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“Global climate change: update on the latest data, recommendations and what you can do to help” by Vânia Coelho, Ph.D., Department of Natural Sciences and Mathematics, Dominican University of California, 50 Acacia Avenue, San Rafael, CA, 94901

I wrote this brief report in response to requests from my students and colleagues to provide an update on the latest data and recommendations regarding global climate change, and give an opportunity for people to reflect on what they could do to help. The source of the information I used to write this report can be found below. Please feel free to distribute this report to others.

The scientific data available is unequivocal; we ARE on the verge of major catastrophic climate change, and I do not use these words lightly.

The next five to ten years are absolutely critical to stop the worst consequences of global climate change in the future.

Currently we are at 387 ppm of atmospheric concentration of the most important greenhouse gas, which is carbon dioxide also called CO₂, and increasing by roughly 2 ppm a year. However the contribution of greenhouse gases from the permafrost melting is likely to accelerate the process.

Just to give you an idea, the CO₂ concentration in the atmosphere has fluctuated around 180 and 280 ppm for the past 800,000 years, and the data show that this variation was closely related to temperature and sea-level changes in the past.

So for the past 800,000 years CO₂ concentrations have been between 180 to 280 ppm and today it is at 387 ppm. Our species *Homo sapiens*, the wise one, has not been in the planet for 800,000 years, so we evolved in a world with much lower CO₂ levels than we have today.

Scientists are warning us that we must revert back to at least 350 ppm if we want to preserve life on the planet as we know it. And we must not allow it to get to 450 to 500 ppm, which would mean a temperature increase of about 2°C. Such change in temperature would be devastating to the most vulnerable ecosystems and human populations. The average global temperature increase cannot surpass 1.5°C and we are already about half way there.

The higher the peak value of carbon dioxide concentrations in the atmosphere, the more severe the consequences will be, and the more difficult to revert the changes.

The consequences if we continue with business as usual and do nothing, will be truly catastrophic, including:

- Extreme weather patterns; droughts in some areas, floods in others
- Sea-level rise by several meters and the consequent displacement of human populations
- Stronger cyclones
- Extreme loss of biodiversity
- Severe break-down of food webs in the ocean, which would further affect our food supplies
- Spread of tropical diseases into higher latitudes, among others

In order to prevent many of the more drastic consequences, global greenhouse gas emissions must be cut by at least 50% below 1990 levels by 2050.

To achieve that, there must an international agreement, including particularly the worst polluters in the world, US among the very top ones, to reduce greenhouse gas emissions by 25 to 40% from the 1990 levels by 2020, otherwise the 50% reduction by 2050 may not be achieved in time.

This agreement is the most important goal of the “United Nations Framework Convention on Climate Change” that will be taking place in December in Copenhagen.

Senators John Kerry and Barbara Boxer have recently introduced a comprehensive energy and climate change bill addressing carbon dioxide emissions, which falls short of the recommended reduction levels by 2020 but supposedly will meet the recommendations for 2050.

Scientists are also proposing the use of technologies to capture CO₂ from the atmosphere in addition to drastically reducing emissions, so that the level of greenhouse gases can be better managed and the stability of the Earth’s climate protected.

So you may ask, what can I do?

In addition to taking responsibility regarding your own carbon footprint by: reducing, re-using, recycling, driving less, using less electricity at home, and so forth, this would be a perfect time to write to our president and congress representatives, demanding effective measures to prevent the catastrophic changes lying ahead.

Finally, the most important thing perhaps that you can do, is to spread the word, to educate the public on this issue. Because in the end, it is our collective will that will come to pass.

References can be found below. For more information please also visit the Greener Dominican web site:

<http://media.dominican.edu/uploads/INFO/vcoelho/GreenerDUC/Welcome.html>

<http://media.dominican.edu/uploads/INFO/vcoelho/GreenerDUC/Help.html>

<http://media.dominican.edu/uploads/INFO/vcoelho/GreenerDUC/Issues.html>

Or just “Google” Greener Dominican and you will get there.

REFERENCES

Reports and Speeches

International Panel on Climate Change (IPCC)

<http://www.ipcc.ch/>

Speech of Dr. Rajendra K. Pachauri, Chairman of the IPCC, at the New York United Nations Headquarters, Summit on Climate Change, given on 22 September 2009

<http://www.ipcc.ch/pdf/presentations/rkp-statement-unccs-09.pdf>

United Nations Summit on Climate Change

<http://un.org/wcm/content/site/climatechange/lang/en/pages/2009summit>

United Nations Secretary General, Ban Ki-moon, tells world leaders at summit's closing “opportunity, responsibility to avoid catastrophic climate change is your hands”. Secretary-General SG/SM/12470 ENV/DEV/1075

<http://www.un.org/News/Press/docs//2009/sgsm12470.doc.htm>

United Nations Framework Convention on Climate Change in Copenhagen

<http://unfccc.int/2860.php>

Pew Center on Global Climate Change (PCGCG)

<http://www.pewclimate.org/>

PCGCG's Key Scientific Developments Since the IPCC Fourth Assessment Report

<http://www.pewclimate.org/brief/science-developments/June2009>

Kerry-Boxer Bill as of September 30, 2009:

<http://www.pewclimate.org/docUploads/detailed-summary-kerry-boxer-as-introduced.pdf>

<http://kerry.senate.gov/cleanenergyjobsandamericanpower/intro.cfm>

Emission of Greenhouse Gases in the United States in 2007. Department of Energy Report #: DOE/EIA-0573 (2007). Released Date: December 3, 2008

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Peer-Reviewed Papers

Hansen J, Sato Mki, Kharecha P, Beerling D, Berner R, Masson-Delmotte V, Pagani M, Raymo M, Royer DL, Zachos JC. 2008. Target atmospheric CO₂: Where should humanity aim? *Open Atmospheric Science Journal* 2: 217-231. DOI:10.2174/1874282300802010217.

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Hoegh-Guldberg O, Mumby PJ, Hooten AJ, Steneck RS, Greenfield P, Gomez E, Harvell CD, Sale PF, Edwards AJ, Caldeira K, Knowlton N, Eakin CM, Iglesias-Prieto R, Muthiga N, Bradbury RH, Dubi A, Hatziolos ME. 2007. Coral reefs under rapid climate change and ocean acidification. *Science* 318 (5857): 1737-1742. DOI: 10.1126/science.1152509

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<http://www.sciencedirect.com/science/journal/0025326X>

CARBON DIOXIDE EMISSIONS DECREASE NEEDED

UN recommended minimum decrease by 2020 and 2050

Decrease by	MMT*	%	Year
	4990.60	100	1990
25%	3742.95	75	2020
40%	2994.36	60	2020
50%	2495.3	50	2050

Kerry-Boxer Bill, 30 September 2009

97% of 2005 emissions in 2012
 80% of 2005 emissions in 2020
 58% of 2005 emissions in 2030
 17% of 2005 emissions in 2050

MMT*	%	Year
6008.6	100	2005
5828.3	97	2012
4806.9	80	2020
3485.0	58	2030
1021.5	17	2050

*MMT: Million Metric Tons of CO₂ Gas