Scientist Spotlight with Rosina Bierbaum

Q&A with prominent FAS-affiliated scientists and engineers

E-mail interview conducted by Allison Feldman, FAS

Dr. Rosina Bierbaum is a Professor and Dean Emerita at the University of Michigan with appointments in both the School of Natural Resources and Environment, and the School of Public Health. This month, she took on the additional role as the Roy F. Weston Chair in Natural Economics at the Public Policy School at the University of Maryland. Her experience extends from climate science into foreign relations and international development. She chairs the Scientific and Technical Advisory Panel of the Global Environment Facility, serves on President Obama's Council of Advisors on Science and Technology, is an Adaptation Fellow at the World Bank, and was a lead author of the recently completed U.S. *National Climate Assessment*. Dr. Bierbaum served for two decades in both the legislative and executive branches of the U.S. Government and she ran the first Environment Division of the White House Office of Science and Technology Policy (OSTP). She was selected by the World Bank to co-direct its *World Development Report 2010*, which focused on climate change and development. She has lectured on every continent and in more than 20 countries. She is a Fellow of the American Academy of Arts and Sciences and the Ecological Society of America, received the American Geophysical Union's Waldo Smith award for 'extraordinary service to Geosciences', and was granted the Environmental Protection Agency's "Climate Protection Award." In addition to FAS, she is also a board member for the Gordon and Betty Moore Foundation, the Wildlife Conservation Society, the Environmental and Energy Study Institute, the Climate Reality Project, and the Tyler Prize for Environmental Achievement. Dr. Bierbaum has a BA in English, a BS in Biology, and a PhD in Ecology and Evolution.

1. When you were a kid, what did you want to be when you grew up?

I grew up in the smoggy steel town of Bethlehem PA, and learned about pollution issues at an early age. Whenever possible, my family would escape to the more pristine environment of the many rivers and lakes nearby, and enjoy a day of boating and water-skiing. Those expeditions shaped my career goal: to be a marine biologist working to preserve our natural resources. In that pursuit, my PhD work focused on understanding the causes and consequences of parasites in shellfish (peacrabs in marine mussels), something that few since Aristotle had written about -- he actually referred to the relationship as an example of 'friendship'. A Congressional Fellowship took my career in an unexpected direction (although many have since opined that studying host-parasite relationships was good preparation for a career in Government...!) and was nothing short of a radically transformative experience. As a result, I enthusiastically pursued a career in science policy, culminating in positions at the highest levels in the federal government.

2. Tell us more about your Congressional Fellowship in the Office of Technology Assessment (OTA). What led you to apply?

I was finishing my doctorate in ecology and evolutionary biology at SUNY Stony Brook when my advisor encouraged – well, really browbeat - me to apply for a Congressional Science and Engineering Fellowship. Dr. Bentley Glass, a great geneticist who fought the eugenics movement, and a believer in using sound science to advance the human condition, felt 'no scientist was worth their salt' unless they interacted with the policy process. When I was selected as a fellow to help Congress respond to the nascent issue of acid rain in the context of the Clean Air Act reauthorization, I realized that there was a crying need for translators and assessors of science. That experience literally changed my life. In the subsequent 20 years of working for the Congress and then the White House, I learned that 'science is never the loudest voice' in policymaking, but it is a necessary one; that scientists must be at the table when decisions about budgets, treaties, policies, and regulations are made; that one has to be nimble to make technical information relevant to *whatever* policy issue is deemed urgent; that keeping things simple – but correct – is a necessary skill to communicate with policymakers; that being a 'civic' scientist requires us all to help educate the lay public, from 'K through gray', about the state of science for advancing human well-being.

3. What do you think is the most important environmental issue for us to deal with today?

Global climate change – it is potentially irreversible and we could leave our children and grandchildren with a fundamentally different world. The projected rates of temperature change over the next century will be unprecedented – potentially up to another 3-4 degrees C average across the globe, unless we dramatically transform our energy systems. Higher latitudes will warm more than the average. Temperature increases amplify the planet's water cycle, melt glaciers, and raise sea level, leading to inundation of coastal areas. Some extreme events have already been linked to climate change, because they represent 3-5 standard deviation events of heat or drought (in an unchanged climate). The United Nations is seriously considering whether it can cope with an environmental refugee situation that flooding of Bangladesh and the Maldives and other small Island States will create; many tens of millions of people could be displaced by a sea level rise of 1 meter over the next century. It is only in the last few decades that scientists have understood that human impacts on the planet are so immense that we are changing the composition of the entire atmosphere and the acidity of the whole ocean. Climate change interacts with all other environmental problems, including air pollution (hotter temperatures enhance smog formation), biodiversity preservation (some ecosystems will disappear, such as the tundra and alpine meadows), and water management (quality and quantity will change as the hydrological cycle speeds up), etc. Time is of the essence. We must rapidly stem climate change, and that requires steep emission reductions of all greenhouse gases, particularly from the energy sector, and the rapid development of the next generation of clean energy sources. Equally, we must ramp up our efforts to cope with the changes already well under-way, and I am pleased that adaptation and resilience are *finally* treated as co-equal and necessary responses to climate change. Congress asked for its first and only report on Adaptation from OTA in 1990 (*Preparing for an Uncertain Climate*) and I was proud to lead it, but as my students are wont to note, that was before they were born! Real recognition of the importance of adaptation has been a long time coming….

4. Do you predict a good or bad future environmentally? Which way do you think we're leaning? (What would be the worst possible scenario vs. the best?)

I vote for optimism and common sense, and I have a strong belief in using science and technology to solve problems. We are now focused on confronting climate change. The Paris Climate Agreement is a great step

forward. All countries of the world have agreed to take action. No generation has ever left the next an irreversible problem, and I don't think ours will do that either. If we don't seriously tackle climate change, that will be the worst scenario. But, I believe we will. The science proving that climate change is occurring due to human activities has become very strong in the last few years; it is irrefutable. Technologies that supply the solutions have made great strides, are beginning to be widely deployed, and the costs are dropping dramatically. Companies and States and cities are all taking action. The deep pockets of the investment community are augmenting public money to rapidly develop next generation technologies. Religious leaders of every faith have called for response to climate change as a moral imperative.

The world climate agreement must be implemented, and ambitions ramped up every 5 years, as planned. The U.S. must clearly play a leadership role in solving climate change. We need to hold our elected officials accountable to help alter the unsustainable energy path that the world is on. We must make the environment a key part of all State and federal elections to avoid leaving the next generation a "roasted" world.

5. How can the youth in the U.S. be inspired to help the environment, especially given the consumer-driven society they have been raised in?

Learn something about the environment. Read Rachel Carson or Aldo Leopold. Spend more time outdoors. Get some understanding of how forests and rivers function as ecosystems. The Senegales poet Baba Dioum said, "In the end we will conserve only what we love. We will love only what we understand."

Reports on our environment show that while some local and regional problems are improving (e.g., acid rain and water pollution), many global problems are worsening (fisheries collapse, desertification, biodiversity loss). It's very clear that, as the great naturalist John Muir said, "When we try to pick out anything by itself, we find it hitched to everything else in the Universe." We can't destroy wetlands or pave over habitat without having impacts that reverberate.

It's important to realize that we are not only Americans, we are also global citizens. We only have one planet. Learn about how others live. Almost 1 billion people live on less than $2 a day, and almost a billion people lack clean water. 2.5 billion people don't have adequate sanitation. The U.S. played a significant role in creating the climate change problem with only 4 percent of the world population. Our lifestyles are over-consuming the planet's resources; it is clearly not sustainable.

And finally, I think challenging families and school children to engage in efforts to reduce their ecological footprint will generate great ideas. For example, calculate how much greenhouse gas your family emits and compare it to the rest of the world. Try to develop a 20 percent emissions reduction path for your lifestyle over the course of a year. It's not that hard, but it is important. Each person can make a difference.

6. Tell us more about your time at the University of Michigan and the unique nature of SNRE.

In 2001, I was appointed dean of the University of Michigan's School of Natural Resources and Environment (SNRE). The goal of SNRE's interdisciplinary approach is to break the disconnect between science, academia, business, and the real world, to equip a new generation of environmental problem-solvers with the tools of many disciplines in order to tackle the increasingly complex environmental issues of today, and to foresee and forestall as yet unrecognized ones. SNRE now regularly turns out students whose natural resource degrees are paired with degrees in business, engineering, urban planning, public policy, public health, or law. The result is graduates who are trained to apply their knowledge in multiple arenas. About 40 percent go on to work in in the private sector, another 30 percent move to government at the federal, state, or local

levels, about 15 percent end up in the non-profit sector or working at multi-lateral institutions, and another 15 percent go into academia. During my tenure as dean, SNRE's research activity tripled, interdisciplinary ties to the University's other programs were strengthened, and the School's mission expanded to encompass global change and risk.

7. What are some of your favorite books?

Some abiding books that never fail to inspire: Rachel Carson's *The Sea Around Us*, Dr. Seuss's *The Lorax*, Aldo Leopold's *Sand County Almanac*, Elizabeth Kolbert's *The Sixth Extinction: An Unnatural History,* and of course, Al Gore's *Earth in Balance*.

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