

Living in a Climate-Changed World



with ...
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Jerry Melillo is a distinguished scientist and former co-director of the MBL Ecosystems Center, and a professor of biology at Brown University. In 2009, he co-authored the landmark federal report to Congress, "Global Climate Change Impacts in the United States." Melillo was a lead author on both the 1990 and 1995 Assessment Reports of the Intergovernmental Panel on Climate Change (IPCC), and he served in President Clinton's Office of Science and Technology Policy from 1996 to 1997. His research focuses on the impacts of human activities on the biogeochemistry of terrestrial ecosystems, which he has studied in numerous sites around the globe. Melillo collaborates with researchers at MIT on the Integrated Global Systems Model, a comprehensive tool to analyze the feedbacks and impacts of climate change based on various economic, climate, and land-use scenarios. He holds a B.A. and a M.A.T. from Wesleyan University and a M.F.S. and Ph.D. from Yale University.

"Climate changes are underway in the United States and are expected to grow," was the firm conclusion of a major federal report in 2009, co-authored by the MBL's Jerry Melillo. All observations point to the facts: Rising temperatures over the past century have brought on changes such as more heavy downpours in the Northeast and Midwest; more days of drought in the Southwest and Great Plains; rising sea levels, especially on the Atlantic and Gulf coasts; and a loss of glaciers, snow cover, and sea ice in Alaska. Global warming has primarily been induced by human activities, the report affirms, but that means the die is not cast. Given the political will, we can mitigate the degree of global warming by reducing greenhouse gas emissions, as well as adapt to the climate changes that are already in place. Melillo has just been appointed by the U.S. Secretary of Commerce to serve on the National Climate Assessment Development and Advisory Committee. Below, he reflects on what may be the next steps.

MBL: Do you think society is more receptive to climate change adaptations—such as farmers preparing for more days of drought—than to mitigation measures, such as enforced restrictions on fossil-fuel burning?

JM: There is a growing recognition that we have to put adaptation measures in place because we are already experiencing climate changes, and we want to minimize adverse effects in the future. People at the local and regional levels are starting to incorporate climate change adaptation measures into their plans. Examples include farmers switching to crop varieties that are better suited to warmer or drier conditions, and communities altering zoning and building codes to put fewer



structures in harm's way, and make them less vulnerable to damage from floods, intense winds, and other extreme events. A terrific example of climate change adaptation is the Deer Island sewage treatment plant in Boston Harbor (lower left), which was built about two feet higher to take into account projected sea level rise by 2050, the planned life of the facility.

Getting the world's nations to agree on mitigation actions to reduce emission of greenhouse gases, such as carbon dioxide, has been difficult. In the United States, communities, states, and regions are showing leadership on mitigation by looking for win-win situations that make good economic sense and at the same time reduce emissions of heat-trapping gases. Many of these win-win cases involve improving the efficiency of energy use. Beefing up insulation in our homes and businesses, switching to more energy-efficient lighting, and buying higher-efficiency cars are all steps in the right direction.

MBL: As an expert in ecological modeling, do you find that people are confused about the use of models to project future scenarios for climate change?

JM: Helping the public understand what the climate change models can and cannot do is an important challenge for the scientific community. We have to do a better job of explaining the benefits and limitations of these models. They help us think more clearly about the complex interactions among the atmosphere, the ocean, and the land that influence the

planet's climate. They also help us to quantify the uncertainties associated with the climate projections. The public needs to be reminded that all of us make many decisions in our daily lives that factor in uncertainty. The military, the business community, governments—all of them use "what if" exploration tools (models) to look into the future and to manage uncertainty.

MBL: Like scientific theories, models might be distrusted because they aren't "facts."

JM: That's why we have to work at linking model projections with our observations of climate trends. A focus on observations allows us to talk about facts. Last spring, for instance, I gave a presentation on climate change to a business group in Rhode Island. We discussed how our observations over the last 30 years show a 70 percent increase in heavy downpours in the Northeast, and our models project this will continue. So how we adapt is a very practical issue, and at the meeting we talked about options like rebuilding the storm drain infrastructure. Three weeks later, there were torrential downpours



that led to extensive flooding in Rhode Island. After that, I got a number of calls from meeting participants who wanted a copy of my Power Point presentation. It's not that I was prescient. It's just that there have been these observations that tell us something, and if we are smart, we will pay attention.

MBL: Do you still encounter people who do not believe climate change is happening, or who do not believe it is primarily caused by human activities?

JM: Yes, but I also find surprising levels of awareness in places you might not think about. For example, the Department of the Navy is very interested in the climate change issue, particularly sea level rise. They have hundreds of bases around the world and they are very concerned about that infrastructure being in harm's way. And they see that this situation will not go away, and that flooding and storm surge problems will likely increase over the century. Hopefully the new Congress will have a dialogue with some of the people in the military who have serious concerns about climate change, and think it could become an important national security issue.

MBL: Are you optimistic that we can mitigate and adapt to climate change before it is too late?

JM: Yes, but I am hoping we do it soon enough so that there aren't really large unintended consequences for society. I have been working with a group at MIT on an integrated assessment model for climate change. Fifteen years ago, when we began this endeavor, we were the only game in town. Now, efforts like these are springing up all over the world. Governments want to think about climate change in this holistic way. In the end, I am optimistic that we will think our way through parts of this problem. We may do some creative things on a global scale, like using land in ways that store more carbon. We can move away from fossil fuels and enter a carbon-light economy through a combination of understanding how nature works and using new energy technologies. I have to be optimistic. We can't give up. We have only one planet. •