

FirstU Sermon August 7, 2011

THE MORALITY OF GLOBAL CLIMATE CHANGE

By Chad A. Tolman

Good morning. It's a great pleasure to be here with you today to share a service on what I see as the greatest moral challenge of our time. I'd like to thank you for the opportunity to speak, and especially to thank Scott Ward for his invitation and his help with planning the service.

Earlier we read: *We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, and that among these are Life, Liberty and the pursuit of Happiness.*

The pursuit of happiness. Americans have always wanted to do good, but they have also wanted to do well. Thomas Jefferson was an outstanding example. He was the author of the Declaration of Independence, and of the Statute of Virginia for Religious Freedom. We claim him as a Unitarian. His words are on the front door of our church. I have always admired him. But he also loved adding to his Monticello home, rare books, good music and food, and fine imported wines. And he was able to live in this grand style because he owned slaves who did the hard work—over 200 of them.

We no longer have slavery, but we do have an energy system based mostly on the burning of fossil fuels, which makes it possible for a relative few to live in luxury while the resulting climate change causes suffering for many more -- for generations to come.

You may be saying to yourself, **“I know that slavery is wrong. It's inconsistent with both the Declaration of Independence and our UU Principles, but how does my use of energy contribute to global climate change, and how on earth is that like slavery?”**

Today I hope to encourage you to look at our society's energy system in a new way, to see that it is both unsustainable and unethical, and to recognize that we all have a responsibility to help change it. As people of faith and goodwill, we must take actions to reduce our energy use, to live sustainably, to minimize the damage we are doing to the climate system, to help those who are suffering, and to preserve what we can of the interconnected web of existence, of which we are a part.

The UN World Commission on Environment and Development in *Our Common Future* defined **‘sustainable development’** as **“meeting the needs of the present without compromising the ability of future generations to meet their own needs.”**

The burning of fossil fuels—coal, oil and natural gas—provides most of the energy used by our modern industrial society. It is not sustainable--for two reasons. First, fossil fuels are a finite one-time resource, formed over hundreds of millions of years. Once they are gone, they are gone forever. They are being used up at an ever-increasing rate as populations grow and as people around the world want to live as we do. Though petroleum is a valuable feedstock for everything from pharmaceuticals to polyester, we are burning it up - as if there were no tomorrow. U.S. production of domestic oil peaked in the early 1970s; world production is projected to peak soon, and maybe already has. And second, by burning fossil fuels, we are changing the composition of the atmosphere—and changing the global climate as a result. The evidence for global warming is now incontrovertible.

The past decade has been the warmest on record, with 2010 tying 2005 as the hottest. The earth's surface temperature, averaged over land and sea, has increased about 1.5° F over the past century - mostly during the past 30 years. Projections of the temperature increase for the coming century are as high as 10 or 11° F. The rate of warming is rapidly increasing!

Sea levels are rising as a result of two factors—warming and expanding seawater and melting glaciers on land. During the past century the ocean rose a foot at Lewes, DE. Sea level rise this century has been projected to be 3-6 feet, but could be a lot more than that. Some low-lying island nations, like Tuvalu, will be gone. Where will its people go? A 3-foot rise will displace 100 million people. Who will house and feed them?

Glaciers are retreating everywhere in the world, and the melting is accelerating. Over a billion people in Asia depend on glacial snowmelt for their summer water supply. What will they do when the glaciers are gone?

The polar ice caps are melting. Satellite measurements of the North Polar cap show that the area at the late summer minimum is rapidly decreasing. The area in September of 2007 was the smallest ever observed, with the years since close behind. Submarine measurements of ice thickness show that it has decreased by 40%. Scientists project that in 15 or 20 years there will be no Arctic sea ice in late summer. Recent satellite measurements of the mass of Greenland ice show that the rate of ice loss has doubled in the past six years!

Migrations of animals and plants to higher latitudes and altitudes are occurring, as they respond to rising temperatures. An armadillo was seen in Illinois; they used to live in Mexico and Texas. Mosquitoes and ticks are expanding their ranges, spreading diseases like malaria, dengue fever, and Lyme disease.

As temperatures rise, so do rates of evaporation and precipitation. This means increasing droughts in some areas and floods in others. Russia had such a serious drought last year that it stopped exporting wheat. Record-breaking floods devastated Pakistan. Rainfall is decreasing in the American Southwest and in much of Africa and the Middle East. We have all seen the faces of the starving children in Somalia. Total global precipitation has increased. So has the fraction that falls in heavy rainfall events—defined as more than two inches of rain in 24 hours. Bombay had 36 inches of rain in one day!

Hurricanes--fueled by warming seawater temperatures--are increasing in intensity, duration, and destructiveness. In 2005 Wilma, set a new record for the most powerful hurricane, with sustained winds over 185 MPH; Katrina set a new record for the most costly—with over \$150 billion of property loss. In our rush to mine and drill for more fossil fuel, 29 men were killed last year in the explosion at the Massey Big Branch coalmine in West Virginia, and the explosion on the BP Horizon oil rig in the Gulf killed 11 and led to the biggest oil spill in U.S. history.

Coral reefs have been called the rain forests of the sea because of their rich biological diversity. They are critically important for the goods and services they provide to tropical and subtropical nations, but they are in serious decline because of higher water temperatures, rising sea levels, increased storm intensity, and increasing ocean acidity. Thirty percent of reefs are already severely damaged, and 60% may be lost by 2030.

Climate depends on a lot of factors, especially the concentrations of greenhouse gases. The principal ones are water vapor, carbon dioxide, methane, nitrous oxide, ozone, and fluorochemicals.

It is important for you to understand the greenhouse effect. You have all had the experience of getting into a car that has been left in the sun with the windows rolled up and finding that it's much warmer inside than outside. Here's why. Much of the visible radiation

from the sun passes through the windows and is converted to heat on your seat cushions and steering wheel. Those heated objects radiate, but in the infrared (IR) part of the spectrum. Window glass is not transparent in the infrared, so the IR radiation from inside the car is absorbed and heats the glass, which now acts as a radiator - radiating back down into the car as well as up and out. The IR radiation coming back down further heats the car's interior and is what makes it hotter inside than outside. This is how a greenhouse works.

The atmosphere acts like a giant greenhouse. It doesn't have a glass roof, but it does have greenhouse gases that act similarly—passing visible radiation coming in from the sun, capturing infrared radiation coming up from below, and radiating part of it back down. The infrared energy coming down from the greenhouse gases is very important. In their absence the world would be a frozen ball of ice; with them, the global average temperature is a nice comfy 60° F. But it's changing.

Carbon dioxide, now over 390 parts per million (ppm), is the most important of the trace gases. Its atmospheric lifetime is very long. Thus what we put into the atmosphere now will affect the climate for centuries to come.

Continuous instrumental measurements of the carbon dioxide in Earth's atmosphere have been made for over 50 years on the top of Mauna Loa, a tall mountain on Hawaii's South Island. During that time the concentration has increased every year. Concentrations before 1957 can be determined from ice cores, with the oldest records from Antarctica going back over 800,000 years. During all of that long period, which saw several major ice ages, the CO₂ was always less than about 280 ppm, its concentration at the beginning of the industrial revolution. Now at over 390, the concentration is much higher than at any other time during the past 800,000 years--and it is rising at over 2 ppm/yr as CO₂ emissions increase.

So what does this mean for Earth's future climate, and what are the likely impacts on human societies and ecosystems? Predictions of the future climate can be made with computer models of the coupled atmosphere, ocean, land, and ice system. These models differ somewhat in their predictions but agree that temperatures, sea levels, and rates of evaporation and precipitation will continue to rise. One of the largest uncertainties in predicting the future is what the human response will be—how soon and how seriously we will cut back our greenhouse gas emissions to arrive at a stable composition of the atmosphere. Another uncertainty is the climate sensitivity – how much the global average temperature will change for a doubling of atmospheric CO₂. Leading scientists warn that we should not let the global average temperature increase more than about 2°C or 3.6°F above what it was in 1750, if we are to avoid severe climate disruption. That means we should not let the CO₂ concentration rise above 450 ppm—a **concentration we will reach in less than 30 years if we continue business as usual—if the sensitivity is 3°C for a doubling of CO₂.** If the sensitivity is actually 6°C for a doubling, as Jim Hansen and others have reported, **the concentration will need to be reduced back to 350 ppm or less. We have already gone too far.**

Direct human health impacts that have already occurred include weather-related mortality, the spread of infectious diseases, and increased respiratory illness. In the summer of 2003, Europe had a heat wave with the highest temperatures ever recorded there. Over 30,000 people—mostly old people without air conditioning—died during the month of August—ten times the number killed here on 9/11 in 2001!

Indirect health impacts include the effects of climate change on agriculture and on water supply and quality. Increasing rates of evaporation and precipitation are leading to both droughts and floods. Hundreds of millions of people this century could be without adequate food or water, or displaced by rising seas.

Coastal states like Delaware and Maryland will see the loss of beaches, the inundation of marshes and coastal lands, and increasing damage to buildings, roads and bridges.

Many ecosystems will suffer as the climate changes. I've already mentioned the coral reefs. Polar bears depend on polar sea ice to hunt for marine mammals. By gorging, they can put on enough weight in the fall to hibernate through the long Arctic winter. What will they do when the sea ice is gone? Many plant and animal species will be driven to extinction from climate-induced loss of habitat, unless they can migrate or adapt. **A quarter to half of the Earth's plant and animal species could be extinct or on their way to extinction by the end of this century.** This has been called the 6th Great Extinction—unparalleled in 65 million years, since the Great Dying of the dinosaurs.

This brings us to the moral and ethical dimension of our use of energy and climate change. Someone defined 'evil' as benefiting yourself by hurting others. Bernie Madoff is a prime example. Our current system of energy use, based mostly on the burning of fossil fuels, is changing the atmosphere, increasing the greenhouse effect, and causing the global climate to change. The benefits and costs are not evenly or fairly distributed. Relatively wealthy people like us have caused most of the greenhouse gas emissions and are the most adaptable, but the poorest people—especially those in underdeveloped places in Africa and South Asia, or our own poor like those in New Orleans--are suffering most of the consequences, which may last for centuries and in some cases will be irreversible.

In 2010 the worldwide burning of fossil fuels and forests added over 8 billion metric tonnes of carbon to the atmosphere as CO₂. That's an average of over one tonne for each of the 7 billion people. But the United States, with less than 5% of the world's population, is responsible for over 20% of the emissions. The average American adds about 6 tonnes of carbon a year. That is twice as much per capita as other leading industrial countries like Great Britain or Japan, four times as much per capita as China, and over 10 times as much as India.

An adult consuming a normal diet exhales about 0.1 metric tonne of carbon as CO₂ in a year. One way to think of the 6 tonne American average is that since the Civil War, we have replaced the work of about 60 slaves for each of us by the work of machines producing as much CO₂ as the slaves would. Every time you use your computer, dishwasher, washing machine, dryer, refrigerator, heater, air conditioner or automobile you are adding CO₂ to the atmosphere, and enjoying the benefits that all of these machines provide.

The resulting convenience benefits us, but it will harm many. Those who will suffer the most will be the old, the poor, and women and children—those with the least resources to move or adapt—especially people in Africa, South Asia, and poor parts of Latin America—mostly people with dark skins, like those in New Orleans and Somalia. Egypt and Bangladesh are two Muslim countries with large and rapidly growing populations, with much of their best agricultural land in river deltas near sea level. How will they adapt, and where will they go, as sea levels rise? With a one-meter rise, over 17% of Bangladesh will be inundated, including half of its best agricultural land. The World Health Organization estimated that 150,000 people died prematurely in the year 2000 from the effects of climate change—for reasons ranging from malnutrition to malaria, but we're hardly aware of it. A more recent estimate last year is 300,000 a year.

In thinking about this, **I have concluded that our energy use, with its resulting climate change, is the moral equivalent of slavery.** It's wrong. Just as in the days of slavery a small fraction of the population enjoyed a high standard of living while many others suffered, now a small fraction of the world's population enjoys the amenities of abundant and **often very wasteful** energy use while many others--including those in generations still unborn--will suffer as a result. Just as the slave owner's family in the big house didn't see the suffering in the fields,

most of us don't see the suffering our actions are causing, and will cause, unless we open our eyes and begin to understand. And the damage done will only become greater the longer we wait to take action.

At the GA in 2006 we passed a **Statement of Conscience on the Threat of Global Warming/Climate Change**. It said, in part:

Earth is our home. We are part of this world and its destiny is our own. Life on this planet will be gravely affected unless we embrace new practices, ethics, and values to guide our lives on a warming planet. ... We declare by this Statement of Conscience that we will not acquiesce to the ongoing degradation and destruction of life that human actions are leaving to our children and grandchildren. We as Unitarian Universalists are called to join with others to halt practices that fuel global warming, to instigate sustainable alternatives, and to mitigate the impending effects ... with just and ethical responses. As a people of faith, we commit to a renewed reverence for life and respect for the interdependent web of all existence.

So what can we do? Before I give you some of my thoughts, I ask each of you to look deep within your own heart, and ask yourself: **What is required of me? Do I have a responsibility to help protect and preserve the web of all existence for my children and grandchildren, and for generations not yet born? What should I do?**

Consider the following:

- Become informed. A good place to start is the list of web resources and books on a list of recommended reading (attached) you can find on a table as you enter the Parish Hall. There you can also request an electronic copy so you can copy and past web addresses. You can also subscribe to *Climate Change News*, a monthly blog on energy and climate science and policy. How is described at the end of any issue. The web address is on the list.
- Know how much energy your family and your church consume, and set a goal of reducing the amounts by 20%.
- Give time and support to an organization working to reduce climate change. Some of these are: the Green Sanctuary Committee in this church, whose application was recently reviewed and accepted by the UUA, the LWV, the Sierra Club, and the Delaware Nature Society, an affiliate of the National Wildlife Federation.
- Write and talk to your legislators – federal, state, and local. Let them know you care, and that you expect thoughtful action - to reduce waste, improve energy efficiency and replace fossil fuels by renewable energy sources like wind and solar - as rapidly as possible.

I have six grandchildren, ranging in age from 6 weeks to 18 years. I really worry about what kind of a world we're leaving them. The thing that gives me hope is that I know we don't have to continue down this path of the unsustainable, and ultimately immoral, burning of fossil fuels and the climate change it produces. I know that by working together, we can make a difference. We can help both preserve Creation and build a world of environmental justice, where we who are fortunate have compassion for the poor, the weak and the hungry, and for generations yet unborn. Remember, after all, that love is the doctrine of this church.

RECOMMENDED READING ON CLIMATE CHANGE

BOOKS

World on the Edge: How to Prevent Environmental and Economic Collapse

by Lester R. Brown, Earth Policy Institute, W.W. Norton and Company, New York, 2011.

Available online at: http://www.earth-policy.org/images/uploads/book_files/wotebook.pdf

Storms of My Grandchildren – The Truth about the Coming Climate Catastrophe and Our Last Chance to Save Humanity

by James Hansen, Bloomsbury USA, New York, 2010.

PLAN B 4.0: Mobilizing to Save Civilization

by Lester R. Brown, Earth Policy Institute, W.W. Norton and Company, New York, 2009.

The Long Thaw – How Humans are Changing the Next 100,000 Years of Earth’s Climate

by David Archer, Princeton University Press, 2009.

Hot, Flat and Crowded – Why We Need a Green Revolution – and How it Can Renew America

Release 2.0 by Thomas L. Friedman, Picador, New York, 2009.

WEB

Climate Change News, a free monthly newsletter about energy and climate change science, policy and public opinion. Posted on a blog by Chad Tolman. At:

<http://tolmanccnews.blogspot.com>

Paul R. Epstein, **Climate Change and Human Health**, *The New England Journal of Medicine*, **353**, October 6, 2005. At:

<http://chge.med.harvard.edu/publications/journals/documents/nejm.pdf>

Adaptation 101: How climate change hurts poor communities, and how we can help, *Oxfam America*, 2008. At:

http://www.lwv.org/Content/ContentGroups/GlobalDemocracy/StateofClimateChange/Adaptation_101_Oxfam_America.pdf

Dale Jamieson, **The Ethics of Climate Change**, *People and Place (P&P)*, March 2009. At:

http://www.peopleandplace.net/perspectives/2009/3/25/the_ethics_of_climate_change

The Toolkit for Climate Action, *US League of Women Voters*. 2010. At:

<http://participate.lwv.org/c/9217/t/6398/p/salsa/web/common>

Chad Tolman, **Positive Feedbacks and Climate Runaway – The Need to Act Without Delay**, LWV US Climate Change Task Force, 2009. At:

http://www.lwv.org/Content/ContentGroups/StudyTaskforces/GlobalClimateChange/CCTF_BP_PositiveFeedback.pdf

The **Oregon Carbon Calculator** helps you calculate greenhouse gas emissions from personal transportation, household energy use, and consumption of food, goods and services. Your emissions can be compared with Oregon’s – one of the better performing states in the U.S. – whose household average is 42 metric tons of CO₂-equivalent per year. At:

<http://www.deq.state.or.us/programs/sustainability/carboncalculator.htm>