Chemicals released from melting glaciers can pollute local habitats.

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Edited by **Jennifer Sills**

Melting glaciers: Hidden hazards

In her In Depth News story "Chile's glacial lakes pose newly recognized flood threat" (10 March, p. 1004), J. Palmer did not mention that melting glaciers pose risks beyond flooding. The water itself contains hidden hazards.

Melting glaciers can release nutrients and pollutants into glacial rivers, which further erode watersheds and contaminate downstream environments. Polar ice sheets may export substantial quantities of iron (*1*, *2*), which affects coastal ecosystems (*3*, *4*). European alpine glaciers have been shown to contain chemicals introduced in the past by humans, which drain into lakes when the ice melts (*5*). Melting Himalayan glaciers contribute persistent organic pollutants to the surface waters in the nearby Gangetic Plain during the dry season (*6*). Glaciers in the inland Tibetan Plateau discharge toxic mercury (*7*). Increased meltwater due to warming temperatures and extreme rainfall could lead to greater glacial river discharge, which would be able to detach and transport higher levels of these chemicals. The timing of such glacial runoff often coincides with biomass blooms (*8*), magnifying the cumulative risk to the environment.

Glacial lake flooding could cause acute damage to local habitats and inhabitants, but the contaminated water of glacial rivers could have lasting and latent effects on distant environments. These risks should be included in the assessment and mitigation of glacial disasters.

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Resetting the bar for graduate admissions

The In Depth News story "Drop in foreign applicants worries engineering schools" (17 February, J. Mervis, p. 676) raised concerns for me about our current graduate programs in science, technology, engineering, and mathematics. According to the News story, university administrators worry that as a result of the Trump administration's policies, there will be a 30% drop in the number of applications from international students, compared with 2016. The article goes on to say that a smaller applicant pool allows "administrators the option of admitting students who previously would not have made the cut, including more domestic students. But educators are loath to move the bar if it would lower the quality of the talent pool."

What does "quality" mean? As researchers, we value creativity more than knowledge, yet "quality" is equated with grades, GRE scores, and supporting letters. International students have more content knowledge because they participate in a different educational system than our own liberal arts education. U.S. students function in the system we have created for them, and then we undervalue their potential when applying for graduate school.

The "bar" should be recalibrated to reflect what is required to succeed in graduate programs. A graduate program has a set of first-year courses that are required, and these courses have undergraduate prerequisites. If an undergraduate has taken these prerequisite courses, excelled in them and in supporting courses with high grades, and has good letters of recommendation, then this student has met the bar, and should be considered for admission. However, grades alone do not guarantee success, and grades should not be used to "weed" out applicants. We need to find ways of assessing factors such as determination, curiosity, creativity, and an ability to communicate. When was the last time graduate departments modernized their entrance requirements by using data that reflect the characteristics of successful graduate students? Decisions on acceptance with funding should then reflect the goals of the funding agencies (such as educating our citizenry and broadening participation in the scientific enterprise), and U.S. citizens should be given priority in funding.

I believe in the power of diversity and feel that the United States has a duty to educate the world. However, when more than 50% of graduate students in U.S. programs are international, there is something wrong with the system. Let's view the current situation as an opportunity to recalibrate admissions criteria and return our graduate programs to a position of equity with regard to our citizenry.

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A sandy road through the Kavango region of Namibia

LIFE IN SCIENCE

The roadless dunes less traveled

To study global roadless areas and their importance for biodiversity, I have traversed the globe on remote roads and rough terrain. I have navigated roads blocked by trees, landslides, and angry people, and I've gotten stuck in mudholes, snow, sand, and even rivers. Once, in Namibia, my fellow researchers and I were attempting to drive through the bushlands and thickets of the Kavango region, south of the Okavango River. There was no human settlement for miles around. The dunes stretched to the horizon, and the hot African sun beat down from above. Although we were well prepared for the knee-deep Kalahari sands with a Jeep 4x4, our driver was not accustomed to off-road driving. He proceeded with an abundance of caution—always at low revs and too slowly. Time and time again, the vehicle would become stranded, and we had to get out, dig with our hands to unearth the tires, and push the jeep to get it going. Finally, we told the driver that once the jeep started, he should not stop, for fear of getting stuck again. "Just keep going!" we called, as we pushed the back of the truck incrementally forward. He did as we asked. Once released from a sand hole, he kept driving in an exemplary manner...though too fast for us to catch up and jump in. After a few minutes of running through the sands, shouting and waving, we saw the jeep climb up a dune and vanish.

As we plodded through the sands, we reflected on the critical importance of roadless areas to biodiversity, ecosystem services, and human well-being. We also considered with new appreciation the challenges faced by the local people, who regularly walk dozens of kilometers through the difficult terrain. As we pondered the complex implications of our research, we crested the dune and spotted our jeep. Relieved, we set off toward our loyal driver, who waited for us on solid ground.

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TECHNICAL COMMENT ABSTRACTS

Comment on "Density functional theory is straying from the path toward the exact functional"

Kasper P. Kepp

Medvedev *et al*. (Reports, 6 January 2017, p. 49) argue that recent density functionals stray from the path toward exactness. This conclusion rests on very compact $1s^2$ and $1s^22s^2$ systems favored by the Hartree-Fock picture. Comparison to actual energies for the same systems indicates that the "straying" is not chemically relevant and is at best specific to the studied dense systems.

Full text: dx.doi.org/10.1126/science.aam9364

Response to Comment on "Density functional theory is straying from the path toward the exact functional"

Michael G. Medvedev, Ivan S. Bushmarinov, Jianwei Sun, John P. Perdew, Konstantin A. Lyssenko

Kepp argues in his Comment, among other concerns, that the atomic densities we have considered are not relevant to molecular bonding. However, this does not change the main conclusion of our study, that unconstrained fitting of flexible functional forms can make a density functional more interpolative but less widely predictive.

Full text: dx.doi.org/10.1126/science.aam9550

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