# I am Bill Moomaw, Professor Emeritus of International Environmental Policy at Tufts University, and Chair of the Science Committee at Earthwatch Institute. AMA!

Dr$_B ill_M oomaw$[1]$and r/ScienceAMAs$[1]

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April 17, 2023

**Abstract**

Hi Reddit, Last year, I retired from Tufts University's Fletcher School of Law and Diplomacy (the only chemist on the faculty!), where I founded and directed the Center for International Environment and Resource Policy (http://fletcher.tufts.edu/CIERP) for 22 years. I supervised many masters' and doctoral students during that time, including the co-chair of the Paris climate negotiations. I continue to work on climate science and policy, energy, water, forests and oceans to develop scientifically valid and effective strategies and policies. I served as a lead author on five IPCC reports over a 19-year period. Until recently I served as Chief Scientist at Earthwatch Institute (http://earthwatch.org/) and continue to serve as the Chair of their Science Committee. I also serve on the board of directors of Woods Hole Research Center (http://whrc.org/), ranked as the most influential climate think tank for the past two years, and several additional environmental science and consensus building organizations. The science of climate change is complex, and the politics are more so. I have always found the interaction between the two to be fascinating, and remember being shocked as a young scientist that science did not always determine the political outcome of a policy process. I want to share with you the role of science in the outcome of the Paris climate negotiation that just ended on December 11th, 2015. A bit of history: back in the 1980s, a group of scientists convinced some governments that based on their research, the release of heat trapping gases into the atmosphere would heat the earth to a point where there could be uncontrollable and irreversible warming with devastating consequences for all life, including humans. This science prompted two actions. The first was to create the Intergovernmental Panel on Climate Change (IPCC) to provide scientific input to governments on the science, impacts, vulnerabilities, adaptation, and mitigation of climate change. The second was to negotiate an international treaty, the UN Framework Convention on Climate Change that was signed by 154 nations in 1992. The Paris negotiations were the 21st meeting of the parties to the original treaty, and its actions both utilized and ignored science in the final outcome. I invite you to join me in a discussion about how science and policy came together and diverged over issues like the 2oC global temperature goal during the recent Paris talks. I'll be back at 1 pm EST (10 AM PST, 6 pm UTC) to answer your questions, ask me anything! EDIT: We are live! EDIT IN CLOSING: Thank you all for your engagement, and your thoughtful questions. It has been very gratifying to hear your concerns. Let me close with one final thought. So many actions to address climate change have many additional benefits for providing sustainable energy to all and lift people out of poverty. There would be far less damage to the planet and our health if we can make the shift away form fossil fuels. As I said earlier, we also need to do Restorative Development to mobilize the biosphere so that we improve our forests and land quality every time we use them instead of constantly degrading them. Perhaps, you will enjoy one of my favorite cartoons as a closing. http://imgur.com/up6yu

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# Science AMA Series: I am Bill Moomaw, Professor Emeritus of International Environmental Policy at Tufts University, and Chair of the Science Committee at Earthwatch Institute. I have worked on solution

DR_BILL_MOOMAW R/SCIENCE

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Over the past few years I have repeatedly seen a message conveying that we have already passed the

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point of no return and that we are more or less trying to salvage what we can of the climate now. How valid are these claims? Are they high estimates for the damage we've done or conservative estimates to prevent total chaos?

I am personally going to be experiencing a roughly 65F temperature for Christmas in an area (Southeast US) where it's typically around freezing by this time of year. Is this just an anomaly caused by some weird cycles or has the temperature really changed that much?

OneArmWilly

Are we past the point of no return? No one knows for certain, but there is certainly such a point where we will exceed the point where there is no longer a reset button. We know that this can occur when we have added enough heat trapping gases that the feedback of carbon dioxide from the oceans and decay of plant material from forests and soils, and most important, the uncontrolled release of heat trapping carbon dioxide and methane from thawing permafrost soils. Just to put this in perspective. Recent research suggests that if we burn just enough fossil fuels to reach 2 degrees C, approximately 150 billion tons of carbon equivalent will be released by 2100 thereby raising global temperatures well above 2 degrees. And the warming will keep on coming.

The good news is that if we bring our energy and industrial gas emissions to near zero and halt deforestation, restore many of our lost forests and degraded soils, we could bring emissions below current levels by 2100. Note it is not either energy or land restoration, IT IS BOTH!

Hi, Dr. Moomaw! Thank you for doing this AMA.

What's the biggest omission in the Paris negotiations, in your opinion?

Also, what's something that every individual should be doing/not doing to make the biggest difference in slowing climate change?

weezerluva369

Getting an agreement that is universal is a major accomplishment. But as has been pointed out by many, it falls short of actually meeting the goals that were set to keep the temperature from rising less than 1.5 or 2 degrees. The good news is we have a platform to improve the commitments every 5 years and to “ratchet up” commitments for emissions reduction. What is left out? While it was great to see tropical forests included in the agreement, but in order to meet the 2 degree goal we have to do much more than tropical forests. It’s all forests. And we have to address the continuing release of carbon dioxide from agriculture, soils, grassland soils, and wetland soils.

For those who live in the U.S. or other developed countries, reducing our use of fossil fuels as rapidly as possible is essential. Unfortunately, we’re headed in the wrong direction with low gas prices leading people to buy fuel inefficient cars and SUVs and we’re in danger of making the use of natural gas a bridge to nowhere, to an ever warmer climate. So finding ways to reduce our energy use, and when possible, to shift to the use of solar panels, and other zero carbon energy sources at home and at work.

What are some of the biggest misconceptions about climate change that even environmentalists don't realize?

black_fire

There are several misconceptions of well-intentioned environmentalists and policy makers. The first is that bioenergy is renewable and low carbon just as is solar, wind, hydro, geothermal and ocean sources. It turns out that burning wood for example releases as much carbon dioxide per unit of heat released as does coal. Using that heat to produce electricity actually releases about 50% more carbon

dioxide for each unit of electricity produced. It takes many decades for the trees that burned in minutes to regrow, and all that time the extra carbon dioxide is in the atmosphere trapping heat and warming the planet. Unfortunately, many governments in Europe and the US provide subsidies to cut forests and turn them into electricity with extra emissions. Liquid biofuels also have problems. Corn ethanol for example releases carbon from soils and very large amounts of nitrous oxide that is a long-lived heat trapping gas, and now the major depleter of the ozone layer. Renewable energy is defined by IPCC as "…any form of energy from solar, geophysical or biological sources that is replenished by natural processes at a rate that equals or exceeds its rate of use." Biomass however is a high carbon emitting "renewable" source that can be collected and burned at a more rapid rate than it is replaced. It can readily be harvested faster than it regrows. So there is a difference among "renewable," "sustainable" and "low carbon."

Hi Dr Moomaw, thanks for doing this and for all the work you do. I'm curious about the personal side of being a leading climate change scientist. Have you ever felt harassed or threatened because of your work on climate change?

anonzilla

At one time or another, most of us who work on studying addressing and climate change have received derogatory or threatening emails, letters, or calls. One colleague of mine received not only death threats but threats against her children: http://www.mtv.com/news/2136380/climate-scientists-hate-mail-merchants-of-doubt/

Her crime was trying to demonstrate to her faith-based community, to which she is deeply committed, the compatibility of climate science and their religious beliefs. In Australia it was even worse. In recent years, they had to post guards around academic office buildings of people working on climate change. I assume, or would like to hope, that these extreme statements are limited to a relatively small number of people.

Hello Bill. Thanks for doing this AMA. Really glad to see dialogues like this taking place.

I have always been slightly confused as to why there is no sustainability/climate change equivalent to, for example, the World Health Organisation. I understand the role the IPCC plays, however, I feel it is primarily an advisory council rather than an active organisation which takes a hands-on role in promoting/advancing sustainability and climate change globally.

All I mean by this is it seems for most other global crises we are undergoing at the moment there is a recognisable/well-known/household name organisation to coordinate global efforts. For example, everyone knows the UN (global peace-keeping), or the WHO (for world health), or Amnesty International (fighting for human rights) or the Red Cross (for politically neutral humanitarian relief)/oxfam, or WWF (for animal conservation) - and even at a stretch the World Bank (aiming to reduce poverty), or Nato or G8 etc. etc.

However for global sustainability or 'action against climate change' there doesn't seem to be similar coherent, commonly known organisation that tries to address all the issues involved and to make a concerted effort to produce change. The IPCC is great, don't get me wrong, it's just it doesn't really do anything other than inform other governments/the UN. I think we can all agree this is the slowest route to success, especially considering we require many different countries to agree on some level. The Red Cross or WWF or WHO take active roles in their fields, regardless (ideally) of political motivations/tensions by supplying funding to institutions/research/education, having accessible volunteer programmes for the public to engage with, raising awareness (by having a logo/organisation attached to the concept, particularly helpful for educating children in the long-term), having charity status, as well as all the informing of governments and looking at all the statistics etc. etc.

The IPCC is an organisation within the UN. Rather than an organisation in it's own right, with it's own

policies and own motive. It is too driven by the UN and therefore means it has to bow to the member states rather than ploughing on through regardless like many other institutions I have mentioned above do in their respective fields.

I'm just surprised there's no World Environment Agency or something similar which is a household name. So I suppose my question is, why isn't there such an organisation? Or equally, is there one and I'm just being stupendously ignorant? :)

Thank you for your time!

arandombritishguy

Always happy to talk to a random British guy.

you obviously understand the international playing field and the players with your question. Some of the organizations you have mentioned are nongovernmental organizations like WWF and Amnesty, and other are international organizations like the World Bank, which has not only addressed poverty but also taken measures to address climate change. They are the largest single funder of climate change action in the developing world. There is a United Nations called the United Nations Environment Program that was responsible for negotiating the highly successful Montreal protocol for protecting the ozone layer. But when it came to climate change, governments decided not to entrust UNEP with the task of addressing it. Instead, the UN took direct control of the climate negotiating process and managed the treaty through the UN Framework Convention on climate change (UNFCCC), the Kyoto protocol – which brought modest slow down in our admission rates, and the new Paris climate agreement. There have been numerous suggestions for a World Environment Organization (WEO) or a Global Environmental Organization (GEO), but no such organization has ever been approved. However, there is the World Trade Organization, which has many environmental implications and these economic interests have been able to block any organization that might interfere with world trade.

Professor MooMaw, thank you for taking this time to do an AMA!

I'm curious to hear your opinion on the Clathrate gun hypothesis.

The short version for laypersons is that as the planet warms pockets of frozen methane will begin to melt and release into the atmosphere. Methane is a greenhouse gas that is thirty times more potent than carbon dioxide. The hypothesis goes on to speculate that this release of methane will accelerate global warming well beyond what current climate models predict, something on the order of >6°C over the next eighty years. There are almost no positive scenarios in regards to global climate change, but most would agree that an increase of 6°C would be amongst the most catastrophic of predictions.

- What are your opinions on the Clathrate gun hypothesis in specific, or the principles on which it is based in general?
- Given that methane is substantially more damaging to our environment than carbon dioxide what are your opinions on natural gas production and fracking?
- If the models hold true, what would the world look like after a 6°C increase in temperature?
- Should there be a cap placed on methane emissions, or regulations regarding its production?

Again, thank you for taking the time to do this AMA, I'm eager to read what you have to say! And now that I'm done reading up on methane emissions and out of control global warming I'm going to go cry in the corner. Frightening stuff.

OneYearSteakDay

The “clathrate gun” hypothesis has been around since soon after methane clathrates were identified in the 1980s. Methane clathrates are mixed crystals of solid water and methane that form under high pressure (deep seas) and cold temperatures. When brought to the surface, what looks like powdery ice will burn. Most are found in the Arctic region, but some deposits are found at great depth under heavy pressure further south. The total carbon content of these crystals exceeds all estimated fossil fuel

reserves by factors of 5 to 10-fold. The fear is that if the ocean warms, these crystals will dissociate explosively and release vast amounts of methane into the atmosphere. Since methane has a higher global warming potential than carbon dioxide, this would be catastrophic. While not disputing the fact that a release would be catastrophic, more recent research suggests that release would not be explosive, and would be a far-in-the-future event in any case. The more immediate issue is that the since the 1990s, Arctic permafrost soils have turned from a sink that stores carbon to one that is releasing carbon dioxide and methane as bacteria begin to feed on the thawing frozen soils.

If we successfully reduce our carbon emissions to a minimal level over the next 10-15-25 years what policy steps need to be taken now and at that point to manage climate change?

ThePaxCanadiana

The point of this question is we must begin acting now for these benefits to accrue in the next decade or two. In the U.S. we're facing barriers to adopting renewable energy in many states because our current laws and regulations are designed to protect large fossil fuel power stations. Our utilities need a new operating model and so we need to change the way we operate and regulate our electric utility system. Secondly we must avoid well-intentioned but troublesome "fixes" – the requirement to increase plant-based ethanol for petroleum is actually increasing CO2 in the atmosphere and degrading the land's capacity to absorb carbon. The substitutions of wood for coal in electric power generation is even more destructive in terms of adding vast amounts of CO2 in the atmosphere and destroying forests. Increasing incentives for low-carbon renewable energy and energy efficiency in order to meet the energy service needs requires that incentives be aligned to do so – putting a price on carbon would help a lot.

I think that many people believe global warming exists, but do not fully appreciate the consequences as you've described them. Do you have a good simple response to this sentiment : **"We've had global warming and global cooling in the past, ice ages, etc., this is just the same thing, only faster. What is the big deal?"**

ThunderBuss

Great question about past changes in climate – warming, cooling, ice ages, etc. Ice ages and the intervening warm periods (in which human society has been basking in for the past 10,000 years) are caused by the irregular orbit of the earth around the sun. Date from the past 800,000 years show an alternating pattern that peaks in warmth about every 120,000 years, and that these warmer periods correspond to peaks in carbon dioxide and methane concentrations in the trapped air bubbles found in the ice of Antarctica. There are other less extreme variations as well. For example this year, we are experiencing an extra warm El Niño, an ocean heat-releasing event that occurs about once a decade. Global temperatures were relatively stable between 1950 and 1980 because of the vast amount of sulfuric acid droplets sent into the atmosphere by burning sulfur containing oil and coal. Ocean currents fluctuate, and the jet stream moves around in response to multiple factors to change the temperatures in different parts of the globe. But all of these fluctuations up and down trend upward over longer periods of time because of the heat trapping properties of the carbon dioxide and other gases that human activity releases into the atmosphere.

'Climate change' sounds like a much more neutral, less urgent term to a layperson. Not better or worse, just different.

In the 1990s, I seem to remember the much scarier term 'global warming' being used more often but it dropped off in the last 15 years or so.

Is there an important difference between the two terms that makes climate change more accurate, or

are they interchangeable?

ADavidJohnson

When we talk about a changed climate, we're talking about a number of factors which include global warming – we're talking about the melting of the Arctic, we're talking about the melting of glaciers around the world, we're talking about altered weather patterns, including increased intensity of storms because there's more energy/heat in the ocean, more heat over the land, which is what drives storms. So climate change is a more comprehensive term. Some people are suggesting we talk about climate chaos, because of the significant and oftentimes unpredictable consequences of a changed climate.

Hello from Porter Square!

I am currently applying to climate system dynamics PhD programs and am really interested in entering the policy realm after completing my PhD, whether through academia or actually working in the government.

What types of opportunities during or after my doctorate do you think would put me in the best position to work in the coupled area of climate science and policy? One of my future career goals is to serve as Chief Scientist for a group like the Earthwatch Institute so I was wondering if you could speak from your experience about the path to getting to a position like that.

Thanks!

alexjt

You are already off to a good start with a plan for your education. So the question is what do you do after a PhD that addresses science and policy? A step that I took was to apply for one of the science fellowships to work in the US government, supported by scientific orgs such as AAAS, the American Physical/Chemical/Ecological Society, and to spend a year working either in an executive branch of the government or the Congress. In my own case I worked for the Congress (a very different political time) and was able to help develop the amendment to the clean air act that phased out the ozone-depleting CFCs in spray cans. I was also able to work on US energy policy and research to address the oil shocks. Other opportunities exist in think tanks or climate and science-based organizations like Earthwatch. You can check out some of the climate-related research studies Earthwatch is working on: http://earthwatch.org/expeditions/earthwatch-climate-change-expeditions

Hi Dr. Moomaw thank you for doing this AMA. I don't have any questions myself but I do have two on behalf of my mother who is a agricultural scientist who focuses on climate change and development in developing countries.

1. Do you feel like this Paris agreement is a good outcome.
2. Do you think the goal of 1.5 is attainable.

Truthfull

As an international agreement, the Paris accord is remarkable in terms of its universal nature and the major goals it has set. Even as it was being concluded, everyone was aware that the "contributions" offered by the governments would not limit warming to 2 degrees Celsius (3.6 degrees Fahrenheit) and certainly not 1.5 degrees. The world may already be committed to a 1.5 degree sea temp rise from the gases in the atmosphere however this does not need to be the case if we need to begin immediately to remove CO2 from the atmosphere as we pursue agricultural development in the developing world and at home, and begin to protect and restore lost forests and degraded grasslands and wetlands.

As for your second question, it will be essential to accelerate our reduction in emissions.

Hi Dr. Mooma,

Thanks for taking the time do this AMA. I am actually attending Tufts next fall, so I'm unfortunately a little late to see you on campus, but hopefully you can answer my question today. When talking to one of my friends, they said that most likely in our lifetime there will be wars fought over clean water (even if we take preventative measures now). What are your thoughts on this? Also, what do you think is the most influential aspect of the Paris deal?

Barbsss

On water. It is probably not a coincidence that the most politically unstable part of the world right now is the most water short. I'm speaking of course about the Middle East - Syria, Iraq, Yemen, Libya and Sudan...these are all countries that are short of water. The pentagon has gone so far as to suggest that the extensive drought that occurred in Syria which led to many farmers having to lead their land and a sharp rise in a cost of bread was in fact associated with a changed climate and was a significant factor in the chaos that has fallen. So water wars or climate wars or instabilities may already be a reality. To date, there have not been wars between countries over water, although there have certainly been tensions between India and Pakistan, Israel and the Palestinians, among China and Southeast Asia or the Mekong, and in Africa the countries of the Nile. Fortunately, none of these disagreements over allocation and use of water have broken out into warfare, but that is not to say it couldn't happen.

How much are the diseases, syndromes and modern maladies facing humans a result of climate changes? Is it possible climate change will force extinction of life or adaptation?

WalkTheMoons

As far as I know, there are no new diseases that have occurred because of a changed climate, but many diseases have moved into new territories. Somehow, there seems a disconnect between West Nile virus and Long Island, New York. But only a decade of so ago, this disease appeared on our shores. The explanation is that the misquotes that carried it were transferred by world travel or trade and as winters became milder in the Northeast U.S., it survived as the host of the virus. As a result, there have been hundreds of human deaths, thousands of horse deaths, and millions of bird deaths. Within the United States, Lyme disease has moved from a more Southern habitat up into northern New England as ticks have been able to survive in what used to be colder climates. The ticks are carrying many other diseases as well and have proliferated and may be responsible for major declines in moose populations across the U.S. and Canada. Many other tropical disease have expanded out of their historic ranges including malaria and cholera.

Hope you are enjoying retirement Prof. Moomaw! I always enjoyed your classes and miss you all in Medford. Re: the Paris Agreement, I was heartened by the emergence of the high ambition coalition but it seems really daunting to get to 2 degrees and impossible to get to 1.5. Was it rhetorically important to have near impossible goals?

Also I'm fairly optimistic that we'll get off coal soon but the agreement seems to have broken down when it comes to diffuse CO2 sources like cars, ships and planes. What sort of policy tools do you see being used to adress those?

purplearmored

It is always wonderful to hear from former students! It was necessary to have a stretch goal for the agreement since most countries came in essentially with what they were planning to do anyway. This is the case for China and the US. So a more ambitious 2030 goal is important to have along with the 5 year revue and "ratcheting" mechanism. Also critical was the clear requirement for transparent and common"Measuring," "Reporting" and "Verification." Also there will be capacity building for developing

countries to meet these stringent requirements.

You are correct. We are shedding coal rapidly all over the world and especially in the US. There is a great potential to switch to electric vehicles that can be charged by solar, wind or hydro power with zero emissions. This year 25% of new car sales in Norway were electric vehicles that are charged by low carbon hydropower. Also performance is much better than gasoline cars, and we now know about clean, efficient diesels thanks to the VW scandal. I have taken a baby step with a plug-in hybrid that has provided the energy for about 13% of my driving over the past 40,000 miles - not a great reduction in carbon. Most battery only vehicles have a range of less than 100 miles which is fine for most driving, but this is rising rapidly. Most of this is for urban driving which means I have reduced my pollution where it matters most. We will continue to use liquid fuels for air travel for a long time to come, and most biofuels do not reduce emissions by much if at all. Policies include putting a price on carbon will help to shift people towards alternatives as will lowering taxes and giving tax benefits to purchasers of electric vehicles.

How can we retrofit our current infrastructure and retrain our current workforce to reduce CO2, while preserving jobs and making the public excited to be a part of it?

account543210

The most important infrastructure we can upgrade are homes and other buildings. The reductions in heating, cooling, lighting, and appliances could reduce our emissions from the building sector by 75%. My wife and I have renovated several homes over the years with reductions of two-thirds in our emissions. 8 and a half yrs ago, we built a home that reduces our total emissions to zero, and our energy to about 90%. In that process, we learned a lot about what needs to be done to make buildings use less energy to begin with and how the relatively small demand for energy that remains can be met with solar energy and other renewable sources. Check out this article (and photo op): http://fletcher.tufts.edu/~/media/Fletcher/News%20Images/Fletcher%20Features/PDFs/08HnGMoomawsm.pdf

The good news is a) we are more comfortable, and b) we are responsible for far fewer emissions, and c) none of the jobs to do this can be outsourced to any place else. This creates massive numbers of jobs in the U.S. Today, there are more people employed in the U.S. in the solar industry than in coal mining, and those numbers are growing rapidly – and that industry had one of the most rapid increases in jobs in the past 2 years. In order for ths to succeed, we need to tighten our building codes, train building inspectors to help contractors meet the goals, and train the building industry in the techniques needed to retrofit and build a new super energy efficient buildings.

On the question of other jobs – in addition to the rooftop solar industry, there's the larger scale wind and solar installations that are being built by towns on their old landfills, by corporations such as Apple that is spending $980 million to build a large solar facility in CA to meet their needs, and communities of households that do not have appropriate roofs for solar panels are building group projects. We could do more of this if we didn't have so many regulatory barriers in the way blocking it.

What is the most promising field of alternative energy at the moment, in your opinion? Are there any geoengineering projects that you believe could work well without negatively disrupting the biosphere?

Thank you for taking the time to address the r/science community and for the vitally important work you've continued to do, even in the face of such legislative apathy!

Gonzo_Rick

I believe that distributed solar PV has the least environmental consequences of any source. It is also very reliable with no moving parts or emissions once it is installed. While fossil fuel combustion kills 3.7 million people per year and an esteemed half a million from weather related events associated with a changed climate, I know of no one being injured by a falling solar panel. This one source cannot solve the entire climate energy problem, but there are lots of roof tops and other locations that do not

interfere with other uses. Geoengineering is a tempting solution as it seems to avoid all of the difficult decisions. Unfortunately, it has many unforeseen consequences. Ocean fertilization and solar intensity management could have major unforeseen consequences. If we do not address climate change with real solutions, we might someday need to pull the emergency lever and use solar management to prevent the complete melting of Greenland or Antarctica. I would hate to have us reach that point.

You've stated several times in this AMA that we need to both restore forests, and move towards more renewable energy sources... but these would seem to be at conflict.

I live in the south-west UK, where government subsidies have caused a huge proliferation of solar panels and wind turbines... but they take up a HUGE amount of land. Especially the solar panels - while the wind turbines are scattered across farmland easily enough (while being incredibly controversial due to being "eyesores" in a typically rural and beautiful part of the country), the solar farms cover acres and acres of land with no room for anything else... And somehow I think putting wind turbines in the middle of a forest isn't a terribly good idea either...

So which would you say is of higher priority? More forests to increase CO2 uptake, or more renewable energy sources to reduce CO2 output?More forests would certainly look a lot nicer...

Ktrenal

Land use for energy production is always an issue. More than 50 mountaintops and their forest cover have been removed in the Eastern United States to produce strip-mined coal. Production of oil form the tar sands of Alberta Canada has removed a vast area of forests in order to mine the earth. Virtually none of the toxic wastes left behind have been recovered. Wind turbines may not be to everyone’s taste, but these actions produce horrific sights and destroy entire ecosystems and the lives of many people. The massive forest fires in Indonesia this past fall were set (as were all previous ones) to clear forestlands in order to grow palm oil in vast plantations. Much of the palm oil is being produced to meet ever-expanding requirements of the EU for “biodiesel” vehicle fuels. I appreciate your concern for protecting scenery and your observation that solar panel installations take up a good bit of land. The UK will be phasing out coal by 2015, which is a wonderful thing to do. However, they are replacing it with wood pellets that are being produced by cutting down entire forests in the United States, turning them into pellets, burning them in the UK and counting the emissions as zero. British tax-payers are subsidizing this effort at a level of 640 million British pounds per year. I can assure you that the destruction of North Carolina forests is pretty unaesthetic.

As solar panels have become more efficient, more electricity can be generated in less space. In fact, the total electricity of the planet could be produced by a relatively small percentage of land. Growing trees only convert about 1% of solar energy into stored chemical energy in wood. Burning this to make electricity is only 0.25% efficient. I recently installed solar panels that convert 20% of solar energy to electricity. Hence on the same piece of land, it is possible to produce 80 times the electricity on a sustained basis as if it grew trees and they were burned for electricity as is being done in the UK. So while I understand your concern, It is essential that we actually reduce our emissions by restoring forests and not burning them for electricity, and reducing the use of fossil fuels. We each need to decide if it is right to put our local aesthetic values over what happens to ecosystems and people in other countries on our behalf.

I have always found the interaction between the two to be fascinating, and remember being shocked as a young scientist that science did not always determine the political outcome of a policy process.

Is this a view that you still hold, and why/why not? What, if anything, has changed?

Are you optimistic that the right decisions about climate policy can be made in the future?

Thanks!

OolongMatcha

I understand the role of science in the policy process much better today than when I began. In the 1970s, politicians would justify actions because "science made me do it." Note the announcement about smoking on airplanes. It is not the airline that forbids smoking, by the FAA, which has based this ban on scientific studies on the danger of smoking for passengers and crew. The role of science is to gather all of the information that is available, and present it in a coherent fashion to the decision makers. For example back when the Climate treaty was first agreed to in 1992 by among others, the US, governments asked scientists to tell them what "to avoid dangerous anthropogenic interference with the climate system" meant. After an intense back and forth, the scientists relied that they could provide information on what might be happening and the risks associated with them, but that it was a decision of society through their governments that decided want "dangerous" meant. On the other hand as a scientists who has worked on policy, I am quite certain that while the laws of societies are negotiable, the laws of nature are not. Passing laws that do not conform to science, will have serious consequences. We cannot repeal the law of gravity nor the laws that determine climate change.

Do you feel that the media accurately represents climate change?

GumGatherer

The press has tended to treat climate change as a debate and a question of belief rather than a discussion over the information and facts that have been revealed. It is perfectly legitimate to discuss what we're going to do about it and to point out any flaws if and when they exist in the science, but to treat it as a debate between two differing belief systems has misled many in the public. We don't have a "balanced view" when a medical doctor or scientist discusses cancer and the need to address cancer. There is no one saying cancer doesn't exist or need to be treated.

But don't take it from me: https://www.youtube.com/watch?v=cjuGCJJUGsg&t=3m4s

If you could force all countries to agree on one thing and one thing only, what would it be?

arandombritishguy

Interesting question. The one obvious thing that all countries should do would be to shift our energy systems away from fossil fuels, leaving them in the ground and meeting our energy needs by low carbon sources as rapidly as possible. I might suggest a second one: it is to mobilize our forests and lands to begin removing CO2 from the atmosphere by increasing the uptake of carbon by forests and soils.

what's your opinion on carbon credits? To me they just seem a sham system so poorer less developed countries, can get a bit of cash by selling their allocation which they don't use anyway, to richer countries. So they can carry on as usual and in some cases even increase the amount of carbon the are producing.

mrcatfunt

That sums it up.

Are we going to pay for kicking the can down the road with much, much nastier regulation (even international bullying to enforce it) later to play catchup?

bea_bear

This is a very insightful question about a potentially troubled future. We know that when a problem becomes more severe we are willing to accept more stringent restrictions on our freedoms and behaviors. Just look at what's happened since 9/11. So if we keep procrastinating on addressing climate change we are certain to see more severe consequences. No one can predict the future, but it does seem likely that there will be far more stringent policies and measures put into place. A very disturbing prospect.

What are your thoughts on claims that climate sensitivity is low enough that there will not be any serious problems?

brinchj

That is wishful thinking. I wish it were so.

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Many of my colleagues in Northern countries often joke about how pleasant global warming might be for those living near the arctic circle, but there are real costs to that. Such as melting permafrost and the destruction of the ways of life of many of the indigenous people living in the arctic. For some time, first the Soviet Union and then Russia has talked about a benefit of warming would be to turn the vast frozen parts of Siberia into productive lands. There are likely to be far more problems than benefits as permafrost thaws and land literally collapses and releases large amounts of additional heat trapping gases. It is also pointed out that certain plants will grow more rapidly in a higher carbon dioxide atmosphere this may be true for a few important crops, but we are already finding a decrease in the uptake of carbon dioxide by natural forests particularly in the Amazon. Also, among the plants that benefit from more carbon dioxide and warmer climates is poison ivy which has been moving farther north in recent years (from my personal experience).