

**Remarks by Vice President Al Gore  
at the  
SE Regional Climate Change Impacts Meeting  
Vanderbilt University  
Nashville, Tennessee  
June 25, 1997**

(ACKNOWLEDGEMENTS FROM ADVANCE)

Thank you very much ladies and gentlemen. I want to thank our hosts here at Vanderbilt and the program committee for organizing this event, and to recognize NASA, the National Oceanic and Atmospheric Administration, and the U.S. Geological Survey for their sponsorship. And I want to give special credit to Jack Gibbons and Jerry Melillo, and the OSTP and USGCRP staffs, for arranging this whole series of regional workshops.

I'm glad to see such a wide variety of participants here. We all have a stake in addressing climate change and its effects. This is one of the most important environmental issues that faces our planet, our nation, and our communities. There is an increasing recognition of this fact.

- Most importantly, we have the landmark statement in the Second Assessment report of the Intergovernmental Panel on Climate Change, published in 1996: "The balance of evidence suggests a discernible human influence on global climate."
- Furthermore, in the last several months we have seen the release of several statements about the risks from climate change. A group of over 2500 scientists warned us that we are "disrupting" the climate and a group of more than 2000 economists, including six Nobel Laureates, stressed the need for preventive action.
- It isn't only the science community that is concerned. Just last month, the Chief Executive of British Petroleum publicly acknowledged the importance of the issue.
- I think that society is taking the climate change issue seriously. The Administration takes it very seriously. And so do you. Your attendance at this event is proof of it.
- We have to work together to confront this challenge. Many of the most significant environmental decisions are made by state, county, and municipal governments, businesses, and individuals -- environmental quality depends on the actions of all of us.
- We are becoming increasingly aware that global changes have significant regional and local consequences; that they form a suite of stresses that place additional strain on ecosystems and natural resources that are already affected by pollution and population pressure, and shorter term climate variability, such as the El Niño phenomena.

Radical changes have occurred in our environment in just my lifetime. I believe very deeply that this dramatic series of changes, of which climate change is the most prominent manifestation, is really attributable to an underlying shift in the fundamental relationship between human civilization and the Earth's environment.

- How has humanity come to have such a profound effect on the Earth system? How did we get to the state where we have fundamentally altered the Earth's atmosphere in just 100 years?

As is often true, when a fundamental change takes place, one can't point to a single causal factor to explain it. In this case, I've come to believe that this radical change in the relationship between civilization and the Earth has come about because of the confluence of three factors: (1) the population explosion, (2) the scientific and technological revolution, and (3) a change in the way we view our responsibility to the future.

- The global population explosion is now adding the equivalent of one China's worth of people every ten years. It took the entire history of the human species to reach two billion people in 1940. We have added another 3.5 billion since and are still growing. Fossil fuel usage has quadrupled during this same time period.
- The scientific and technological revolution has dramatically magnified the potential environmental impact of each of the billions of people on Earth, leading to a new coefficient by which the impact of human civilization on the Earth must be measured.
- And most importantly, there has been a change in thinking about our duty to consider the future consequences of our present actions. Some assert that we can't possibly have any meaningful impact on the Earth's environment, therefore we shouldn't think about it, much less worry about it or study it in detail.

Together, these three elements have combined to produce a discontinuity, a fundamental change in the relationship between human civilization and the Earth. They mean that sustainability has graduated from an interesting concept to a necessity. Our actions do have wide reaching and long-term consequences, and it is our responsibility to consider these consequences as we make our decisions. We have a choice about the environmental legacy we leave to our children, and our children's children. They are depending on us to choose wisely.

Wise decisions must be based on knowledge. When it comes to climate change a great deal of progress has been made. We are still a long way from having all the answers, but we have acquired some vital understanding.

There is -- the revisionist few not withstanding -- scientific consensus on the most salient issues:

- Burning of fossil fuels releases about 6 billion metric tons of carbon per year. Changing land use patterns (agriculture and forestry) contribute about another 1-2 billion metric tons per year.

- We know that greenhouse gas concentrations are building up in the atmosphere due to these human activities: Since the industrial revolution, CO<sub>2</sub> has increased nearly 30%, Methane has more than doubled, and Nitrous oxide has gone up by 15 percent.
- Scientists agree that continuing this buildup of greenhouse gases **will--** not **may--** cause the climate to change. The scientific community can't yet tell us precisely the pace or pattern of future changes, but they are telling us that change has already occurred and that more changes are coming.
- Over the last century, the global mean surface temperature increased by about a half degree Celsius (almost one degree Fahrenheit). Over the same period, global mean sea level has already risen 10 to 25 cm and mountain glaciers have retreated world-wide.
- The surface temperature this century is as warm or warmer than any century since at least 1400 AD. The last few decades have been the warmest of this century, the ten warmest years this century have all occurred since 1980, and 1995 was the warmest single year on record.
- Over a recent 10 year period, high latitudes (between 45° and 70° North) sustained a longer growing season, an earlier greening in spring and summer, and what appears to be an increase of approximately 10% in photosynthetic activity.
- The international consensus is that the global surface temperature will increase another two to six degrees Fahrenheit over the next century. That is a rate unseen on the planet for the last 10,000 years. There is a relationship between carbon dioxide (CO<sub>2</sub>) and temperature. See for yourself.

*[The Vice President shows the 170,000 year record from the Vostok ice core and describes the clear relationship between temperature and CO<sub>2</sub>. He then shows the potential future trend in CO<sub>2</sub> and discusses what that might mean for global temperatures.]*

- New findings are extending this record much further into the past. At the American Geophysical Union Meeting in Baltimore last month, a group of French, Russian, and US scientists announced new discoveries from the Vostok, Antarctica Ice core that extend the paleo-CO<sub>2</sub>, methane, and temperature records back to around 400,000 years ago.
- This new record, from trapped air bubbles in ice more than 3000 meters below the surface of the Antarctic ice sheet, show that CO<sub>2</sub> concentrations during each of four previous interglacial periods were about 290 ppmv, generally similar to preindustrial levels.
- The evidence shows that we are now at a CO<sub>2</sub> level higher than any experienced in the last 400,000 years. An article describing these findings will soon appear in Nature.
- Looking to the future, our trajectory is clear and ominous. In a geological blink of an eye -- 100 years -- we will be taking CO<sub>2</sub> to levels not seen on this planet in 50 million years.

Sherrard Rowland

NSF

Clearly this kind of global-scale, long-term evidence is quite compelling, but I think it can still seem a bit remote to many people. However, global-scale changes have a variety of impacts that manifest themselves at regional scales. For instance, NOAA's Tom Karl has compiled some very interesting data on precipitation.

- Total precipitation has increased worldwide since the beginning of the century. In the US, it is up by 6%, which is equal to about half the annual flow of the Mississippi.
- The kind of rainfall in the US also appears to be changing. Over the last century, intense rainfall events, where more than 2 inches of rain falls in a day, have increased by about 20%. Intense precipitation leads to flooding, soil erosion and even loss of life. The human and economic costs of such events are staggering.
- In December and January, we had terrible flooding in the Northwest and on the West Coast (California, Washington, Oregon, Idaho, Nevada, and Montana), with 36 deaths and damage estimates of \$2 to \$3 billion.
- This spring, the Dakotas and Minnesota were hit hard. 11 people died in the Northern Plains floods, and damage estimates range from \$1 to \$2 billion.
- The March tornadoes and floods in the Mississippi and Ohio river valleys took the lives of 67 people. Tens of thousands had to be evacuated, with damages of about \$1 billion.
- Just this weekend, we have seen serious flooding in the South Texas Hill country. Bandera, Texas was hit with over 20 inches of rain in a 36 hour period. Preliminary reports indicate that several people were killed, and dozens more evacuated.
- The opposite effect -- too little rain -- is also serious. Cost estimates for the South Plains drought in 1996 are about \$4 billion.
- We can't attribute these specific events, or **any particular** weather or climate event to increases in greenhouse gases. But we can say that global warming increases the potential for climate and weather extremes. Flooding and droughts are expected to become more frequent than past averages indicate.
- These recent episodes are the kind of situations we can expect as the climate continues to warm and the hydrological cycle intensifies. They illustrate the vulnerability of our communities and natural resources to climate changes and severe weather events.
- We can clearly see the influence of shorter scale climate variability on the hydrological cycle when we look at the worldwide effects of the periodic changes in Pacific ocean temperatures and circulation known as the El Niño (warming in the eastern Pacific) and La Niña or El Viejo (cooling in the eastern Pacific).

- El Niño has been shown to affect western crop yields and rangeland conditions, and to increase SE winter rainfall. New results from one of our co-chairs, Jim O'Brien, are showing an intriguing relationship between La Niña and the distribution and frequency of springtime tornadoes in Tennessee, Alabama and Indiana.
- On June 17, NOAA announced that we are entering another intense El Niño period. This will likely mean wetter, cooler weather in the Southern US; much increased rainfall in California, the SE and the SW; increased dryness in the Midwest and Northwest; and a decrease in hurricane and tornado activated. Brazil, Australia and S. Africa are bracing for drought conditions. Peru has already declared a state of emergency.

While we are learning more and more about the effects of climate change and climate variability on some extreme events, others are not well understood, and we don't have a clear picture of the future. We know more about costs than causes. The insurance industry consistently expresses concern about this uncertainty. Frank Nutter, President of the Reinsurance Association of America, fears that significant, and perhaps permanent, changes in our climate could bankrupt the insurance industry. Sobering words.

The vulnerability of the Southeast is clear. Extreme events and sea-level rise could have especially serious impacts, because the SE has more than 50 percent of the country's barrier islands and 85 percent of the nation's coastal wetlands, as well as more than 80 percent of the direct hits from hurricanes.

- Louisiana's Barrier Islands are a vanishing resource. These islands shelter important coastal wetlands that serve as the nurseries for many types of fish and shellfish, which together form a billion dollar a year industry for the region.
- These islands are currently being eroded so quickly that some scientists estimate that the islands will completely disappear by the end of this century. Climate change induced sea-level rise will accelerate this process.
- Some projections indicate that the Southeastern forests -- of great commercial value to the region -- could be severely impacted. Climate change will alter rainfall and soil moisture patterns, and cause northward shifts in the climate zones appropriate for particular species.
- As we can see from these examples of the kind of vulnerabilities that exist here in the SE, climate change can exacerbate existing stresses on human populations, natural resources and ecosystems, such as pollution, ecosystem fragmentation, and urbanization.

These are troubling, complex and challenging issues to confront. How should we respond to this challenge? The Clinton Administration believes there are a series of prudent actions we must take.

**1. We need to deepen our scientific understanding of climate change and its relationships to other stresses.**

- An aggressive U.S. Global Change Research Program must continue to refine our understanding of the physical climate system, but add a **new** focus on the regional-scale ecological, social, and economic impacts of climate change.

**2. We must stay engaged in the international process of confronting climate change.**

- The U.S. and 160 other nations have ratified the Framework Convention on Climate Change. In the current round of negotiations, the US is strongly supporting adoption of a binding emissions target rather than an “aim,” the use of flexible, market-based mechanisms, and the participation of all nations.

**3. We must lead the world in developing and deploying clean technologies for cost-effective reductions in greenhouse gas emissions.**

- After a decade of languishing budgets, our Administration is just beginning to return the energy efficiency and renewable energy R&D programs in the Department of Energy to viable levels. But this has been a struggle every step of the way. Congress needs to join us in supporting these efforts instead of slowing us down.
- Not only are these programs essential for climate change mitigation, they benefit our economy and reduce our dependence on foreign energy supplies.
- These are industries of the future, and we can develop them at home or let others reap the benefits. Let me give you just 2 examples:
- Although the fuel economy of cars has almost doubled in the last twenty five years, we travel more than twice as many miles as in 1970. Our Partnership for a New Generation Vehicles has some of the brightest government engineers and scientists working with their private-sector counterparts in Detroit to triple the fuel efficiency of passenger cars with no decrease in comfort or safety.
- Productivity improvements in the building industry are lagging far behind all other industries and energy use in buildings accounts for more than one-third of total US emissions. We are pursuing a Partnership for Advancing Technologies in Housing (PATH) with industry that will make homes cheaper, safer, more efficient, more durable, and more environmentally friendly through focusing efforts of the government and the private sector to develop and implement new technologies and practices.

- I want to emphasize that we are not just supporting the status quo with these programs. Working through his Committee of Advisors on Science and Technology (PCAST), the President has asked a group of our nation's top experts from the academic community and industry to conduct an intensive review of our national energy R&D programs.
- We expect a report from this group on October 1, and will use their recommendations in defining a national energy strategy that looks ahead to the next century.

Let me close by drawing an analogy to international efforts to address ozone depletion.

Ten years ago, at about the same scientific stage, the nations of the world came together in Montreal to take prudent steps toward protecting the Earth's ozone layer.

- These initial efforts were expanded in the aftermath of a stunning scientific discovery -- a hole in the ozone layer the size of North America was found over Antarctica.
- This led to the London amendments in 1990 where the world agreed to phase out the most damaging ozone depleting chemicals and subsequent Copenhagen agreement which accelerated the process by five years.
- This process was greatly facilitated by technological innovation and involvement of industry in the development of alternatives to ozone-depleting chemicals.

As with the ozone issue, nations have agreed on the nature of the climate change threat. We have taken initial steps to thwart that threat, and even though these are the first steps of what promises to be a very long journey, I am encouraged that we have begun.

- I believe that we are in the dawn of a new era. I believe we can all work together to protect the environment, reduce poverty, and create wealth.
- A new environmental awareness is beginning to emerge. Together, we can meet the challenges ahead.