

Patrick Moore: We Need More Carbon Dioxide, Not Less

Posted: November 27, 2014 by **tallbloke** in **alarmism**,

My thanks to Patrick Moore, co-founder and ex Greenpeace leader, and since 1986 'the sensible environmentalist', for his permission to repost this article printed recently. The name of Patrick's own venture – **Ecosense** reflects his logical and humanist approach to the climate debate.

Patrick Moore: We Need More Carbon Dioxide, Not Less



Australian politics has been more influenced by the climate debate than any other country. Yet Australia is responsible for only 1.5 per cent of global CO₂ emissions. Perhaps this speaks of Australia's extraordinary commitment to the international community. Yet Australia has threatened to hobble its own economy while much larger -nations take a pass while making pious pronouncements.

I am sceptical that humans are the main cause of climate change, and that it will be catastrophic in the near future. There is no scientific proof of this hypothesis, yet we are told "the debate is over", the "science is settled".

My scepticism begins with the warmists' certainty they can predict the global climate with a computer model. The entire basis for the doomsday climate

change scenario is the hypothesis that increased CO₂ due to fossil fuel emissions will heat the Earth to unliveable temperatures.

In fact, the Earth has been warming very gradually for 300 years, since the Little Ice Age ended, long before heavy use of fossil fuels. Prior to the Little Ice Age, during the Medieval Warm Period, Vikings colonised Greenland and Newfoundland, when it was warmer there than today. And during Roman times, it was warmer, long before fossil fuels revolutionised civilisation.

Looking back over millennia, today the Earth is colder, and has a lower level of atmospheric CO₂ than during nearly all the history of modern life. The idea that it would be catastrophic if CO₂ were to increase and average global temperature were to rise a few degrees is preposterous.

Recently, the IPCC announced for the umpteenth time that we are doomed unless we reduce CO₂ emissions to zero. -Effectively this means either reducing the population to zero, or going back 10,000 years before humans began clearing forests for agriculture. This proposed cure is worse than adapting to a warmer world, if it comes about.

By its constitution, the IPCC has a hopeless conflict of interest. Its mandate is to consider only the human causes of global warming, not the many natural causes changing the climate for billions of years. We don't understand the precise workings of the natural causes of climate change any more than we know if humans are part of the cause at present. But if the IPCC did not find that -humans were the cause of warming, or if it found that warming would be more positive than negative, there would be no need for the IPCC under its present mandate. To survive, it must find on the side of the apocalypse. -Either the IPCC should be reconstituted with a larger membership of UN bodies (it is now a partnership between the World Meteorological Organisation and the UN Environment Program), and its mandate expanded to include all causes of climate change, or it should be dismantled.

Climate change has become a powerful political force for many reasons. First, it is universal; we are told everything on Earth is threatened. Second, it invokes the two most powerful human motivators: fear and guilt. We fear driving our car will kill our grandchildren and feel guilty. Third, a powerful convergence of interests among key elites support the climate "narrative". Environmentalists spread fear and raise donations; politicians appear to be saving the Earth from doom; the media has a field day with sensation and conflict; science institutions raise billions in grants, create whole new departments, and engage in a feeding frenzy of scary scenarios; business wants to look green, and get huge public subsidies

for projects that would otherwise be economic losers, such as large wind farms and solar arrays. Fourth, the Left sees climate change as a perfect means to redistribute wealth from industrial countries to the developing world and the UN bureaucracy.

So we are told CO₂ is a “toxic” “pollutant” that must be curtailed when in fact it is a colourless, odourless, tasteless, gas present at 400 parts per million of the global atmosphere and the most important food for life on earth. Without CO₂ above 150 parts per million, all plants would die.

Over the past 150 million years, CO₂ had been drawn down steadily (by plants) from about 3000 parts per million to about 280 parts per million before the industrial revolution. If this trend had continued, CO₂ would have become too low to support life on Earth. Human use of fossil fuels and clearing land for crops have boosted CO₂ from its lowest level in the history of the Earth back to 400 parts per million today.

At 400 parts per million, all our food crops, forests, and natural ecosystems are still on a starvation diet for CO₂. While one wing of CSIRO promotes the IPCC line, another is demonstrating the positive impact of the small increase in CO₂ over the past 50 years due primarily to fossil fuel use — a 10 per cent to 30 per cent increase in plant growth in many regions. Australia is benefiting more than most because its vegetation evolved for dry conditions. Increased CO₂ means plants don't need as much water, so our deserts are lush.

The optimum level of CO₂ for plant growth, given enough water and nutrients, is about 1500 parts per million, nearly four times higher than today. Glasshouse growers inject CO₂ to increase yields of 50 to 100 per cent. Farms and forests will be much more productive if CO₂ keeps rising.

We have no proof increased CO₂ is responsible for the slight warming over the past 300 years. There has been no significant warming for 18 years while we have emitted 25 per cent of all the CO₂ ever emitted. Yet we have absolute proof CO₂ is vital for life on Earth and plants would like more of it. Which should we emphasise to our children?

The IPCC's followers have given us a vision of a dying world due to CO₂ emissions. I say the Earth would be a lot deader with no CO₂ and more of it will be a very positive factor in feeding the world. Let's celebrate CO₂.

Patrick Moore was a co-founder, and leader of Greenpeace for 15 years is now an independent ecologist and environmentalist based in Vancouver, Canada. You can follow him on twitter [@EcoSenseNow](#)



- 1.
2. Jazznick says: **November 27, 2014 at 10:16 am** An excellent post that needs to be spread more widely. However, we must all be aware that the 'warmist' view has nothing to do with the science as discussion of this is stifled at every opportunity and shouted down by vested interests; as it cannot be defended by open debate. Instead the voices behind this climate deception for political and ideological world governmental control speak for themselves:-
(=====
== "We've got to ride this global warming issue. Even if the theory of global warming is wrong, we will be doing the right thing in terms of economic and environmental policy." Timothy Wirth, President of the UN Foundation "Isn't the only hope for the planet that the industrialized civilizations collapse? Isn't it our responsibility to bring that about?" Maurice Strong, Founder of the UN Environmental Program "We need to get some broad based support, to capture the public's imagination... So we have to offer up scary scenarios, make simplified, dramatic statements and make little mention of any doubts... Each of us has to decide what the right balance is between being effective and being honest." Stephen Schneider, Stanford Professor of Climatology, Lead author of many IPCC reports "...the world is more sophisticated and prepared to march towards a world government. The supranational sovereignty of an intellectual elite and world bankers is surely preferable to the national autodetermination practiced in past centuries." ~ David Rockefeller, June, 1991, Bilderberg Conference, Baden, Germany. "We are on the verge of a global transformation. All we need is the right major crisis..." – David Rockefeller, Club of Rome executive member This Mr Moore, is what we are up against.
- 3.
4. **James Grant Matkin** says:
5. **April 12, 2015 at 6:12 pm** CO2 is a pollutant only to politicians and bureaucrats. In fact, Carbon dioxide is a trace gas that makes up only 0.039% of the atmosphere, accounts for only 3.6% of the greenhouse effect, and has increased by only 0.009% since 1950. By itself, it is incapable of warming the climate by more than a fraction of a degree. CO2 is an essential gas, without which there would be no life on earth. CO2 is plant food. Sadly global warming has never been a scientific argument from the get-go. It has always been — and always will be — a political argument dressed up in the language of science. Al Gore is a very impressive politician, but he is not a scientist. His pitch on global warming took on the attributes of a new religion where belief not doubt is the touchstone. Politics has a short time line unlike climate science so Al Gore and his followers needed to convince the world's populations that doomsday was coming if they didn't reduce carbon dioxide emissions now. But in order to pull this off, these operatives first needed to demonize carbon dioxide, the single most important nutrient on the planet for reforestation, plant growth, food production and "greening" the planet. Carbon dioxide is so important to plants that

greenhouse operators buy and install carbon dioxide generators to provide extra nutrients to their plants which are starving from the low levels of CO₂ in the atmosphere. "The benefits of carbon dioxide supplementation on plant growth and production within the greenhouse environment have been well understood for many years," says the Ontario Ministry of Agriculture and Food. "CO₂ increases productivity through improved plant growth and vigour. Some ways in which productivity is increased by CO₂ include earlier flowering, higher fruit yields, reduced bud abortion in roses, improved stem strength and flower size. Growers should regard CO₂ as a nutrient... increasing the CO₂ level to 1,000 ppm will increase the photosynthesis by about 50% over ambient CO₂ levels." The attempted demonization of carbon dioxide, in other words, falls apart once you embrace the simple scientific reality that plants use CO₂ like a nutrient. Carbon dioxide is "atmospheric fertilizer" for nearly all plants. Thus, the higher CO₂ is in the atmosphere, the more quickly land areas of the plant can be reforested or restored from near-desert-like conditions. Thanks to propagandist brainwashing efforts conducted on the public, most people today wrongly believe that CO₂ is a dastardly pollutant. Once people were convinced that CO₂ was bad, they could be "guilt-tripped" into supporting restrictions on CO₂ emissions that ultimately allow government to control virtually every industry imaginable: agriculture, transportation, energy and even human reproduction and population (since humans exhale CO₂ when they breathe). CO₂ became the leverage point by which the global economy could be enslaved to an anti-science control agenda called "global warming." That lie was sold to the public with a long list of bizarre claims and deceptions including the claim that polar bears can't swim and were drowning because all the floating ice was disappearing. As part of the global warming propagandist deception, American children across the country were found tearfully sobbing over depressing images that attempted to depict polar bears as drowning. But it turns out polar bears are powerful swimmers. This is common knowledge among arctic biologists, of course. Even Sea World knows this and publishes it openly on their website: "Polar bears are strong swimmers; they swim across bays or wide leads without hesitation. They can swim for several hours at a time over long distances. They've been tracked swimming continuously for 100 km (62 mi.). Polar bears can obtain a swimming speed of 10 kph (6.2 mph)... "The absurd claim that polar bears can't swim is the biological equivalent to claiming that humans can't walk. The entire polar-bear-global-warming hoax was based on the single observation of just four polar bears floating in the ocean after being apparently killed in an arctic storm. The scientists who claimed these bears were killed by global warming were later reprimanded, reports a Huffpost story." Further the polar bears are not endangered by retreating polar ice. Arctic ice expanded by 50% from 2012 to 2013 and is stable today while antarctic ice has broken all records for expansion.

<https://tallbloke.wordpress.com/2014/11/27/patrick-moore-we-need-more-carbon-dioxide-not-less/comment-page-1/#comment-99835>

Greenpeace founder delivers powerful annual lecture, praises

carbon dioxide – full text

Anthony Watts / October 15, 2015

Full text of the speech: Dr. Patrick Moore: Should We Celebrate Carbon Dioxide?

2015 Annual GWPF Lecture

Institute of Mechanical Engineers, London 14 October 2015

My Lords and Ladies, Ladies and Gentlemen.

Thank you for the opportunity to set out my views on climate change. As I have stated publicly on many occasions, there is no definitive scientific proof, through real-world observation, that carbon dioxide is responsible for any of the slight warming of the global climate that has occurred during the past 300 years, since the peak of the Little Ice Age. If there were such a proof through testing and replication it would have been written down for all to see.

The contention that human emissions are now the dominant influence on climate is simply a hypothesis, rather than a universally accepted scientific theory. It is therefore correct, indeed verging on compulsory in the scientific tradition, to be skeptical of those who express certainty that “the science is settled” and “the debate is over”.

But there is certainty beyond any doubt that CO₂ is the building block for all life on Earth and that without its presence in the global atmosphere at a sufficient concentration this would be a dead planet. Yet today our children and our publics are taught that CO₂ is a toxic pollutant that will destroy life and bring civilization to its knees.

Tonight I hope to turn this dangerous human-caused propaganda on its head. Tonight I will demonstrate that human emissions of CO₂ have already saved life on our planet from a very untimely end. That in the absence of our emitting some of the carbon back into the atmosphere from whence it came in the first place, most or perhaps all life on Earth would begin to die less than two million years from today.

But first a bit of background.

I was born and raised in the tiny floating village of Winter Harbour on the northwest tip of Vancouver Island, in the rainforest by the Pacific. There was no road to my village so for eight years myself and a few other children were taken by boat each day to a one-room schoolhouse in the nearby fishing village. I didn't realize how lucky I was playing on the tide flats by the salmon-spawning streams in the rainforest, until I was sent off to boarding school in Vancouver where I excelled in science. I did my undergraduate studies at the University of British Columbia, gravitating to the life sciences – biology, biochemistry, genetics, and forestry – the environment and the industry my family has been in for more than 100 years. Then, before the word was known to the general public, I discovered the science of ecology, the science of how all living things are inter-related, and how we are related to them.

At the height of the Cold War, the Vietnam War, the threat of all-out nuclear war and the newly emerging consciousness of the environment I was transformed into a radical environmental activist. While doing my PhD in ecology in 1971 I joined a group of activists who had begun to meet in the basement of the Unitarian Church, to plan a protest voyage against US hydrogen bomb testing in Alaska. We proved that a somewhat rag-tag looking group of activists could sail an old fishing boat across the north Pacific ocean and help change the course of history. We created a focal point for the media to report on public opposition to the tests.

When that H-bomb exploded in November 1971, it was the last hydrogen bomb the United States ever detonated. Even though there were four more tests planned in the series, President Nixon canceled them due to the public opposition we had helped to create. That was the birth of Greenpeace.

Flushed with victory, on our way home from Alaska we were made brothers of the Namgis Nation in their Big House at Alert Bay near my northern Vancouver Island home. For Greenpeace this began the tradition of the Warriors of the Rainbow, after a Cree Indian legend that predicted the coming together of all races and creeds to save the Earth from destruction. We named our ship the Rainbow Warrior and

I spent the next fifteen years in the top committee of Greenpeace, on the front lines of the environmental movement as we evolved from that church basement into the world's largest environmental activist organization.

Next we took on French atmospheric nuclear testing in the South Pacific. They proved a bit more difficult than the US nuclear tests. It took years to eventually drive these tests underground at Mururoa Atoll in French Polynesia. In 1985, under direct orders from President Mitterrand, French commandos bombed and sank the Rainbow Warrior in Auckland Harbour, killing our photographer. Those protests continued until long after I left Greenpeace. It wasn't until the mid-1990s that nuclear testing finally ended in the South Pacific, and in most other parts of the world as well.

Going back to 1975, Greenpeace set out to save the whales from extinction at the hands of huge factory whaling fleets. We confronted the Soviet factory whaling fleet in the North Pacific, putting ourselves in front of their harpoons in our little rubber boats to protect the fleeing whales. This was broadcast on television news around the world, bringing the Save the Whales movement into everyone's living rooms for the first time. After four years of voyages, in 1979 factory whaling was finally banned in the North Pacific, and by 1981 in all the world's oceans.

In 1978 I sat on a baby seal off the East Coast of Canada to protect it from the hunter's club. I was arrested and hauled off to jail, the seal was clubbed and skinned, but a photo of me being arrested while sitting on the baby seal appeared in more than 3000 newspapers around the world the next morning. We won the hearts and minds of millions of people who saw the baby seal slaughter as outdated, cruel, and unnecessary.

Why then did I leave Greenpeace after 15 years in the leadership? When Greenpeace began we had a strong humanitarian orientation, to save civilization from destruction by all-out nuclear war. Over the years the "peace" in Greenpeace was gradually lost and my organization, along with much of the environmental movement, drifted into a belief that humans are the enemies of the earth. I

believe in a humanitarian environmentalism because we are part of nature, not separate from it. The first principle of ecology is that we are all part of the same ecosystem, as Barbara Ward put it, “One human family on spaceship Earth”, and to preach otherwise teaches that the world would be better off without us. As we shall see later in the presentation there is very good reason to see humans as essential to the survival of life on this planet.

In the mid 1980s I found myself the only director of Greenpeace International with a formal education in science. My fellow directors proposed a campaign to “ban chlorine worldwide”, naming it “The Devil’s Element”. I pointed out that chlorine is one of the elements in the Periodic Table, one of the building blocks of the Universe and the 11th most common element in the Earth’s crust. I argued the fact that chlorine is the most important element for public health and medicine. Adding chlorine to drinking water was the biggest advance in the history of public health and the majority of our synthetic medicines are based on chlorine chemistry. This fell on deaf ears, and for me this was the final straw. I had to leave.

When I left Greenpeace I vowed to develop an environmental policy that was based on science and logic rather than sensationalism, misinformation, anti-humanism and fear. In a classic example, a recent protest led by Greenpeace in the Philippines used the skull and crossbones to associate Golden Rice with death, when in fact Golden Rice has the potential to help save 2 million children from death due to vitamin A deficiency every year.

The Keeling curve of CO₂ concentration in the Earth’s atmosphere since 1959 is the supposed smoking gun of catastrophic climate change. We presume CO₂ was at 280 ppm at the beginning of the Industrial Revolution, before human activity could have caused a significant impact. I accept that most of the rise from 280 to 400 ppm is caused by human CO₂ emissions with the possibility that some of it is due to outgassing from warming of the oceans.

NASA tells us that “Carbon Dioxide Controls Earth’s Temperature” in child-like denial of the many other factors involved in climate change. This is reminiscent of NASA’s contention that there might

be life on Mars. Decades after it was demonstrated that there was no life on Mars, NASA continues to use it as a hook to raise public funding for more expeditions to the Red Planet. The promulgation of fear of Climate Change now serves the same purpose. As Bob Dylan prophetically pointed out, “Money doesn’t talk, it swears”, even in one of the most admired science organizations in the world. On the political front the leaders of the G7 plan to “end extreme poverty and hunger” by phasing out 85% of the world’s energy supply including 98% of the energy used to transport people and goods, including food. The Emperors of the world appear clothed in the photo taken at the close of the meeting but it was obviously Photo-shopped. They should be required to stand naked for making such a foolish statement.

The world’s top climate body, the Intergovernmental Panel on Climate change, is hopelessly conflicted by its makeup and its mandate. The Panel is composed solely of the World Meteorological Organization, weather forecasters, and the United Nations Environment Program, environmentalists. Both these organizations are focused primarily on short-term timescales, days to maybe a century or two. But the most significant conflict is with the Panel’s mandate from the United Nations. They are required only to focus on “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the atmosphere, and which is in addition to natural climate variability.” So if the IPCC found that climate change was not being affected by human alteration of the atmosphere or that it is not “dangerous” there would be no need for them to exist. They are virtually mandated to find on the side of apocalypse.

Scientific certainty, political pandering, a hopelessly conflicted IPCC, and now the Pope, spiritual leader of the Catholic Church, in a bold move to reinforce the concept of original sin, says the Earth looks like “an immense pile of filth” and we must go back to pre-industrial bliss, or is that squalor?

And then there is the actual immense pile of filth fed to us more than three times daily by the green-media nexus, a seething cauldron of

imminent doom, like we are already condemned to Damnation in Hell and there is little chance of Redemption. I fear for the end of the Enlightenment. I fear an intellectual Gulag with Greenpeace as my prison guards.

Let's begin with our knowledge of the long-term history of the Earth's temperature and of CO₂ in the Earth's atmosphere. Our best inference from various proxies back indicate that CO₂ was higher for the first 4 billion years of Earth's history than it has been since the Cambrian Period until today. I will focus on the past 540 million years since modern life forms evolved. It is glaringly obvious that temperature and CO₂ are in an inverse correlation at least as often as they are in any semblance of correlation. Two clear examples of reverse correlation occurred 150 million years and 50 million years ago. At the end of the Jurassic temperature fell dramatically while CO₂ spiked. During the Eocene Thermal Maximum, temperature was likely higher than any time in the past 550 million years while CO₂ had been on a downward track for 100 million years. This evidence alone sufficient to warrant deep speculation of any claimed lock-step causal relationship between CO₂ and temperature.

The Devonian Period beginning 400 million years ago marked the culmination of the invasion of life onto the land. Plants evolved to produce lignin, which in combination with cellulose, created wood which in turn for the first time allowed plants to grow tall, in competition with each other for sunlight. As vast forests spread across the land living biomass increased by orders of magnitude, pulling down carbon as CO₂ from the atmosphere to make wood. Lignin is very difficult to break down and no decomposer species possessed the enzymes to digest it. Trees died atop one another until they were 100 metres or more in depth. This was the making of the great coal beds around the world as this huge store of sequestered carbon continued to build for 90 million years. Then, fortunately for the future of life, white rot fungi evolved to produce the enzymes that can digest lignin and coincident with that the coal-making era came to an end.

There was no guarantee that fungi or any other decomposer species

would develop the complex of enzymes required to digest lignin. If they had not, CO₂, which had already been drawn down for the first time in Earth's history to levels similar to today's, would have continued to decline as trees continued to grow and die. That is until CO₂ approached the threshold of 150 ppm below which plants begin first to starve, then stop growing altogether, and then die. Not just woody plants but all plants. This would bring about the extinction of most, if not all, terrestrial species, as animals, insects, and other invertebrates starved for lack of food. And that would be that. The human species would never have existed. This was only the first time that there was a distinct possibility that life would come close to extinguishing itself, due to a shortage of CO₂, which is essential for life on Earth.

A well-documented record of global temperature over the past 65 million years shows that we have been in a major cooling period since the Eocene Thermal Maximum 50 million years ago. The Earth was an average 16°C warmer then, with most of the increased warmth at the higher latitudes. The entire planet, including the Arctic and Antarctica were ice-free and the land there was covered in forest. The ancestors of every species on Earth today survived through what may have been the warmest time in the history of life. It makes one wonder about dire predictions that even a 2°C rise in temperature from pre-industrial times would cause mass extinctions and the destruction of civilization. Glaciers began to form in Antarctica 30 million years ago and in the northern hemisphere 3 million years ago. Today, even in this interglacial period of the Pleistocene Ice Age, we are experiencing one of the coldest climates in the Earth's history.

Coming closer to the present we have learned from Antarctic ice cores that for the past 800,000 years there have been regular periods of major glaciation followed by interglacial periods in 100,000 year-cycles. These cycles coincide with the Milankovitch cycles that are tied to the eccentricity of the Earth's orbit and its axial tilt. It is highly plausible that these cycles are related to solar intensity and the seasonal distribution of solar heat on the Earth's surface. There

is a strong correlation between temperature and the level of atmospheric CO₂ during these successive glaciations, indicating a possible cause-effect relationship between the two. CO₂ lags temperature by an average of 800 years during the most recent 400,000-year period, indicating that temperature is the cause, as the cause never comes after the effect.

Looking at the past 50,000 years of temperature and CO₂ we can see that changes in CO₂ follow changes in temperature. This is as one could expect, as the Milankovitch cycles are far more likely to cause a change in temperature than a change in CO₂. And a change in the temperature is far more likely to cause a change in CO₂ due to outgassing of CO₂ from the oceans during warmer times and an ingassing (absorption) of CO₂ during colder periods. Yet climate alarmists persist in insisting that CO₂ is causing the change in temperature, despite the illogical nature of that assertion.

It is sobering to consider the magnitude of climate change during the past 20,000 years, since the peak of the last major glaciation. At that time there were 3.3 kilometres of ice on top of what is today the city of Montreal, a city of more than 3 million people. 95% of Canada was covered in a sheet of ice. Even as far south as Chicago there was nearly a kilometre of ice. If the Milankovitch cycle continues to prevail, and there is little reason aside from our CO₂ emissions to think otherwise, this will happen gradually again during the next 80,000 years. Will our CO₂ emissions stave off another glaciation as James Lovelock has suggested? There doesn't seem to be much hope of that so far, as despite 1/3 of all our CO₂ emissions being released during the past 18 years the UK Met Office contends there has been no statistically significant warming during this century.

At the height of the last glaciation the sea level was about 120 metres lower than it is today. By 7,000 years ago all the low-altitude, mid-latitude glaciers had melted. There is no consensus about the variation in sea level since then although many scientists have concluded that the sea level was higher than today during the Holocene Thermal optimum from 9,000 to 5,000 years ago when the Sahara was green. The sea level may also have been higher than

today during the Medieval Warm Period.

Hundred of islands near the Equator in Papua, Indonesia, have been undercut by the sea in a manner that gives credence to the hypothesis that there has been little net change in sea level in the past thousands of years. It takes a long time for so much erosion to occur from gentle wave action in a tropical sea.

Coming back to the relationship between temperature and CO₂ in the modern era we can see that temperature has risen at a steady slow rate in Central England since 1700 while human CO₂ emissions were not relevant until 1850 and then began an exponential rise after 1950. This is not indicative of a direct causal relationship between the two. After freezing over regularly during the Little Ice Age the River Thames froze for the last time in 1814, as the Earth moved into what might be called the Modern Warm Period.

The IPCC states it is “extremely likely” that human emissions have been the dominant cause of global warming “since the mid-20th century”, that is since 1950. They claim that “extremely” means 95% certain, even though the number 95 was simply plucked from the air like an act of magic. And “likely” is not a scientific word but rather indicative of a judgment, another word for an opinion.

There was a 30-year period of warming from 1910-1940, then a cooling from 1940 to 1970, just as CO₂ emissions began to rise exponentially, and then a 30-year warming from 1970-2000 that was very similar in duration and temperature rise to the rise from 1910-1940. One may then ask “what caused the increase in temperature from 1910-1940 if it was not human emissions? And if it was natural factors how do we know that the same natural factors were not responsible for the rise between 1970-2000.” You don’t need to go back millions of years to find the logical fallacy in the IPCC’s certainty that we are the villains in the piece.

Water is by far the most important greenhouse gas, and is the only molecule that is present in the atmosphere in all three states, gas, liquid, and solid. As a gas, water vapour is a greenhouse gas, but as a liquid and solid it is not. As a liquid water forms clouds, which send solar radiation back into space during the day and hold heat in at

night. There is no possibility that computer models can predict the net effect of atmospheric water in a higher CO₂ atmosphere. Yet warmists postulate that higher CO₂ will result in positive feedback from water, thus magnifying the effect of CO₂ alone by 2-3 times. Other scientists believe that water may have a neutral or negative feedback on CO₂. The observational evidence from the early years of this century tends to reinforce the latter hypothesis.

How many politicians or members of the media or the public are aware of this statement about climate change from the IPCC in 2007? “we should recognise that we are dealing with a coupled nonlinear chaotic system, and therefore that the long-term prediction of future climate states is not possible.”

There is a graph showing that the climate models have grossly exaggerated the rate of warming that confirms the IPCC statement. The only trends the computer models seem able to predict accurately are ones that have already occurred.

Coming to the core of my presentation, CO₂ is the currency of life and the most important building block for all life on Earth. All life is carbon-based, including our own. Surely the carbon cycle and its central role in the creation of life should be taught to our children rather than the demonization of CO₂, that “carbon” is a “pollutant” that threatens the continuation of life. We know for a fact that CO₂ is essential for life and that it must be at a certain level in the atmosphere for the survival of plants, which are the primary food for all the other species alive today. Should we not encourage our citizens, students, teachers, politicians, scientists, and other leaders to celebrate CO₂ as the giver of life that it is?

It is a proven fact that plants, including trees and all our food crops, are capable of growing much faster at higher levels of CO₂ than present in the atmosphere today. Even at the today’s concentration of 400 ppm plants are relatively starved for nutrition. The optimum level of CO₂ for plant growth is about 5 times higher, 2000 ppm, yet the alarmists warn it is already too high. They must be challenged every day by every person who knows the truth in this matter. CO₂ is the giver of life and we should celebrate CO₂ rather than denigrate it

as is the fashion today.

We are witnessing the “Greening of the Earth” as higher levels of CO₂, due to human emissions from the use of fossil fuels, promote increased growth of plants around the world. This has been confirmed by scientists with CSIRO in Australia, in Germany, and in North America. Only half of the CO₂ we are emitting from the use of fossil fuels is showing up in the atmosphere. The balance is going somewhere else and the best science says most of it is going into an increase in global plant biomass. And what could be wrong with that, as forests and agricultural crops become more productive?

All the CO₂ in the atmosphere has been created by outgassing from the Earth’s core during massive volcanic eruptions. This was much more prevalent in the early history of the Earth when the core was hotter than it is today. During the past 150 million years there has not been enough addition of CO₂ to the atmosphere to offset the gradual losses due to burial in sediments.

Let’s look at where all the carbon is in the world, and how it is moving around.

Today, at just over 400 ppm CO₂ there are 850 billion tons of CO₂ in the atmosphere. By comparison, when modern life-forms evolved over 500 million years ago there was nearly 15,000 billion tons of CO₂ in the atmosphere, 17 times today’s level. Plants and soils combined contain more than 2,000 billion tons of carbon, more than twice as much as the entire global atmosphere. The oceans contain 38,000 billion tons of dissolved CO₂, 45 times as much as in the atmosphere. Fossil fuels, which were made from plants that pulled CO₂ from the atmosphere account for 5,000 – 10,000 billion tons of carbon, 6 – 12 times as much carbon as is in the atmosphere.

But the truly stunning number is the amount of carbon that has been sequestered from the atmosphere and turned into carbonaceous rocks. 100,000,000 billion tons, that’s one quadrillion tons of carbon, have been turned into stone by marine species that learned to make armour-plating for themselves by combining calcium and carbon into calcium carbonate. Limestone, chalk, and marble are all of life origin and amount to 99.9% of all the carbon ever present in the

global atmosphere. The white cliffs of Dover are made of the calcium carbonate skeletons of coccolithophores, tiny marine phytoplankton. The vast majority of the carbon dioxide that originated in the atmosphere has been sequestered and stored quite permanently in carbonaceous rocks where it cannot be used as food by plants. Beginning 540 million years ago at the beginning of the Cambrian Period many marine species of invertebrates evolved the ability to control calcification and to build armour plating to protect their soft bodies. Shellfish such as clams and snails, corals, coccolithofores (phytoplankton) and foraminifera (zooplankton) began to combine carbon dioxide with calcium and thus to remove carbon from the life cycle as the shells sank into sediments; 100,000,000 billion tons of carbonaceous sediment. It is ironic that life itself, by devising a protective suit of armour, determined its own eventual demise by continuously removing CO₂ from the atmosphere. This is carbon sequestration and storage writ large. These are the carbonaceous sediments that form the shale deposits from which we are fracking gas and oil today. And I add my support to those who say, “OK UK, get fracking”.

The past 150 million years has seen a steady drawing down of CO₂ from the atmosphere. There are many components to this but what matters is the net effect, a removal on average of 37,000 tons of carbon from the atmosphere every year for 150 million years. The amount of CO₂ in the atmosphere was reduced by about 90% during this period. This means that volcanic emissions of CO₂ have been outweighed by the loss of carbon to calcium carbonate sediments on a multi-million year basis.

If this trend continues CO₂ will inevitably fall to levels that threaten the survival of plants, which require a minimum of 150 ppm to survive. If plants die all the animals, insects, and other invertebrates that depend on plants for their survival will also die.

How long will it be at the present level of CO₂ depletion until most or all of life on Earth is threatened with extinction by lack of CO₂ in the atmosphere?

During this Pleistocene Ice Age, CO₂ tends to reach a minimum level

when the successive glaciations reach their peak. During the last glaciation, which peaked 18,000 years ago, CO₂ bottomed out at 180 ppm, extremely likely the lowest level CO₂ has been in the history of the Earth. This is only 30 ppm above the level that plants begin to die. Paleontological research has demonstrated that even at 180 ppm there was a severe restriction of growth as plants began to starve. With the onset of the warmer interglacial period CO₂ rebounded to 280 ppm. But even today, with human emissions causing CO₂ to reach 400 ppm plants are still restricted in their growth rate, which would be much higher if CO₂ were at 1000-2000 ppm.

Here is the shocking news. If humans had not begun to unlock some of the carbon stored as fossil fuels, all of which had been in the atmosphere as CO₂ before sequestration by plants and animals, life on Earth would have soon been starved of this essential nutrient and would begin to die. Given the present trends of glaciations and interglacial periods this would likely have occurred less than 2 million years from today, a blink in nature's eye, 0.05% of the 3.5 billion-year history of life.

No other species could have accomplished the task of putting some of the carbon back into the atmosphere that was taken out and locked in the Earth's crust by plants and animals over the millennia. This is why I honour James Lovelock in my lecture this evening. Jim was for many years of the belief that humans are the one-and-only rogue species on Gaia, destined to cause catastrophic global warming. I enjoy the Gaia hypothesis but I am not religious about it and for me this was too much like original sin. It was as if humans were the only evil species on the Earth.

But James Lovelock has seen the light and realized that humans may be part of Gaia's plan, and he has good reason to do so. And I honour him because it takes courage to change your mind after investing so much of your reputation on the opposite opinion. Rather than seeing humans as the enemies of Gaia, Lovelock now sees that we may be working with Gaia to "stave off another ice age", or major glaciation. This is much more plausible than the climate doom-and-gloom scenario because our release of CO₂ back into the atmosphere has

definitely reversed the steady downward slide of this essential food for life, and hopefully may reduce the chance that the climate will slide into another period of major glaciation. We can be certain that higher levels of CO₂ will result in increased plant growth and biomass. We really don't know whether or not higher levels of CO₂ will prevent or reduce the eventual slide into another major glaciation. Personally I am not hopeful for this because the long-term history just doesn't support a strong correlation between CO₂ and temperature.

It does boggle the mind in the face of our knowledge that the level of CO₂ has been steadily falling that human CO₂ emissions are not universally acclaimed as a miracle of salvation. From direct observation we already know that the extreme predictions of CO₂'s impact on global temperature are highly unlikely given that about one-third of all our CO₂ emissions have been discharged during the past 18 years and there has been no statistically significant warming. And even if there were some additional warming that would surely be preferable to the extermination of all or most species on the planet. You heard it here. "Human emissions of carbon dioxide have saved life on Earth from inevitable starvation and extinction due to lack of CO₂". To use the analogy of the Atomic Clock, if the Earth were 24 hours old we were at 38 seconds to midnight when we reversed the trend towards the End Times. If that isn't good news I don't know what is. You don't get to stave off Armageddon every day.

I issue a challenge to anyone to provide a compelling argument that counters my analysis of the historical record and the prediction of CO₂ starvation based on the 150 million year trend. Ad hominem arguments about "deniers" need not apply. I submit that much of society has been collectively misled into believing that global CO₂ and temperature are too high when the opposite is true for both. Does anyone deny that below 150 ppm CO₂ that plants will die? Does anyone deny that the Earth has been in a 50 million-year cooling period and that this Pleistocene Ice Age is one of the coldest periods in the history of the planet?

If we assume human emissions have to date added some 200 billion

tons of CO₂ to the atmosphere, even if we ceased using fossil fuels today we have already bought another 5 million years for life on earth. But we will not stop using fossil fuels to power our civilization so it is likely that we can forestall plant starvation for lack of CO₂ by at least 65 million years. Even when the fossil fuels have become scarce we have the quadrillion tons of carbon in carbonaceous rocks, which we can transform into lime and CO₂ for the manufacture of cement. And we already know how to do that with solar energy or nuclear energy. This alone, regardless of fossil fuel consumption, will more than offset the loss of CO₂ due to calcium carbonate burial in marine sediments. Without a doubt the human species has made it possible to prolong the survival of life on Earth for more than 100 million years. We are not the enemy of nature but its salvation. As a postscript I would like to make a few comments about the other side of the alleged dangerous climate change coin, our energy policy, in particular the much maligned fossil fuels; coal, oil, and natural gas.

Depending how it's tallied, fossil fuels account for between 85-88% of global energy consumption and more than 95% of energy for the transport of people and goods, including our food.

Earlier this year the leaders of the G7 countries agreed that fossil fuels should be phased out by 2100, a most bizarre development to say the least. Of course no intelligent person really believes this will happen but it is a testament to the power of the elites that have converged around the catastrophic human-caused climate change that so many alleged world leaders must participate in the charade. How might we convince them to celebrate CO₂ rather than to denigrate it?

A lot of nasty things are said about fossil fuels even though they are largely responsible for our longevity, our prosperity, and our comfortable lifestyles.

Hydrocarbons, the energy components of fossil fuels, are 100% organic, as in organic chemistry. They were produced by solar energy in ancient seas and forests. When they are burned for energy the main products are water and CO₂, the two most essential foods for

life. And fossil fuels are by far the largest storage battery of direct solar energy on Earth. Nothing else comes close except nuclear fuel, which is also solar in the sense that it was produced in dying stars. Today, Greenpeace protests Russian and American oil rigs with 3000 HP diesel-powered ships and uses 200 HP outboard motors to board the rigs and hang anti-oil plastic banners made with fossil fuels. Then they issue a media release telling us we must “end our addiction to oil”. I wouldn’t mind so much if Greenpeace rode bicycles to their sailing ships and rowed their little boats into the rigs to hang organic cotton banners. We didn’t have an H-bomb on board the boat that sailed on the first Greenpeace campaign against nuclear testing.

Some of the world’s oil comes from my native country in the Canadian oil sands of northern Alberta. I had never worked with fossil fuel interests until I became incensed with the lies being spread about my country’s oil production in the capitals of our allies around the world. I visited the oil sands operations to find out for myself what was happening there.

It is true it’s not a pretty sight when the land is stripped bare to get at the sand so the oil can be removed from it. Canada is actually cleaning up the biggest natural oil spill in history, and making a profit from it. The oil was brought to the surface when the Rocky Mountains were thrust up by the colliding Pacific Plate. When the sand is returned back to the land 99% of the so-called “toxic oil” has been removed from it.

Anti-oil activists say the oil-sands operations are destroying the boreal forest of Canada. Canada’s boreal forest accounts for 10% of all the world’s forests and the oil-sands area is like a pimple on an elephant by comparison. By law, every square inch of land disturbed by oil-sands extraction must be returned to native boreal forest. When will cities like London, Brussels, and New York that have laid waste to the natural environment be returned to their native ecosystems?

The art and science of ecological restoration, or reclamation as it is called in the mining industry, is a well-established practice. The land

is re-contoured, the original soil is put back, and native species of plants and trees are established. It is possible, by creating depressions where the land was flat, to increase biodiversity by making ponds and lakes where wetland plants, insects, and waterfowl can become established in the reclaimed landscape. The tailings ponds where the cleaned sand is returned look ugly for a few years but are eventually reclaimed into grasslands. The Fort McKay First Nation is under contract to manage a herd of bison on a reclaimed tailings pond. Every tailings pond will be reclaimed in a similar manner when operations have been completed. As an ecologist and environmentalist for more than 45 years this is good enough for me. The land is disturbed for a blink of an eye in geological time and is then returned to a sustainable boreal forest ecosystem with cleaner sand. And as a bonus we get the fuel to power our weed-eaters, scooters, motorcycles, cars, trucks, buses, trains, and aircraft. To conclude, carbon dioxide from burning fossil fuels is the stuff of life, the staff of life, the currency of life, indeed the backbone of life on Earth. I am honoured to have been chosen to deliver your annual lecture. Thank you for listening to me this evening. I hope you have seen CO₂ from a new perspective and will join with me to Celebrate CO₂!

<http://wattsupwiththat.com/2015/10/15/greenpeace-founder-delivers-powerful-annual-lecture-praises-carbon-dioxide-full-text/>

Patrick Moore

Co-founder, former leader of Greenpeace; Chairman of Ecology, Energy and Prosperity with Canada's Frontier Centre for Public Policy



Dr. Patrick Moore has been a leader in the international environmental field for over 40 years. He is a co-founder of Greenpeace and served for nine years as President of Greenpeace Canada and seven years as a Director of Greenpeace International. As the leader of many campaigns Dr. Moore was a driving force shaping policy and direction for 15 years while Greenpeace became the world's largest environmental activist organization.

In recent years, Dr. Moore has been focused on the promotion of sustainability and consensus building among competing concerns. He was a member of British Columbia government-appointed Round Table on the Environment and Economy from 1990 - 1994. In 1990, Dr. Moore founded and chaired the BC Carbon Project, a group that worked to develop a common understanding of climate change.

Dr. Moore served for four years as Vice President, Environment for Waterfurnace International, a manufacturer of geothermal heat pumps for residential heating and cooling with renewable earth energy. He also served

as Vice-President, Industry and Government Affairs for NextEnergy Geothermal, the largest distributor of geothermal systems in Canada. As Chair of the Sustainable Forestry Committee of the Forest Alliance of BC from 1991 - 2002, he led the process of developing the "Principles of Sustainable Forestry" which were adopted by a majority of the industry. In 2010, Dr. Moore published *[Trees are the Answer](#)*, a photo-book that provides a new insight into how forests work and how they can play a powerful role in solving many of our current environmental problems. In 2013 he published *[Confessions of a Greenpeace Dropout – The Making of a Sensible Environmentalist](#)*, which documents his 15 years with Greenpeace and outlines his vision for a sustainable future.

From 2000-2012 he served as Chair and Chief Scientist of Greenspirit Strategies, a consultancy focusing on environmental policy and communications in forestry, agriculture, fisheries and aquaculture, mining, biodiversity, energy and climate change.

From 2006-2012 he served as co-Chair of the Clean and Safe Energy Coalition, a US-based advocacy mission to build public support for more nuclear energy plants to provide electricity.

In 2013 Dr. Moore, with his brother Michael and other family members, founded the Allow Golden Rice Society, a non-profit organization dedicated to seeing Golden Rice approved for commercial agriculture. 250 million children, mainly in the tropical countries, are deficient in vitamin A and as a result 2 million die each year. The *[Allow Golden Rice Now!](#)* Campaign demands that Greenpeace and their allies discontinue their campaign of opposition to Golden Rice, which could eliminate vitamin A deficiency if cultivated and consumed.

In 2014 Dr. Moore was appointed Chair of Environmental Studies at the Frontier Centre for Public Policy.

Dr. Moore is an independent ecologist/environmentalist with *[Ecosense Environmental Inc.](#)*

“Speaking Truth to Power Award”, Ninth International Conference on Climate Change, 2014

National Award for Nuclear Science and History, Albuquerque, New Mexico, 2009

Honorary Doctorate of Science, North Carolina State University, 2005

Ph.D. in Ecology, Institute of Resource Ecology, University of British Columbia, 1974

Ford Foundation Fellowship, 1969-1972

Honours B.Sc. in Forest Biology, University of British Columbia

VIDEOS: Confessions of a Greenpeace Dropout, Las Vegas, July 8, 2014 at [ICCC9](#).

Patrick Moore receives the "Speaks Truth to Power" award at the [Ninth International Conference on Climate Change](#). Las Vegas, July 8, 2014.

Recent Articles

6. **Why I am a Climate Change Skeptic** Energy and Environment – March 20, 2015

INTERVIEW: Greenpeace Founder Makes Case for Climate Skepticism, Biotech Foods Energy and Environment – March 19, 2015

<https://www.heartland.org/patrick-moore>

Lecture Outline for Campbell/Reece Biology, 7th Edition, © Pearson Education, Inc. 10-1"

7. "On a global scale, photosynthesis is the most important process on Earth.
It is responsible for the presence of oxygen in our atmosphere.
Each year, photosynthesis synthesizes 160 billion metric tons of carbohydrate.
- 8.
9. http://www.course-notes.org/Biology/Outlines/Chapter_10_Photosynthesis

PHOTOSYNTHESIS

INTRODUCTION

Photosynthesis, process by which green plants and certain other organisms use the energy of light to convert carbon dioxide and water into the simple sugar glucose. In so doing, photosynthesis provides the basic energy source for virtually all organisms. An extremely important byproduct of photosynthesis is oxygen, on which most organisms depend.

Photosynthesis occurs in green plants, seaweeds, algae, and certain bacteria. These organisms are veritable sugar factories, producing millions of new glucose molecules per second. Plants use much of this glucose, a carbohydrate, as an energy source to build leaves, flowers, fruits, and seeds. They also convert glucose to cellulose, the structural material used in their cell walls. Most plants produce more glucose than they use, however, and they store it in the form of starch and other carbohydrates in roots, stems, and leaves. The plants can then draw on these reserves for extra energy or building materials. Each year, photosynthesizing organisms produce about 170 billion metric tons of extra carbohydrates, about 30 metric tons for every person on earth.

Photosynthesis has far-reaching implications. Like plants, humans and other animals depend on glucose as an energy source, but they are unable to produce it on their own and must rely ultimately on the glucose produced by plants. Moreover, the oxygen humans and other animals breathe is the oxygen released during photosynthesis. Humans are also dependent on ancient products of photosynthesis, known as fossil fuels, for supplying most of our modern industrial energy. These fossil fuels, including natural gas, coal, and petroleum, are composed of a complex mix of

hydrocarbons, the remains of organisms that relied on photosynthesis millions of years ago. Thus, virtually all life on earth, directly or indirectly, depends on photosynthesis as a source of food, energy, and oxygen, making it one of the most important biochemical processes known.

WHERE PHOTOSYNTHESIS OCCURS

Plant photosynthesis occurs in leaves and green stems within specialized cell structures called chloroplasts. One plant leaf is composed of tens of thousands of cells, and each cell contains 40 to 50 chloroplasts. The chloroplast, an oval-shaped structure, is divided by membranes into numerous disk-shaped compartments. These disklike compartments, called thylakoids, are arranged vertically in the chloroplast like a stack of plates or pancakes. A stack of thylakoids is called a granum (plural, grana); the grana lie suspended in a fluid known as stroma.

Embedded in the membranes of the thylakoids are hundreds of molecules of chlorophyll, a light-trapping pigment required for photosynthesis. Additional light-trapping pigments, enzymes (organic substances that speed up chemical reactions), and other molecules needed for photosynthesis are also located within the thylakoid membranes. The pigments and enzymes are arranged in two types of units, Photosystem I and Photosystem II. Because a chloroplast may have dozens of thylakoids, and each thylakoid may contain thousands of photosystems, each chloroplast will contain millions of pigment molecules.

HOW PHOTOSYNTHESIS WORKS

Photosynthesis is a very complex process, and for the sake of convenience and ease of understanding, plant biologists divide it into two stages. In the first stage, the light-dependent reaction, the

chloroplast traps light energy and converts it into chemical energy contained in nicotinamide adenine dinucleotide phosphate (NADPH) and adenosine triphosphate (ATP), two molecules used in the second stage of photosynthesis. In the second stage, called the light-independent reaction (formerly called the dark reaction), NADPH provides the hydrogen atoms that help form glucose, and ATP provides the energy for this and other reactions used to synthesize glucose. These two stages reflect the literal meaning of the term photosynthesis, to build with light. AThe Light-Dependent Reaction Photosynthesis relies on flows of energy and electrons initiated by light energy. Electrons are minute particles that travel in a specific orbit around the nuclei of atoms and carry a small electrical charge. Light energy causes the electrons in chlorophyll and other light-trapping pigments to boost up and out of their orbit; the electrons instantly fall back into place, releasing resonance energy, or vibrating energy, as they go, all in millionths of a second.

Chlorophyll and the other pigments are clustered next to one another in the photosystems, and the vibrating energy passes rapidly from one chlorophyll or pigment molecule to the next, like the transfer of energy in billiard balls. Light contains many colors, each with a defined range of wavelengths measured in nanometers, or billionths of a meter. Certain red and blue wavelengths of light are the most effective in photosynthesis because they have exactly the right amount of energy to energize, or excite, chlorophyll electrons and boost them out of their orbits to a higher energy level. Other pigments, called accessory pigments, enhance the light-absorption capacity of the leaf by capturing a broader spectrum of blue and red wavelengths, along with yellow and orange wavelengths. None of the photosynthetic pigments absorb green light; as a result, green wavelengths are reflected, which is why plants appear green.

Photosynthesis begins when light strikes Photosystem I pigments

and excites their electrons. The energy passes rapidly from molecule to molecule until it reaches a special chlorophyll molecule called P700, so named because it absorbs light in the red region of the spectrum at wavelengths of 700 nanometers. Until this point, only energy has moved from molecule to molecule; now electrons themselves transfer between molecules. P700 uses the energy of the excited electrons to boost its own electrons to an energy level that enables an adjoining electron acceptor molecule to capture them. The electrons are then passed down a chain of carrier molecules, called an electron transport chain. The electrons are passed from one carrier molecule to another in a downhill direction, like individuals in a bucket brigade passing water from the top of a hill to the bottom. Each electron carrier is at a lower energy level than the one before it, and the result is that electrons release energy as they move down the chain. At the end of the electron transport chain lies the molecule nicotinic adenine dinucleotide (NADP⁺). Using the energy released by the flow of electrons, two electrons from the electron transport chain combine with a hydrogen ion and NADP⁺ to form NADPH.

When P700 transfers its electrons to the electron acceptor, it becomes deficient in electrons. Before it can function again, it must be replenished with new electrons. Photosystem II accomplishes this task. As in Photosystem I, light energy activates electrons of the Photosystem II pigments. These pigments transfer the energy of their excited electrons to a special Photosystem II chlorophyll molecule, P680, that absorbs light best in the red region at 680 nanometers. Just as in Photosystem I, energy is transferred among pigment molecules and is then directed to the P680 chlorophyll, where the energy is used to transfer electrons from P680 to its adjoining electron acceptor molecule.

From the Photosystem II electron acceptor, the electrons are passed through a different electron transport chain. As they pass along the cascade of electron carrier molecules, the electrons give up some

of their energy to fuel the production of ATP, formed by the addition of one phosphorous atom to adenosine diphosphate (ADP). Eventually, the electron transport carrier molecules deliver the Photosystem II electrons to Photosystem I, which uses them to maintain the flow of electrons to P700, thus restoring its function. P680 in Photosystem II is now electron deficient because it has donated electrons to P700 in Photosystem I. P680 electrons are replenished by the water that has been absorbed by the plant roots and transported to the chloroplasts in the leaves. The movement of electrons in Photosystems I and II and the action of an enzyme split the water into oxygen, hydrogen ions, and electrons. The electrons from water flow to Photosystem II, replacing the electrons lost by P680. Some of the hydrogen ions may be used to produce NADPH at the end of the electron transport chain, and the oxygen from the water diffuses out of the chloroplast and is released into the atmosphere through pores in the leaf.

The transfer of electrons in a step-by-step fashion in Photosystems I and II releases energy and heat slowly, thus protecting the chloroplast and cell from a harmful temperature increase. It also provides time for the plant to form NADPH and ATP. In the words of American biochemist and Nobel laureate Albert Szent-Gyorgyi, "What drives life is thus a little electric current, set up by the sunshine." BThe Light-Independent Reaction The chemical energy required for the light-independent reaction is supplied by the ATP and NADPH molecules produced in the light-dependent reaction. The light-independent reaction is cyclic, that is, it begins with a molecule that must be regenerated at the end of the reaction in order for the process to continue. Termed the Calvin cycle after the American chemist Melvin Calvin who discovered it, the light-independent reactions use the electrons and hydrogen ions associated with NADPH and the phosphorous associated with ATP to produce glucose. These reactions occur in the stroma, the fluid in the chloroplast surrounding the thylakoids, and each step is controlled by a different enzyme. The light-independent reaction

requires the presence of carbon dioxide molecules, which enter the plant through pores in the leaf, diffuse through the cell to the chloroplast, and disperse in the stroma. The light-independent reaction begins in the stroma when these carbon dioxide molecules link to sugar molecules called ribulose biphosphate (RuBP) in a process known as carbon fixation.

With the help of an enzyme, six molecules of carbon dioxide bond to six molecules of RuBP to create six new molecules. Several intermediate steps, which require ATP, NADPH, and additional enzymes, rearrange the position of the carbon, hydrogen, and oxygen atoms in these six molecules, and when the reactions are complete, one new molecule of glucose has been constructed and five molecules of RuBP have been reconstructed. This process occurs repeatedly in each chloroplast as long as carbon dioxide, ATP, and NADPH are available. The thousands of glucose molecules produced in this reaction are processed by the plant to produce energy in the process known as aerobic respiration, used as structural materials, or stored. The regenerated RuBP is used to start the Calvin cycle all over again.

PHOTOSYNTHESIS VARIATIONS

A majority of plants use these steps in photosynthesis. Plants such as corn and crabgrass that have evolved in hot, dry environments, however, must overcome certain obstacles to photosynthesis. On hot days, they partially close the pores in their leaves to prevent the escape of water. With the pores only slightly open, adequate amounts of carbon dioxide cannot enter the leaf, and the Calvin cycle comes to a halt. To get around this problem, certain hot-weather plants have developed a way to keep carbon dioxide flowing to the stroma without capturing it directly from the air. They open their pores slightly, take in carbon dioxide, and transport it deep within the leaves. Here they stockpile it in a chemical form that releases the carbon dioxide slowly and steadily

into the Calvin cycle. With this system, these plants can continue photosynthesis on hot days, even with their pores almost completely closed. A field of corn thus remains green on blistering days when neighboring plants wither, and crabgrass thrives in lawns browned by the summer sun.

Bacteria lack chloroplasts, and instead use structures called chromatophores—membranes formed by numerous foldings of the plasma membrane, the membrane surrounding the fluid, or cytoplasm, that fills the cell. The chromatophores house thylakoids similar to plant thylakoids, which in some bacteria contain chlorophyll. For these bacteria, the process of photosynthesis is similar to that of plants, algae, and seaweed. Many of these chlorophyll-containing bacteria are abundant in oceans, lakes, and rivers, and the oxygen they release dissolves in the water and enables fish and other aquatic organisms to survive. Certain archaeobacteria, members of a group of primitive bacteria-like organisms, carry out photosynthesis in a different manner. The mud-dwelling green sulfur and purple sulfur archaeobacteria use hydrogen sulfide instead of water in photosynthesis. These archaeobacteria release sulfur rather than oxygen, which, along with hydrogen sulfide, imparts the rotten egg smell to mudflats. Halobacteria, archaeobacteria found in the salt flats of deserts, rely on the pigment bacteriorhodopsin instead of chlorophyll for photosynthesis. These archaeobacteria do not carry out the complete process of photosynthesis; although they produce ATP in a process similar to the light-dependent reaction and use it for energy, they do not produce glucose. Halobacteria are among the most ancient organisms, and may have been the starting point for the evolution of photosynthesis.

While it may seem that we understand photosynthesis in detail, decades of experiments have given us only a partial understanding of this important process. A more thorough understanding of the details of photosynthesis may pave the way for development of

crops that are more efficient at using the sun's energy, producing food for increasingly bountiful harvests.

Contributed By: Leal G. Dickson

"Photosynthesis," Microsoft® Encarta® Encyclopedia 2000. © 1993-1999

Microsoft Corporation. All rights reserved.

<http://www.life.illinois.edu/govindjee/encyc/encarta.htm>

Popular Technology.net

<http://www.populartechology.net/2008/11/carbon-dioxide-co2-is-not-pollution.html>

Thursday, November 20, 2008

Carbon Dioxide (CO₂) is Not Pollution

"CO₂ for different people has different attractions. After all, what is it? - it's not a pollutant, it's a product of every living creature's breathing, it's the product of all plant respiration, it is essential for plant life and photosynthesis, it's a product of all industrial burning, it's a product of driving – I mean, if you ever wanted a leverage point to control everything from exhalation to driving, this would be a dream. So it has a kind of fundamental attractiveness to bureaucratic mentality." - Richard S. Lindzen, Ph.D. Professor Emeritus of

Atmospheric Science, MIT

Carbon Dioxide (CO₂) is not pollution and Global Warming has nothing to do with pollution. The average person has been misled and is confused about what the current Global Warming debate is about - greenhouse gases. None of which has anything to do with air pollution.

People are confusing Smog, Carbon **Monoxide** (CO) and the pollutants in car exhaust with the life supporting, essential trace gas in our atmosphere, Carbon **Dioxide** (CO₂). Pollution is already regulated under the Clean Air Act and regulating Carbon Dioxide (CO₂) will do absolutely nothing to make the air you breath "cleaner", as Carbon Dioxide (CO₂) is actually plant food.

They are also misled to believe that CO₂ is polluting the oceans through acidification but there is nothing unnatural or unprecedented about current measurements of ocean water pH and a future rise in pCO₂ will likely yield growth benefits to corals and other sea life. Thus regulating Carbon Dioxide (CO₂) emissions through either 'Carbon Taxes', 'Cap and Trade' or the EPA will cause energy prices (electricity, gasoline, diesel fuel, propane, heating oil ect...) to [skyrocket](#).

"CO₂ is not a pollutant. In simple terms, CO₂ is plant food. The green world we see around us would disappear if not for atmospheric CO₂. These plants largely evolved at a time when the atmospheric CO₂ concentration was many times what it is today. Indeed, numerous studies indicate the present biosphere is being invigorated by the human-induced rise of CO₂. In and of itself, therefore, the increasing concentration of CO₂ does not pose a toxic risk to the planet." - John R. Christy, Ph.D. Professor of Atmospheric Sciences, University of Alabama

"Carbon dioxide is not a pollutant but a naturally occurring, beneficial trace gas in the atmosphere. For the past few million years, the Earth has existed in a state of relative carbon dioxide starvation compared with earlier periods. There is no empirical evidence that levels double or even triple those of today will be harmful, climatically or otherwise. As a vital element in plant photosynthesis, carbon dioxide is the basis of the planetary food chain - literally the staff of life. Its increase in the atmosphere leads mainly to the greening of the planet. To label carbon dioxide a "pollutant" is an abuse of language, logic and science." - Robert M. Carter, Ph.D. Professor of Environmental and Earth Sciences, James Cook University

"Carbon dioxide is not a pollutant. On the contrary, it makes crops and forests grow faster. Economic analysis has demonstrated that more CO₂ and a warmer climate will raise GNP and therefore average income. It's axiomatic that bureaucracies always want to expand their scope of operations. This is especially true of EPA, which is primarily a regulatory agency. As air and water pollution disappear as prime issues, as acid rain and stratospheric-ozone depletion fade from public view, climate change seems like the best growth area for

regulators. It has the additional glamour of being international and therefore appeals to those who favor world governance over national sovereignty. Therefore, labeling carbon dioxide, the product of fossil-fuel burning, as a pollutant has a high priority for EPA as a first step in that direction." - S. Fred Singer, Ph.D. Professor Emeritus of Environmental Sciences, University of Virginia

"To state in public that carbon dioxide is a pollutant is a public advertisement of a lack of basic school child science. Pollution kills, carbon dioxide leads to the thriving of life on Earth and increased biodiversity. Carbon dioxide is actually plant food." - Ian R. Plimer, Ph.D. Professor Emeritus of Earth Sciences, University of Melbourne

"Carbon and CO₂ (carbon dioxide) are fundamental for all life on Earth. CO₂ is a colorless, odorless, non-toxic gas. CO₂ is product of our breathing, and is used in numerous common applications like fire extinguishers, baking soda, carbonated drinks, life jackets, cooling agent, etc. Plants' photosynthesis consume CO₂ from the air when the plants make their carbohydrates, which bring the CO₂ back to the air again when the plants rot or are being burned." - Tom V. Segalstad, Ph.D. Professor of Environmental Geology, University of Oslo

"To suddenly label CO₂ as a "pollutant" is a disservice to a gas that has played an enormous role in the development and sustainability of all life on this wonderful Earth. Mother Earth has clearly ruled that CO₂ is not a pollutant." - Robert C. Balling Jr., Ph.D. Professor of Climatology, Arizona State University

"CO₂ is not a pollutant as Gore infers. It is, in fact essential to life on the planet. Without it there are no plants, therefore no oxygen and no life. At 385 ppm current levels the plants are undernourished. The geologic evidence shows an average level of 1000 ppm over 600 million years. Research shows plants function most efficiently at 1000-2000 ppm. Commercial greenhouses use the information and are pumping CO₂ to these levels and achieve four times the yield with reduced water use. At 200 ppm, the plants suffer seriously and at 150 ppm, they begin to die. So if Gore achieves his goal of reducing CO₂ he will destroy the planet." - Tim F. Ball, Ph.D. Climatology

"Many chemicals are absolutely necessary for humans to live, for instance oxygen. Just as necessary, human metabolism produces by-products that are exhaled, like carbon dioxide and water vapor. So, the production of carbon dioxide is necessary, on the most basic

level, for humans to survive. The carbon dioxide that is emitted as part of a wide variety of natural processes is, in turn, necessary for vegetation to live. It turns out that most vegetation is somewhat 'starved' for carbon dioxide, as experiments have shown that a wide variety of plants grow faster, and are more drought tolerant, in the presence of doubled carbon dioxide concentrations. Fertilization of the global atmosphere with the extra CO2 that mankind's activities have emitted in the last century is believed to have helped increase agricultural productivity. In short, carbon dioxide is a natural part of our environment, necessary for life, both as 'food' and as a by-product." - Roy Spencer, Ph.D. Meteorology, Former Senior Scientist for Climate Studies, NASA

"I am at a loss to understand why anyone would regard carbon dioxide as a pollutant. Carbon dioxide, a natural gas produced by human respiration, is a plant nutrient that is beneficial both for people and for the natural environment. It promotes plant growth and reforestation. Faster-growing trees mean lower housing costs for consumers and more habitat for wild species. Higher agricultural yields from carbon dioxide fertilization will result in lower food prices and will facilitate conservation by limiting the need to convert wild areas to arable land." - David Deming, Ph.D. Professor of Geology and Geophysics, University of Oklahoma

"Carbon dioxide is not a pollutant. It is a colorless, odorless trace gas that actually sustains life on this planet. Consider the simple dynamics of human energy acquisition, which occurs daily across the globe. We eat plants directly, or we consume animals that have fed upon plants, to obtain the energy we need. But where do plants get their energy? Plants produce their own energy during a process called photosynthesis, which uses sunlight to combine water and carbon dioxide into sugars for supporting overall growth and development. Hence, CO2 is the primary raw material that plants depend upon for their existence. Because plants reside beneath animals (including humans) on the food chain, their healthy existence ultimately determines our own. Carbon dioxide can hardly be labeled a pollutant, for it is the basic substrate that allows life to persist on Earth." - Keith E. Idso, Ph.D. Botany

"To classify carbon dioxide as a pollutant is thus nothing short of scientific chicanery, for reasons that have nothing to do with science, but based purely on the pseudo-science so eagerly practiced by academia across the world in order to keep their funding sources

open to the governmental decrees, which are in turn based on totally false IPCC dogma (yes, dogma - not science)." - Hans Schreuder, Analytical Chemist

"Atmospheric CO₂ is required for life by both plants and animals. It is the sole source of carbon in all of the protein, carbohydrate, fat, and other organic molecules of which living things are constructed. Plants extract carbon from atmospheric CO₂ and are thereby fertilized. Animals obtain their carbon from plants. Without atmospheric CO₂, none of the life we see on Earth would exist. Water, oxygen, and carbon dioxide are the three most important substances that make life possible. They are surely not environmental pollutants." - Arthur B. Robinson, Ph.D. Professor of Chemistry

Defined:

"Carbon Dioxide (CO₂) - A colourless, odourless gas produced by burning carbon and organic compounds and by respiration, and absorbed by plants in photosynthesis." - [Compact Oxford English Dictionary](#)

"Carbon Dioxide (CO₂) - A heavy colorless odorless atmospheric gas. Source: respiration, combustion. Use: during photosynthesis, in refrigeration, carbonated drinks, fire extinguishers." - [Encarta Dictionary](#)

"Carbon Dioxide (CO₂) - A heavy colorless gas that does not support combustion, dissolves in water to form carbonic acid, is formed especially in animal respiration and in the decay or combustion of animal and vegetable matter, is absorbed from the air by plants in photosynthesis, and is used in the carbonation of beverages." - [Merriam-Webster Dictionary](#)

"Carbon Dioxide (CO₂) - A colorless, odorless, incombustible gas, CO₂, formed during respiration, combustion, and organic decomposition and used in food refrigeration, carbonated beverages, inert atmospheres, fire extinguishers, and aerosols." - [The American Heritage Dictionary](#)

"Carbon Dioxide (CO₂) - A colorless, odorless, incombustible gas that is produced naturally in breathing, combustion, and decomposition, and commercially for use in dry ice, fire extinguishers, and carbonated beverages." - [Wordsmyth Dictionary](#)

Carbon Dioxide:

- Carbon Dioxide (CO₂) is a natural part of Earth's Atmosphere ([NASA](#))
- Carbon Dioxide (CO₂) levels in the atmosphere are only at 0.04% (400ppm) ([Source](#))
- Carbon Dioxide (CO₂) is not toxic until 5% (50,000ppm) concentration ([Source](#))
- Any detrimental effects of Carbon Dioxide (CO₂) including chronic exposure to 3% (30,000ppm) are reversible ([Source](#))
- OSHA, NIOSH, and ACGIH occupational exposure standards are 0.5% (5,000 ppm) Carbon Dioxide (CO₂) ([Source](#))
- Submarine Crews live and work in a Carbon Dioxide (CO₂) rich environment of 3,500 to 4,100 ppm on average ([Source](#))

Kyoto Protocol:

The Kyoto Protocol is a treaty to regulate '**Greenhouse Gases**' only:

- Carbon dioxide (CO₂)
- Methane (CH₄)
- Nitrous oxide (N₂O) (*Laughing Gas, Nitrous, NOS*)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulphur hexafluoride (SF₆)

Car Exhaust:

Car Exhaust consists of:

Harmless:

- Carbon dioxide (CO₂)
- Nitrogen (N₂)
- Water vapor (H₂O)

Some Pollutants:

- Carbon monoxide (CO) *
- Hydrocarbons or Volatile Organic Compounds (VOCs) *
- Nitric oxide (NO) *
- Nitrogen dioxide (NO₂) *

* Your car's **Catalytic Converter** removes about 95% of these pollutants by **converting** them to harmless Carbon Dioxide (CO₂), Nitrogen (N₂), Oxygen (O₂) and Water (H₂O)

Smog:

Smog consists of:

- Ozone (O₃) * (*formed from the photochemical reaction of Nitrogen dioxide (NO₂) + Hydrocarbons*)
- Particulate matter (PM-10) *
- Sulfur dioxide (SO₂) *

* **Air Pollution is already regulated in the: 1970 Clean Air Act (Amended: 1977, 1990)**

Air Quality in America:

- The United States has sharply reduced air pollution levels, despite large increases in nominally "polluting" activities ([Source](#))
- Air pollution affects far fewer people, far less often, and with far less severity than is commonly believed. ([Source](#))
- Areas in the United States with the highest pollution levels have improved the most ([Source](#))
- Air quality in the United States will continue to improve ([Source](#))
- Regulators and environmental activists exaggerate air pollution levels and obscure positive trends in the United States ([Source](#))

[Air Quality in America](#) (PDF) ([AEI](#))

Ocean Acidification:

- There is nothing unnatural or unprecedented about current measurements of ocean water pH. Model-derived estimates of a CO₂-induced 0.1 pH unit decline since the start of the Industrial Revolution cannot be validated in the historical record. ([Source](#))
- Coral calcification is a biologically-driven process that will likely overcome physical-chemical limitations, which in the absence of life would not be possible. ([Source](#))
- Observational data overwhelmingly demonstrate that rates of coral

calcification have increased over the past century and beyond as temperatures and atmospheric CO2 concentrations have risen.

([Source](#))

- Potential future declines in oceanic pH will likely not prove to be a major detriment to corals and other sea life. For many such organisms, the future rise in pCO2 will yield growth benefits. ([Source](#))

[Effects of Ocean Acidification on Marine Ecosystems](#) (PDF) (Craig D. Idso, M.S. Agronomy, Ph.D. Geography)

Peer Reviewed Papers:

[Environmental Effects of Increased Atmospheric Carbon Dioxide](#) (PDF)

(*Climate Research*, Volume 13, Number 2, pp. 149–164, October 1999)

- Willie H. Soon, Sallie L. Baliunas, Arthur B. Robinson, Zachary W. Robinson

[Scientific Shortcomings in the EPA's Endangerment Finding from Greenhouse Gases](#) (PDF)

(*The Cato Journal*, Volume 29 Number 3, pp. 497-521, 2009)

- Patrick J. Michaels, Paul C. Knappenberger

 Print  PDF

http://www.amazon.ca/Climate-Change-Justice-Eric-Posner/dp/0691137757/ref=sr_1_16?s=books&ie=UTF8&qid=1442096420&sr=1-16&keywords=climate+change

Climate Change Justice— Mar 14 2010

by [Eric A. Posner](#) (Author), [David Weisbach](#) (Author)

6 of 56 people found the following review helpful

How many angels can dance on the head of a pin? May 7 2012

By Norman Rogers - [Published on Amazon.com](#)

Format: Hardcover **Verified Purchase**

The authors could have debated what to do if it became known that a huge astroid was heading straight for the earth. That would have been more interesting exercise in wild speculation than musing about what what to do to prevent or embrace apocalyptic climate change. At least astronomy is a solid science and if the astronomers say an astroid is about to hit the earth you can have some confidence in what they say.

The authors do not ask if there is any substance to the predictions of climate doom handed down by the Intergovernmental Committee on Climate Change (IPCC). The supposedly sophisticated law professors seem to think that the highly implausible predictions of the IPCC have been handed down from heaven on stone tablets. Perhaps the authors have to accept apocalyptic climate change predictions as true. There wouldn't be much reason to write most of their book otherwise.

Some judge said the constitution is not a suicide pact. But our law professors think that is plausible that the important nations of the world will join in a treaty that would clearly be an economic suicide pact. These nations are supposed to give up most fossil fuels in the name of preventing the hypothetical global warming. These are the same nations that can't sacrifice 5% of the GDP to keep their debt from spiraling out of control.

The professors have a real problem with science. They seem to think that if an expert with an impressive false front (i.e. the IPCC or Al Gore) say that the sky is falling it must be so. They eagerly swallow the most fake predictions, such as rising sea level or malaria going wild. There is no indication that their understanding of global warming is even up to the boy scout merit badge level. That said, maybe global warming really is a looming disaster. It's hard to prove a negative.

Cool It: The Skeptical Environmentalist's Guide to Global Warming– Sep 4 2007

by [Bjorn Lomborg](#) (Author)

http://www.amazon.ca/Cool-Skeptical-Environmentalists-Global-Warming/dp/0307266923/ref=sr_1_9?s=books&ie=UTF8&qid=1442097085&sr=1-9&keywords=Glaciers+are+not+melting

An Excellent, Logical Viewpoint that Isn't Voiced Often Enough

By [Eric Boyer](#) on Oct. 9 2010

Format: Paperback

This is one of the few books that I think everyone should read. Global warming has become such an incredibly irrational issue, and this book brings a rational, objective voice to the debate. Basically, this book is meant to cool everyone's temper on the issue (hence the name 'Cool It'), and provide logical solutions to the problem.
Lomborg's main argument is the following: global warming is caused at least partially by

humans, but dealing with it by means of extreme CO2 cuts it not a viable solution. Instead, he argues that using our world's resources to solve other world problems, such as disease and poverty, will have an incredibly larger benefit to the world in the long-term, and will in turn put us in a better position to deal with a world that is slightly warmer than it is now. He argues that we should continue making our technology more environmentally-friendly, but that suddenly making all technology have no environmental impact (as some environmentalists want) is completely unreasonable. In addition, Lomborg argues that the effects of global warming will not be nearly as apocalyptic as most media sources would have us believe, and hence completely preventing the slight temperature increases that it will bring is not necessary.

Lomborg supports his position with a tremendous amount of evidence, cost-benefit analyses, and references. To give an idea of how much his argument is supported, this book has 164 pages of actual content, and there are approximately 450 citations and 400 references. Of course I can't browse through all of them to see how valid they are, but of the few dozen that I checked they seemed quite reliable. However, there are some claims that I found somewhat hard to believe, such as what is predicted by the various models of climate and human condition that Lomborg references. For example, Lomborg claims that humans will be richer in general over the coming century, which I find somewhat believable, but I find it hard to believe the precise numbers that he gives from the models of the worldwide economy that he references.

As I mentioned, I recommend this book to EVERYONE. You might not believe all the claims made in the book, but it definitely provides an excellent viewpoint on the subject. The book is short enough to be accessible to almost anyone, yet it doesn't miss any important aspect of the issue.

<http://www.ncpa.org/pub/ba256>

Who's Afraid of CO2?



No. 256

Friday, January 23, 1998

by Merrill Matthews Jr.

For the past 10 years, carbon dioxide (CO₂) has gotten a bad rap. Despite the fact that 95 percent of the CO₂ emitted each year is produced by nature (see Figure I), environmentalists started referring to CO₂ as a pollutant in 1988 after some scientists claimed that the 30 percent rise in atmospheric CO₂ over the last 150 years was attributable to humans and was causing global warming. In response, Vice President Al Gore in his 1992 book *Earth in the Balance* called for "carbon taxes," stating that "filling the atmosphere with carbon dioxide and other pollutants . . . is a willful expansion of our dysfunctional civilization into vulnerable parts of the natural world." The evidence shows neither that a modest warming will threaten human life through environmental catastrophe nor that the recent rise in CO₂ levels is responsible for the measured rise in global temperature.

Carbon dioxide is not a pollutant. It is tasteless, colorless, nontoxic to humans at concentrations up to 13 times present levels and is essential to life. Plants breathe CO₂, and as they grow and reproduce they exhale oxygen, making the earth habitable for humans. Instead of a disaster, the expected doubling of CO₂ due to human activities will produce a number of benefits over the next century.

The Role of CO₂. CO₂ is a "greenhouse gas," one of several that partially trap solar radiation in the atmosphere. Without these gases the earth would be uninhabitable - at least by humans. CO₂ occurs naturally and accounts for 2 to 4 percent of the greenhouse effect (water vapor is responsible for virtually all of the rest). Most of this CO₂ is used by or stored in oceans, plants and animals.

However, over the past 150 years atmospheric CO₂ concentrations have increased approximately 30 percent, rising from 280 to 360 parts per million (ppm).

CO₂ and Global Warming. Ground-level temperature measurements indicate that the earth has warmed about 1 degree Fahrenheit since 1850, but human-generated carbon dioxide could have been only a small factor because most of the warming occurred before 1940 - preceding the vast majority of human-caused CO₂ emissions. Historically, increases in atmospheric CO₂ concentrations have often followed rather than preceded warm periods.

Plants Need CO₂. Most of the earth's plant life evolved in an atmosphere of much more concentrated CO₂. Indeed, some scientists have argued that, until quite recently, many plants were starving for CO₂.

CO₂ is essential to photosynthesis, the process by which plants use sunlight to produce carbohydrates - the material of which their roots and body consist. Increasing CO₂ levels speeds the time in which plants mature and improves their growth efficiency and water use. Botanists have long realized that CO₂ enhances plant growth, which is why they pump CO₂ into greenhouses.

- In addition, higher CO₂ levels decrease water loss in plants, giving them an advantage in arid climates and during droughts. In 55 experiments conducted by U. S. Department of Agriculture research scientist Sherwood Idso, increased levels of CO₂ dramatically enhanced plant growth. For example, Idso found:
10. With a CO₂ increase of 300 ppm, plant growth increased 31 percent under optimal water conditions and 63 percent when water was less plentiful.
 11. With a 600 ppm CO₂ increase, plant growth increased 51 percent under

optimal water conditions and an astonishing 219 percent under conditions of water shortage (see [Figure II](#)).

Also, CO₂ enrichment causes plants to develop more extensive root systems with two important results. Larger root systems allow plants to exploit additional pockets of water and nutrients. This means that plants have to spend less metabolic energy to capture vital nutrients. Additionally, more extensive, active roots stimulate and enhance the activity of bacteria and other organisms that break nutrients out of the soil, which the plants can then exploit.

Farmers Need CO₂. Based on nearly 800 scientific observations around the world, a doubling of CO₂ from present levels would improve plant productivity on average 32 percent across species. Controlled experiments have shown that:

- Tomatoes, cucumbers and lettuce average between 20 and 50 percent higher yields under elevated CO₂ conditions.
- Cereal grains including rice, wheat, barley, oats and rye average between 25 and 64 percent higher yields under elevated CO₂ levels.
 - Food crops such as corn, sorghum, millet and sugar cane average yield increases from 10 to 55 percent at elevated CO₂ levels.
 - Root crops including potatoes, yams and cassava show average yield increases of 18 to 75 percent under elevated CO₂ conditions.
 - Legumes including peas, beans and soybeans post increased yields of between 28 and 46 percent when CO₂ levels are increased.

Trees Need CO₂. International research has demonstrated that trees also benefit from increased CO₂ levels. In research from the U.S. Water Conservation Laboratory, doubling CO₂ from current levels helped orange trees accumulate 2.8 times as much biomass in the first five years of the tests and yield 10 times as many oranges in the first two years of orange production. Other U.S. studies confirm these findings. For example:

- Since 1890, high-altitude conifers in the Cascade Mountains of Washington have increased in mass approximately 60 percent from previous growth trends.
- In New England, a study of 10 tree species showed an average growth enhancement of 24 percent from 1950 to 1980, a period when CO₂ levels were rising.

European studies have also demonstrated that elevated CO₂ levels benefit tree growth. For example:

- Stands of Scotch pine in northern Finland have experienced growth increases of 15 to 43 percent since 1950.
- Forest growth rates in Baden-Wurtemberg, Germany, have increased 20 percent in the past 20 years.

Scientists have discovered no environmental factor other than the CO₂ increase that could explain the higher growth rates found in forests around the world.

Ecosystems Need CO₂. The earth's ecosystems should benefit from higher levels of CO₂. Increased crop yields mean that humans will not have to convert more fragile forests, savannas and deserts into crop lands to feed growing populations. Wildlife will get a respite from the development of their habitats. As forests increase, many currently fragmented ecosystems will regenerate - as

many already have in Europe and the eastern United States. Since trees will put on more mass under higher CO2 conditions, fewer trees will have to be cut to supply humanity's demand for timber.

Finally, many scientists contend that outside of human society the availability of food is a primary inhibitor of population growth. Therefore, as plants increase in size and number, so should animals - more herbivores due to increased edible vegetation and more omnivores and carnivores due to increased herbivore populations.

Conclusion. According to government mine safety regulations, atmospheric CO2 would have to rise as high as 5000 ppm before it posed a direct threat to human health. Since no scientist predicts a rise of this magnitude in the next century, the anticipated rise in CO2 levels should be viewed as beneficial. Even if temperatures increase slightly, life on earth will thrive.

This Brief Analysis was prepared by NCPA environmental analyst H. Sterling Burnett and NCPA vice president of domestic policy Merrill Matthews, Jr.

- See more at: <http://www.ncpa.org/pub/ba256#sthash.fdtic0Ew.dpuf>

Browse: [Home](#) / [2012](#) / [May](#) / [24](#) / [Multiple Glacier Studies Show Wide Holocene Climate Variations In Asia And Europe](#)
Multiple Glacier Studies Show Wide Holocene Climate Variations In Asia And Europe

By P Gosselin on 24. May 2012

A recent [study by A.R. Agatova et al](#) investigated glacier dynamic and climatic variations in the southeastern part of the Russian Altai during the last 7000 years and show distinct natural climatic changes had occurred.

Not surprisingly, these changes coincide with changes occurring at other parts of the globe, and so add to the massive weight of evidence refuting the claim that climate fluctuations on centurial in millennial scales are regional phenomena and occur over a small temperature range.

The scientists exhumed organic material and carried out radiocarbon dating on wood remains from buried dead trees at the upper tree limit, and from rock glaciers on trough slopes from six glacial valleys in the North Chuya Range, SE Altai. They compiled an extensive dataset, which form the basis for understanding the relative magnitudes and timing of the most important glacial and climatic events of SE Altai.

Their conclusion:

New data refute the traditional concept of the Russian Altai Holocene glaciations as a consecutive retreat of the late Würm glaciers and argue their complete degradation at the head of trough valleys at least 7000 cal. years BP.”

Moreover, they identified three periods of glacial advances: from **4900 to 4200 cal. years BP** (Akkem stage), from **2300 to 1700 cal. years BP** (Historical stage) and in the **13th–19th centuries** (Little Ice Age (LIA) or Aktru stage).

The coincident extremes of lowering temperature and increasing precipitation during the Akkem stage led to abrupt glacier advances and forming of the most remote moraine complexes downstream in the valleys.

The authors also write that in addition to the radiocarbon data, the time limits of the Historical stage were defined more precisely using dendrochronological and archaeological data from Scythian burials of Pazyryk culture in SE Altai.

Repeated forest regrowth in the presently glaciatiated area indicates significant retreat or even complete glacier degradation during interstage warming. The decreases of glacier length in the following stages argues for intensification of aridity in the SE Altai during the second half of the Holocene. The thermal minimum in the middle of 19th century, the greatest in the last millennium, did not positively influence the mass balance of glaciers, which also supports this conclusion.”

So much for bogus claim that climate was more or less stable before man populated and developed.

Also strong glacial variations in the Alps as well

Easy Plugin for AdSense V8.20 [midtext: 0 urCount: 0 urMax: 0]

Easy Plugin for AdSense V8.20

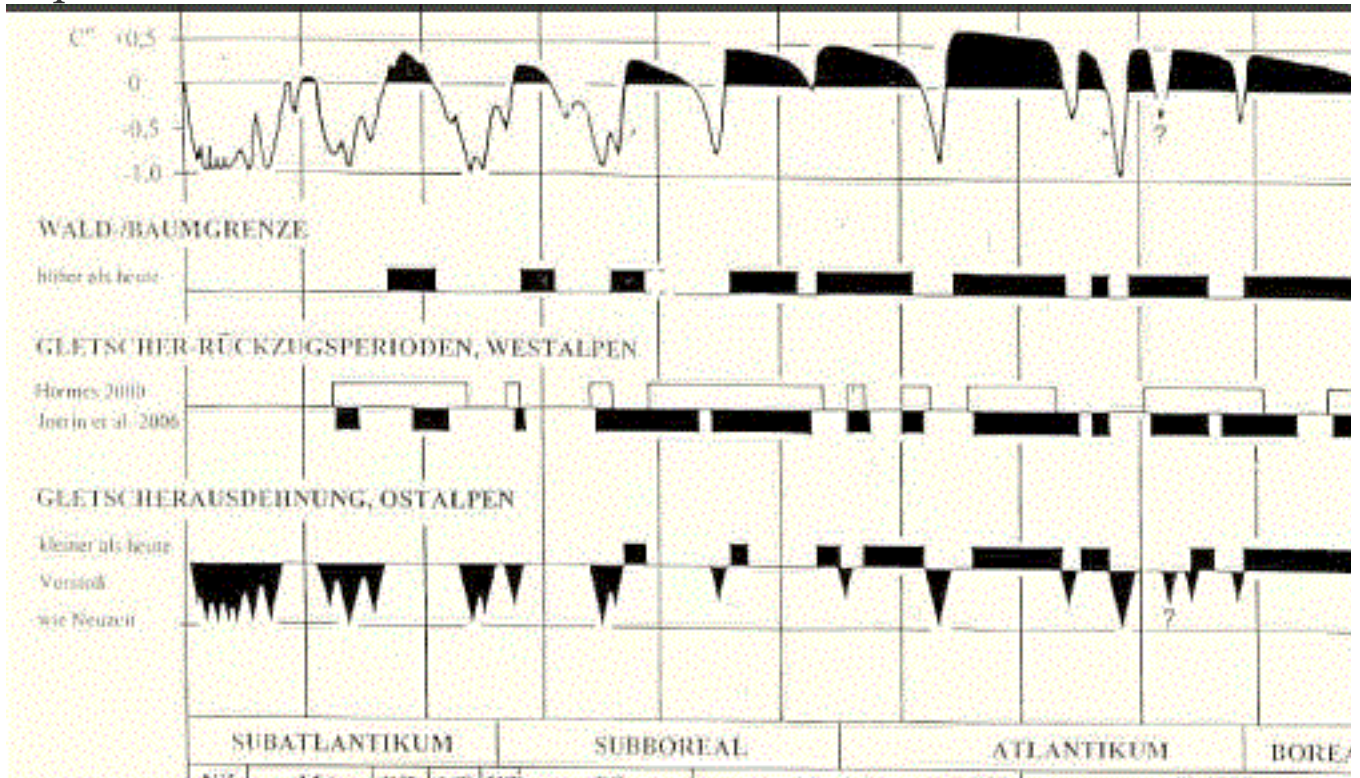
Interestingly, Prof. em. **Dr. Gernot Patzelt**, University of Innsbruck, made a presentation at the International Climate and Energy Conference in Munich late last year,

which the European Institute for Climate and Energy has just released.

In his presentation, Dr. Patzelt also reveals glacier advances and retreats in the Alps throughout the Holocene, thousands of kilometers away from the Russian Altai. Forests existed at elevations that were higher than today – in areas that are presently covered by glaciers.

At the 12:22 mark, Patzelt summarizes the data of the three glaciers examined in the Alps and presents a temperature reconstruction. His conclusion at the 13:42:

Over the last 10,000 years it has been warmer than today 65% of the time. Our current climate does not in any way show an anomaly in temperature development. That's an important result."



Top curve shows the reconstructed temperature of the Alps over the Holocene. Dark-shaded areas show warm periods. (Snipped from Patzelt's presentation at the 13:30 mark).

Clearly from his chart one sees the millennial cycles that

coincide with documented solar activity. And as Dr. Sebastian Lüning showed yesterday in Chicago, we are not talking about fluctuations of a couple of tenths of a degree, but of fluctuations over 1, 2 or even 3°C.

At 14:50 Patzelt shows the Greenland ice core reconstruction for comparison.

Clearly there are natural forces at work. Claims that natural factors retired 100 years ago are simply absurd.

- See more at:

<http://notrickszone.com/2012/05/24/multiple-glacier-studies-show-wide-holocene-climate-variations-in-asia-and-europe/#sthash.upMQpAi7.m4pD53JE.dpuf>

-