Members Forum

Reshaping Land Grant Institutions to Solve the Global Grand Challenges of the 21st Century

by Paul Bertsch and Gary Pierzynski

Last year, across the U.S., there were celebrations marking the 150th anniversary of the Morrill Act, which created the land grant colleges and universities, and set in motion the proliferation of a world-class network of public colleges and universities. Public research universities in the U.S. now educate ~85% of the undergraduate students, enroll ~70% of graduate students attending research universities, and conduct ~62% of federally funded research. The land grant colleges and universities are special among public institutions due to their long and unique history as innovation engines as well as enablers of technology development, transfer, and implementation through close collaboration and engagement with stakeholders at the state, regional, national, and global levels.

There has been a good deal of discussion and analysis surrounding the fragile future of land grant colleges and universities resulting from decreasing state and federal support. While this discussion is important and necessary, we believe there has been far too little discussion of what land grant institutions of the future must look like if they are to successfully enable the U.S. and, indeed, the global community, to solve the enormous challenges associated with sustainably supporting a high quality of life for the 9 to 9.5 billion individuals expected on the planet by 2050.

Sustainable Intensification

Sustainable intensification is a term that is widely associated with the need to roughly double production of food on existing agricultural lands by 2050. The U.S. agriculture enterprise successfully doubled yields of key crops between ~1960 and 2004 although the reality is that this incredible achievement was possible by creating production systems that, in some cases, were not sustainable. Further, there is evidence that the rate of increase for yields is beginning to diminish. To double yields again, and to do so sustainably, will require the development and deployment of a multitude of technologies. Land grant universities were responsible for the R&D and effective technology translation via innovative engagement that led to the past successes, and they will be critical to solve the enormous challenges that lie ahead, although with an expanded scope.

We believe that a sustainable future will require sustainable intensification applied more broadly than for food production systems. The concept will need to be applied across all interconnected human endeavors—management of built and natural environments, manufacturing, energy, health care, nutrition, etc. We also believe that to truly reach a sustainable future with the time constraints that we face, all human endeavors will have to be approached holistically and from a rigorous life-cycle perspective with a full understanding of the various complex interconnections. Unlike many significant advances in the past, we can no longer afford to solve specific problems only to discover negative, unintended, and unsustainable consequences down the road. The innovation engine needed to solve the global grand challenge of achieving sustainability across all human endeavors.