

## Project Synopsis

### Dimensions of the Problem

Our planet is under unprecedented stress. Humanity's collective impact has been surpassing the regenerative capacity of the Earth for at least several decades. Global demand for water, fossil fuels, and grain has tripled over the past 50 years. Air and water pollution threaten our health. Ecosystems are stressed. We face problems of resource consumption and depletion, waste production, and climate change that, if left unaddressed, will affect humanity for generations to come. Addressing these challenges will require great commitment, investment, and ingenuity from our citizenry, which in turn will require improved education in science, technology, engineering, and mathematics (STEM). More than ever before, we need people who not only understand the scientific and societal dimensions of these environmental problems but also are motivated and equipped to help solve them.

However, despite large investments of federal and private funding, the pace and scope of improvement in postsecondary STEM education have not been satisfactory. Too few students are interested in learning what science is, how science is done, and how it can address these complex global challenges. Too many students veer away from majors in the STEM disciplines. Too few STEM faculty members have adopted the proven teaching and assessment methods that could attract, retain, and better prepare students for 21st-century citizenship, and STEM graduate studies or careers. Moreover, the STEM education improvement "community" is not a cohesive community but rather an unconnected array of individuals and partial social networks that have not been effective in bringing about systemic, widespread change.

The sustainability education movement, comprised of an array of educators most actively addressing global problems and strategies for addressing them, also has unrealized goals. Although interest in sustainability has exploded on college campuses in the last decade, changes in the postsecondary curriculum lag far behind sustainability practices in campus operations and sustainability initiatives led by student organizations. Sustainability studies courses often do not effectively integrate scientific concepts, and STEM courses often omit rapidly emerging topics in "sustainability science."

Sustainability educators appear to be pursuing their goals with little connection to the STEM education improvement community, and vice versa. That these groups are largely on separate tracks hampers efforts to address global challenges.

### A Response: A National Initiative

**Mobilizing STEM Education for a Sustainable Future seeks to address these issues by reshaping postsecondary STEM teaching and learning in the context of pressing global environmental and social problems (<http://mobilizingstem.wceruw.org/people.html>).** To achieve this ambitious aim, we are launching a national initiative that will link the communities engaged in improving STEM education with those engaged in global sustainability, thereby accelerating and amplifying both groups' efforts. This linkage is designed to accomplish two goals:

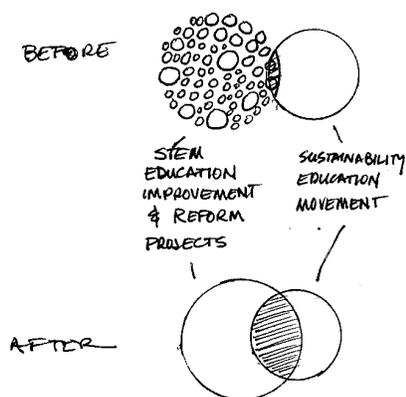
1. Use the growing interest in urgent sustainability challenges expressed by STEM education faculty and students at large, and evidence that student learning benefits from engagement with real-world problems, to motivate and improve student learning of STEM concepts; and
2. Infuse sustainability education with rigorous science and teaching approaches that reflect what has been learned about how people learn the STEM disciplines.

To begin to pursue these ends, we assembled a powerful group of 35 critical advisors comprising national experts and leaders that included STEM education improvement leaders, leaders in the emerging sustainability education movement, and scholars of organizational change in higher education. During 2009, we held a series of meetings with these advisors plus 60 representatives of higher education organizations, disciplinary

professional societies, and organizations devoted to issues of sustainability. These meetings resulted in the following consensus: a campaign – a coordinated, strategic advocacy effort – is needed to reshape STEM education to more effectively address global challenges.

### A Campaign Approach For Change

Despite clear evidence that interest in sustainability issues among college administrators, faculty members, and students is high and continues to grow, only a tiny proportion of STEM faculty are both using the more powerful pedagogical methods developed and validated in recent years and incorporating sustainability education into their teaching. These faculty members occupy what our critical advisors termed the “green zone,” illustrated by the tiny overlap of circles in the “before” portion of the drawing below. Our campaign seeks to expand this green zone, the shared space where STEM faculty already involved in either STEM education improvement or sustainability education can actively learn and benefit from each other.



We plan to organize this campaign into two highly interdependent and iterative components focused on the STEM faculty who are the center of the teaching and learning process. One component will consist of action research, the other of high-leverage networking. The team that undertakes the action research component will identify the members of the dispersed STEM education improvement community and produce maps of both that community and the sustainability education communities. This team also will identify the key leverage agents – the individuals who have influence with intermediary organizations (e.g., professional societies, higher education organizations, accrediting organizations, state agencies, and funding agencies). As the mapping activity proceeds, it will both inform and be informed by the work of the networking team. This team will mobilize and support faculty so that they can help achieve our goals

in their own professional contexts, while also emerging as a coherent community that shares resources and ideas within and across higher education institutions and disciplines. Equally important, this team will encourage sustainability educators to incorporate into their teaching the pedagogical methods developed by those engaged in STEM education improvement.

We plan to have measurable evidence within three years that we have:

1. Motivated and enabled members of the STEM education improvement and the sustainability education communities to work in collaborative and synergistic ways with one another;
2. Embedded sustainability education as a priority in the core agendas of:
  - STEM education improvement communities;
  - The major STEM disciplinary societies and associations;
  - The major American higher education associations that serve both two- and four-year institutions; and
  - The major associations involved with teacher education, especially with the training of K–12 science teachers; and
3. Embedded sustainability education as a priority area of funding of private foundations that are interested in STEM education and in the expansion and professional development of math and science teachers in the K–12 sector.

### How You Can Get Involved

A successful campaign depends on the support of peers, collaborators, and other stakeholders. You can learn more about our project, its staff, and critical advisors at <http://mobilizingstem.wceruw.org/>. To receive updates on our project or to offer suggestions or other input, please click on the “Contact Us” link.