Hello everyone, and welcome to the inaugural seminar of the Yale Global Initiative on Climate Change and Public Health Ethics, as a part of the Yale Center for Climate Change and Health.

My name is Laura Bothwell, and I'm delighted to welcome you to this seminar, which is also the first in a series of three virtual or hybrid noontime seminars this term on various topics related to climate change and public health ethics.

As you've seen this seminar is being recorded and we'll have about 15 minutes starting at 12:45 for questions and answers.

It is such a privilege to introduce Stephen Latham, director of the Yale Interdisciplinary Center for Bioethics.

Dr. Latham has a JD and a PhD. He's a fellow of the Hasting Center and teaches bioethics and environmental ethics in the Yale College, the Yale Law School and the School of the Environment.

He chairs the Human Subjects Committee at Yale. Co-chairs the Embryonic Stem Cell Research Oversight Committee.

He is a former board member and secretary of the American Society for Bioethics and Humanities from which he received a distinguished service award.
And today we are so lucky to hear from him speaking about geoengineering for climate crisis mitigation, accountability, transparency, and democracy. Well, hello everyone. I'm starting my timer, so I will be sure to have some time at the end for some questions. It’s a more grand title than I would like actually and I’m not sure how much I’m gonna get to talk about democracy, but I certainly will be talking about accountability. So the topic is geoengineering and there has been in the environmental community a long tradition of opposition to the very idea of engaging in geoengineering as a response to climate change for reasons that I’ll be addressing later. But I think there is increasingly an awareness that our international efforts to address climate change are pretty feeble and that we are very likely to overshoot the one and a half degree temperature goal that was set in Paris. And many voices are saying that no matter how quickly we manage to adjust the way we produce energy and the way we emit greenhouse gases, it won’t be enough to avoid really catastrophic side effects.
and that we will need to do some form of geoengineering to get ourselves into a tolerable situation.

So let me now talk about a couple of kinds of things that fall under the name of geoengineering.

There are two major sort of subgroups. One is just carbon dioxide removal, which comes in many, many forms, which I’ll discuss in a second.

And the other is solar radiation management, in one form or another involves in increasing the albedo of the earth, the reflectivity of the earth to bounce back some of the sun’s energy and heat in order to lower the temperature of the world.

I’ll say first something about carbon dioxide removal methods.

The one that we’ve all heard about is, of course, planting, reforestation and afforestation, the planting of different kinds of crops that will absorb carbon and so on, where there are other already well established methods of removing carbon from the air, things like biochar, or bioenergy energy use with carbon capture and storage, Becks,

which involves burning biomass in a controlled way and capturing the carbon from that burning and then storing that.

We have plans to increase the amount of carbon
0:04:38.65 –> 0:04:40.92 that can be sequestered in soils.
0:04:40.92 –> 0:04:45.92 We have this idea of sinking biomass so deep in the ocean
0:04:46.25 –> 0:04:49.99 that it will not be able to degrade there,
0:04:52.54 –> 0:04:55.85 and then hauling it out to sea and waiting it down,
0:04:55.85 –> 0:04:57.67 so it sinks to the bottom of the sea
0:04:57.67 –> 0:05:00.9 and in theory will not release its carbon
0:05:00.9 –> 0:05:02.403 for many centuries.
0:05:04.11 –> 0:05:06.05 We have the idea of enhanced weathering,
0:05:06.05 –> 0:05:09.43 particularly at the seashore that will,
0:05:12.13 –> 0:05:13.423 will capture carbon.
0:05:14.32 –> 0:05:17.2 The idea of fertilizing the ocean with bits of iron
0:05:17.2 –> 0:05:20.223 to increase algal growth,
0:05:21.12 –> 0:05:24.623 which will capture carbon as well and then sink.
0:05:27.404 –> 0:05:32.1 Oh, and the idea of restoration of our coastal wetlands,
0:05:32.1 –> 0:05:34.37 which are actually really excellent carbon sinks
0:05:34.37 –> 0:05:36.11 of themselves.
0:05:36.11 –> 0:05:40.97 There’s quite a wide range of carbon capture techniques
0:05:40.97 –> 0:05:41.86 and then of course,
0:05:41.86 –> 0:05:46.73 we have this new-ish idea of direct air carbon capture
0:05:46.73 –> 0:05:48.48 in factories that
0:05:50.29 –> 0:05:52.42 withdraw carbon from the air
0:05:52.42 –> 0:05:54.273 using chemistry of different kinds,
0:05:54.273 –> 0:05:57.023 there’s several different kinds out there now.
0:05:58.236 –> 0:06:02.91 And then sequester that carbon possibly underground,
0:06:02.91 –> 0:06:05.583 possibly with other methods.
0:06:08.48 –> 0:06:12.713 These things are not terribly controversial,
0:06:14 –> 0:06:15.22 most of them,
0:06:15.22 –> 0:06:17.44 I think there are some issue with the idea
0:06:17.44 –> 0:06:19.47 of dropping biomass into the sea
0:06:19.47 –> 0:06:23.16 because there are questions about where it might wash up
0:06:23.16 –> 0:06:25.55 and how effective it might be.
0:06:25.55 –> 0:06:28.61 There are several problems with these things,
0:06:28.61 –> 0:06:31.88 most of them are not terribly scalable,
0:06:31.88 –> 0:06:36.61 most of them are pretty expensive for the amount of carbon
0:06:36.61 –> 0:06:40.2 that they’ll actually succeed in sequestering,
0:06:40.2 –> 0:06:43.56 but many of them would be susceptible
0:06:43.56 –> 0:06:45.96 to pretty much local governance,
0:06:45.96 –> 0:06:48.07 much of their environmental impact
0:06:48.07 –> 0:06:50.603 for most of these methods would be local.
0:06:51.96 –> 0:06:55.3 The business of fertilizing the sea
0:06:55.3 –> 0:06:58.19 raises some issues about accountability
0:06:58.19 –> 0:06:59.98 and international accountability.
0:06:59.98 –> 0:07:02.47 But I think the biggest,
0:07:02.47 –> 0:07:05.62 one of the biggest problems in this area is with monitoring
0:07:05.62 –> 0:07:08.75 and reporting and verification because
0:07:08.75 –> 0:07:13.75 there are a lot of controversies about the way in which,
0:07:14.27 –> 0:07:17.09 for example, carbon sequestration in plants
0:07:17.09 –> 0:07:21.45 is being counted, whether reforestation, for example,
0:07:21.45 –> 0:07:25.62 is really new reforestation that will capture carbon
0:07:25.62 –> 0:07:28.29 that wasn’t going to be captured by forests
0:07:28.29 –> 0:07:30.053 that were gonna be planted anyway.
0:07:31.27 –> 0:07:35.58 And there are questions about competing values for land use
0:07:35.58 –> 0:07:38.473 associated with some of these methods,
0:07:40.52 –> 0:07:44.68 but these are as a group far less controversial
0:07:44.68 –> 0:07:47.61 than the solar radiation management varieties
0:07:47.61 –> 0:07:52.31 of geoengineering because mostly what they’re doing
0:07:52.31 –> 0:07:55.57 is simply trying to remove carbon from the air
0:07:56.76 –> 0:07:59.37 and the likelihood
0:08:03.101 –> 0:08:101 of having any kind of unexpected disproportionate impact
0:08:08.5 –> 0:08:11.89 anywhere in the world from these methods is pretty low.
0:08:11.89 –> 0:08:13.71 Again, the ones that involve the ocean
0:08:13.71 –> 0:08:16.01 are probably the most controversial of them,
0:08:16.01 –> 0:08:17.26 but most of these
0:08:20.87 –> 0:08:25.87 do not pose many difficult governance kinds of issues.
0:08:27.23 –> 0:08:31.033 We need better monitoring, reporting and verification.
0:08:32.36 –> 0:08:33.193 And
0:08:34.3 –> 0:08:37.92 we need probably some rules about how
0:08:37.92 –> 0:08:40.55 and where carbon is going to be sequestered,
0:08:40.55 –> 0:08:42.87 especially if carbon is not sequestered
0:08:42.87 –> 0:08:46.003 in the same location where it’s being drawn out of the air.
0:08:47.8 –> 0:08:51.82 And most of these methods also
0:08:51.82 –> 0:08:54.31 should involve some kind of involvement
0:08:54.31 –> 0:08:56.55 of the public in the location
0:08:56.55 –> 0:09:01.4 where these carbon reduction methods are going to be used.
0:09:02.97 –> 0:09:05.32 So for example, if you’re gonna do enhanced weathering
0:09:05.32 –> 0:09:07.68 on a shore line by depositing
0:09:09.62 –> 0:09:14 minerals there that will capture carbon with wave action,
0:09:14 –> 0:09:17.54 you’ll wanna talk to the people who use that shoreline
0:09:17.54 –> 0:09:22.54 and you’ll want to engage in some kind of public discussion
0:09:23.13 –> 0:09:27.22 and get the permission from the relevant public authorities.
0:09:27.22 –> 0:09:29.74 Same thing with carbon sequestration underground
0:09:29.74 –> 0:09:30.593 in the salt,
0:09:32.61 –> 0:09:34.78 there’s a proposal now to sequester carbon
in bottom of fracking mines, those kinds of things should involve local permission and local governance. There are a few kinds of codes that have been put out there, completely non-binding, just put out by different groups, in one case by single author, there are the Oxford principles, there's the (mumbles) principles for research in climate engineering techniques. And there's a single author code of conduct for responsible geoengineering research and the last two of those are very explicit of calling for public participation. So to the extent that researchers in geoengineering voluntarily choose to follow some of these available codes of research conduct, we will see some public participation and some openness and accountability. All of these principles call for periodic reporting of results and transparency in terms of how well the techniques are working, but there is very little explicitly binding law that deals with any of these methods, in all likelihood, the Framework Convention on Climate Change.
will be able to come up with some monitoring mechanisms, they are explicitly mentioned in that framework. And there’s also explicit mention of the need to govern sequestration locations. So there is some promise of some kind of governance in this area, but again, in general, the is not where the controversy lies. The controversy really lies with solar radiation management. There are a couple of major types of solar radiation management. I’ll say a little bit about each of them. First, there is marine cloud brightening. This involves injecting salt possibly from ocean water into the clouds above the sea and brightening them up so that they have greater albedo and will be more reflective. This looks like it would be pretty inexpensive to do, it would involve a fleet of, to have an effect at the global level, we would have to have a fleet of many ships spraying salt into the sky above the oceans. That fleet would have to be mobile because the impact of the sun changes as the seasons change and so on, would wanna position the reflective clouds in places that would have optimal effect on global temperature. It seems to be possibly effective and possibly rather cheap. And especially if the material used is salt water, there don’t seem to be that many
immediate polluting side effects.

Marine cloud brightening also has a great deal of promise as a method of local protection from the sun.

So for example, Australia is paying for some research in this area because they believe that they could do marine cloud brightening over the barrier reef to prevent, to lower temperature and prevent bleaching of the coral.

Australia is paying for some research in this area because they believe that they could do marine cloud brightening over the barrier reef to prevent, to lower temperature and lower the amount of sun striking and prevent bleaching of the coral.

There's also some possibility that at marine cloud bleaching could be used in the Arctic to prevent certain kinds of runoff and so on.

So there's real possibility of marine cloud bleaching being used all around the world and having an effect on global temperature.

It looks like it would be very inexpensive to do, the total numbers are in 25 to 50 billion dollars.
to have planetary, wide, global temperature reduction of all of the temperature that has risen because of greenhouse gases. The theory is that you could begin to see global temperatures fall even within one year of doing this aerosol spraying. And that the temperatures could be brought down to sort of pre-climate change level in a matter of a couple of years, but then of course the spraying would have to be main-
tained to keep the temperature level steady. So it has the promise of being stunningly effective and relatively inexpensive, but it has a lot of scientific kind of safety issues. First, many of the particles that are being thought of as candidate particles might have the tendency to deplete our ozone layer. Some estimates say that, for example, the closing of the ozone hole would be delayed by about 40 years by the use of this tactic. In addition to that, some of the particles when they fall to earth after that three year initial period might be pollutants. Sulfur is not particularly a problem ’cause there’s a great deal of that in the atmosphere anyway,
but some of the other particles might just cause ordinary particle fallout pollution.

Another big worry, and this is a worry both for cloud brightening and for aerosol injection,
is this idea of termination shock because neither of these things does anything about the ongoing accumulation of CO2 and other greenhouse gases.

When they’re stopped, if they were stopped suddenly, there would be a big rebound effect and the temperature of the earth is predicted to climb incredibly rapidly if that intervention is stopped all at once.

So it would be absolutely necessary to have in place some kind of international agreement about how and when to stop the intervention in order to avoid this termination shock.

There have been models that have looked at this and it’s not gonna be very hard to do, but it does require international cooperation.

Another big problem with both the solar management techniques is that they’re both better at controlling temperature than they are at controlling water circulation through the air and in the soils so that the predictions and these are better modeled with the stratospheric aerosol injection.

Its prediction is that if we reach an optimal temperature,
we will reduce total amounts of rainfall and this reduction is not gonna be uniform across the planet. It would particularly affect monsoon in areas that have monsoon seasons. In other areas it looks like soil moisture, which is what you care about for agriculture would not be that badly affected, even if rainfall reduces, the temperature reduction would make up for the smaller amount of rainfall, but the point is that there would be global winners and losers in terms of potential for interference with agriculture, potential for drought, potential for reduction of the amount of monsoon rains, potential for reduction of the amount of snow pack in some parts of the world. There would be other effects too, the sky would no longer be blue, the sky would be a kind of diffuse white light. This would have effect on agriculture, it would slow down agricultural growth. On the other hand, advocates for this think that having the increased CO2 would speed up some kinds of agricultural growth. So the effects are upped to be mixed. So this is extremely controversial, the threat of ozone depletion, the threat of termination shock,
0:20:05.12 --> 0:20:06.63 and particularly the fact
0:20:06.63 --> 0:20:09.74 that there would be international winners and losers
0:20:09.74 --> 0:20:11.703 from solar management,
0:20:13.39 --> 0:20:15.753 makes it quite controversial.
0:20:17.46 --> 0:20:21.25 The fact also that it seems like it would be incredibly
0:20:21.25 --> 0:20:24.14 effective at temperature control
0:20:24.14 --> 0:20:26.63 and that it’s not expensive,
0:20:26.63 --> 0:20:31.63 raises other really important kinds of governance issues.
0:20:33.12 --> 0:20:35.853 So to make an obvious point,
0:20:36.69 --> 0:20:40.48 a single country could do this
0:20:40.48 --> 0:20:44.493 and affect the entire temperature of the world.
0:20:46.27 --> 0:20:51.27 There have been many, many different kinds of scenarios run,
0:20:51.7 --> 0:20:55.76 and there’s a big growing literature on governance
0:20:55.76 --> 0:20:57.68 of this kind of geoengineering
0:20:58.69 --> 0:21:02.97 in which people trot out all kinds of scenarios
0:21:02.97 --> 0:21:05.99 of single countries,
0:21:05.99 --> 0:21:09 or all coalition of countries,
0:21:09 --> 0:21:11.56 or a widespread
0:21:11.56 --> 0:21:15.24 diverse group of climate
0:21:15.24 --> 0:21:17.92 change activists
0:21:17.92 --> 0:21:21.04 might actually just do this
0:21:21.04 --> 0:21:23.72 without any kind of formal permission
0:21:23.72 --> 0:21:25.37 from the rest of the world,
0:21:25.37 --> 0:21:29.82 or from the countries that are gonna be most affected
0:21:29.82 --> 0:21:33.44 And this poses all kinds of threats
0:21:34.31 --> 0:21:37.483 to the international order.
0:21:39.2 --> 0:21:40.22 Even if
0:21:41.27 --> 0:21:42.31 we could come up
0:21:42.31 --> 0:21:47.16 with international governance mechanisms
that would control
and
manage the use
of stratospheric aerosol injection, for example,
even if we could do that,
there would be serious political issues
because different countries are gonna have different views
of what optimal temperatures are.
For example, there have been some winners
in terms of agriculture in particular
from the global warming that we’ve experienced so far,
the growing season has increased
in parts of the global north, for example.
And it may be that
less of a temperature reduction
would be appealing to those countries that have been winners
from the climate change we’ve so far experienced.
So there is this risk of a single state actor
changing the entire globe,
or of small groups of states doing it,
or of even of independent actors doing it.
And we have
a small
story already
about this risk of accountability for action in this area
in terms of research in the area.
Bill Gates has been funding a study at Harvard,
which is a trial of
aerosol injection, not of sulfur, but of calcium carbonate.
He had a plan with this Harvard group in the southwest of the United States, to who loft some balloons which would spray a small amount of calcium carbonate to the stratosphere enough to cover about 11 football fields. And to then send up instruments to measure the effect of the reflection, the gains to albedo and so on, just to do a kind of trial run of stratospheric aerosol injection, but pandemic related considerations moved this group to decide that they weren’t gonna do the experiment in the southwest of the United States after all and they just kind of up and moved their location to Sweden, they decided they were gonna launch their balloon in Sweden and they didn’t ask anyone in Sweden. They didn’t get permission from any local authorities at all and the Sami people, the indigenous peoples of the Northern part of Sweden, they’re an indigenous group that inhabit the whole polar region, Sweden and Finland and Russia. They heard about this test site movement and even though the first test was just going to be to fly the balloon and test the aerosol injection mechanism.
and it wasn’t actually gonna spread any material into the sky.

The Sami objected and wrote a letter to the research group at Harvard and their advisory board and said, "You can’t do this, you can’t alter the skies above us."

They had a wide range of objections to this. At the baseline, their fundamental objection was with the idea of tinkering with nature at all. The idea that nature is there to be adapted to and that we should not try to manage the atmosphere, or the globe,

to manage the atmosphere, or the globe,

but they also cited a number of other arguments, especially moral hazard that I’ll be talking about in a moment.

And they were joined by some environmental groups from Sweden.

The Sami people were affected by fallout from Chernobyl, which actually killed a lot of the deer and their whole lifestyle is sort of centered on the herding and management of these Arctic deer herds.

Chernobyl killed a bunch of the deer and even today they have to screen deer meat for radiation before they can eat it. So they have a history of being affected by interventions from other countries and they have been very active in terms of trying to reduce climate change,
they lobbied Norway to stop investing in fossil fuels,
they sent a group to Standing Rock to protest the Dakota access pipeline.
So they have been very active in this area and their activity basically shut down
the Harvard Gates project, the advisory board got the letter and said,
"These objections are serious. They’re posing a real political problem for us and so we’re not going to do this study yet."
And the study is still on hold.
Gates also, by the way, is funding direct air carbon capture and he has been funding a seawater project, which is designed to do a cloud brightening.
So he is very much a person who has a great deal of resources
and he is very much in favor of these technical geoengineering solutions to the climate change problem and here we have an example of him acting with private researchers to do research in this area, in the sky over Sweden,
without any governance at all, without any political consultation at all,
let alone permission or input from the local people.
So this is just one lesson about the possibility of abuse of these kinds of techniques.
The biggest objection that most people have to geoengineering is the moral hazard objection.
Basically they say, "If we can geo engineer, then we will be less motivated in actually reducing our carbon emissions." People will say to themselves, "Look, we can prevent these dramatic results from temperature change and that means we don’t have to worry as much, or we don’t have to act as quickly to reduce carbon, lots of problems with that as an outcome, for example, the CO2 would just continue to build up, ocean acidification would continue and so on, but it’s more than just a kind of an abstract worry that people will feel less motivated, particularly here in the United States, there is a worry that the same forces that have been funding climate change disinformation and have been slowing us down in terms of changing the way that we produce electricity, might turn and suddenly start funding research and actual interventions in this solar management. And might actually, following the lead of Bill Gates, for example, start touting the benefits of geoengineering as a way to preserve our existing underlying greenhouse gas producing economy. So there’s a great deal of worry about this moral hazard and it’s probably the biggest single objection to the use of geoengineering.
Just last week on the 17th, there was a global group of about 60 climate scientists and some governance scholars who have called for a moratorium and an international non-use agreement on solar radiation management and other geoengineering.

And so there is very strong sentiment to try to stay away from these methods. We do have a little bit of existing international governance, like the Convention on Biodiversity to which the US is not a party and it’s non-binding, but the Convention on Biodiversity does mention that we should not be using geoengineering methods that would affect biodiversity on the planet.

We have a convention on ozone, which would be implicated if it turns out that solar management would start to deplete the ozone layer. And we have the UN Framework Convention on Climate Change which doesn’t directly address this, but which could be mobilized to put some governance in place.

I recommend to you the Carnegie Climate Governance Initiative website.
0:32:21.22 -> 0:32:24.71 There’s also been some international movement toward
0:32:25.61 -> 0:32:29.61 thinking about international government of geoengineering.
0:32:29.61 -> 0:33:08.71 So for example,
0:32:32.23 -> 0:32:35.3 the Paris Peace Forum is creating a global commission
0:32:35.3 -> 0:32:38.18 on governance risks from climate overshoot
0:32:38.18 -> 0:32:41.96 that is gonna be put together in the coming year
0:32:41.96 -> 0:32:45.11 and it’s gonna have a lot of global leaders in it,
0:32:45.11 -> 0:32:47.37 it’s gonna be headed by the former head of the
0:32:47.37 -> 0:32:49.69 World Trade Organization, I believe.
0:32:49.69 -> 0:32:53.68 The UN General Assembly is actually going to talk
0:32:53.68 -> 0:32:58.13 about governance of international geoengineering
0:32:58.13 -> 0:33:09.06 in upcoming meetings.
0:33:09.06 -> 0:33:09.53 And there has been a resolution that Switzerland
0:33:09.53 -> 0:33:12.05 intends to reintroduce, it introduced it years ago,
0:33:12.05 -> 0:33:14.34 but it’s going to try again
0:33:14.34 -> 0:33:18.24 to introduce this resolution
0:33:18.24 -> 0:33:23.83 on governance to the UN Environment Assembly.
0:33:23.83 -> 0:33:29.54 So
0:33:29.54 -> 0:33:32.77 there is a growing recognition
0:33:32.77 -> 0:33:36.14 of the need for governance in this area.
0:33:36.14 -> 0:33:38.95 The most important
0:33:38.95 -> 0:33:43.52 need is research
0:33:43.52 -> 0:33:47.55 because
0:33:47.55 -> 0:33:52.57 none of these methods that I’ve described
0:33:52.57 -> 0:34:00.16 has been adequately researched at all.
0:34:00.16 -> 0:34:03.91 For example, the spray tools that would put
0:34:03.91 -> 0:34:07.17 the salt from ocean water into the clouds
0:34:07.17 -> 0:34:10.97 have not yet been developed.
0:34:10.97 -> 0:34:14.23 There’s been plenty of modeling,
but there’s been no kind of in the air studies of any kinds of stratospheric aerosol injection. The Gates thing would’ve been the first real trial. And it does seem as though, unless we are so worried about the possibility of moral hazard, or about some of the scientific risks of doing these, unless we worried about this that we want entirely to rule out stratospheric aerosol injection, we ought to be doing research on it because it has potential to inexpensively buy us time in terms of lowering the globes temperature. And right now it is really not researched at all, there is some worry that rogue states, or single powerful states could simply start trying to do it on the basis of inadequate research and that would be a big problem. So there really does need to be some kind of regulation of research methods and some kind of international agreement about how and when the research should be done, unless we wanna make the move to simply say we’re not going ever to do this
no matter how much we overshoot the Paris climate goal.

In the research context in particular, though,

it’s gonna be really important to have local

and public participation.

We need complete transparency because at the research phase

this is gonna just be done,

it’s not gonna be done at a level

where it’ll start to affect global temperature,

or global rainfall, but it will be done in particular areas

over particular populations

and it might have local effects on agriculture.

It might have local short term effects

on water supply and rainfall,

air exchange generally.

So it seems as if,

even to

find out more about the real risks

of this kind of climate intervention,

we need to put in place international rules

that we really don’t have right now.

So I’ve ended earlier than I thought I would,

that’s really all I have to say on this subject

and I am happy then to open things up for discussion

and hear what your questions might be,

or what your comments might be.

And we also,

I know that we already have some questions that were

sent in

by people at the time that they signed up for this,

so I’m happy to entertain those.
And I think the way we’re gonna do them is we’re gonna have you put your questions in the chat and Laura will address them to me, is that the plan, Laura?

Yeah,
or actually I’m gonna slightly modify the plan, Laura, without telling her, which is, since we’re a small enough group, I think what you could do is put in the chat the fact that you have a question and then Laura can call on people and you can unmute yourself and just ask your question live.

But Laura has some questions that were submitted written as well.

That’s great, thank you so much, Steve, for raising so many really challenging points that are difficult to address, but you’ve really opened an excellent terrain and identified a number of the scenarios in which these questions will be considered in the future.

So I’d like to turn to Dr. Dubrow for the first question.

Okay, thanks.

Hi Rob. Hi Steve.

Thanks, it was refreshing to have the seminar without slides, actually (chuckles), that was courageous.

I see the moral hazard question has been huge and my direct question to you is whether the fossil fuel industry has been pushing soil management
in any ways as a quote, solution?

Not yet that I know of,

there is speculation in print that it would happen,

but I’m not yet aware of that.

The only person I know of

who’s really been funding it has been Bill Gates

and Bill Gates has come in for a lot of criticism.

He’s funded this direct air capture project

that’s happening in Canada,

where they’re actually already

sucking a small amount of carbon outta the air

and that’s great,

but he is really in favor of technical solutions and

is not that interested in addressing

some of the underlying problems of the way

that we sort of do business on the planet.

And in fact, as Bill McKibben

reviewed the Bill Gates climate change book,

I think in the Times, but anyway,

Bill’s review basically pointed out that Microsoft

donated tons of money
to politicians who are climate change deniers.

So Gates seems to be one person

who’s pushing these technocratic solutions

without really wanting to address underlying

kind of political realities

about how we’ve gotten into the situation.

I have not heard of any funding from fossil fuel industry,
or the Koch brothers or whatever it might be

of these interventions,

but there is worry in print in multiple articles
that might be the turn they take. If they lose on preventing action on climate change, they might pivot to say, "Here's what we do. Let's just lower the temperature. We could do it in a year, it's cheap."

Thank you, the next question is from Bruce Jennings, and Bruce will be speaking in the seminar series as well.

Thank you very much, Steve, for a very informative and clear presentation for sure. I want to specifically sort of raise a question about the aspect that has been discussed and that you mentioned concerning public participation and deliberation in various approvals of various experimental trials, or even in climate governance more generally because it does interest me in general what we say about participation.

But before I turn to that one, I just wanted to also note, I think one of the most moral hazard thing is very important, but another thing that's very important sort of at the level of culture and framing has to do with this sort of eco modernism Gates type of approach, versus what I would think would be closer
to the approach that, the name of this indigenous people, Sami?
Sami.
Yeah.
Right, so their position, which might be called a sort of eco accommodationist, or adaptationist position if you want to. Anyway, that debate, I think is very important, will the same kind of thinking that got us into this problem in the first place, namely an emphasis on the fact that human beings can do everything that we decide to do get us out of it. And that does seem to me to be a bit of a paradox worth noting. On the participation side, I guess, I just think, or I ask you about some analogies such as the genetic modification of species of mosquito using gene drives, which would lessen the zonanic transmission of some terrible diseases like Zika and others. And the controversy on Florida case that concerned a similar kind of effort to essentially a bioengineer mosquito populations for the sake of human health. The participation experience there was very far from the ideals of deliberative democracy,
transparency, inclusion,
so I just sort of look at things like that
and I see kind of a problematic track record
when it comes to public deliberative democracy
participation, vis a vi biotechnology.
I’m not sure why we should be any more optimistic
along those lines when it comes to geo technology.
Yeah,
I’m proud to say that my bioethics center here
funded the early days of Natalie Kofler’s project
called the Editing Nature, which is now moved to a different university,
but she’s very concerned with trying to promote
more public participation and more transparency
around the bioengineering that you’re talking about.
She’s concerned with,
there’s genetic modification of mosquitoes,
but there’s also genetic modification of plant life,
for example, that might spread.
Her whole project
is to improve kind of public input
and public permission for some of these experiments.
But I will say,
the reason that she’s busy is these things have,
the efforts of public participation
have not been particularly strong.
And I kind of share your pessimism, I mean,
I think it is
really important as a principle
for us to consult with people
who are gonna be affected by our research.
It’s the same kind of thing that we talk about when we talk about research on human subjects in a new population or whatever,
but there is kind of a NIMBY problem.
You could come up with kind of intervention that everybody wants for the globe,
but nobody wants to have done on their soil.
So public consultation could turn out to be a real block to methods that actually could help us with climate change.
And also the public participation if it’s being run by the people is apt to be kind of flimsy and lane on the flip side.
So I think you put your finger on a really serious problem.
And it’s also, once we think about actually implementing any of these things, these are gonna be global changes brought about and there’s no way to have a full public participation, except if the whole thing is managed by some sort of United Nations international body, in which case there would be some kind of representation involved.
As to your first point, I think of it as kind of the Heidegger objection, Heidegger’s essay on technology is all about this idea that we have gotten to where we are
0:47:43.6 –> 0:47:45.95 by thinking of everything in the whole world
0:47:45.95 –> 0:47:50.95 as a resource to split open and take the energy out of
and
0:47:51.58 –> 0:47:56.54 he is very skeptical in that essay about the idea
0:47:56.54 –> 0:48:01.4 that all of the kinds of social and other problems
0:48:01.4 –> 0:48:04.43 that this technological attitude have engendered
0:48:04.43 –> 0:48:06.903 can be technique out of.
0:48:08.04 –> 0:48:11.95 So it’s just another way to put your point
0:48:11.95 –> 0:48:16.03 that we should be skeptical that we can
0:48:17.67 –> 0:48:20.04 use the same methods
0:48:20.04 –> 0:48:22.55 to get out of this climate change problem
0:48:22.55 –> 0:48:24.86 that got us into it in the first place.
0:48:24.86 –> 0:48:25.97 I also think that
0:48:28.39 –> 0:48:30.23 there’s something powerful to the notion
0:48:30.23 –> 0:48:33.54 that we just shouldn’t, that it’s hubris,
0:48:33.54 –> 0:48:35.3 not as a matter of actual risk,
0:48:35.3 –> 0:48:39.15 but just that we shouldn’t be engaged in trying to
0:48:39.15 –> 0:48:44.15 manage the globe, but against that people say, ”Well,
0:48:44.78 –> 0:48:46.09 there’s no part of the globe
0:48:46.09 –> 0:48:50.493 that we haven’t already adulterated one way or an-
other.
0:48:51.63 –> 0:48:54.709 There is no pristine part of the planet,
0:48:54.709 –> 0:48:59.37 there’s no nature that isn’t affected by us already.”
0:48:59.37 –> 0:49:00.203 And so
0:49:02.551 –> 0:49:04.81 maybe geoengineering is not so different
0:49:04.81 –> 0:49:06.86 from what we’ve already done by accident.
0:49:08.42 –> 0:49:09.363 Thank you, Bruce.
0:49:10.38 –> 0:49:12.14 <v ->Thank you, Bruce and Steve.
0:49:12.14 –> 0:49:14.95 And into the next question, Steve, you mentioned
hubris
0:49:14.95 –> 0:49:18.08 and I’d just like to ask you very briefly on that point,
0:49:18.08 –> 0:49:22.41 in biomedicine we have a very long history
of hubris leading to subsequent experimentation proving that there are unpredicted adverse events that lead to outcomes that could not have been predicted.

And when this is all experimental, I’m wondering if you’d like to speak to that dimension of the ethics as well.

Wells, I think hubris is actually used in the letter from the Sami people.

I wanna say that there are two ways of thinking about what hubris is, one is that it’s just a species of overconfidence, that it’s just like, we’re sure we can wade into this problem and solve it. And then we learn time and time again that when we do that we get smacked with unanticipated consequences.

And so there that when you say that there’s hubris, what you’re saying is we will bring about unanticipated consequences, but there’s another way to think about hubris, which is maybe a deeper, which is it’s just inappropriate for us to take that role on, even if we could do it beautifully, it’s just wrong for human beings to try to load it over all creation.

So and both those kinds of objections are out there and talked about quite a bit in the literature on geoengineering.
Thank you so much.

Ethan Sims has the next question.

Thank you very much.

So my question is,

should we be any more optimistic about relying on governmental organizations to change policy that’s going to lead to reduction of fossil fuel consumption, then innovators leading to techniques that lead to temperature reduction?

I think your question about hubris is really a question about trusting scientific method and realizing that science is not without consequences. And we do our best to analyze the pros and cons of anything before we take it on.

But I fear that we are approaching a true existential crisis where we’re going to reach irreversible damage to the planet, significant human health impacts from the rapidly progressive climate change. And if we don’t do some sort of mitigation in terms of not just how it impacts us, but reducing the rapid increase spread that we have caused, that we’re going to reach an unsustainable future.

And I think your point about the sort of UN type body is a good one because I wish there was a global governing organization that had respect
0:52:32.4 –> 0:52:36.76 and really credibility throughout the world
0:52:36.76 –> 0:52:38.23 that could take the lead on this,
0:52:38.23 –> 0:52:39.67 but I’m not sure that there is.
0:52:39.67 –> 0:52:44.54 So my question is sort of can we afford to ignore that
0:52:44.54 –> 0:52:46.87 because my optimism is much lower
0:52:46.87 –> 0:52:48.63 that we’re gonna have a governmental solution
0:52:48.63 –> 0:52:51.13 than that we’re gonna have an innovative solution?
0:53:00.37 –> 0:53:01.293 <v ->Yeah,
0:53:07.49 –> 0:53:09.33 I don’t expect it to be govern,
0:53:09.33 –> 0:53:12.85 governments that are developing and
0:53:15.96 –> 0:53:17.173 making these things.
0:53:18.32 –> 0:53:19.94 I do expect governments
0:53:19.94 –> 0:53:22.03 who are very concerned about climate change
0:53:22.03 –> 0:53:24.75 to make pots of money available to private researchers
0:53:24.75 –> 0:53:26.25 to do these kinds of things.
0:53:26.25 –> 0:53:28.3 But that’s separable from the question of
0:53:29.77 –> 0:53:31.45 how it should be overseen.
0:53:31.45 –> 0:53:33.12 I mean, I do expect it to be
0:53:33.12 –> 0:53:34.81 independent scientific innovators
0:53:34.81 –> 0:53:36.25 who come up with the best methods
0:53:36.25 –> 0:53:38.17 for doing this kind of stuff.
0:53:38.17 –> 0:53:40.07 And I also share your pessimism,
0:53:40.07 –> 0:53:43.21 I think we’re close to an existential crisis.
0:53:43.21 –> 0:53:45.73 And one thing that’s happened in the literature
0:53:45.73 –> 0:53:47.01 is 10 years ago,
0:53:47.01 –> 0:53:50.11 if you talked about geoengineering at all,
0:53:50.11 –> 0:53:52.74 everybody jumped down your throats and said, ”No,
0:53:52.74 –> 0:53:55.11 we can never do that, that’s the wrong solution.
0:53:55.11 –> 0:53:58.21 What we need to do is change the way we produce energy,
0:53:58.21 –> 0:54:01.32 change the way we construct our buildings,
we need to reduce emissions.”
And we’re now at a time when we’ve so failed to do that,
even if we keep our Paris promises,
which there’s no sign of being able to do,
even if we keep those commitments that were made
in the Paris agreement,
we’re headed toward overshooting the temperature goal.
So now talk about geoengineering
and there are people calling out for it
at the same time as there are still a bunch of voices
saying we shouldn’t touch it,
particularly the solar management side of it.
That’s a long answer, but I share your pessimism,
which is why own position
is that we should move very quickly
to develop governance in the United States
and internationally
for the research
so that we can figure out if these things can help us
if we reach a really big crisis in the next decade.
Our next question is to Kyle Ferguson.
Hi, Steve.
Thanks so much for the talk.
So my question’s about the moral hazard argument
when it’s used as an objection to conducting research
on any of these strategies.
I’m wondering if you think that argument,
when it’s directed at field trials as opposed to the sort of computer modeling research that has been taking place for a long time, why would the argument look any different if it’s at the field trial phase as opposed to the pre-field trial phases, or why would it be any stronger, or weaker depending on what phase of research it’s directed at?

Well, I’m not sure that it is stronger, or weaker as an argument, I think the people who are very concerned with moral hazard probably wish that the modeling had been going on. There’s one sense in which it might be stronger though, which is that a field trial might show that this would work, it might definitively show, hey, look, this reflects a lot and it stays up there for the amount of time that we thought it would and if we use this material, we’re not seeing any ozone depletion. The right kind of field trial might show that this is seriously available as a tool. And just showing that might be enough to, for example, cause the fossil fuel industry to run out and pour a whole bunch of funding into it and start us down this path. So there’s a sense in which a field trial, the moral hazard argument is more urgently directed at field trials for that reason.
Thank you.

I’d like to give the final question to Sappho Gilbert.

Hi, it was more a comment than a question, sorry.

I just wanted to say thanks to Steve for a great talk and just make mention of the opaqueness and undemocratic nature of the status quo in representation.

But yeah, looking forward to a brighter future perhaps.

(laughs) A wider sky.

Thank you, Steve, for a really riveting conversation.

into everyone for your engagement.

This has been fascinating and we’ll see what happens (chuckles).

Yes, yes, we will.

Thank you everybody,

I’m sorry I didn’t get a chance to answer all of the questions.

And please do note in the chat that Laura’s gonna give a talk in this series and Bruce Jennings is gonna give a talk in this series.

So please join us again.