

**Public Comments
on the U.S. Commission on Ocean Policy's Preliminary Report**

Topic Area: Climate Change

Comments Submitted by:

- Aubrie Adams, Sonoma State University
- Robert W. Helber, University of South Florida
- Russ George, Planktos Foundation

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May 21, 2004

Aubrie Adams
Sonoma State University

To Whom It May Concern:

I would first like to mention that I am pleased to see that the U.S. government is seriously thinking about the present and future state of the oceans. However, as a student I am shocked to find out that this work has not been done earlier. It seems to me that the fact that the oceans have been falling in to a poor state within the last 50 years has been a widely known fact, and I am surprised to find out that only now, has our government considered stricter conservation efforts. Nevertheless, it is a good thing that current focus has been directed to the oceans.

The topic I would like to focus on, however, is climate change. As is common knowledge on the topic, due to human activities greenhouse gases have been let out in to the atmosphere at alarming rates during the past century and are causing the global warming phenomenon. If humans continue at their present rate, global warming could have a very harmful effect on the world's ocean. For instance, global warming causes coral bleaching. "The projected increases in carbon dioxide over the next 50 years could cause temperatures to exceed the conditions under which coral reefs have flourished over the past half-million years," (Hughes et al, Climate change, human impacts, and the resilience of coral. Science 2003 August (301): 929-933).

But the changes that the government has considered implementing to help solve this problem most likely will not be able to help the situation much. This is because not only does public policy need to change, but public opinion. We cannot rely on education in the school system to change public opinion, as this is a problem not only for people in the future, but people now. We need to focus efforts on educating the general public as well as students. If the general public knew about the adverse effects of driving their cars and releasing Co2 in to the atmosphere, they might seriously consider switching to alternate energy sources such as bio-diesel or electric cars.

The truth of the matter is that at times it seems like the public is in fact educated, but that the public just does not generally care. The truth is that the public is just simply misinformed. The average person has heard reports that driving their car is bad for the environment, but they generally tend to think that they do not do much damage since they are only one person. They also tend to believe that since it is not on the news every night, that it must not be a problem.

The public needs to be more informed, however, because most people tend to believe that the state of the ocean is just problematic - but in reality the state of the ocean is in crisis. If this was made to be common knowledge, and constantly reinforced, people would seriously consider alternate sources of energy. In addition to that, the government needs to make alternative fuel sources more widely available and distributed. I had heard that within the next ten years the majority of the cars on our

streets would be electric-powered, however, this does not seem to be actually happening.

It seems like our government places a great deal of emphasis on acquiring gas to use for our cars and such, yet it seems more logical to me that our government should instead be trying to switch to alternate means of energy instead of putting effort in to acquiring normal gas which will just cause more harm to the oceans.

In summary, I believe that two things need to be done in order to slow the process of global warming which will have adverse effects on the ocean.

One of those things is to educate the general public; maybe we should have a color system similar to the terror alert system? Every night on the news the reporters can announce that our oceans waters are in a "red severe" state of alert. And once effort has been made to help make our oceans better, maybe the color could drop down to orange and yellow.

The second thing that needs to be done is that our government needs to help the process of creating vehicles that are more fuel-efficient and that rely on energy sources that do not release greenhouse gasses. Of course there are many other factors that are affecting the state of the oceans besides climate change, yet something that the general public can do on a regular basis to help alleviate the pressure that all humans are placing on the ocean is seek alternate means of powering their cars so that they contribute less to green house gases and global warming

Comment Submitted by Robert W. Helber, University of South Florida

May 5, 2004

Dear Ocean Commissioners,

I've read the preliminary report of the U.S. Commission on Ocean Policy and I am very supportive of the vision for the future of ocean policy and the recommendations. I am excited about this commission in general and am looking forward to the good things that I expect will result from this commission.

I have a general comment that I hope will help strengthen the report. In the preliminary report the ocean's role in global climate and global climate change are not prominently discussed. There is no mention of this in the executive summary. The word "climate" appears only once in the table of contents and this only addresses how climate change will influence organisms in the ocean. I had thought that global climate, warming, and/or abrupt climate change, which cannot be understood without understanding the ocean's role in climate, would be an important hook for getting people to consider new ocean policy. As a scientist interested in climate related ocean processes I would like to see just a little more emphasis on global climate. While I am very enthusiastic about the coastal ocean emphasis that the report has, I don't want the government to forget how important the ocean is to global climate. In the coming century ocean weather forecasting will become increasingly realistic as our understanding of the ocean's role in climate improves. U.S. ocean policy needs to be prepared for these developments because global climate will affect other aspects of government policy as well as our everyday lives.

The commission has undoubtedly considered global climate issues and tailored the report based on the numerous expert testimonies. I only suggest that there may be a way to strengthen (slightly) discussion of Global Climate issues in a tactful way, without altering the strengths of an already excellent document or altering the recommendations.

A suggestion of how this may be done:

In the first part (chapter 3), add an additional bullet and more discussion.

In: Chapter 3: Setting the Nation's Sights

Under: Building Ocean Policy on sound Grounding Principles

Add the bullet:

Global Ocean -- Global Climate: Ocean policies should be based on the recognition that the ocean is a major player in global climate and global climate change.

Additional discussion could follow in Chapter 3 and in part VII.

This bullet would provide a link between the introduction of the report with discussion about increasing scientific knowledge and the integrated ocean observing system in Part VII. Global climate issues, therefore, are put a little closer to the front of the report.

It is my feeling that these additions would help strengthen support for the already well-justified and well-planned recommendations that the report provides. It could also help in the future when the government may need to make decisions regarding global climate issues.

Thank you for considering my suggestion.

Sincerely,

Robert W. Helber, Ph.D.
College of Marine Science,
University of South Florida,
St. Petersburg, Florida

Comment Submitted by Russ George, Planktos Foundation

April 22, 2004

Public Comment to the U.S. Commission on Ocean Policy:

Oceans in Peril - We Sometimes Worry About The Right Thing For The Wrong Reason.

(April 2004 The Planktos Foundation)

The global community worries about global warming or more rightly global climate change. What we have all not been told is that this **"global warming" is likely the last and least effect that we will experience as part of global climate change.** 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 monumental 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. We are no different than plants in that the majority of water we lose is via our breath.

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.

NOW... 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 water saving preserves their life 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.

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 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 both 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. 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, which remember the oceans cover over 70% of this blue planet. This is the power of a feedback system. As the oceans die 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.

"Twenty years from now, you will be more disappointed by the things you did not do than by the things you did do. So, throw off the bowlines. Sail away from the safe harbor. Catch the trade winds in your sails. Explore. Dream. Discover." Mark Twain.

Come along with us on our voyage of discovery and help with our work to save the oceans from this peril. It can be done.

Russ George - Founder
The Planktos Foundation
Half Moon Bay, CA
www.planktos.com