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## Inspiring Action at Macalester College

BY CYNTHIA MWENJA, PhD

Roopali Phadke, professor in the Department of Environmental Studies at Macalester College in Saint Paul, Minn., brings bold visions to reality through her strengths in leadership, collaboration, and communication. Her research focuses on energy and climate policy, citizen science, community based research methodologies, and sustainable development initiatives.

In addition to exploring these complex issues with her students in classes and summer lab experiences, Phadke also organizes an annual student observer trip to the United Nations Climate Summit, and she is the lead organizer of a remarkable battery recycling initiative which has impressive reach.

### Considering Climate Complexities

Now in her 21st year at Macalester, Phadke has explored her research interests more and more through the lens of critical minerals mining over the past 10 years. According to the U.S. Geological Survey (USGS), “Minerals that are ‘critical’ are both essential to the nation’s economy or national security and have supply chains that are vulnerable to disruption”; the USGS lists 60 of these minerals, including cobalt and nickel, for example. Phadke and her students study policies and community issues which arise around minerals mining. Phadke’s summer undergraduate research labs funded through grants from the National Science Foundation (NSF) investigate matters of water quality protection, since “mining and water use go

hand-in-hand,” as Phadke notes. They also consider questions of energy justice because that idea connects to critical minerals mining practices, as well.

Phadke points out that “Global issues touch down locally”; these connected concerns of water quality, energy justice, and their interactions with critical minerals mining are definitely at play in Minnesota—and making decisions about any one “best” course of action can quickly become challenging, due to the variety of stakeholders involved. One Minnesota example is the proposed mining of one of the largest deposits of copper, nickel and cobalt in the U.S., which is a mere five miles from the Boundary Waters Canoe area; this watershed is currently protected by a 20-year mining ban that the Trump administration would like to rescind. The mining companies proposing new drilling in the area say that they can extract the critical minerals responsibly, but environmental groups point out that clean extraction has not yet been successful, and the proposed mines threaten environmental destruction in

what is currently a protected area.

As Phadke points out, most young people today don’t need to be convinced that climate change and environmental degradation are real issues that they will have to manage; many students experience anxiety specifically relating to fears of climate catastrophe. In their search for solutions, Phadke has noticed that young people often have “knee-jerk” faith in green energy solutions like electric cars that rely on mining of critical minerals. When Phadke discusses green energy production in her classes—and the environmental impacts of extracting critical minerals—she makes the story of “green” energy much more complex for her students. Considering the nuances and tensions of real-life issues such as these is the foundation of a liberal arts education, Phadke says.

As Phadke and her students consider the more complicated picture of green energy production, they grapple with questions such as “Who bears the burden of these mines and the environmental degradation they cause?”



“Who gets to decide on the projects, and are the decision-makers responsible to those who bear the burdens?” and even: “In the case of electric vehicles, are more cars really the solution?” Phadke states that wrestling with these thorny issues requires her students to come to terms with their own identities and really examine who pays the price for climate action.

The answers are not one-size-fits-all, either. Phadke reports that she and her students have examined mines all over the U.S. and in diverse biomes such as arid regions and wetlands. The answers about “best” practices, she notes, are very place-based; each case is unique and has different considerations, leading to different answers about the most effective and ethical course of action in each case.

### Urban Mining

The newest chapter of this research in Phadke’s lab centers on urban mining, or “harvesting” metals already circulating above

ground. Such harvesting is generally done by collecting metals from e-waste, or discarded electrical or electronic devices. According to the World Health Organization, “Common items in e-waste streams include computers, mobile phones, large household appliances, and medical equipment.... E-waste is one of the fastest growing solid waste streams in the world... however, e-waste streams contain valuable and finite resources that can be reused if they are recycled appropriately.” Even though only about 20 percent of global e-waste is recycled or recovered, Phadke’s students find these ideas really exciting and empowering—and they are shocked to learn that anyone is simply burying economically valuable metals in landfills or burning them in incinerators.

### CollectED Battery Recycling Initiative

As a result of this line of inquiry, Phadke secured a notable \$1.8 million dollar grant from the U.S. Department of Energy to develop public education about the collection and recycling of e-waste, particularly batteries.

She and her partners created the CollectED Battery Recycling Initiative, which features several key components: a professional and informative website, an interactive public exhibit, and the 2025 REcharge Academy, a workshop for K-12 educators. According to the website, CollectED’s goal is to “provide tools, resources, and practical guidance for individuals, schools, and communities to take simple, informed steps to prevent battery-related hazards, protect the environment, and recover valuable materials.”

At <https://collectedproject.org/>, visitors find information about battery recycling that is easy to navigate, access, and understand. The site includes resources for people in any location to “take meaningful steps toward better battery recycling.” It also includes an interactive “Drop-Off Spot Locator” which shows site visitors where they can recycle different kinds of e-waste in their local communities. Additionally, the website provides information about the two other prongs of the CollectED project, described below.

**CollectED Exhibit**

There is also a \$300,000 CollectED exhibit boasting multiple enticing, interactive kiosks that fill 500-square-feet. The exhibit involved seven partner organizations in its development, design, and implementation. Taken as a whole, the exhibit tells the story of batteries and why they should be collected and recycled—why recovering their components is so important for both the economy and the environment. One of the design partners was a social marketing firm which tested logos and design features with young people. The resulting displays look like high-end science museum installations, and the array is certainly eye-catching and compelling for people of all ages. Phadke particularly appreciates the “trash panda” mascot and the cheeky messages it conveys.

Phadke worked with many people to launch the public CollectED exhibit, which debuted at the Minnesota State Fair. Covering the

event required all of her summer lab student workers as well as an additional 50 volunteers. Millions of people attend this state fair each year, and nearly 250,000 of them came through the EcoExperience where the CollectEd exhibit was housed. She says that this was a great opportunity to get her students in front of the public, and they had amazing moments interacting with so many people. Readers can view a video of the exhibit at the CollectED website above.

**REcharge Academy**

In the grant application to fund the CollectED project, Phadke and her team committed to making their project replicable for other states so that information about battery recycling could be spread “far and wide.” In one initiative toward this goal, CollectED partnered with the KidWind Project to host its 20th annual REcharge Academy at Macalester, focusing the 2025 workshop on battery science and recycling

education. Sixteen K-12 educators from across the country attended this weeklong institute in which they learned how to promote battery recycling; their experiences enabled them to take this knowledge back to their home communities and begin their own initiatives there.

While the CollectED project did not receive the entire amount granted due to federal budget cuts, it produced notable results in the one year that it was funded. The group met all of the milestones they had set for the initial year, and they will continue with the project in every way they are able to do so; as Phadke points out, “The need for the work has not gone away.” She hopes that they are able to access the remaining funds in the future; until then, they are seeking to partner with Minnesota state agencies, particularly in meeting the goal of returning with the CollectED exhibit to the 2026 Minnesota State Fair. They also hope to take the exhibit



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on tour throughout the state, installing it in various sites, such as institutions and museums. In a related creative initiative, Phadke and her team are building a small-scale traveling library exhibit, which will be deployed on interlibrary loan (ILL) trucks so that people throughout the state of Minnesota can interact with the information.

**United Nations Climate Summit**

In a different ambitious initiative, for over 10 years, Phadke has run Macalester College’s program which takes students to the annual United Nations Climate Change Conference; this event is also called a “summit” or “Conference of the Parties” (COP). Macalester faculty members and students have been given observer status for these events through the UN Framework Convention on Climate Change (UNFCCC). Phadke notes that it is important for the parties negotiating international treaties to have observers, and she and her students are honored to serve in that

role. With their status, they have access to the diplomatic zone, sit in on treaty negotiations, and interact with attendees from around the world.

To prepare students to take full advantage of their access and experiences at the climate summit, Phadke teaches a course focused on the issues addressed at the event; this class culminates in their travel. This fall’s group is slated to travel to Turkey for COP31 in November. Each student prepares a research question to bring to the conference; each attendee then uses their access as an opportunity to gather research pertinent to their topic. The array of topics they choose is broad; past research inquiries have included agriculture, industry, Indigenous rights, sustainable food systems, and more.

As Phadke drily states, this initiative clearly ties to her work and interests. She appreciates that attending the event can transform her

students’ lives because of their ability to learn from so many stakeholders from all over the globe. Phadke says that this experience has inspired her students to pursue careers in climate law, policy, and advocacy, among other fields.

Through the examples of projects she has spearheaded, Phadke demonstrates that leadership, collaboration, and communication can produce inspiring and admirable results—results that can change individual lives as well as the world’s collective well-being. Phadke provides a model for educators who aim to tie their research interests to the world outside the academy, and her results show that these goals can be reached in truly spectacular ways.



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