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Riders on the Blue Marble Must Confront Climate Change

By Al Gore

"To see the earth as it truly is, small and blue in that eternal silence where it floats, is to see riders on the earth together, brothers on that bright loveliness in the eternal cold—brothers who know now they are truly brothers."
—Archibald McLeish

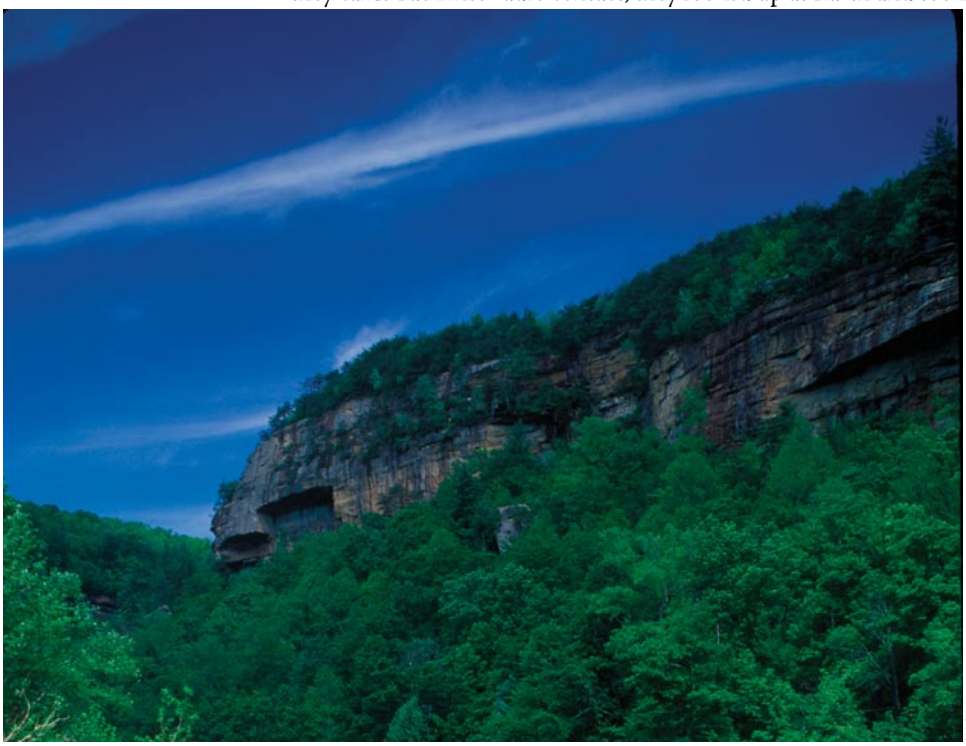

Al Gore

The creation of the Clean Air Act of 1970 marked an important turning point in our nation's history, but it also revealed what is possible when two men from opposing parties work together to effect positive change. There is stark contrast between what goes on now in the relationship between the two parties and the kind of relationship that Senator Howard Baker (R-TN) and Senator Ed Muskie (D-ME) enjoyed. This reality should cause all of us as Americans to pause and ask ourselves how we can rebuild that comity, that bipartisanship that senators Muskie and Baker were known for.

I am going to try to relate the global perspective of what is happening to our environment and the challenge of making further progress in cleaning up our air. I'd like to begin by referencing the first photograph ever taken of Earth from space, and it's one we've all seen. It's called "Earth Rise," and it depicts the partly illuminated planet hovering in the black of space with the surface of the moon in the foreground. It was taken by a rookie astronaut on an important mission. The mission commander was Frank Borman.

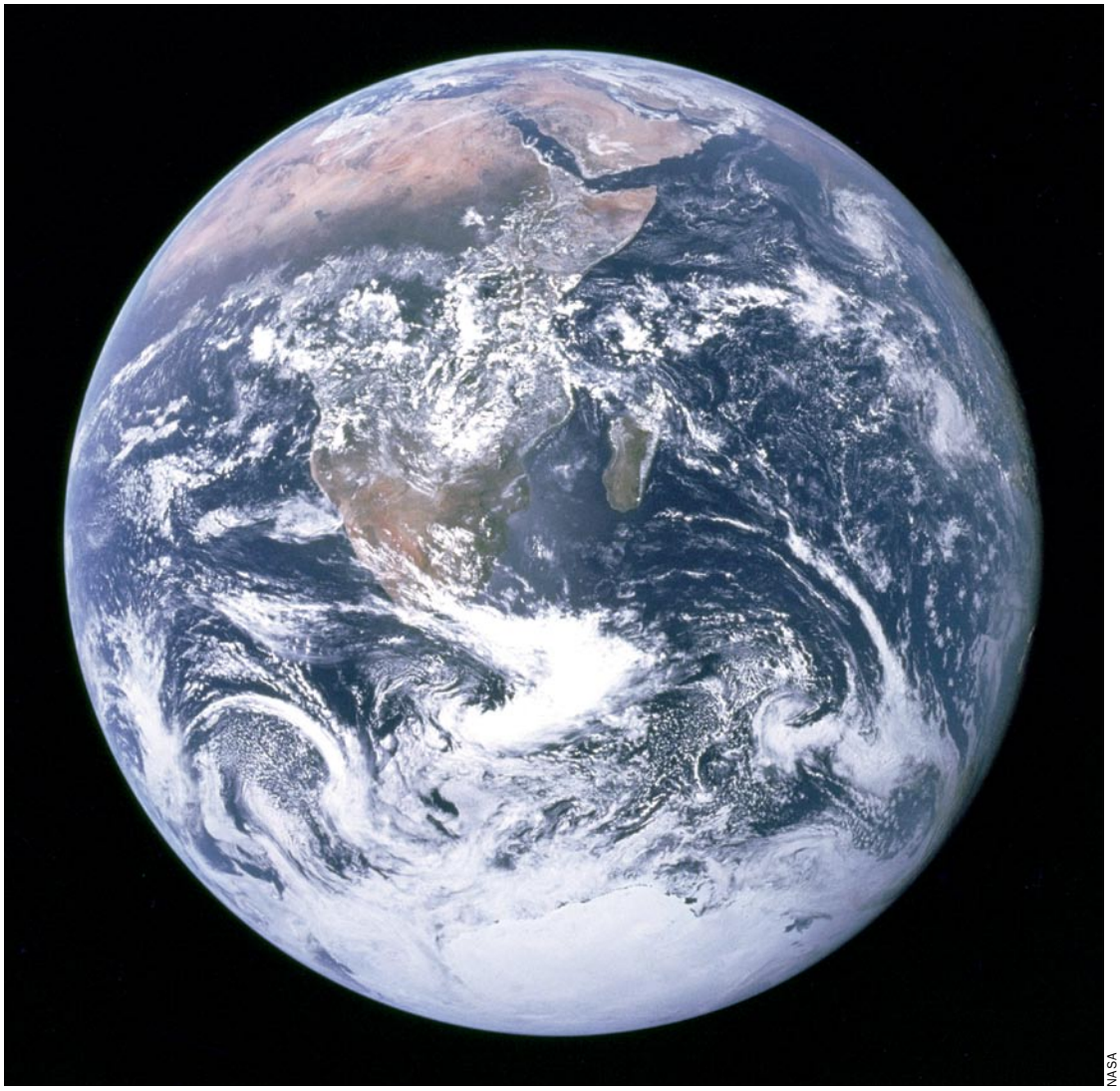
Many historians believe that the worldwide modern environmental movement began the moment this picture exploded into the consciousness of people around the world.

NASA's Apollo missions culminated in the moon landing of Apollo 11. But before that landing, three missions went around the moon before returning to the earth, and Apollo 8 was the first of those missions. The crew had lost radio contact with Earth when they passed around the dark side of the moon. And when they came back into radio contact, they looked up at Earth and took the picture. And I want you to make note of the date: December 24, 1968. Many historians believe that the worldwide modern environmental movement began the moment this picture exploded into the consciousness of people around the world. At that moment, if people could have put their feeling into words, they likely would have said, *Oh, I get it*. This picture began a new way of thinking about our relationship to one another on this planet.


NASA

In the next session, Senator Howard Baker and Senator Ed Muskie led Congress to pass the Clean Air Act of 1970 unanimously. The Clean Water Act, the National Environmental Policy Act, and a raft of others soon followed.

Another striking photo of Earth was taken during the last Apollo mission, on December 11, 1972, halfway between



NASA

Called "The Blue Marble," this photo, taken from the last Apollo mission, is the most widely published photograph in history.

Earth and the moon. It's a unique picture because the sun was directly behind the spacecraft, so the disk of planet Earth is fully lit up. It's called "The Blue Marble," and it's the most widely published photograph in history.

Faulty Assumption

I'm going to relate two stories about teachers I had—one I liked and the other one I didn't. This one is about my 6th-grade teacher, the one I didn't like. When we studied geography, he'd pull a map of the world down over the blackboard. I had a classmate who pointed to the outline of South America and pointed to the outline of Africa and asked, "Did they ever fit together?"

The teacher said, "Of course not; that's the most ridiculous thing I've ever heard." That student went on to become a drug addict and a ne'er-do-well. As we know now, they did fit together. Alfred Wegner discovered that in the 1930s, but his science was ridiculed for 35 years until it was at last accepted. My teacher was merely expressing the prevailing view; he held an assumption that he didn't question. Continents are so big that they obviously can't move, and that illustrates the old saying from Mark Twain about what gets us into trouble: it's not what we don't know; it's what we know for sure that just ain't so.

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There is another prevalent assumption, and it goes like this: The earth is so big that we humans can't possibly have any impact on it. Maybe that used to be true, but not anymore. The most vulnerable part of the earth's environment is its atmosphere. From here to the top of the atmosphere is not as far as it is from here out to the airport. If you were driving in a car, you'd get to the airport in a few minutes. And that space is being

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filled up with a lot of pollution, and that pollution is causing local air problems. For example, pollution is causing problems with lung diseases, and Knoxville has the highest asthma rate of any city in America.

These increasing pollution levels are important also because they contribute to global warming. Global warming is a fairly simple concept: Solar radiation comes in the form of light waves that are absorbed by the earth. Some of it is re-radiated into space as infrared (heat) energy, and the atmosphere traps some of that outgoing infrared radiation. That warms the earth, and that's a good thing. It keeps our temperature relatively constant.

However, when air pollution from all of the earth's residents enters the atmosphere, it thickens the layer closest to the ground so that it acts like a blanket, capturing more of the outgoing infrared energy. In brief, that's what causes global warming.

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Charting CO_2

Now for the story about the second teacher, a college professor I had as an undergraduate. Roger Revelle was the first man to measure carbon dioxide in the earth's atmosphere. In the middle 1960s, Revelle showed his class of undergraduates—some 20-odd of us—a graph depicting the first results from the measurement of atmospheric CO_2 over time. Right away it was clear that the concentrations were increasing. Revelle started making these CO_2 measurements in 1958, and every year since then, without fail, they have gone up. At first it was an increase of about 1.5 parts per million, but over the last few years it's been 2.5 parts per million.

I was elected to Congress in 1976, and I helped to organize the first hearings on this issue. I got my old professor to come and be the lead witness, and I thought if those members of Congress heard what he had to say, that'd solve the problem. But it didn't work that way. When I ran in for president in 1988, I tried to make this an issue. Then in 1992, as vice-president, I put a carbon tax into the economic plan. It was whittled down and didn't survive.

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My point is that here we are in 2005, and somewhere along these last decades global warming has become not just a potentially significant problem—now it's showing up in the real world. Glaciers all over the world are melting. Within 15 years there will be no snows of Kilimanjaro. My friend Lonny Thompson from Ohio State University studies glaciers and brought me several pictures taken from the top of Kilimanjaro, showing the pitiful remnants of the once-mighty glaciers on the top of that mountain.

The same thing is happening in our own Glacier National Park. Within 15 years, it will be "the park formerly known as Glacier." And it's happening all over the world. In Alaska, what was once a glacier is now a lake.

Over the past 25 years, the Columbia glacier, located along the southern coast of Alaska near Valdez, has receded very rapidly. Glaciers that existed 100 years ago in Switzerland, China, Argentina, and Peru are now completely gone.

On a glacier in Austria, hikers found the body of a 5,000-year-old man because the ice had retreated—ice that hadn't melted in 5,300 years.

Core Science

Scientists dig ice cores from glaciers and can read the layers as they might read the rings of a tree, counting back year by year. Several years ago, while I was in Antarctica, scientists brought up some core drillings, and one of the scientists counted back and, pointing, said, "Right here is when the U.S. Congress passed the Clean Air Act." I could see the layer with the unaided eye.

These ice-core samples can indicate warming and cooling of the planet over the centuries. The skeptics of global warming insist that the current warming is part of a cyclical phenomenon. They cite the fact that there was a medieval warming period, and they're right. But there's a big difference between what happened then and what's happening now. The fact is, glaciers don't care about politics, and they don't care about ideology. They just melt or freeze, and in that way they are very faithful witnesses. They reveal a thousand years of CO_2 and a thousand years of temperature.

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A thousand years of CO_2 sounds like a measure that stretches a long way back, but the core samples they're drilling in Antarctica go back 400,000 years. At no time in this long 400,000-year period has the amount of CO_2 in the atmosphere risen above 280 parts per million.

The fact is, CO_2 levels are now way, way above where they've been as far back as we can measure, and they're continuing to increase. This is not in dispute by anyone, but people interpret the data differently. There are people who say, *Oh, this is perfectly all right. No problem*. But if the cold periods revealed by the ice core samples indicate ice depths a mile deeper than they are now, what, then, does continued warming mean? We are engaged in an experiment to find out.

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Fatal Heat

Two summers ago in Europe we saw the effects of the big heat wave. Thousands of people died. It didn't get as much notice in India, where temperatures went up to 122 degrees Fahrenheit. But this creates stronger storms, because when you put more energy into a system, the system gets more energetic. And when the oceans are warm, that energy creates stronger storms.

Florida learned this lesson firsthand—and at a considerable cost to life and property—during the hurricane season of the summer and fall of 2004. In that same year, we set a record for tornadoes. Scientists have not established a clear connection between tornadoes and global warming, but we did have more tornadoes than ever before, most likely as a result of the hurricanes. Also in 2004, Japan had an all-time record number of typhoons. The previous record was seven; in 2004, it was ten.

The textbooks say you can't have hurricanes in the South Atlantic, but this past year we had the first hurricane ever in the South Atlantic, and it hit Brazil. A lot of people are asking why these hurricanes seem more deadly now. The scientific community says that warming produces an increase in rainfall that takes the average hurricane an extra half-step up the 5-step intensity scale.

As water temperature goes up, wind velocity and moisture increase. There's been a 20-percent increase in moisture—in the form of rain and snow in the United States—in the last century. Just last year we had a lot of moisture here in Tennessee, and many of the Eastern states had near-all-time-record amounts of moisture.

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The biggest negative consequence of global warming in monetary terms is drought, because the warming increases evaporation off of the oceans, so more moisture falls in single intense storms, which doesn't replenish the aquifers in the same way that more frequent but less dramatic storms do. The same warming that causes evaporation off the oceans also causes soil moisture to evaporate, and soil dries out very quickly.

Global precipitation is not evenly distributed. While there has been more precipitation in North America, parts of Africa have experienced extreme drought. Lake Chad is 1/10 the size it was just 35 years ago.

According to the scientists, if CO_2 levels double in the next 45 years, we will lose as much as 35 percent of our soil moisture. If we don't act soon and thus experience a quadrupling of CO_2, then huge swaths of the United States will lose as much as 65 percent of their soil moisture. And you think farming is difficult now.

Shrinking Ice Shelves

Two areas of the world serve as canaries in the coal mine in terms of CO_2 levels: the Arctic and the Antarctic.

The Ward Hunt Ice Shelf, the largest land-based ice shelf in the Arctic, just cracked in half. In Alaska, trees that sank their roots into the frozen tundra a long time ago are beginning to totter drunkenly because the tundra is melting. The warming and thawing is also causing structural damage to buildings in Alaska and is damaging this country's oil pipeline there.

Starting around 1970, the amount of ice in the Arctic Ocean started dropping off rapidly. We've lost 40 percent of it in the last 40 years. The melting is accelerating because of what's known as a "phase change" where water is present in both its solid phase (ice) and its liquid phase. When the sun's rays strike ice, 95 percent of the solar energy bounces back into space. But when the sun's rays hit liquid water, more than 90 percent of the energy is *absorbed*. When the ice begins to melt into liquid water, there is more water around the ice to absorb much more solar energy, thus warming the water, which melts more ice, and so on in an accelerating process. So where the

If we want to solve the mercury problem, we must understand the causes and sources of the problem, and our assessment must be based on scientific fact.