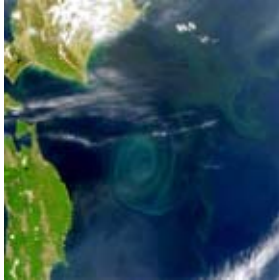


Planktos

Planktos Inc (www.planktos.com) works to develop science and technology to address global warming and the declining productivity of the world's oceans.



Plankton blooms absorb almost half the world's CO2

[Official Planktos Site](#)

Contributors

[Laura](#)
[Mark](#)

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THURSDAY, AUGUST 23, 2007

More for Less

On the scale of sexiness, hybrid cars beat out hand-washed clothes and brown eggs beat out the white ones. In these comparisons, both examples result in a similar CO2 savings, but we pay a premium for the products that appear more green. This line of thinking influences decisions made by governments and corporations alike, as well as the debate between carbon reductions and carbon offsets.



Earlier this year, the European Union made the decision to replace 10% of its diesel fuel with renewable biodiesels by 2020, with the intention of reducing its greenhouse gas pollution. Unlike corn ethanol, which provides little benefit to the environment, a [lifecycle assessment of biodiesels](#) suggests that a switch to biodiesels can reduce the carbon footprint of diesel fuel by 78%.

But a lifecycle assessment only includes direct costs due to the production and manufacturing of a product. Any economist knows that opportunity cost is a major factor in decision-making, and a [recent study](#) by scientists in the UK finds that tropical climate forests reduce our overall CO2 footprint 9 times more than a biodiesel farm on the same patch of land. Not to mention that a whopping 38% of European farmland would be required to make the 10% substitution. Even those of us who sneer at the idea of offsets would have a hard time maintaining that 9 carbon offsets don't out-value a single reduction.

On top of this, the feel-good-factor of biodiesels doesn't come for free. Government subsidies are required for biodiesel to compete with its fossil fuel counterpart and costs the government money in the form of the subsidies as well as lost profits from diesel taxes.

My advice... if you have a couple extra dollars for the brown eggs, go ahead and spend the money. But when it comes to big decisions that affect the planet, don't let green appeal dupe you into paying more for less.

Posted by Laura at 5:46 PM [1 comment](#)

TUESDAY, JULY 17, 2007

Holy Sequestration!

Planktos is proud to announce the donation of climate forests that offset 100% of carbon dioxide produced by The Holy See this year, making the Vatican the first carbon-neutral sovereign state in modern history.

Our founder and CEO, Russ George, presented these carbon offsets to Reverend Eminence Cardinal Paul Poupard, who presided over this historical ceremony. "As President of the Pontifical Council of Culture; I am honored to receive this donation from the leaders of Planktos-Klimafa. This donation means an entire section of a national park in central Europe will be reforested. In this way, the Vatican will do its small part in contributing to the elimination of polluting emissions from CO2 which is threatening the survival of this planet."

We would like to thank the Catholic community for taking a leadership role in protecting our Earth, and for making a positive example for the rest of the world. I hope many believers will follow in your green footsteps.



Posted by Laura at 12:28 PM 1 comments

MONDAY, JULY 16, 2007

Green Wheels

"Get a Prius!"

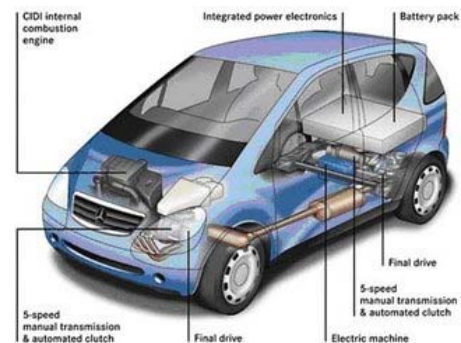
I asked my friend Gene if I should buy a Toyota Corolla or a Honda Civic, and he didn't want me to buy either. "You want a hybrid," he told me.

At first, the idea of putting the same amount of fuel into my vehicle and going a longer distance was very enticing. It is like getting something for nothing -- buying the "25% more free" bottle of shampoo instead of the regular 16oz bottle. I'd be able to drive farther without stopping for gas, and feel good about myself for reducing my carbon footprint.

Unfortunately, the Civic hybrid costs about \$5600 more than a comparable non-hybrid Civic. How long would it take to get my investment back in fuel savings? The car salesman answered my question right away.

"Forever," he told me. "You don't buy a hybrid to save money."

Consumer Reports made a similar conclusion. Even after tax rebates and incentives for hybrid vehicles, the cost of the investment is never recovered in gasoline savings. The car that comes closest is indeed the Civic, which after 5 years (75,000 miles) still puts you \$3700 in the hole. Part of the



problem is that the hybrids do not deliver as high of a gas mileage as is quoted by the EPA's outdated measurement system.

In terms of carbon pollution, the hybrid does indeed protect the environment. But not very much, considering the investment. In the entire lifespan of a Civic hybrid (assuming 150,000 miles), about 9.9 tonnes of carbon dioxide are saved from the atmosphere, a quantity that would cost only \$49.50 to sequester with Planktos carbon credits. If you're not into sequestration, you would be better off buying compact fluorescent bulbs, which return their minimal investment in about a year, and prevent about 400 pounds of CO₂ pollution over their 5-year lifespan.

For me, this analysis (and my lowly salary) ended with the purchase of a regular Civic, which has a very respectable efficiency rating even without the hybrid technology. Of course, for those of us who can spare a couple grand to save the planet, investing in a hybrid certainly helps the environment, and as a bonus, also decreases our dependence on oil.

Posted by Laura at 1:44 PM 3 comments

TUESDAY, JULY 10, 2007

Think Twice

As I'm sure many of you know, Planktos has been all over the press recently. Not surprisingly, a surplus of good press is often followed with debate.

The convincing arguments in these debates (some of the arguments are non-factual) raise three main questions:

- 1) *Are carbon credits an excuse for companies to pollute?***
- 2) *Is the ocean a sacred realm that we should leave to mother nature?***
- 3) *Should a for-profit company be allowed to contribute towards scientific research?***

To be honest, the libertarian side of me wants to squash the protesters with a big anvil, but really, I know that public image matters to me. So here's my two cents -- overall, I think we are not in much disagreement at all. Planktos actually shares many of these concerns. (Feel free to hit the comment button if you want to debate anything.)

To address question 1, it is important to know that there is no source of carbon-free energy that is both feasible and immediate on a large scale, aside from nuclear energy. Trust me -- I spent a year in college getting my engineering specialization in energy technology, and I learned countless depressing lessons about our energy future. A silicon solar panel takes 40% of its lifespan to produce the same amount of energy that was used to make the cell. Ethanol uses even more energy in production, and also requires vast amounts of land and water. Hydro power, wind energy, bio diesel, and hydrogen fuel all suffer from insurmountable limitations. In the end, nuclear energy is our only viable option, but the idea of all that nuclear waste is a little hard to stomach.

Because of this limitation in technology, the debate about carbon credits has more to do with motivation than with carbon. It's true that a moderate amount of research money could be allocated to alternative energy research if it weren't being used for sequestration technology. There is also a fear that companies will purchase carbon credits instead of improving energy efficiency to meet greenhouse gas emission standards, thereby avoiding the problem instead of addressing it. (Fortunately, laws are being written that will prevent this.) Personally, I believe that big polluters need to be held accountable for their actions, and this is one way to redistribute their capital into costly ecosystem restoration projects.

Carbon credits can be implemented right away whereas feasible zero-emission technologies are decades down the road. Planktos does not think that carbon credits are the solution to global warming, nor do we think that they are better than emissions reductions. It seems obvious to me that reducing emissions AND researching new technologies would be the best path, so let's do both!

To address question number two: YES, I am in absolute positive agreement.

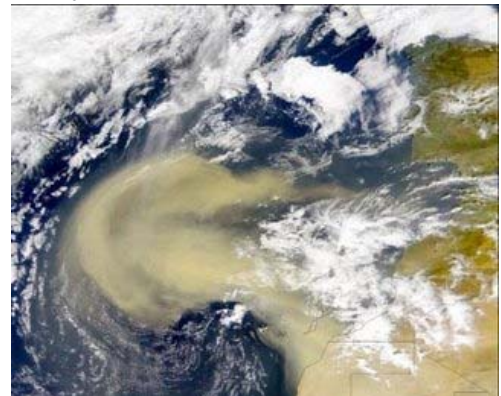
But only in principle.

Irreversible changes have already begun to occur in the oceans. Increased atmospheric CO₂ has caused an increase in ocean acidity, and critters are literally going to dissolve as the rising acidity of their surroundings burns them away. Overfishing has vastly affected the oceanic food web. Coral reefs are constantly dying (actually, dissolving) and entire habitats are going extinct. In an ideal world, we would have stayed clear of ocean ecosystems a long time ago, but even if we leave the oceans completely, the changes we have made to the land surface will continue to affect marine ecosystems.

Wind-blown dust is a major provider of vitamins and minerals for plants growing in the middle of the ocean, and entire habitats die when the dust doesn't arrive.

The satellite photograph on the right shows a dust storm blowing off the coast of Africa. This

particular source delivers iron to thousands of square miles of Pacific



and sends phosphates as far as the Amazon rain forest. These habitats depend on the dust to deliver these vital nutrients, and anthropogenic changes in land use have irreversibly altered the amount of dust that gets picked up by the wind. In the ocean, the supply of iron is constantly declining, and the marine environment suffers as a result.

Mother Nature may not have intended for people to sprinkle dust into the water, but a fair amount of scientific evidence suggests that it will be helpful. The patch of ocean that Planktos plans to fertilize is hundreds of times smaller than a natural, wind-born patch (the dust storm shown above is the size of Spain) thereby providing a large enough area for optimal research conditions, while still respecting the sanctity of the oceans. Data gathered from this plankton bloom will be used to verify (or deny) the influence of plankton on global warming, and will expand the literature about iron fertilization as described in IPCC 2007 and other documents. We are confident that our project will be successful, however it should be known that future blooms will not occur if initial tests show any risky or unnatural effects. We want the ocean to thrive!

Which brings us to question 3.

We are a research company. We are fully engaged in generating scientific results and comprehensive data, and our techniques mimic those used by iron fertilization experiments conducted by academic institutions in the past. The only thing that separates us is the way we fund these projects. Previous experiments conducted by academics were funded by government grants; Planktos uses self-generated funds that come from investors and buyers in the carbon market. Just because we depend on sales to fund our projects, we are not in any way profit-motivated or unconcerned with the environment -- why would we choose such an environmental project if this were true?

Of course, I understand that this is not the only conflict for scientists; the transition from research to application is challenging in every field of science. If I were studying the effectiveness of a new fertilizer, and a company began to commercialize the product during my experiment, I would feel robbed of the applicability of my research. As a company, this is a problem that is out of our control. But I assure you that Planktos conducts only the utmost quality of research, and that we are open to new ideas. If you're an ocean scientist and you are interested in the Planktos project, let us know. We are always eager to hear about new research, and willing to listen to individual points of view.

Posted by Laura at 1:24 PM [6 comments](#)

FRIDAY, JUNE 29, 2007

Plantos President Responds to Critics

As someone who has committed most of my waking life to caring for the planet, recent misleading reports on the foundations and future of my

current company's work have led me to reflect on some large and important questions.

Let me start with a bit of personal history to provide some context. My career on behalf of the planet began with my education as a biologist and in post-university life with the tree-planting company I founded (Coast Range) in British Columbia in 1972. Along with planting and caring for scores of millions of trees in Canada, I also helped in many volunteer roles on behalf of the environment, including standing night watch at sea on the Greenpeace ship Rainbow Warrior. I worked for government and industry as an environmental manager, crafting and enforcing environmental regulations and prescribing remedies to mitigate harm being done to the environment. I was also a writer, producer and director in the late '80s of the award-winning documentary films *The Wild Pacific Salmon* and *The New Environmentalists*.

In more recent years, since 1997, my work has focused substantially on developing and delivering programs to accomplish ecorestoration of the trees and seas as a means to help cure some of the damage done by the ravages of fossil fuel carbon dioxide and to curtail further damage. In this latter work I've been developing Canada's first major eco-restoration climate forest company, HaidaClimate, in partnership with the native peoples of the Queen Charlotte Islands (Haida Gwaii). In partnership with the government of Hungary through our Planktos subsidiary company KlimaFa, we are now beginning to grow vast new forests within the national park system of Europe. I have also been an adviser to governments in Central America and Asia on eco-restoration strategies in the world of the Kyoto Protocol and climate change.



Combining all of this has resulted in the creation of the public company called Planktos, which was founded with multiple purposes, two of which are to address the most critical problems of our small blue planet: global warming and the ecological collapse it is forcing upon ocean and terrestrial plant life.

And yes, we do this for profit and expect to earn good returns for those who invest in our public company stock.

After all of this work, I was shocked when Planktos came under attack from fringe environmentalists, who were later joined by a few other organizations and scientists with unfounded reservations about Planktos' methods.

Since the attacks refer to our ocean work, it's important to describe that work. Following 20 years and \$100 million worth of international spending on pure academic science studies of the ocean crisis and possible solution(s), it is clear the single most critical ocean issue is the decline of available iron, which comes primarily from dust in the wind. In our work we will mimic natural processes and use natural iron ore, red hematite, to replenish missing iron and "fertilize" modest, forest-sized patches of ocean, restoring plankton growth (and aquatic life) and effectively sequestering fossil carbon for millennia.

This is a way to safely store the excess carbon each of us adds to our atmosphere every day. In fact, it may be the most efficient route we have. It is likely the most useful means to help the planet, as the healthy green plants that grow in plankton blooms are the most critical part of the planetary ecology that is impacted most when we produce excess CO₂ in the atmosphere. Excess CO₂ leads to global warming, ocean acidification, and loss of ocean plant life.

My expectation has been that many groups would call for increased

research, which, as a scientist, I have demonstrably committed my life to doing. Others would call for caps and regulations on when and if the method comes into the carbon markets fully fledged, which I am also fully aligned with. But to come under such an extreme attack, in a way that misrepresents both our intent and our actions, skews our research, and impugns our motives in quite dramatic ways is another story.

Why, in a time when our beloved planet is in dire straits, would environmentalists turn on their own? Why is the suspicion and cynicism so deep that it would lead to falsified and emotionally charged mudslinging in press releases and letters to the editor? Why the refusal by some to discuss our approach in more accurate detail and to report on those accurate details? And why the refusal by media and others to consider the possibility that their opening volley was misaligned?

Perhaps it is a kind of fundamentalism that drives this, where all for-profit companies are intrinsically evil, all interventions -- even restorative ones -- a form of desecration. Perhaps they fear that if the patient, in this case Mother Earth, is somehow brought back from the edge of death, their *raison d'être* will disappear. I have a hard time understanding what their motives might be.

It seems all is fair game once the enemy is identified. But what if the company or person in the sights is not actually an enemy? What if that company and its people are deeply aligned with the same principles, and our snap judgments have led us to see them with dark red glasses?

In a time of dire straits, we really need all hands on deck, working together to find solutions. We are not yet sure of exactly how effective iron fertilization is as a method to restore oceans and alleviate global warming. Our best estimates are that one-half of global carbon excess could be turned into a revived plankton forest, and in the bargain restore ocean fisheries if we just restore the ocean plants to the state of health they had in 1970. That's why we need good science, creativity, and collaboration: to find out exactly what role iron replenishment can play in the solution to this catastrophic manmade problem.

Verbal mudslinging serves only to degrade our collective green cause and postpone possible solutions. Instead of leading us to come together and collaborate far more extensively than ever before, it leads to factionalism, suspicion, and infighting. It obscures the noble quest for truth. That's why it is so damaging and unfortunate.

What I most dearly hope is that we can all move beyond infighting and into solidarity in finding, researching, and providing true solutions to the perils ahead.

--Russ George, Planktos CEO

Posted by Laura at 4:25 PM [0 comments](#)

WEDNESDAY, MAY 02, 2007

Can plankton help save the planet?

The New York Times published an [article about us](#) today. The article focuses on questions about plankton sequestration, ranging from profitability of carbon credits to effectiveness of iron fertilisation. These issues are clearly important, but in the end, it may not really matter.

G
l
o
bal warming is a problem

The New York Times



that needs to be fought now - not later. And ocean sequestration is one of few strategies that can correct for our dirty past on a large scale. Even if iron fertilisation fails to lower carbon dioxide concentrations, having that information is invaluable. Someone needs to figure out what CO2 mitigation strategies are going to work, and we can't wait for a hundred different studies to be conducted before going into the oceans.

We're taking our chances on this one, hoping to "save the planet, and make a little money of the side" (as our CEO likes to say). If things go as planned, we'll have taken millions of pounds of carbon out of the atmosphere *and* begun to restore ocean ecosystems by the end of the year. Even if things fail completely, we'll have obtained priceless information about our oceans, and our fight against global warming. And we're going to do it without burning a single tax dollar.

The New York Times raises some important questions, but in some ways misses the point. What really matters is that we're doing *something*, and that's a lot more than most people can say.

Posted by Laura at 3:50 PM [3 comments](#)

WEDNESDAY, APRIL 25, 2007

Carbon Bartering

Since Planktos was the official carbon neutralizing agency of the Chicago Green Festival, [Russ George](#) (our CEO) was asked to give a public speech at the event.

On the way back to the airport after the festival, Russ told his taxi driver about the trip. Moved by our company's mission, the taxi driver accepted payment of the cab fare in the form of carbon offsets for the taxi.

I find this wonderfully hilarious. And good for the jolly green cabbie.

Posted by Laura at 3:51 PM [0 comments](#)

MONDAY, APRIL 23, 2007

Buy one pound, get one free!



Today, I purchased a package of grapes. On the label of the grapes, it says that the fruit was "grown in Chile."

This doesn't surprise me. In my birth-given rights as a wealthy American, I deserve to consume any piece of food I feel like consuming at any given point in time, even if this requires shipping the piece of food halfway around the world for my personal self enjoyment. Obviously.

So, how much CO2 is produced by shipping grapes around the world? Let's find out.

Some rough estimates:

The middle of Chile is about 5270mi from the middle of the US.

A 747 cargo plane uses about 6.8 gal/mi. Yikes.

At full capacity, a 747 can carry an impressive 450,000 pounds of cargo.

So, we use a little math magic and we get
(6.8 gal/mi x 19.4 lbs of CO₂/gal gasoline x 5270 miles) / 450,000 lbs
cargo =
1.5 pounds CO₂ per pound of fruit

This is actually much less than I had expected. To put this number into perspective, the average American produces a whopping 122 pounds of CO₂ daily. Although, eating grapes in April is rather unnecessary, and every pound I can keep out of the atmosphere makes a difference.

I'll make up for myself at the farmer's market this weekend, to free myself of liberal guilt.

Posted by Laura at 3:52 PM [2 comments](#)

TUESDAY, APRIL 17, 2007

Green is good in any shade

'Green' is not synonymous with 'elite.' It's not a club, it's not exclusive, and there are no rules to being green. Every person who ever recycled a bottle or rode a bicycle is helping to some degree, and any shade of green is better than none at all.

The reason I say this is because recently, I have witnessed environmentally conscious people criticizing one another for the way they practice their beliefs. I heard a bicyclist talk down to a carpooler. I saw a vegetarian sneer at a meat-eater... in an organic restaurant. Even Al Gore is being criticized for using too much electricity, as if his impact as a public speaker does not do enough for the planet.

This phenomenon is especially confusing to me. I'm sure Snoop Dogg uses just as much energy as Al, and he's not getting criticized for it. Even President Bush gets by without having his energy bill scrutinized. If Al is a bad person for heating his swimming pool, then I am a better person than my vegan friend, because she once killed a mosquito while we were camping. (Even though I was eating a hamburger.)

When it comes down to it, we are fighting a difficult battle, and we are going to have moments of frustration. Let us channel that frustration into warmth and encouragement, instead of separating into Yankees and Dodgers. With a little love, we can inspire a Hummer-driver to stop at the local farmer's market. And that is a good first step.

(And while we're at it, let's make sure Snoop Dogg keeps his tires properly inflated.)

Posted by Laura at 3:53 PM [2 comments](#)

FRIDAY, APRIL 13, 2007

Watt's your problem?

Sometimes people ask me why global warming focuses on CO₂ instead of heat. When I burn gasoline, doesn't it produce *heat*? Isn't *heat* responsible for global warming?

When you drive your car, fuel gets burned and a lot of heat is produced. In order to keep your engine cool, this heat gets sent through the radiator, where it gets released into the atmosphere. This warms the air around your car and keeps your car cool.

Despite this, the amount of heat released into the atmosphere while driving is very small when compared to the amount of heat trapped by carbon dioxide. Let's look at some numbers to make sure.

World-wide, we are using somewhere around 6×10^{12} (6 million million) watts of energy at any point in time. That's a whole lot of light bulbs. Since burning fuel usually makes more heat than useful energy (about 3 times as much), we'll estimate that 18 million million watts of heat are being produced at a time. Yikes!

Now let's compare that to the amount of heat being trapped by greenhouse gases. According to the most recent IPCC report, the atmosphere captures 1.6 watts/square meter more heat than it did before the industrial revolution. That means for every square meter of space on our planet, 1.6 extra watts of sunlight are warming the atmosphere. How much heat does that produce? Well,

1.6 watts/sq meter x 510 trillion square meters on our planet =
816 million million watts of heat trapped by greenhouse gases

That's a whole lot more than we calculated for burning fuels.

Maybe heat produced by a car engine or a power plant is enough to warm the earth, but I am pretty sure that greenhouse gases are responsible for our hyper-speed climate change. At this very moment, greenhouse gases are warming our planet 45 times more than the burning of fuels.

Posted by Laura at 3:54 PM [0 comments](#)

MONDAY, MAY 10, 2004

The Planktos Blog

This is the blog for The Planktos www.planktos.com. We work to develop solutions to help the world's oceans endure and recover from the ravages of global climate change.

This blog is open for comments by readers. Welcome all well mannered and intentioned commentary.

Below is a brief essay that describes in part what we do.

Oceans in Peril from Rising Atmospheric CO₂ (April 2004 The Planktos Foundation)

The global community worries about global warming or more rightly global climate change. What we have not recognized is that "global warming" is likely the last and least effect that we will experience as part of global climate change. Today, a hundred years before the predicted few degrees of warming becomes palpable vast changes to the Earth's ecosystems will have wrought monumental changes in the way we humans live and behave on and with this small blue planet. Unlike Global Warming these changes are not some debatable future scenario they are upon us today. The most significant changes we see today are in the world's oceans. The ocean environment is in real peril now. Why is this?

The cause of this change and warming is known to be greenhouse gases, primarily CO₂, that are accumulating in our atmosphere as a result of the burning of fossil fuel. We know for certain that the concentration of CO₂ in the atmosphere has risen, since the dawn of the fossil fueled industrial age 150 years ago, from roughly 250ppm to 380ppm. We can predict and project the continued rise of CO₂ to levels in the very near future beyond 500ppm and reaching even beyond 1000ppm over the next century or two.

The first and most dramatic effects of 150 years of rising CO₂ are seen in eco-systems that are part of and responsive to powerful feedback systems. Delicately balanced eco-systems respond to the slightest shift that we apply with tremendous leverage. The first evidence of such a feedback eco-system couple is seen in the desert - ocean system. It is a remarkable part of the natural balance of our planet that the wettest and driest eco-systems on this planet are so intimately intertwined. Here is how it works as we now understand as a result of the massive experiment we have been conducting in altering those two eco-systems by raising the CO₂ concentration of the atmosphere by 50%. Had this massive atmospheric enrichment experiment called fossil fuel burning not occurred we might not have seen the desert and ocean link.

We know plants absorb CO₂ from the atmosphere and give back oxygen. They do this the same way all life on the planet exchanges gases with the air. They have to expose wet tissues to the air where the gas exchange takes place. We humans do this by opening our lungs and drawing in air to expose it to the wet tissues in our bodies. Plants do this by open cells on their leaves called stomata and allowing the air to exchange gases with wet tissues inside the leaf. We all pay for our oxygen CO₂ exchange with molecules of water that evaporate from those wet tissues. We can see this water when we exhale into cold air and see our breath form a cloud. Plants are no different than us in that the majority of water lost is via breathing.

For plants that have access to a relative abundance of water they can afford to trade water for CO₂. For desert and dry land plants it is a very different story. Desert plants have evolved to have short fast life cycles so that they can live their lives in the short period that water is available. They trade precious water with the air for the CO₂ they need to use in photosynthesis. Remember we are all "carbon" based life forms on this planet. All of that carbon comes from CO₂ that is changed via the photosynthesis of plants which combine it with nutrients and minerals from the soil into what we animals find delicious and nutritious.

TODAY we see that the air has 50% more CO₂ than it did a mere hundred years ago. Desert and dry land plants are very happy about this. They now obtain the CO₂ they need at far less expense in terms of water loss. This preserves their water supply for many days, they grow larger, and they produce more foliage and more viable seeds. For the deserts and dry lands of earth this higher CO₂ concentration in the air is a fantastic bounty and we see those deserts and dry lands of the Earth becoming greener over greater areas and for longer periods each year. We know that the best way to reduce the loss of topsoil and dust from blowing from the land is to better cover the land with vegetation. To be certain the dry lands and deserts still dry out and become dusty deserts but that dry dusty period becomes smaller and for a shorter time each year. This may be good news for deserts but there is a price to be paid. There is indisputable quantitative data showing dramatically reduced dust over the worlds oceans.

Enter the relationship of the deserts and dry lands with the oceans. We know that the ocean plants, phytoplankton, like their desert cousins have evolved a short life cycle. They live in an abundance of water but live in a desert of with regard to the nutrients and minerals that plants on earth take from the soil. So where do ocean plants get these nutrients and minerals... As it happens they get these from the land and the process of erosion that slowly wears down the earth and washes or blows it into the oceans. However some very critical mineral nutrients do not last long in the ocean ecosystem as being rather insoluble they dissolve slowly and sink quickly to the bottom. Chief in importance of these trace minerals required for photosynthesis and life on this planet is iron. Iron acts like a catalyst in photosynthesis with a very tiny amount being

needed to empower a very great amount of photosynthesis. Evolution has adapted ocean plants to make use of iron in concentrations almost too small for us to measure.

So where do ocean plants obtain their iron? They obtain it from the deserts of the earth where that abundant red dust is red because of the iron it contains. The dust that blows from the deserts feed the ocean plants the tiny amounts of iron they need to survive and flourish. When these dust storms pass episodically over the oceans they dip down here and there in a random fashion and deliver the precious iron to the waiting ocean plants. As this is a rare and somewhat unpredictable event ocean plants have evolved to grow at much reduced level of productivity as their normal life. But if additional iron arrives via a fortuitous dust storm they have the capacity to bloom like the desert after a spring rain and bloom they do.

In a few short days a deep blue ocean can turn into a green pea soup as the ocean plants rush to make use of every last atom of iron before it sinks into the abyss. Along with this dusty iron stimulated bloom comes a growth of the entire food chain as tiny krill and other zooplankton rise to the dinner table and feed on the temporary bounty. The bloom is temporary as the other macro-nutrients that the plants need is in limited abundance as well and as it becomes exhausted like a wet spring in the desert the ocean bloom rapidly comes to an end. This particular patch of ocean water will not be able to bloom again until the slow mixing of the ocean replenishes the water with the dissolved macro-nutrients. This is nature's way and it keeps our oceans rather more blue than green.

It is this delicate system that is now staggeringly out of balance due to rising CO₂ in the atmosphere. It is a feedback system that is now spinning up like a giant typhoon gaining strength from the weakness of the oceans that threatens to change this planet in ways the likes of which our earthbound and earth focused climate modelers have never dreamed, and it is happening faster than we know.

There is now evidence that is unchallengeable that shows atmospheric CO₂ is 50% higher than it was 150 years ago. There is correspondingly quantitative evidence showing the dramatic greening of dry and desert regions and the reduction of dust that is blowing from these regions over and onto the world's oceans. We also know from studies from satellites and ships that the baseline productivity of the world's great oceans is now stunningly reduced. The major oceans like the Pacific, Atlantic, and Southern oceans are 10-30% lower in productivity of ocean plants than they were a mere 25 years ago. If this rate of decline continues the oceans will become the deserts of this planet long before we humans notice a little warming and switch to a lighter jacket or sweater when we go out.

What is worse is that the amount of CO₂ the now diminished oceans are already failing to remove from our atmosphere, remember the oceans cover over 70% of this blue planet. This is the power of a feedback system. As the oceans become deserts our atmosphere is losing the most powerful CO₂ removal mechanism on the planet. This will result in a rise of atmospheric CO₂ at a far greater rate than the earth bound atmospheric scientists have predicted. This is already apparent in the actual rates of rising CO₂ concentration that are reported as being mysteriously faster than the models have predicted.

But this is not a story of inevitable doom and gloom. We can do something about this. As it happens the concentration of iron in the ocean on average is but a few parts per trillion. This number 1/1,000,000,000,000 is incredibly small and offers the opportunity for a

form of eco-judo to be practiced. We know that raising the concentration of iron in a patch of ocean by only a few additional tens of parts per trillion can stimulate an ocean bloom. We also know that iron is super abundant on this earth in the form of iron ore which is indeed the same form of iron Mother Nature dusts her oceans with. With a very small effort relative to what we earthlings spend on countless luxuries we can replenish the dust that the oceans are dying for. In the bargain we will scrub the CO2 that we spew from our tailpipes and power plants from the air using the free sunlight energy, we will replenish the food chain of the ocean that all ocean life and those of us who eat fish from the sea depend on, and we be able to do this in an affordable safe manner. No small effort is required but the effort is not so large that we cannot succeed in a timely fashion. If we start now we may be able to save the oceans and ourselves.

Planktos Inc
Foster City, CA
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Posted by Laura at 8:17 AM [53 comments](#)

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