Modeling Groundwater Contamination at Coal Ash Dumps

Faculty Mentor: Rachel Nethery

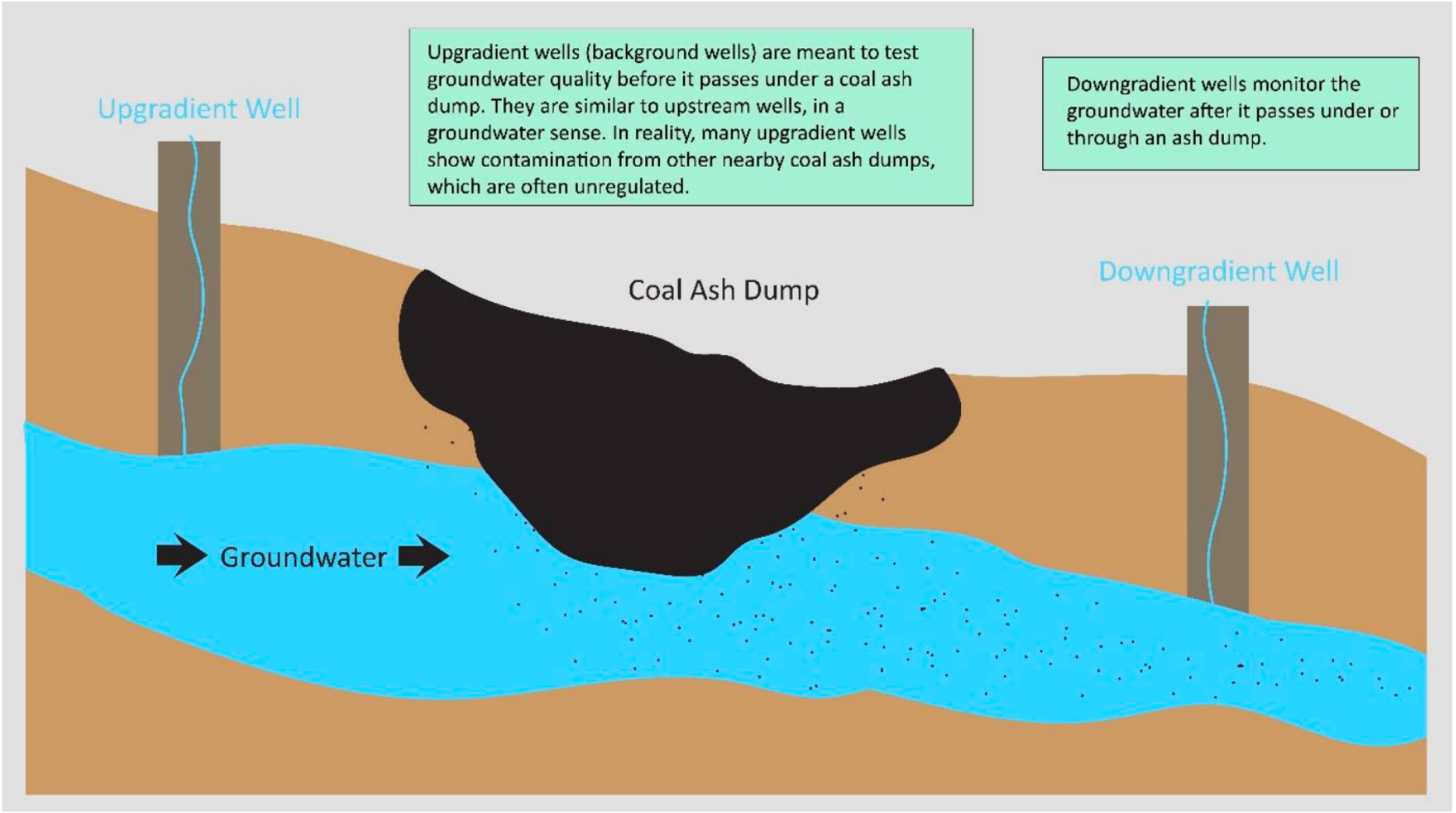
Student Mentor: Luli Zou

Toxic contaminants in coal ash from power plants often contaminate groundwater

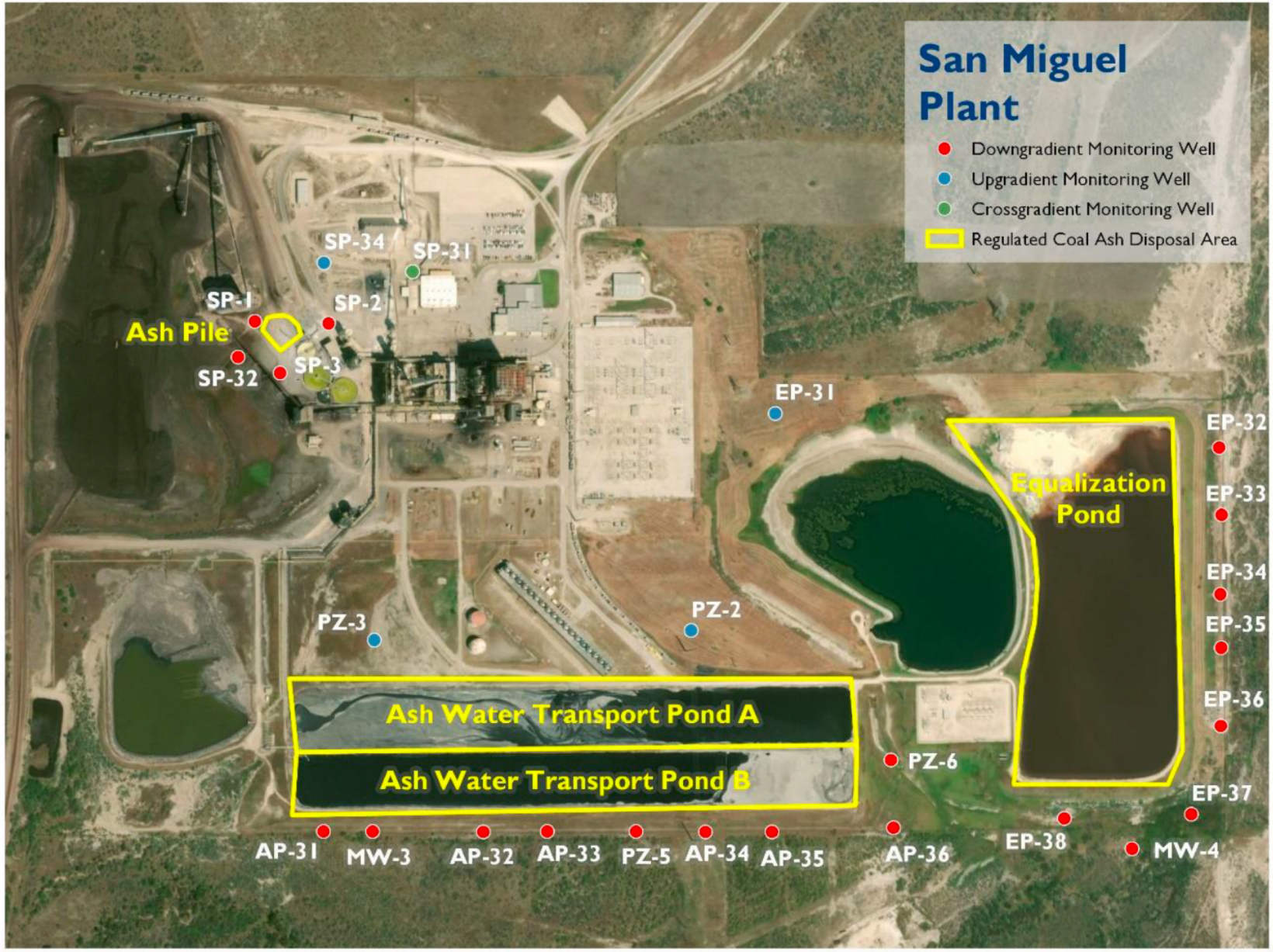
- Coal-fired power plants in the US produce around 100 million tons of coal ash annually
- Coal ash contains toxic chemicals including carcinogens and metals that can impair children's developing brains
- For much of the last century, power companies dumped coal ash into unlined landfills and ponds, allowing it to leak into groundwater
- EPA's 2015 Coal Ash Rule established groundwater monitoring requirements for coal ash dumps, and monitoring data made available to the public starting in March 2018

Groundwater monitoring

- Question: How much chemical contamination of groundwater is being caused by each coal ash dump?
- Must account for the fact that <u>many chemicals are naturally occurring</u> and their natural levels vary over space



Groundwater monitoring



Data problem

- To estimate the amount of arsenic contamination caused by a coal ash dump, we might want to do:

  Downgradient arsenic-Upgradient arsenic

- However, this may be inaccurate due to occasional contamination of “upgradient” wells by retired/unregulated ponds
- Goal of this project: identify contaminated upgradient wells and seek to “correct” their measurements

Identifying and correcting contaminated upgradient well measurements

- Do measurements at a small number of “upgradient” wells look fishy compared to other upgradient wells at the same site?
- Do measurements at an “upgradient” well look fishy compared to all other upgradient wells within a 100 mile radius?

- If we assume that natural levels of each chemical in groundwater follow some distribution (based on empirical distribution of measurements at non-contaminated upgradient sites) then we can impute corrected measurements for contaminated wells from this distribution.