

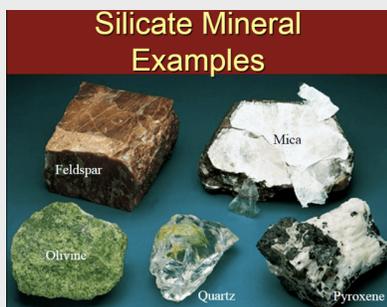
IN THE SPOTLIGHT: DR. NINA BINGHAM

Crushing Rocks to Capture Carbon

How Do Crushed Rock Soil Amendments Work?

Carbon dioxide (CO₂) from the atmosphere is used by rocks made of silicate minerals when they break down through a process called weathering. When the CO₂ is removed from the atmosphere, it is stored in the rocks. This process happens over millions of years naturally, but we can speed up this process and store more CO₂ by crushing up the rocks. Additionally, when rock weathers, it supplies essential nutrients to the soil.

By adding the crushed rock to an agricultural field, the field is able to capture and store more CO₂ and the crushed rock can also resupply the existing soils with nutrients.



UC Davis Postdoctoral Fellow Dr. Nina Bingham researches how soil amendments can help capture and store CO₂ in agricultural fields.



DR. NINA BINGHAM is a Postdoctoral Fellow with the Houlton Research Group at UC Davis. Nina fell in love with soils while completing her undergraduate degree in Geosciences at Pennsylvania State University. Eager to learn about soils and geomorphology in a new environment, she switched coasts for graduate school, heading to the geography department at UC Santa Barbara where she wrote her PhD dissertation in 2019 on rock weathering, soil erosion, and soil nutrient status in the Western Transverse Range of southern California. Nina joined UC Davis in 2019 and now partners with the Working Lands Innovation Center to research how adding crushed rocks to agricultural fields can help to combat climate change by trapping carbon dioxide (CO₂) in the soil.

Improve the Soil, Improve the Climate

Soil amendments are additions to soil — like compost, biochar, or crushed rock — that are added to improve the quality of the soil. The Working Lands Innovation Center (WLIC) is a research collaboration that studies how agricultural lands can be part of the climate change solution by using soil amendments to capture and store more CO₂ in the soil, while also providing benefits for soil health and crop production.

Dr. Bingham puts her expertise to work studying how differences in climate across California will control the amount of soil carbon sequestration from crushed rock soil amendments. To do this, Dr. Bingham travels to agricultural demonstration sites across the state and measures how quickly crushed rocks are broken down by the environment and how much carbon then accumulates as a result of the weathering action. These measurements are compared to experiments done in the lab in order to verify the data collected in the field.



*Crushed rock pile and soil amendment spreader.
Courtesy Nina Bingham.*

The first round of crushed rock soil amendments were applied in Fall 2019. Dr. Bingham and her colleagues are currently collecting soil samples from the demonstration sites at regular intervals, looking for changes in soil carbon and soil nutrients over the growing season. At the same time, Dr. Bingham's collaborators at Lawrence Berkeley National Laboratory are using mathematical models to estimate how much CO₂ could potentially be captured in this first year.

Collectively, these efforts represent the first large-scale demonstration of crushed silicate rock soil amendment as a strategy for mitigating climate change.

Working in the Present to Improve the Future

Agriculture-based solutions to climate change will be important to feeding our growing population and assuring a livable world for the future. Dr. Bingham's research will help to develop practical and profitable solutions for today's agricultural sector. As Dr. Bingham noted, "Viable solutions to climate change are desperately needed, and the Working Lands Innovation Center is at the forefront of research. I would hope that the future of this field will involve more people working on these solutions, and that institutions and agencies will prioritize funding for agriculture-based climate remediation work."

Read More About Dr. Bingham and the Working Lands Innovation Center

- How is the WLIC working to reduce net carbon emissions on working lands in California? [Read more about their shovel-ready solutions here.](#)
- What are Dr. Nina Bingham and her colleagues in the Houlton Lab working on? [Check out the research lab's webspace here.](#)

The California Climate Hub will occasionally spotlight our collaborators or impactful research projects relevant to California agriculture, forestry, and rangelands. If you know of a researcher, resource manager, producer, or project that should be highlighted, please let us know. For recommendations or more information, contact Lauren Parker at leparker@ucdavis.edu