huh), Humboldt County, NV

Northern Paiute + Western Shoshone lands

Proposed mine: ~9 sq-mile pit,
30 sq-mile project area

EIS: ↑ TDS, heavy metals in groundwater

#1 ag-producing county in driest state



ALFALFA

#1 produced + irrigated crop in Humboldt County

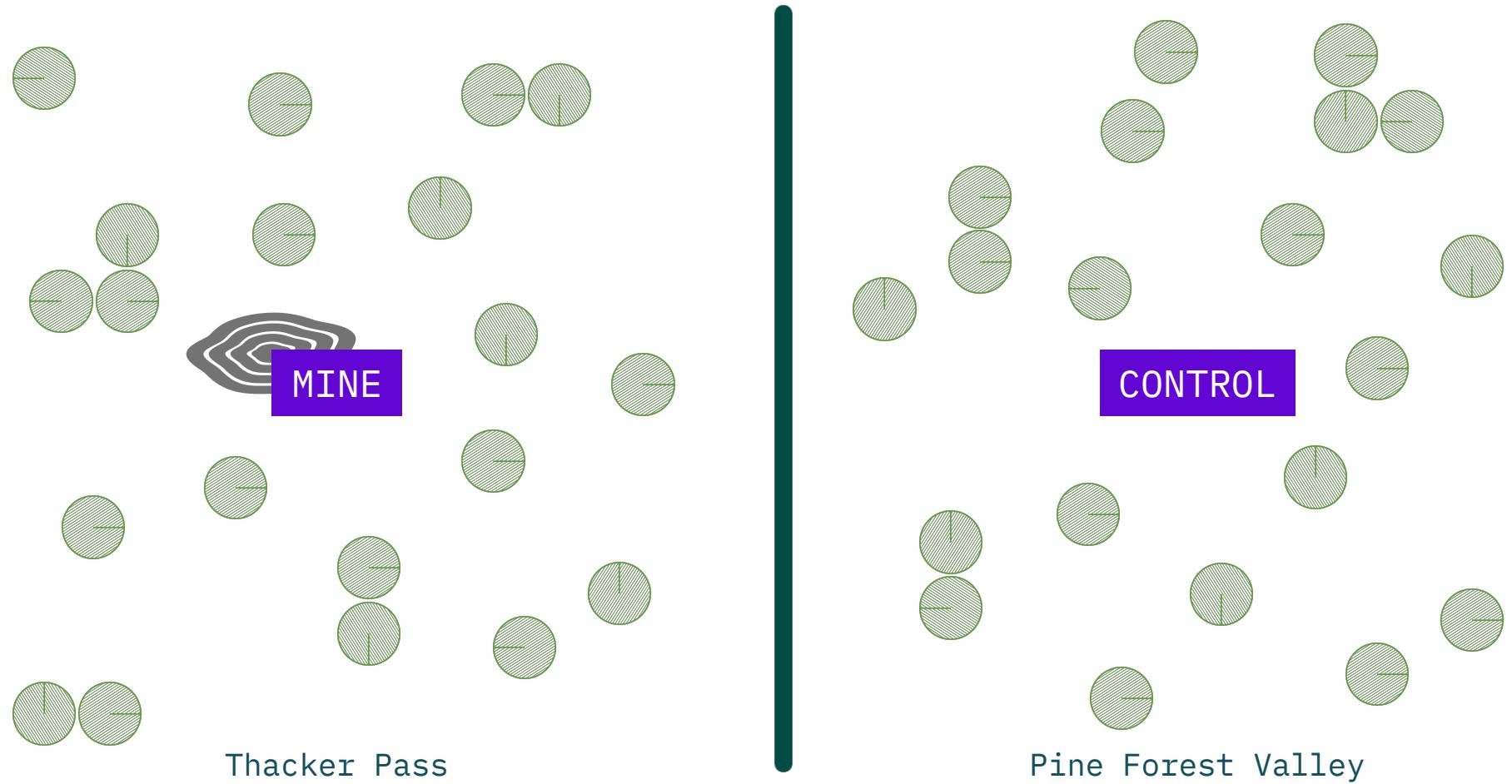
salt stress: ↓ germination, seed vigor, biomass accumulation, growth

heavy metals: ↓ germination, growth

RQ1: Is the Thacker Pass lithium mine associated with heightened **contamination of water used for irrigation** on surrounding alfalfa fields?

RQ2: Are mining activities and irrigation water contamination associated with **reduced crop productivity** on surrounding alfalfa fields?

Methodology: field selection



Methodology: RQ1

Is the Thacker Pass lithium mine associated with heightened **contamination of H₂O used for irrigation** on surrounding alfalfa fields?



irrigation H₂O samples
TDS, heavy metals

Frequency: quarterly

Duration: 2 yrs

Yr 1: pre-operation
Yr 2: active

changes in **TDS + heavy metals**
from Yr 1 to Yr 2 in **mining vs. control** field irrigation H₂O

whether changes are correlated w/
proximity to mine

Methodology: RQ2

Are mining activities + irrigation H₂O contamination associated with **reduced crop productivity** on alfalfa fields?



crop productivity surveys
stem density, height

Frequency: 6 per yr
pre-bud + bud stages prior to
1st, 2nd, 3rd summer cuttings

Duration: 2 yrs
Yr 1: pre-operation
Yr 2: active

magnitude of changes in
stem density + height from
Yr 1 to Yr 2 on **mining vs. control** fields

whether changes
are correlated
w/ changes in
irrigation H₂O quality (RQ1)

whether changes
are correlated w/
proximity to mine

Methodology: interviews



semi-structured interviews

crop productivity

stand characteristics

management practices

Frequency: 1 per yr

Duration: 2 yrs

identify covariates +
bolster findings

	F 22	W 23	Spr 23	Sum 23	F 23	W 24	Spr 24	Sum 24
H2O quality sampling								
crop productivity surveys								
interviews								

F=Fall, W=Winter, Spr=Spring, Sum=Summer

Considerations / predicaments

- + Timeline: Phases of mine development
- + Design: BACI, groundwater, distance of fields from mine
- + Feasibility: \$\$\$, time

Outcomes + applications

Local applications

Advocacy

H₂O quality data

Other directions

Broader applications

Green + just futures

