This podcast is presented by the Centers for Disease Control and Prevention. CDC - safer, healthier people.

Global changes in atmospheric chemistry, meteorology, ecology and other dimensions of our world together comprise perhaps the greatest environmental health challenge.

Basically 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 later of greenhouse gases. That layer, of course, has intensified over the last 100 or 150 years.

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 CO_2 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 associate with those rising levels of CO_2 and other greenhouse gases, we're seeing temperatures rise. 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.

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.

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. Event if we were to stabilize our emissions of CO_2 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."

So we have a number of predictable changes, and an umber 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. 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 flooring. 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. 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.

The European heat wave was a good example of the potential effects of climate change. There were approximately 30,000 deaths across Europe – and those are only form the countries that reported data that could be confirmed. So the death toll was probably higher. One of the public health responses is to anticipate heat waves and put heat wave plans into place.

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, leaving 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.
Infectious diseases are a huge topic, if tropical climates expand their range, then tropical diseases will expand their range. There is evidence 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.

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 CO_2 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. We really do need to ask bout the impact of this much gloomy news on all of us and our children, who need and deserve the prospect of a sustainable and safe world in which to grow up.

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 hd 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.

We can use the precautionary principle, something with which we're ery 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 fsst 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 form that danger. This is standard public health practice. We do it in emergency rooms every day, and we an use this thinking to help us move forward on climate change.

What should we do in the public health context?

Adaptation is 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.

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 it 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.

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.
Leadership requires courage, courage to deliver difficult messages, courage to get outside yoru 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.

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