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During the time that I have with you, I want to make just three points. First, we have a history. The work we do to assure safe, healthy environments for ourselves, our communities, the nation and the world continues a tradition that dates back to our earliest ancestors. Whether you inspect restaurants or perform chemical risk assessments or prepare for environmental emergencies or craft environmental policies, that tradition gives perspective and meaning to the work that we do.(

Second, we now face a new and unprecedented challenge, climate change. Global changes in atmospheric chemistry, meteorology, ecology and other dimensions of our world together comprise perhaps the greatest environmental health challenge(for the remainder of our careers and for those who will follow us. I'll talk briefly about climate change and its implications for public health.(

Third, I'll make the case that climate change is in a sense our teacher—that the principles and practices that we deploy in protecting the public from climate change can inform our work, not only on this modern problem, but across the spectrum of environmental health. So as depicted in this wonderful Paul Gauguin painting—Gauguin, as you know, took an environmental approach to his painting and left France for the South Pacific seeking better environmental input into his art—I'm going to talk about where we're coming from, where we are and where we're going.(

This very rare 15,000-year-old photograph is a reminder(that even our ancestors had to deal with the problem of indoor environment. You can see that lighting and humidity were problems, and if you look to the right of the picture, it looks as though vector control is a problem as well.(

Water and sanitation have been problems for as long as we've lived in cities and towns. In these ruins from several thousand years ago in the Indus Valley, you can see examples

of plumbing systems, the delivery of fresh water, and even the delivery of sewage services in the form of toilets that had running water to carry away waste.(

These Anasazi Ruins in the Southwest remind us of the importance of built environment features to protect safety and health. They also are a reminder that ecological collapse, the depletion of resources, can be a major determinant of health, ultimately accounting for the collapse of this civilization.(

Food safety has been an issue for thousands of years. The ancient Jewish and Islamic dietary laws that are pictured here—believe it or not, that is a kosher McDonald's—(reflect necessities for food safety that were recognized by our ancestors.(

Even mold has been a problem for thousands of years. The caption here says, “When the waters subside, the problem’s going to be mold.” This slide shows one of my favorite Biblical passages. It’s a bit long, but bear with me. This is from the book of Leviticus, and it’s usually translated as a passage about leprosy. But see what you think. “He who owns the house shall come and tell the priest, ‘There seems to me to be some case of disease in my house.’ Then the priest shall command that they empty the house and afterward the priest shall go in to see the house. And he shall examine the disease. If the disease is in the walls of the house with greenish or reddish spots (and if it appears to be deeper than the surface, then the priest shall shut up the house seven days and come again on the seventh day.” This is probably an early example of an environmental consultant letting the clock run for seven days. “And the priest shall look again. If the disease has spread in the walls of the house, the priest shall command that they take out the stones in which the disease resides and throw them into an unclean place outside the city”—an early hazardous waste site. “He shall have the inside of the house scraped all around, and the plaster that they scrap off they shall pour out in the same unclean place outside the city. Re-plaster the house”—and so on. This is a remediation job. If this isn’t early moldy housing, I don’t know what(is.(

Now with the onset of the Industrial Age a couple of centuries ago, new kinds of environmental health problems appeared. Air pollution became a major problem. This is Pittsburgh in 1910. Contemporary travelers would describe noticing the presence of Pittsburgh from 50 miles away, because they could see the telltale plume of smoke in the sky. The famous smoke episode in Donora, Pennsylvania in 1948 is pictured on the right. That picture was taken at noon time. And, of course, just a few years later came the London smog of 1952 that took hundreds and probably thousands of lives. This is a mid-day picture as well. And so is this one. This picture not only shows the thickness of the pollution, but it reassures us that even in 1952 you could find a decent ethnic alternative to fish 'n' chips in the middle of London. (

Water pollution became a problem as industry discharged pollutants into waterways. This has fortunately been largely controlled in this country. But we still have to tackle the problem of non-point-of-service water pollution. (

Toxic chemicals became a major issue for the country. Such chemicals as DDT and the ways that DDT was applied with very little precaution called public attention to the magnitude of this problem. It's a good time to acknowledge almost half a century later the pioneering work of Rachel Carson, who called the nation's attention to the problems of toxic chemicals and eventually helped give rise to the movement that created parts of our agency. (

Solid and hazardous waste from industries, from household uses, and from other sources remain problems for us. And the built environment is a new issue that we have addressed in recent years—the idea that transportation, land use, and community design, from the huge metropolitan scale you see here right down to the small neighborhood scale of disconnected single-use neighborhoods, can all affect our health and well being. We are working hard now to identify how best to design and build neighborhoods so that they are healthy for people. We even are thinking back to something that our ancestors probably knew very well, and that's the benefits of being outside in natural settings, of being physically active and creating those kinds of amenities in the places where we live. (

But I want to turn for the next few minutes to a new kind of problem—a problem that's unprecedented for us: the problem of climate change. I think everybody in the room is familiar with the science, so I won't spend much time on it. In brief, we've got radiant energy arriving (from the sun. It comes through the blanket of gases that envelops the earth, much as sunlight comes through the glass walls of a greenhouse. It warms the earth. And then as some of that energy is about to be reflected back into space, it is retained by the layer of greenhouse gases. That layer, of course, has intensified over the last 100 or 150 years. Carbon dioxide is one of the main greenhouse gases. As you can see here, we've lived with very stable levels of atmospheric carbon dioxide for many centuries, until about 150 years ago, when levels began to climb from their baseline of about 280 parts per million up about 380 now. (

Taking a long view of things, we have ice core data going back several hundred thousand years. You can see that there is natural fluctuation. But we have never, in the history of this record, seen CO₂ levels as high as they are now. We're now up to 380 and rising. So this is absolutely unprecedented in the history of the earth. (

In association with those rising levels of CO₂ and other greenhouse gases, we're seeing temperatures rise. This slide shows that we've gained about a degree centigrade—almost two degrees Fahrenheit—over the last century. Seven of the ten hottest years in history have occurred in the last decade. We continue to see average warming across the face of the globe. That has led to changes in the world. We're living in a different world than our great-grandparents did. (

Severe weather events, of course, have always occurred. But as the air gets warmer, it holds more moisture, and tends to dump this moisture more intensely, making these events more likely. Here are some very interesting data from investigators at Georgia Tech, published just last year. Experts traced the frequency and severity of storms in each of the basins of the world. It turns out that the frequency of storms hasn't changed in recent years, but the severity of storms has changed. If you look at the picture on the

right, the steeply rising red line shows the proportion of hurricanes classified as “intense.” You can see that the intensity of storms is rising.(

We’re also experiencing what I call the balding of the world. This is a picture of the extent of the Arctic ice cap, from 1979 to 2005. You can see that the Arctic ice cap is shrinking. This was a nice graphic from the New York Times, when the data were released in 2005. The red line that traces from Russia to Alaska to Canada to Greenland is the traditional extent of the Arctic ice cap from 1979 to 2000. The white picture in the middle is how it actually looked in 2005—a shrinking ice cap, the balding of the world.(

Those of you who like folk music remember the story of Lord Franklin, who famously tried to find the Northwest Passage, across the North Pole, and disappeared into the cold. It’s been historically impossible to make that crossing by sea. When Roald Amundsen made the trip by dog sled in 1903, it took more than two years. By 2005 there were just 40 miles of scattered ice in Victoria Strait. And no surprise, this slide shows a Website advertising a North Pole expedition. You can now sign on, get on a boat, pay your money and take a ride across the North Pole, the trip of a lifetime—something that would never have been possible in years past.(

Polar bears and other flora and fauna are suffering as a result. Polar bears are one of those charismatic mega-fauna that everybody knows about and loves. The Hudson Bay polar bear population has diminished 22 percent in the last 20 years. The one-year survival of polar bear cubs has dropped from 65% to 43% in the last 20 years. There are now confirmed reports of polar bears drowning while swimming from ice floe to ice floe, because the ice is simply too dispersed—a longer swim than anything for which they evolved. And there are reports of polar bear cannibalism, something never seen before, because of the shortage of food for the polar bears.(

We are losing glaciers. This is a picture of Glacier Bay National Park in 1941. Here is the very same scene in 2004. No more glaciers. This is Glacier National Park in 1932, and this is the Boulder Glacier. And here is a picture of the very same scene in 1988. You can

make those comparisons at the Matterhorn. The snow cap on the Matterhorn has gone away or has diminished in the last 40 years. We can see the same pattern in Austria. This is the Pasterze Glacier, which is now largely gone. The Portage Glacier in Alaska is now a lake rather than a glacier. This is a changing world. (

Not only are glaciers diminishing in size, but the ice is melting in Greenland, the site of one of the largest sets of glaciers in the northern hemisphere. As the ice melts, water from the melting glacier percolates down through the glacier and lubricates the interface between glacier and earth, causing the glaciers to (advance toward the water much more rapidly than had been predicted. So we're seeing much faster glacier loss than models predicted even 10 or 20 years ago. (

Now this is my favorite scientific journal, and it points out that the oceans are rising. The good news is that the oceans are actually not rising 150 feet. But we have seen an average mean sea level rise of several centimeters over the past 100 years. And particularly in the last 10 or 20 years, we're seeing that rise accelerating. Ocean levels rise because water expands as it gets warmer. Ocean levels also rise because large repositories of frozen water in the Arctic and Antarctic regions melt and contribute to the increase in the ocean level. (

The number of floods is also increasing—both thanks to rising ocean levels and because of unstable weather patterns. Here are IPCC data showing that in each region of the world, floods are becoming more common decade by decade. Weather and flood catastrophes are a major concern for the insurance industry. These rising patterns that you see here in the cost of disasters reflect in part worsening weather and of course in part more structures with more value built in more susceptible areas. But it is clear that the worsening weather, the more intense flooding, the more intense storms are a major economic threat as well. (

So the world is changing. Rising temperatures, more severe weather events, loss of polar ice cover, ecological damage, glacier loss, sea level rise, floods—and that’s not a complete list.(

Well, that’s the situation up to(today. Where will this be going in coming decades? What does the future hold in store? We know that carbon dioxide levels are continuing to rise. Even if we were to stabilize our emissions of CO2 levels and other greenhouse gases today, levels would continue to rise because there is a lot of momentum in the system. There are various projections for how high carbon dioxides are going to go and various calculations of the ceiling beyond which we shouldn’t go if we are to avoid irreversible and deadly changes(to the earth’s ecosystem. We also expect temperatures to continue to rise. Again, there is uncertainty around how much the temperature will rise. But several degrees is a midpoint estimate. And that appears to be something that is inescapable at this point—the so-called “climate change commitment.”(

Carbon dioxide concentrations, temperature, and sea level continue to rise even after emissions are reduced. In this picture, you can see the brown curve that peaks and declines. That scenario depicts a peak in(greenhouse gas emissions followed by a decline, something toward which we aspire in coming decades. But you can also see that the impacts of the greenhouse gases will continue to rise—in some cases, for centuries—(before stabilizing. The picture on the left shows that if we were to keep the atmospheric composition exactly as it is today, we would continue to see the temperature rise. And if we continue to emit as we’re doing today, we’ll see a much faster and longer-duration temperature rise. If we increase(our emissions, given the rapid development in many parts of the world, we will expect even more warming in(coming years.(

Now all of that is based on relatively linear models. But abrupt changes in the system could complicate things even more. For example, the thermohaline shutdown is the concept that the flow of ocean currents seen in this slide could be altered. These ocean currents are important for maintaining climate at the levels to which we’re accustomed. If, for example, the ocean currents were to shut down, Europe would become

substantially colder than it is. Recent data suggest this is less likely than we feared, but it is still a concern. Methane releases from tundra could occur suddenly in an accelerated form as the tundras begin to thaw. Methane is a very potent greenhouse gas that could in turn be a positive feedback loop that would accelerate climate change. If the continental ice sheets collapse, that could lead to relatively sudden increases in sea level.(

This wouldn't happen in a day or a week, but rather over the course of decades to centuries. It could lead to major inundations of coastal areas. Ocean acidification could occur with more CO₂ in the atmosphere. CO₂ is absorbed in part by the oceans. That's a good thing. The oceans act as a sink. But acidified oceans are a different ecosystem than normal oceans. And that means that the food chain would be threatened. So we have a number of predictable changes, and a number of unpredictable potential changes, and all of that cautions us.(

The ones that we think about most as public health people are those that pertain to human health. As you can see here, there is a range of potential health effects from climate change—the direct effects of heat, causing morbidity and mortality, and the effects(of storms in coastal flooding. All of us watched Katrina last year, and we're very familiar with what severe storms do to public health. Coastal flooding could displace large populations, causing tremendous trauma and public health threats. Changes in ecosystems lead to changes in vector biology, creating infectious disease risks. Some air pollutants, especially ozone, are created at higher levels, at higher temperatures. That's why December is the ozone season here in Atlanta and elsewhere. So that warmer(temperatures may cause worse problems with air pollution. Changes in the ecosystem will lead to changes in how we produce our food. And those changes could compromise the food supply for some of the most vulnerable among us. And all of this could lead to civil conflict.

The European heat wave was a good example of the potential effects of climate change. The graph on the left shows the kind of epidemiologic data that CDC has collected for years to trace the effects of heat waves. There were approximately(30,000 deaths across

Europe—and those are only from the countries that reported data that could be confirmed. So the death toll was probably higher than shown here. One of the public health responses is to anticipate heat waves and put heat wave plans into place. I'll come back to that in just a few minutes.(

The urban heat island refers to the fact that cities are warmer than the surrounding countryside. Two factors create this effect: the loss of trees, leading to the loss of evapotranspiration, and the construction of dark surfaces that absorb heat and re-radiate that heat during the evenings, when the cities would otherwise cool down. As we build bigger and bigger cities, as we become more and more an urban species, then the combined effects of urbanization and climate change may well lead to more heat waves in cities.(

Rising ocean levels will cause inundation of coastal areas. This slide shows a prediction of what will happen to Florida with a one-meter rise in sea level. The red areas are areas that would be inundated and would become uninhabitable, forcing the displacement of the people who live there. A three-and-a-half-meter sea level rise would look like this. The same picture can be done for Manhattan. Here it is on the left as it is today; large portions of Manhattan and the other boroughs and parts of New Jersey would disappear with a three-and-a-half-meter sea level rise.(

Infectious diseases are a huge topic in the context of climate change. Jonathan Patz, one of the world's experts on this topic, is here with us, and he will be running a session during this meeting. So if you'd like to learn more about the impacts of climate change on infectious disease risk, I urge you to attend that session. This is an IPCC slide that shows the likelihood of an expanded distribution of the various infectious diseases. You can see indicators in the right-hand column of varying levels of risk. The "highly likely" category is reserved for malaria. The "very likely" category includes schistosomiasis,(river blindness, and dengue, among others. In short, if tropical climates expand their range, then tropical diseases will expand their range. There is very solid evidence now

that this is happening already, both in terms of geographic spread and in terms of spread to higher altitudes in places already at risk of infectious diseases.(

This is a picture of ozone formation versus temperature and a reminder that with higher temperatures we expect more ozone formation.(

Climate change and food—a very complex set of relationships. As places get warmer, as rainfall patterns vary, some places become wetter, some places become dryer, and some pests become more prevalent. Many of the standard forms of agricultural production that we know may be expected to change. It may be that the grain basket of North America migrates north toward the Yukon Territory and Manitoba.(

We do have good data on the impact of warmer weather and higher CO2 levels on the growth rates of various food plants. While there is some uncertainty, in most cases we expect grain yields to decline. Most of the plants that we now know and on which we rely have evolved (or have been evolved by us) in the context of a particular climate. If that climate changes, plant growth may be impaired. It's especially notable that the poorest and most nutritionally precarious regions of the world depend on the grains that are most at risk of declining production under climate change scenarios. We have to worry greatly about those who are most at risk.(

Mental health is another key issue, as suggested in this New Yorker cartoon. It says, "This past summer I got deeply depressed about our planet, as if I didn't have enough problems of my own." We really do need to ask about the impact of this much gloomy news on all of us and on our children, who need and deserve the prospect of a sustainable and safe world in which to grow up.(

Civil strife is another concern associated with climate change. Our species has an unfortunate but very familiar history, when resources grow scarce, of fighting with each other over what's left. We have to expect that individual acts of violence or widespread acts of violence may be on the rise in certain circumstances.(

This is very gloomy stuff. It's hard to talk about. How do we think about it? To begin with, we're called on to think about the unthinkable. We've had to do that before. It was unthinkable until September 2001 that an act of carnage like the attack on the World Trade Center would occur on our soil. But we had to grapple with it, and we did. We took it on. We've taken a number of steps to prevent such terrorist acts from happening again. It changed life for many of us. But it showed us that we have the ability to take on the unthinkable and to tackle very big problems.

It's hard to think about climate change for a number of reasons.

- It's very complicated. In the short time that I've talked, I've jumped from infectious disease ecology to meteorology to atmospheric chemistry, and there is a lot more that one needs to know to understand the problems fully.
- We've never experienced climate change. It is unprecedented, and that makes it hard to think about.
- It's scary, and the natural reaction in thinking about something scary, of course, is to recoil.
- It implies behavioral changes because we are profligate users of energy. We emit large amounts of carbon dioxide into the atmosphere. And if we're to make contributions to prevention, we'll probably need to change some aspects of our lifestyle. But since we're mighty comfortable, who wants to think about making those changes?
- And finally, misinformation has been actively disseminated for some time. I think we're seeing a growing national consensus across all sectors of the nation that this is a real problem that we need to tackle. And the misinformation is declining. But it has been a real confusion to many, many people.

We can think about climate change in a number of ways that will help us move forward. One is in a moral framework, the concept of intergenerational responsibility—the concept

that we have a(moral obligation to leave for our descendants a world that they can inhabit safely and healthfully and to take more responsibility for sustainability over time.(

For some there is a religious obligation to be good stewards of the earth that was given to us in trust. I call your attention to the Evangelical Climate Initiative, one of a number of major religious initiatives that have tackled the problem of climate change and have used this framework of divinely ordained stewardship as an obligation.(

We can use the precautionary principle, something with which we're very familiar in environmental health and in public health more generally. Do we know all of the details of climate change? No, we certainly don't. Do we know how fast it will occur or how serious(the problems will be? No, we don't. But given credible indications that there is a danger, we need to act in order to protect people from that danger. This is standard public health practice. We do it in emergency rooms every day, and we can use this thinking to help us move forward on climate change.(

A final way to think about this problem is a medical analogy. If you feel hopeless about climate change, if you think that there is nothing at all we can do, if you think that things are too far gone to repair—we still have a calling. Our calling is to relieve suffering and do the right thing. If my patient develops a terrible terminal disease, I don't abandon the patient. I stay with the patient and see things through. If nothing else does, that concept ought to motivate those of us in public health to roll up our sleeves and work hard on the climate change issue.(

Well, what do we do? In this cartoon, Bob sees on the television that the chief contributors are carbon dioxide and methane. He looks at his Coke and he looks at his bean dip and suddenly he realizes that he's part of the problem. And he resolves to take action.(

What should we do in the public health context? Those in the climate change world talk about two main arenas of response—mitigation and adaptation. Mitigation corresponds to

primary prevention. It represents efforts to control climate change by lowering greenhouse gas emissions, by reducing levels of greenhouse gases in the atmosphere, by stabilizing and ultimately reversing the entire phenomenon. That's mitigation.(

Adaptation is also an approach that we use in public health. It involves anticipating things that will be occurring or are occurring now and taking steps to minimize the harm done to people. This is what we call preparedness.(

So(we can deploy both primary prevention and preparedness, mitigation and adaptation. Mitigation, technically, can be accomplished in a number of ways: reducing carbon dioxide and other greenhouse gas emissions by such means as alternative energy sources, energy conservation and efficiency and more, and pulling carbon dioxide out of the atmosphere, sometimes even before it gets there, and sequestering it in places where it won't contribute to atmospheric changes. There are policy approaches that would support(these and other approaches to mitigation—voluntary behavioral changes, market mechanisms such as cap and trade regulations, and incentives for the development of new technology. Now none of these things is primarily the responsibility of public health. But we need to be aware of them, and to the extent that they are acts of prevention, we need to support them.(

The public health side has a lot more to do with adaptation. Adaptive mechanisms for climate change vary widely—more dikes, dams and levees, and relocating people who are in high-(risk areas for hurricanes and floods; changing agricultural practices to assure a supply of food; developing heat-wave plans for cities that are at risk of heat waves, so that those who are most vulnerable can be found and rescued if a heat wave should occur. Vector-borne disease control programs are another form of adaptation. We can assure that physicians and nurses in areas at risk of infectious disease spread are ready and prepared and can diagnose diseases such as malaria and dengue and can act rapidly to control them. Changes in food handling are forms of adaptation. There is a wide range of public health actions that we can take and that we need to be taking. (

We can frame a lot of our responses to climate change in terms of the ten essential public health services. I think everybody in the room knows this list by heart, from monitoring health status down to doing research. What are some examples of how, within the public health paradigm, we can tackle climate change? (

We can monitor health status by tracking health conditions that are related to climate change. In terms of informing, educating and empowering people, we can educate the public and policy makers about the health consequences of climate change to help move adaptation efforts forward and to help move prevention efforts forward. In terms of developing policies and plans, many of the necessary policies and plans belong to the energy sector or the transportation sector or others. These aren't primarily public health actions, but we can support adaptation and mitigation efforts as we have supported efforts historically in arenas other than our own—efforts such as seatbelt installation in cars. Research is a clear mandate. There is a lot we still don't know. We need to promote research on the links between climate change and health so that we better understand those links and so that we can better prepare to protect the public. (

The last point I want to make is that climate change is our teacher. The things we have to do in response to climate change are things that we have to do as environmental public health professionals generally, and they will enrich our work and improve the results that we get across the board. (

The first principle I'll suggest for your consideration is to envision healthy, wholesome environments. Sir Francis Bacon said, "They are ill discoverers that think there is no land when they can see nothing but sea." We need to be visionary. We need to envision a better world than the one that bad news stories would sometimes put in front of us. When it comes to climate change, that means envisioning healthy, sustainable, stable ecosystems in which our children, grandchildren and great grandchildren live. We do that all the time. Many of us working on built environment issues are accustomed to looking at a scene like the one in this picture, a very common street scene across the country, and imagining that if we put in some trees, some transit, some better pedestrian infrastructure,

some mixed land use, with residential and commercial, so that people could walk on their errands instead of having to drive, that would be a healthier place. And if we add transit and bicycle lanes, encouraging walking and biking, we have envisioned a healthy neighborhood, the kind of thing that we want to provide for the populations we protect.(

We need to move from the automotive arms race, the arms race that brought us the Ford Excursion, which was topped in size by the Lincoln Navigator, which was outdone by the Hummer, which will probably be conquered very soon by the Peterbilt Crusader, All Sport, Denali Outback, Eddie Bauer 5.9 Limited.(

We can move from that to envisioning efficient vehicles that look like these, that are fun to drive, energy-efficient and sustainable, and to envisioning walkable communities where people can use their feet or use bicycles powered only by the food they eat, while they are getting healthy as they travel from place to place. That's envisioning.(

Second, we need to think big, to think synthetically, to think across many issues. We need to appreciate the synergies that occur when our efforts achieve goals on many levels. This picture is a simplified version of our response to any problem. Climate change is an important problem to tackle. But we're also going to face the problem of peak petroleum, probably in our lifetimes. Petroleum will become a lot scarcer. That means the transportation patterns will have to change, and that in turn calls on us to think about solutions that will serve both of those challenges.(

In addition, population will continue to grow. The census bureau predicts that the US population will nearly double by the year 2100. That means we need room for a lot more people. And the places that we design and build for those people have to be places that do not emit large amounts of greenhouse gases and that do not require a lot of petroleum for traveling around.(

So we have a three-part problem. We have an obesity epidemic. That means it's in our interest to get people walking and biking more, while riding in vehicles less. And that means that we can solve a number of problems if we think holistically. (

Here is an example. This is a rare photograph of a parent walking children to school. The year is 1956. It's the last known time this happened in the United States. What's good about this in public health terms? Lots of things are good about this. This family is getting physical activity, something that we know—now more than ever—people need. They're decreasing their contribution to air pollution by walking rather than driving their 1956 car. They're not contributing to climate change because they're not burning fossil fuels. They're building social capital and sense of community, because they can meet and greet neighbors on the sidewalk rather than shake their fist at adversaries through the windshield of their car. In addition, physical activity is a very effective anti-depressant, should mom have any tendency in that direction. Injury risk is down, for the automobile is a very injury-prone micro environment and they are out of that automobile. Being physically active is a good preventative against osteoporosis. (

I could go on but the slide runs out of room pretty soon. But I will mention that all of those benefits and more are supplemented by the fact that if we don't have to keep on building roadways, then the money that we save socially can be put into healthcare, education, law enforcement, and other priorities that all of us share. (

A third imperative for us is to be good ancestors. (Remember that we are taking care not only of ourselves, but of those who come after us. When I was a practicing physician, I thought in terms of the clinical approach. I cared for each patient one-by-one in the exam room. When I shifted to public health, I took a public health approach, and I thought of myself as caring for an entire community at a time. (

I want to suggest a third transition that we can all consider. We need to care for future generations as well as the communities that we now serve. This is the legacy approach.

This invites us to think forward to long after we're gone, to what sort of a world we will have left for the people that come after us.

Don't be afraid to lead. A lot of the messages that we need to deliver may be difficult messages for people to hear, and our leadership is absolutely necessary. Leadership involves accountability—and community accountability is very much a part of environmental health practice. I think most of the people in this room have found themselves sitting in community meetings, and listening to the community and forming answers together rather than declaring what the answer is going to be. That sort of accountability is essential. It is a part of leadership.

Leadership requires courage, courage to deliver difficult messages, courage to get outside your comfort zone. If you know environmental public health and you don't know climatology or you don't know infectious diseases, you need to tackle those topics, and that takes courage. You even need to get up in front of groups, as I'm doing right now, knowing that you're not an expert. That takes courage. It takes the courage to form partnerships with people in different fields, because we need those partnerships to tackle big jobs. It takes the courage to deal with uncertainty, something that we're very accustomed to in the world of environmental public health. We make risky decisions in the face of uncertainty all the time. And it takes courage, and it is an act of leadership when we do that.

Next, we need to pursue justice. We know across the public health world, including in environmental public health, that not all of us are equally affected by public health problems. Some people are disproportionately exposed and disproportionately at risk. This has given rise to the transformative field of environmental justice. Poor communities and communities of color have taught us all that people at risk deserve special consideration. We need to devote our attention to those communities. We saw in Hurricane Katrina that not all of us are equally at risk from some of the kinds of severe weather events that we expect with climate change, and we need to keep that absolutely at the center of our attention.

We also need to think about justice on a global level, because the parts of the world that are at most risk from climate change-induced disasters, changes in food supply, disease patterns and so on are those that are already the most marginal. This is true not only in the climate change arena but across all of environmental health and across all of public health. Who is most at risk? Who is most vulnerable? Those are the populations that deserve to be at the center of our attention. (

Finally, be joyful. Have fun. We do have some hard messages to deliver, but we have some great messages to deliver. The vision of a wonderful, healthy, sustainable, and beautiful world is something to which we can all aspire. The fact that we have each other to work with is a blessing. I have loved being in the environmental health field, and it's because of the kinds of people who are in this room with whom I get to work every day. Be lighthearted. Be fun. Have fun. Take joy from the good work we do, because there could not be a finer and more uplifting and more ennobling calling for any of us. (

These are the messages that climate change teaches us. But these are lessons that can guide us in all of our environmental public health work and in all of the public health work that we do. (

Thank you for all of the work that you do to protect the health of the public from environmental challenges and to ensure that every member of the public, locally, nationally and globally, can enjoy safe, healthy environments now and for generations to come. Thank you. (