ACADEMIC ENGAGEMENT SERIES

Banner and Guda: Reforming universities to save the environment

Jay Banner and Nelson Guda, LOCAL CONTRIBUTORS

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Water is a critical natural resource around the world, and in Texas it is a particularly fragile one.

Texas history is replete with accounts of water shortages, including those affecting 19th century settlers, the Dust Bowl of the 1930s, the drought of the 1950s, and the Rio Grande failing to flow to the Gulf of Mexico in 2002. In the mid-19th century, little more than a billion people populated the planet. Today, as we surpass 6.4 billion, water issues are even more severe and widespread.

The United Nations estimates that waterborne diseases cause 5 million deaths each year, and that by 2025 two in three people worldwide will face water shortages. In our own backyard, less visible problems include a class of contaminants recently detected in water resources: pharmaceuticals. That's right, the water we use can contain such compounds as ibuprofen, Prozac, caffeine, antibiotics, birth control hormones and Viagra.

These facts underscore growing concerns about the quality and security of our environment, particularly the vital resource that is water. How far can technological solutions, such as desalinization of seawater, take us? How much freshwater flow is needed to protect wildlife habitats within streams, aquifers and estuaries? What new challenges will we encounter in the face of a projected doubling of Texas' population by 2040, and shifts in

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regional rainfall patterns driven by global changes in climate? Will there be sufficient quantities of clean water for drinking, agricultural and industrial needs?

If answers to these questions are not found, future Texans will be unable to balance the use and renewal of water resources, and we will continue on an unsustainable path.

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Our ability to answer these questions depends in part upon our ability to educate tomorrow's students with an interdisciplinary perspective reaching beyond narrow specializations. As noted by professor Rick Cherwitz and other contributors to this series on academic engagement, scientific and learning breakthroughs often occur at the intersection of different disciplines. The interconnected nature of environmental problems is no exception.

We need professionals trained to understand complex water problems from a variety of angles, including science, engineering, urban planning, business and policy. Unfortunately, few graduate programs exist that educate students beyond a chosen discipline.

Scientists with a deep knowledge in their field will continue to be essential for advancing knowledge, but the importance of a broad perspective is rapidly increasing. Universities must formulate major improvements in how they engage the community and bring new knowledge from researchers to the public, in order to reverse the trend of the shrinking numbers of American students who choose science and engineering careers.

So how can we meet these challenges? Do we eliminate existing academic departments and realign resources into new departments? Or can new cross-cutting organizations meld traditionally separate disciplines? Answers vary, but the assortment of environmental programs recently formed in different U.S. universities indicates that no blueprint exists.

On a federal level, the National Science Foundation, a leading agency funding university research, now requires that such research have an impact beyond a small circle of specialists. This agency also supports elite fellowships for students who pursue an interdisciplinary Ph.D. or creatively bring the excitement of university science to K-12 classrooms.

Locally, the University of Texas' Environmental Science Institute was established with these same goals — to cultivate a more balanced approach to complex environmental problems in the areas of research, education and public outreach.

These are great starts, but to guarantee success we must go the extra mile, addressing the underlying barriers that prevent achievement of genuine interdisciplinary education and engagement. It is time to construct novel degree programs — including a graduate training program in water studies — that are more than add-ons to existing curriculum and degree requirements.

New programs of this sort cannot be implemented and have little chance of succeeding without the support of faculty members who drive university research and education — the best of whom are already over-committed within and tied to their own disciplines.

Getting them to buy into an interdisciplinary approach can be fostered through changes in the university's structure and reward system. Faculty and students need to be enabled and encouraged to connect with each other across the departmental walls so typical of a university setting.

Interdisciplinary graduate training and public outreach require systemic changes capable of addressing our most challenging problems, including our water future and our energy future.

What is the cost of addressing these problems? Perhaps the question should be recast. In pondering our next glass of water, we might ask: What will be the cost of waiting?

Banner is a professor of geological sciences and director of UT Environmental Science Institute; Guda is an ecologist and an associate director at the institute.