



MIND & LIFE
INSTITUTE

**The Dalai Lama with Greta Thunberg and Leading Scientists:
A Conversation on the Crisis of Climate Feedback Loops**

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with Host Susan Bauer-Wu, Moderator Diana Chapman Walsh, His Holiness the Dalai Lama, Greta Thunberg, and scientists Sue Natali and William Moomaw

[Link to event video recording](#) at mindandlife.org

[Link to synopsis of conversation](#) as written on dalailama.com

Susan Bauer-Wu (00:00:05):

Welcome. I'm Susan Bauer-Wu, president of the Mind and Life Institute, and I'm so pleased that you can join us for this auspicious virtual gathering. There are millions of you joining in from every continent right now. We're all together to listen to this remarkable conversation with His Holiness the Dalai Lama, Greta Thunberg, and two renowned climate scientists, Sue Natali and Bill Moomaw.

Susan Bauer-Wu (00:00:45):

Our goal today is to raise awareness of climate feedback loops, heightening a sense of urgency, and to offer promising solutions. We will address this through three essential perspectives: science, secular ethics, and social action. The event is also the official launch of a series of short films called "Climate Emergency: Feedback Loops." The films are narrated by Richard Gere, translated or subtitled in 20 languages, and are offered freely online. The films are powerful, and convey critical insights that will inspire you to take action. During this program, we will show three brief clips that will spark the conversation among His Holiness, Greta, and the scientists.

Susan Bauer-Wu (00:01:48):

I'm delighted to introduce the moderator for this program, Diana Chapman Walsh. Diana is president emerita of Wellesley College, a former board member of the Mind and Life Institute, and she is-

His Holiness the Dalai Lama (00:02:09):

Yes.

Susan Bauer-Wu (00:02:10):

Yeah. Diana is deeply committed to mitigating climate change, and is the co-founder of the Council on the Uncertain Human Future. It is my great pleasure to introduce Diana Chapman Walsh.

Diana Chapman Walsh (00:02:25):

Thank you, Susan, and your Holiness, thank you. Thank you for convening us, for being here with us. I'm so happy to be with you again. It's really a joy. I've missed you. It's been quite a while. And to be back with the Mind and Life Institute, which you co-founded three decades ago. You and I have been together in dialogues in many places all over the United States, and in India, and Mundgod, and also in your home in exile in Dharamshala, where you are now. So, it's just such a pleasure to be with you again in this different medium, as you say. Very different. We used to sit around your table. It was quite intimate. Joined by so many people across the time zones, millions, Susan said, in light and in dark, gathering on this beautiful planet that is our only home. The title of your latest book, Your Holiness, "Our Only Home: A Climate Appeal to the World."

Diana Chapman Walsh (00:03:27):

And, Greta, Greta Thunberg, all of us are so grateful for your presence with us today. You're up in the middle of the night. We're so excited to be with you and I want to wish you a happy birthday from last week, January 3rd. You and I haven't met, but I was at your global climate strike in September of 2019. I was in San Francisco. So, maybe I can say I've marched with you and some seven million others. We took to the streets that day. We were called to action by young leaders you inspired. We had been watching you, your personal sacrifices, your knowledge and self discipline, the force of your words, their precision. We were learning from you and we were saying to ourselves, "I can't just sit here and admire her. I have to stand with her. I have to march with her. Together, we can make a difference." Many of us have been saying those words for years, Greta. You made them true. Thank you.

Diana Chapman Walsh (00:04:31):

We have a singular purpose for our time together, all of us, that each of us will leave this conversation changed. And I include myself. Changed by two words related to climate change. One we're hearing increasingly. The second less so. Emergency and possibility. Behind those two words are two other words.

His Holiness the Dalai Lama (00:04:54):

Climate change, she said.

Thupten Jinpa Langri (00:04:56):

Climate change, because emergency, the possibilities.

His Holiness the Dalai Lama (00:05:15):

Right.

Diana Chapman Walsh (00:05:18):

Good. Behind those two words are two other words. Feedback loops and that's what we're here to learn about today. Scientists worry constantly about climate feedback loops, but the public, politicians, the media and others in power are mostly unaware of them. We need to wake them up. Greta has been trying to do just that.

Diana Chapman Walsh (00:05:43):

We're here to learn about feedback loops, what they are and what they mean. First and foremost, they mean that we are in an emergency now, not later, now. But also, and here's the possibility: we'll learn today that the forces caught up in these feedback loops, the natural balances of nature are a crucial part of the possibility we have to slow and even reverse global heating, if we act to protect these natural balances now. We'll show three short clips from our new film series that explains why all of us should educate ourselves and be alarmed. Then, we'll hear from two scientists, as we've heard from Susan. Doctors Susan Natali and William Moomaw, who will help us see the problem, how global heating from our fossil fuel emissions and destruction of our forests are accelerating natural processes that threaten to spin out of control.

Diana Chapman Walsh (00:06:45):

And, this is important, and they will show us how we can be part of a solution that if we work together urgently, intelligently, we can hope overtime to renew nature's own best technologies for storing excess carbon where it belongs in the ground. Before we turn to the science though, we have the great pleasure of witnessing a live encounter, the first ever as I understand it, between two extraordinary individuals. Both are great admirers of science and both are greatly appreciated by scientists. Your Holiness and Greta Thunberg, it is you who have drawn so many of us together here today. Your star power. Both of you live with the urgency of the climate emergency. You're very focused on it, both of you. And you both embody the possibility that we can address it. Two moral leaders from two ends of the age spectrum, from the east and from the west. Two visionaries who see the future and are calling us to action. Calling us to our better selves.

Diana Chapman Walsh (00:08:00):

So, I begin our time together by inviting you two into a dialogue. Standing by is Thupten Jinpa Langri, translator for the Dalai Lama and chair of the Mind and Life Board, to assist as needed. Thanks, Jinpa La. But Your Holiness, I want to begin with you. Your book that I just held up, "Our Only Home," begins with a letter to Greta. You wrote to her in May and then part of it is published in this new book that came out a bit later. I'm going to read your first two paragraphs now and then I'm going to ask for your thoughts as you were writing them and your thoughts now. This is what you wrote to Greta.

Diana Chapman Walsh (00:08:43):

"I am also an ardent supporter of environmental protection. We humans are the only species with the power to destroy the earth as we know it. Yet, if we have the capacity to destroy the earth, so to do we have the capacity to protect it. It is encouraging to see how you have opened the eyes of the world to the urgency to protect our planet, our only home. At the same time, you have inspired so many young brothers and sisters to join in this movement."

Diana Chapman Walsh (00:09:21):

So, your Holiness, my first question to you is, what inspired you to write that letter to Greta? Why did you want to be in touch with her? And how do you see this importance of her work now and going forward? This is your chance. We brought you together. Your Holiness.

His Holiness the Dalai Lama (00:09:46):

When I heard the young lady's, you see, the thinking about environment, these things, I really admire. It is really encouraging. Now from the young community, younger members of humanity showing a genuine sense of concern of our future, of our planet, this is a very, very hopeful sign. Now actually, you see everybody want happy life, no question about that. Not only we human beings, but also animals, insects, everyone want happy life and for that we say everyone is very much concerned about their own existence. Now about human being, humanity.

His Holiness the Dalai Lama (00:11:39):

Anyway human brain is something very special, remarkable, yet judging our world, human being in a way, most trouble maker. Other animals, you see their daily life, eat, sleep, sex, but we no. Much sort of desire and too much sort of sense of "we" and "they." Human history, you see, I think among the different species of mammals on this planet, I think we human being, one way, create a lot of good things, but at the same time, we create a lot of problem. Now today, world lot of problem. Even some extent, the ecology. All this much sort of our own creation.

His Holiness the Dalai Lama (00:13:07):

So now, question is why our brain, wonderful, but we too much thinking, firstly, we are self, human being, secondly, then our nation, our country, then finally, my family. So, eventually with this thinking, a very small circle. The reality, individual human beings' life depend on the community or family. The family, their family depend on the community.

His Holiness the Dalai Lama (00:14:03):

Now, today's world, you see, the entire seven billion human being are one human community, so now time come. We have to think entire humanity. The ancient time, small circle. We, we, we. That's now, according to this reality, now, is the thinking "we", small circle, unrealistic. So seven billion human beings, entire our life, depend each other.

Diana Chapman Walsh (00:14:56):

Thank you, your Holiness, that's beautiful, thank you. If you don't mind, is it all right if I ask Greta if she would like to say something to you, since she's having the chance now to meet you?

His Holiness the Dalai Lama (00:15:10):

Oh indeed. I am eager.

Diana Chapman Walsh (00:15:12):

Good.

His Holiness the Dalai Lama (00:15:15):

Hold on.

Diana Chapman Walsh (00:15:15):

Good, Greta.

His Holiness the Dalai Lama (00:15:16):

Yes.

Diana Chapman Walsh (00:15:16):

Is there anything you'd like to ask His Holiness or say to him or tell us about receiving his letter? Whatever you'd like to say.

Greta Thunberg (00:15:27):

Well first of all I would like to say thank you for hosting this event and thank you to everyone who is taking part and thank you to Your Holiness for being such a loud advocate for environmental protection and environmental action. I can say as a younger generation, we appreciate that very much, we are eternally grateful that you are standing up for us, not only for us but for the future of the entire humanity and for the entire planet and also, of course, thank you for your letter and for your support. It means a lot and yes, although we may be very different in terms of age span and many other things, we share the same goal, we share a common goal and that is to protect our planet and life on earth and humanity and so thank you once again, Your Holiness.

His Holiness the Dalai Lama (00:16:44):

Thank you. So when I heard this young girl from Sweden.

Thupten Jinpa Langri (00:16:56):

Sweden

His Holiness the Dalai Lama (00:17:00):

I really felt, "Oh, there's real hope from our younger generation, who's really thinking this environment and these things." So this is, I can attest, such a time. We generally will materialistic thinking and then finally, small circle, my nation, my community, as I briefly mentioned, so now it is quite rare who talking about world. About environment. These things. I really feel this a sign of hope for future. Like my generation now, ending. Like you, the younger generation really now all our hope depend on these young people.

Diana Chapman Walsh (00:18:27):

Yes. Thank you, your Holiness and so I'm--

His Holiness the Dalai Lama (00:18:31):

So, you see, past--

Diana Chapman Walsh (00:18:32):

I'm close to your age. Thank you, so much your Holiness.

His Holiness the Dalai Lama (00:18:36):

You see, past is past. Past is past. Now future depend on younger generation.

Diana Chapman Walsh (00:18:49):

Yes.

His Holiness the Dalai Lama (00:18:49):

I think anyway, I may say our generation create a lot of problem. Sufficient problem. Now let them solve.

Diana Chapman Walsh (00:19:03):

Right. Thank you, thank you very much. So now, we have a short clip from the film series that we're introducing today and it includes just a little part of the speech, Greta, that you gave at the UN Climate Action Summit in 2019, and I know Your Holiness that you saw that speech. It's the one, Greta, you sailed across the Atlantic Ocean in a small sail boat to address and in that speech, you referred to irreversible chain reactions or feedback loops.

Diana Chapman Walsh (00:19:42):

So before we show the clip, and it's only a couple of minutes, Greta would you want to say anything about why you thought it was important to raise this issue of feedback loops at that meeting? What you knew about them and why you thought world leaders needed to hear those words from you?

Greta Thunberg (00:20:04):

Well, the speech is very dramatic but I thought that, at least my experience is that right now there is a huge lack of awareness and that the science isn't being enough discussed and brought into conversation, so I think we are desperate for a raise in spreading of awareness and we need to tell people about what's happening right now because we are, to a large extent, unaware of what's happening. Most people I know, I encountered haven't even heard of feedback loops or tipping points, chain reactions and so on, but they are so crucial to understanding how the world works.

Greta Thunberg (00:21:00):

They just show how complex everything is, that our actions have consequences. We have such a lack of respect for nature and for the environment that we just think that, "Oh things, they will work out in the end." We don't seem to think about our actions have consequences, a lot of the time beyond our comprehension, things that we cannot understand, things that we cannot predict.

Greta Thunberg (00:21:34):

And when these things are set in motion, we can in many cases not stop them.

Greta Thunberg (00:21:48):

So we cannot solve the climate emergency without taking these feedback loops into account and without really understanding them. So that is a crucial step.

Diana Chapman Walsh (00:22:00):

Thank you, and we have you both to thank, Your Holiness for lending your prestige--

His Holiness the Dalai Lama (00:22:27):

It seems we generally thinking of course, basically human nature is more self-centered, selfish, from the birth, but now for individuals' best interest depend on community. When we say community, entire world is one same human community.

Diana Chapman Walsh (00:23:03):

Right.

His Holiness the Dalai Lama (00:23:03):

So now, the taking care yourself in reality, in practical level, we have to think about humanity, about world. Thinking world, not religious matter, but practical level. You see, our future depend on entire humanity, on this planet, so we have to think about this planet. It's our home

Diana Chapman Walsh (00:23:46):

Yes.

His Holiness the Dalai Lama (00:23:46):

And then the ancient time, we say east to west or north to south and within that, different religion, different color, different language, now these are minor. Now time come, we have to think about humanity, oneness of seven billion human being. We have to think about humanity. So it is important we keep in our mind that individual's future depend on humanity, so we have to think about humanity. Happy humanity, healthy world.

Diana Chapman Walsh (00:24:36):

Yes. Thank you, thank you so much. If you'll allow me, we wanted to be able to teach all the millions of people who have logged on to this program a little bit about this idea of these feedback loops and we have a piece of a film, a very short piece of a film that we'd like to show now to start that process and then our scientists will explain more, Your Holiness. And you're absolutely right, and you have been so clear your entire life that the only way we solve these challenges now is to find a way to come together as one human family to solve these problems and what we're hoping from this program is that everyone who has tuned into this will be inspired by you and by Greta and by this new knowledge and information that we're hoping to transmit today, they go out and work very hard together, linking arms together, all of us, to get in front of this problem of the climate crisis.

Diana Chapman Walsh (00:25:43):

So with that, I would like to start with this first film clip. It's part of the introduction to this series of films. There are five films and one is an introduction, and this short segment begins after the concept of feedback loops has been explained, so just to get us started, let me just offer us

simple definitions and our scientists will allow us to elaborate it more as we go along. But for now if we think of causes and effects in a system, the cause, in our case, and Buddhist cosmology certainly helps us understand this, the cause in our case - greenhouse gas emissions - produces an effect - the planet warms - and that effect, hotter temperature, feeds back into the climate system and causes more heat trapping gases to be released into the atmosphere, which then accelerates the rate of heating, and on it goes, faster and faster and faster in a vicious cycle.

Diana Chapman Walsh (00:26:50):

We'll see examples of this problem, from our scientists and then we'll see how this situation may improve if that feedback cycle can be reversed. So that's the basic idea, and the scientists, again will elaborate. Let's now watch that first film clip.

"Climate Emergency: Feedback Loops" narrated by Richard Gere (00:27:08):

But it's more than our emissions heating the globe, something else is at work here. The rising temperatures are setting in motion earth's own natural warming mechanisms that then feed upon themselves.

Greta Thunberg (00:27:22):

The popular idea of cutting our emissions in half in 10 years only gives us a 50% chance of staying below one point five degrees and the risk of setting off irreversible chain reactions beyond human control. 50% may be acceptable to you, but those numbers do not include tipping points, most feedback loops, additional warming hidden by toxic air pollution or the aspects of equity and climate justice.

"Climate Emergency: Feedback Loops" narrated by Richard Gere (00:27:54):

Emissions from fossil fuels are the input which add heat-trapping gases to the atmosphere, raising earth's temperature and setting in motion self-perpetuating warming loops. Warming as a result of the warming itself.

"Climate Emergency: Feedback Loops" narrated by Richard Gere (00:28:11):

That ever-growing screeching noise is an apt analogy for the damage that human-caused feedback loops are wreaking on the planet. Scientist have identified dozens of feedback loops already in motion. It's imperative that we understand them if we're going to solve the climate crisis.

"Climate Emergency: Feedback Loops" narrated by Richard Gere (00:28:34):

As the climate warms, forests, once removers of carbon, release it back into the atmosphere as carbon dioxide or CO₂. Frozen ground in the northern hemisphere thaws and emits CO₂ and methane. These are the kind of feedback loops that lead to further warming, triggering the release of even more heat-trapping gases and raising the temperature even higher. In this series, we will highlight four of the major feedback loops impacting climate.

"Climate Emergency: Feedback Loops" narrated by Richard Gere (00:29:08):

The melting of sea ice in the Arctic Ocean, increase drought and fires in the world's forests, the decay of organic matter from permafrost thaw in the northern hemisphere and disruptions to the jet stream in our global weather. Each amplifies warming and combined, they are spinning out of control.

Diana Chapman Walsh (00:29:32):

To help us understand what the world is failing to see, we now turn to two scientists who have dedicated their lives to these problems and are here to help us understand them more fully. First, Dr Susan Natali. Sue, you are an inspiration for your expertise, your dedication, your brilliance, and the compassion that drives you forward into the collapsing tundra. You work in perhaps the most challenging area on the planet now, the rapidly warming Arctic. Difficult work. At the Woodwell Climate Research Center in Woods Hole Massachusetts, you direct the Arctic program. We're eager to learn from you and from your colleague, Dr William Moomaw.

Diana Chapman Walsh (00:30:13):

Bill, your distinguished career in environmental studies has garnered much recognition including from the Nobel Peace Prize committee in 2007, that selected the IPCC, the Intergovernmental Panel on Climate Change, for reports on which you and others scientists were lead authors. Bill and Sue will discuss, as examples, feedback loops in two kinds of natural ecosystems. Thawing permafrost in the Arctic, that's Sue's area, and destruction of the world's forests, that's Bill's expertise. They'll discuss how these two systems interact.

Diana Chapman Walsh (00:30:49):

Sue will go first and she will introduce a second short clip from the series. It shows her in the field and in her lab. Sue, would you please explain to us about what we need to know about Arctic warming, permafrost thaw and feedback loops?

Sue Natali (00:31:05):

Yes, thank you, Diana. First I also want to thank Your Holiness and Greta for your leadership, for your powerful words and for your actions to protect our planet. I'm going to be talking about the Arctic which is home to a number of important feedback loops, for example, the loss of reflective ice and snow is causing the earth to absorb more of the sun's energy. As a result, the Arctic is warming more than twice as fast as the rest of the planet.

Sue Natali (00:31:36):

But no matter where you live, you've likely felt or seen the impacts of climate change over the past few years because across the planet, we're seeing an increase in the frequency and severity of wildfire, of heatwaves, of floods and of droughts, but nowhere are the impacts of climate change more severe than in the Arctic, as has been witnessed by Arctic residents for more than a decade.

Sue Natali (00:32:04):

In this next film clip, I describe the rapidly-changing Arctic landscape, and the impacts on global climate and I start off with my observations from a recent field expedition in Alaska. So let's now watch the second film clip.

“Climate Emergency: Feedback Loops” narrated by Richard Gere (00:32:20):

Last summer, while working in her usual field location in Alaska, Natali witnessed a remarkable acceleration of permafrost melting.

Sue Natali (00:32:29):

First of all, it was very, very warm. It was 90 degrees Fahrenheit in the tundra. There were places where we walked, where my foot fell into the ground because there was no longer any ground structure because there was, the permafrost was thawing. I have never seen change happening that quickly from one year to the next.

“Climate Emergency: Feedback Loops” narrated by Richard Gere (00:32:52):

To understand how this thawing will impact the global climate, Natali and her team collect permafrost cores from different locations across the Arctic.

“Climate Emergency: Feedback Loops” narrated by Richard Gere (00:33:06):

In the lab she analyzes their carbon content and composition to determine how much gas will be released when the permafrost thaws.

Sue Natali (00:33:15):

These cores were taken from a location that has really organic, rich, deep, peaty soils and you can tell that when you look at this core because it's really dark brown and that dark brown color means that it holds a lot of carbon.

“Climate Emergency: Feedback Loops” narrated by Richard Gere (00:33:29):

The thawing permafrost not only impacts the climate through the release of greenhouse gases, it can entirely transform the landscape, as Natali has seen in Duvanny Yar, Russia.

Sue Natali (00:33:42):

I had never seen permafrost thaw and ground collapse of that magnitude. I remember driving up to it on the boat and it was like, wow, this huge cliff, many, many stories high. You see these really, really fine roots that have been frozen for 40,000 years. Once they're thawed, they'll decompose in a year.

Sue Natali (00:34:12):

So as you saw in the video, the thawing of frozen ground, called permafrost, is dramatically altering the land in the Arctic, and in other regions that contain permafrost, including the Tibetan Plateau. When permafrost thaws, it can cause the ground to collapse, damaging infrastructure, people's homes, and creating hazardous conditions for the people who live on permafrost.

Sue Natali (00:34:37):

In addition to these direct local effects, permafrost thaw can also impact everyone on the planet. This is because of the permafrost feedback that can warm our climate. The source of this feedback is the vast amount of carbon that's stored in permafrost. There's twice as much carbon in permafrost as is currently contained in our entire atmosphere. Three times more carbon

stored in the permafrost region than is in every tree, and every forest on the planet. That carbon has been frozen for thousands of years and now it's starting to thaw. As it thaws, microbes break down that organic carbon and release it into the atmosphere as greenhouse gases. Those greenhouse gases contribute to warming. Warming in turn, leads to more thaw, which leads to more heating. This is the permafrost feedback loop.

Sue Natali (00:35:30):

The amount of permafrost that will thaw and the greenhouse gases that will be released from permafrost once it thaws depends on the actions that we take now in terms of limiting fossil fuel emissions, and protecting our forests. If we continue to emit fossil fuels at our current rate, permafrost carbon emissions will be substantial. For example, by the end of this century, permafrost carbon emissions may be on par with the current rate of emissions of the United States, the second largest greenhouse gas-emitting nation. But if we substantially reduce fossil fuel emissions and protect our forests, we can cut permafrost carbon emissions by more than in half. This will have important consequences for the people who live on permafrost in the Arctic, on the Tibetan Plateau and for people across the planet.

Sue Natali (00:36:25):

Importantly, and perhaps surprisingly, this permafrost feedback has not been accounted for in the global carbon budgets that have been used to determine how much and how fast we need to reduce greenhouse gas emissions to limit warming. It's critical that decision-makers are aware of and account for the permafrost carbon feedback in order to keep our climate under control and to restore the planet.

Diana Chapman Walsh (00:36:53):

Thank you very much, Sue. Bill, much of your work has been in the forests. Would you take a few minutes now to explain the complexities of the forests in the feedback loops and in this climate emergency and the relationships too, between the forest and the Arctic.

Bill Moomaw (00:37:12):

Thank you, Diana and thank you, Sue. As you've all learned from my colleague, Dr Sue Natali, the Arctic is warming faster than the rest of the globe because of feedback loops, the loss of reflective snow and ice, in addition to the increased atmospheric greenhouse gases, so this extra warming is thawing permafrost soils and releasing even more carbon. In other parts of the globe, warming of forests, wetlands, grasslands and agricultural soils, increases the metabolism of plants and soil microbes, so that they store less carbon and release more carbon dioxide and methane to the atmosphere - an important feedback loop, accelerating warming.

Bill Moomaw (00:37:57):

Our warming climate has increased droughts, pests and has made possible some of the largest wildfires in history. The massive fires this past year in Australia, in the western United States and in the Arctic have added carbon dioxide into the atmosphere and the remaining dead trees cannot remove carbon dioxide. It is essential that we halt warming rapidly so that we can continue to have the benefit of large scale atmospheric carbon dioxide removal that our forests provide.

Bill Moomaw (00:38:29):

While carbon dioxide emissions began to increase after about 1750, when industrialization began, half of all human-caused emissions have occurred since the first climate treaty in 1992. As you heard Sue say, halting these direct emissions is essential, but to change our trajectory in the direction of a more benign climate, we also need to remove more carbon dioxide from the atmosphere. Forests are the most powerful way we have to do that right now and they provide an important, helpful feedback. While 11 billion tons of carbon is released by human activity each year, the increase in the amount in the atmosphere is just five billion tons.

Bill Moomaw (00:39:17):

Oceans and plants on land remove the rest, and over half of this is removed by forests. Trees steadily accumulate carbon by absorbing atmospheric carbon dioxide through the amazing process of photosynthesis. That carbon makes up half the weight of dry wood, and some of it accumulates in soils as leaves and fallen wood decompose. In older, temperate forests, half the carbon is in the soils and in northern forests, up to 90% is stored in soils.

Bill Moomaw (00:39:49):

Now when a forest is cut, much of the carbon from the wood in soils is released rapidly into the atmosphere. About 15% of human-caused carbon dioxide emissions come from forest loss. Forests are cleared for agriculture and urban development or to produce wood products and burned to produce electricity in the developed world. There are more effective ways to grow food and electricity from burning wood emits more carbon dioxide than burning coal. Zero emission technologies like solar and wind produce electricity with no emissions during their operation and they do so at a lower cost than burning wood. So I would say that it is better to keep our carbon inheritance, that's what it is, it's an inheritance from the past, that we keep our carbon inheritance in our forest and soils rather than release it to the atmosphere and try to recover it later.

Bill Moomaw (00:40:47):

Well even when forests aren't harvested or cleared, scientists who study forests are finding a worrying trend. In the videos, you will hear scientists reporting that forests like the Amazon are accumulating less carbon now than they did even a decade ago. These trends are seen in other forests in different regions as well. An altered climate, that is more drought-prone, appears to be driving these changes. Forests are at the heart of a feedback loop that can either warm or cool our planet and we get to determine which direction that goes.

Bill Moomaw (00:41:26):

In a few minutes, we will describe how we can increase the amount of carbon dioxide removed by forests and soils to eventually cool the planet, but first we would like to share this short excerpt from one of the Climate Emergency films.

Diana Chapman Walsh (00:41:43):

Wow.

“Climate Emergency: Feedback Loops” narrated by Richard Gere (00:41:43):

With the clock ticking, it comes down to how we manage temperate forests, use them for commercial purposes or keep them intact to cool the planet.

“Climate Emergency: Feedback Loops” narrated by Richard Gere (00:42:06):

While human activity has kicked off natural warming loops, human ingenuity could reverse their direction, turning them into cooling feedbacks instead. It would mean protecting and expanding forests, preserving marshes, grasslands and all natural habitats. Using agricultural practices that store carbon instead of releasing it and letting trees and plants do their job of taking carbon out of the air. This would lower earth's temperature and kick in a self-perpetuating cooling feedback loop.

“Climate Emergency: Feedback Loops” narrated by Richard Gere (00:42:45):

George Woodwell was an early pioneer, warning about fossil fuel use setting off warming feedback loops five decades ago. He's convinced that the solution lies with nature's own ability to cool the planet.

George Woodwell (00:43:01):

We can store carbon in life. If we want to be optimistic, we have to be very progressive in our transition away from fossil fuels and into a new green world but it takes imagination, interest and a recognition of the reality of an earth that is failing at the moment.

George Woodwell (00:43:30):

We can't allow it to be too late.

Diana Chapman Walsh (00:43:57):

"We can't allow it to be too late." That's why we're here. So we have a few moments if you would like, for you, Greta, and for you, your Holiness, to ask questions of the scientists. There was a lot of information packed in those remarks that they offered, so starting with you, Greta, is there anything you would like to ask of either or both of the scientists?

Greta Thunberg (00:44:32):

There's so much to ask but maybe whether you could clarify in what way these affects, these aspects and feedback loops are not included and are not accounted for in, for example the global carbon budgets and why is that?

Sue Natali (00:45:03):

Well, I'll start. Thank you, Greta. So in the models that inform the last reports that advise these global carbon budgets, permafrost was not included in those models and part of that is because these models are built for the planet, and not specifically for the Arctic and so scientists are well aware of this and are actively trying to get these processes into the models, but sometimes science acts a little bit slower than it needs to, when we think about policy, when we think about a climate emergency. So we need to take the information that we have, even if the models aren't perfect, the scientists are aware that this is happening and when we think about managing for risk, we need to act. Maybe we don't know the specific number, maybe we know a

range of numbers, but those numbers are good enough for us to communicate what these risks are.

Bill Moomaw (00:45:59):

I might just add that the models as they are tell us a pretty serious problem is on hand and I think even the scientists who work with those models then are quick to say, "Yes, but it's really worse than that, because of these feedback loops." As science progresses and we learn more, and as Sue can tell you, it's not easy working in the Arctic, it's not easy to get those kinds of measurements and data, but as we get more of it, we'll be able to do a better job.

Diana Chapman Walsh (00:46:35):

Your Holiness--

Greta Thunberg (00:46:38):

Sorry.

Diana Chapman Walsh (00:46:39):

Greta, go ahead, you had a follow up?

Greta Thunberg (00:46:42):

Sorry, and yet because all these announcements that countries are starting to do now as, for example, Net-Zero 2050 or halving emissions by 2030 and so on, those are based on these incomplete carbon budgets, which gives us a way too low probability of staying below the safety limits set out. Do you think there's a risk in that? That this is being miscommunicated and misunderstood and what do you think we could do about that?

Sue Natali (00:47:27):

I think there's definitely a risk. We're about one degree celsius, and we're already seeing the hazards of climate change. We're underestimating what it takes because we're not accounting for these feedbacks, so there's definitely a risk, and what we can do about it, is I think events like this, educating ourselves, communicating ourselves, communicating others about what's being left out and what we need to do, and what we need to do is be a lot more ambitious and to make our voices heard.

Diana Chapman Walsh (00:48:01):

Yes, that's a big part of the reason we're having this meeting. Your Holiness, is there anything you would like to ask of the scientists before we move on?

His Holiness the Dalai Lama (00:48:26):

Now today, we already have the solar power, then wind power. These quite clean. We already as a practice these things, now we should put more effort. Then also we have to pay more attention, the deforestation. We should now think more seriously the protection of these environment. Within my own lifetime in Tibet, in Lhasa area, when I was young, most of the high mountain, lot of snow, but gradually, year by year, less and less. And here Dharamshala also. Now, the snowfall less and less, so now these are some scholar say because of global

warming. Now even area like Tibet become desert. Some scientist said that, so serious matter. Like Tibet, I always now, although regarding Tibet, the political matter on these things I already retired, but one my commitment is Brazil and Tibetan ecology. There's something very important.

His Holiness the Dalai Lama (00:50:35):

Usually the people, they do not much think about importance of this Brazil environment. So now, we should cultivate more trees, then I think these things, I think much depend on education. We feel thousand years, we're simply go like that, but now today, because of climate warmer, climate change, global warming, so we have to think now seriously, preservation of this ecology. Very important.

His Holiness the Dalai Lama (00:51:40):

Then, since many years I have one dreams. When I go flight to Europe and to some African countries. They large area. In Africa, there desert. Sand land. And similarly in Australia, except in coast line, in coast area, otherwise in central, the very center, there is once steam. I also visited there. Otherwise large number of Australia, desert. Yet Australia all four sides, sea. We have now technology translate sea water, salty water, to drinking water. I have seen. So we already have that technology, so we can use sea water, use for cultivate and our drinking or use, so the Australia big land eventually can be cultivated area, land and then Sahara, from Mediterranean. You can use the sea, because of the transform, drink water and also from western side of Sahara, you can use a lot, a lot of sea water and cultivate the Sahara land.

His Holiness the Dalai Lama (00:54:06):

So sometimes I have that kind of dream. A possibility there. So when we saw due to global warming, the ...

Thupten Jinpa Langri (00:54:32):

Northern hemisphere.

His Holiness the Dalai Lama (00:54:33):

Oh, north hemisphere as picture shows, there's a lot of melting the big ice, so ...

Thupten Jinpa Langri (00:54:53):

Arctic.

His Holiness the Dalai Lama (00:54:57):

Arctic? South Pole, not much concern, but northern pole, we have to think seriously. Now this picture very useful, but now question is how to protect this. What is the sources of this big melting and what we can do. So I can nowadays related with environment.

His Holiness the Dalai Lama (00:55:30):

So now we already know these serious consequences this melting, but now important is discuss how to reduce this and one way as I mentioned earlier, you see the ...

Thupten Jinpa Langri (00:56:03):

Fossil fuels.

His Holiness the Dalai Lama (00:56:08):

Oh. So use, more clean energies like that.

Diana Chapman Walsh (00:56:23):

Thank you, thank you your Holiness. When you won the Nobel Peace Prize in 1989, you began articulating a vision very much like the one you've just described. You've been thinking about this for a very long time and we're grateful for your leadership on these questions and what we have with this new science, represented briefly by these scientists who've spent their lives and continue to spend their lives doing this deep work, is that there are new ways to think about enlisting nature as an ally, with us. We're part of nature so it is, we are of nature, in solving these very serious problems of these feedback loops that are spinning out of control and causing this excessive warming, so that is developed much more fully in the film series and we will make available the links to the films, to everyone who's watching and we hope that everyone will see a way to educate themselves more deeply and more fully in what's actually happening on the planet.

Diana Chapman Walsh (00:57:40):

As Greta has said, the fact that the decision makers are not taking this into account in the decisions that they're making, they aren't paying attention to the damage being done by these feedback loops, so we'll ask everyone, the millions of people who have listened in today to take inspiration from your lifelong effort to preserve the environment in the Tibetan Plateau and around the whole world, and your deep, deep belief that we can act now as one humanity, seven billion, on the planet and begin addressing these questions.

Diana Chapman Walsh (00:58:18):

So just before we finish, I thought I would ask each of you for your call to action, we'll call it. So what would you like to say as we finish? And I'll begin with Greta who has started a social movement and mobilized millions of people. Greta, as we complete this brief time together, and as we hope very much that everyone will take from this a commitment to learn more about these feedback loops and how to manage them more effectively, what would you say to encourage people to stay with this challenge?

Greta Thunberg (00:59:05):

Well first of all, I can clarify, that I haven't created a movement, I haven't mobilized people, it is me together with other millions of people of all ages, but especially young people. It is we, together, who have done that. But also that my call to action would maybe be that we are right now at a time where we need to start to speak clearly and we need to educate ourselves. What we need the most right now is of course climate action, but in order to achieve that, we need awareness and we need for people to understand these kinds of global mechanisms and what is happening right now with the planet and maybe also what is not happening. So that is my call to action, that is my, if I could ask one thing of you, it would be to educate yourself, to try to

learn as much as you possible can. There's unlimited amount of education and spread that knowledge, spread that awareness to others.

Greta Thunberg (01:00:21):

We need to create a social movement, we need to shift the social norm because if we are enough people who demand change, and who are advocating for these things, then we reach a critical mass and then we will no longer be possible to ignore, so that's what we need to do right now. It's not a small task, but it's something that we need to do because there is simply no other option.

Greta Thunberg (01:00:57):

Of course yes, also focus on solutions, and I think that you will be talking about that more later on, but also restoring nature is perhaps, it's not only a solution to the climate crisis, it's also a solution to the biodiversity crisis and so on and then we no longer have the possibility to choose between different kinds of actions. We now need to do everything we possibly can and then restoring or rewilding nature is perhaps one of the most important things of doing that, to change the way that we see nature.

Diana Chapman Walsh (01:01:40):

Thank you.

Greta Thunberg (01:01:44):

And also, if this is my final statement, then I would also like to thank every one of you. Thank you to Diana, Sue, Bill and of course, Your Holiness, and Jinpa, of course, and everyone else who's taken part. And all of you for watching as well.

Diana Chapman Walsh (01:02:04):

Thank you very much, Greta. Bill, did you want to say something very briefly now about solutions as succinctly as you can make it so that we go away with a clear idea of what it is we need to advocate for?

Bill Moomaw (01:02:26):

Do you want me to go next or--

Diana Chapman Walsh (01:02:28):

Yes, Bill, yes.

Bill Moomaw (01:02:29):

All right, good. Well to achieve a safe global climate we must re-freeze the Arctic to save it. To re-freeze the Arctic we must cool the Earth. To cool the Earth we must reduce the heat-trapping gases in the atmosphere and stop feedbacks. And now I'm going to say something that will probably shock many people but I think it's important for everybody to know this.

Bill Moomaw (01:02:57):

Well it is essential to halt the addition of heat-trapping gases to the atmosphere, such as carbon dioxide from our energy systems and from our exploitation of nature, as well as to stop the release of short-lived but more potent warming gases such as methane and refrigerants. That's absolutely essential. But current feedbacks will continue and raise global temperatures even if we halted all emissions today because the current amount of heat-trapping gases in the atmosphere are so high.

Bill Moomaw (01:03:31):

So what must we do in addition to halting putting things in, we must simultaneously reduce our emissions and increase the capabilities of natural systems to remove more carbon dioxide than we are releasing so that the atmospheric amounts decrease. When we reach that point we will begin to lower global temperatures. Recent studies show that by allowing more of our forests to grow, they have the potential to store twice as much carbon as they do today.

Bill Moomaw (01:04:06):

This process of forest restoration, called pro-forestation, will rapidly accumulate more carbon out of the atmosphere by avoiding harvest-related emissions, which by the way are typically half the carbon that's in the trees, and take advantage of the fact that larger trees accumulate and store the most carbon. We need to let trees get big in order to store the carbon that has to be stored. Reforestation and planting additional forests is a good thing to do, but it will take a lot longer. It will complement us for the distant future. Similarly, changing grazing practices on grasslands, altering farming methods, protecting existing wetlands will both maintain existing carbon out of the atmosphere and accumulate more while increasing the productivity of soils and agriculture.

Bill Moomaw (01:05:00):

So as Sue pointed out, the addition of heat-trapping gases in one place has global climate consequences. Likewise removal of these gases from any place on the earth reduces the global amount of heat-trapping in gases and contributes to eventually cooling the earth. So as surprising as it may sound, saving the Amazon and many of our other forests will also help to save the Arctic and our climate. If we can reduce emissions and increase removal sufficiently to lower atmospheric gases, the feedbacks that were so harmful as atmospheric accounts were increasing, it will amplify reductions as we decrease the gases in the atmosphere.

Diana Chapman Walsh (01:05:43):

Thanks.

Bill Moomaw (01:05:44):

Sue, would you like to?

Diana Chapman Walsh (01:05:45):

No, Bill, I'd like to go to his Holiness.

Bill Moomaw (01:05:49):

Okay.

Diana Chapman Walsh (01:05:49):

We're running low on time and I think we should. We want to hear from His Holiness as the last word, and thank you for your summary. Your Holiness, the floor is yours.

His Holiness the Dalai Lama (01:06:12):

So it seems now, we human being in different place to say our life over thousand years, millions of years, we take for granted now this kind of life, or this kind of a situation. Now through education, climate changing and human population much increase, then we, I think very much utilize natural resources. So these are the new development. So due to that, you see now, some new problems there, so I think we should now educate. Those scholars should explain the reality, our lifestyle unlike hundred or thousand years. Now today our lifestyle changing and utilize natural resources very much, so now climate change and nature's resources now much of effect so we have to think seriously about the new situation and our lifestyle, way of thinking, now have to think about today's reality, so through education and a young leader, like you, I think raise earnest or seriousness through education about the future generation.

His Holiness the Dalai Lama (01:08:28):

Now things are now become more serious but we take for granted and usually that I think sometimes you see, that's a mistake. We have to think seriously about reality, then we have to think how to protect that. So now, leader, like you, are very, very important. You can do much of life earnest, so very good.

Diana Chapman Walsh (01:09:17):

Thank you.

His Holiness the Dalai Lama (01:09:20):

And then, previously--

Diana Chapman Walsh (01:09:21):

Thank you.

His Holiness the Dalai Lama (01:09:22):

Previously we, when we face some problem, difficulties, then according your own religion, faith, God, God, God or Buddha, Buddha, Buddha. That's not sufficient. We must react according to situation. Not sufficient. God or Buddha. Saying that, not sufficient. We are self. As far as Buddhism is concerned Buddha mentioned, "You human being, you are your own master. Things depend on your thinking. On your action," so sometimes we too much easy. We create lot of problem when we face that problem is just say, "God, God, God." That's I think if Jesus Christ there, we pray to God, to God. You, you, you and who created problem? Not Jesus Christ, but you yourself. Now you have the responsibility. Buddha also similar sort of answer.

His Holiness the Dalai Lama (01:10:42):

So therefore we, ourself, there are a lot of problem due to our own behavior then we have to think seriously how to resolve, how to reduce this problem. Thank you.

Diana Chapman Walsh (01:11:02):

Absolutely. Thank you, Your Holiness, thank you very much. You're right, it is our responsibility, all of our responsibilities. Maybe the best news, as you've said, is that Greta Thunberg and the many young activists, Greta thank you for correcting me, it's many young activists who have risen up, are rising up now everywhere to demand that the world's leaders do act now to address this emergency and they're also insisting that these leaders do so in the context of a serious focus on social and economic justice, climate, environmental justice. So I think for us it is now to join them, all of them to act not once but over and over to enlist others to join us until each one of us forms a multitude.

Diana Chapman Walsh (01:11:48):

If we do this well, if we stay with it, then we can imagine the possibility of a social feedback loop that builds and builds and builds to a global response of sufficient speed and scale to meet this looming threat. We can begin right away by spreading the word, demanding of our leaders, as Greta often says that they act as though our house is on fire because it is. We're not lacking for fire extinguishers, that's what the scientists are telling us, and some of them are in nature. We must take care of them so that they can take care of us. These forces of nature that these two scientists have studied so intensively.

Diana Chapman Walsh (01:12:35):

So please everyone, watch these films. Make sure everyone you know watches them, talk about them. You can find them at [feedback loops climate](https://feedbackloopsclimate.com), that's three words: feedbackloopsclimate.com. Join together, organize, learn more, study, educate. Yes, Your Holiness, education, education, education. Yes, Greta, we all have to become scholars and teach ourselves and learn. There are so many resources available that all of us could become quite expert if we just make the effort.

Diana Chapman Walsh (01:13:09):

There are many effective organizations that will welcome you eagerly and being active with others is a great way to cope with the anxiety of our situation. We should hold to account for the health of the planet every leader we know in every setting, whether elected or appointed or are self-appointed and ourselves, our families, our friends. We must hold ourselves accountable too, as Your Holiness you have said.

Diana Chapman Walsh (01:13:35):

Find the roles we can play. Find our partners. Find our passions. Find our joy. With the Dalai Lama who has overcome great hardships by consistently spreading compassion and love and joy. We can start living now for a future that we can love. So finally, we thank you all so very much for being with us. Your Holiness, thank you from the bottom of my heart for your wisdom, your guidance, your insight and for hosting this event for us and with us.

Diana Chapman Walsh (01:14:10):

Greta, thank you so much, and it's just been such a joy to see the two of you join together for the first time on this computer screen. We will all hold that image of the two of you together.

These two world leaders and all that you represent, all the people behind you. We'll hold that in our hearts as we go forward and take up this work together.

Diana Chapman Walsh (01:14:33):

And finally, I want to acknowledge with great gratitude the Mind & Life Institute for hosting this event and for their deep commitment and ongoing efforts to bridge science and contemplative wisdom, to foster insight and inspire action toward flourishing. Individual flourishing, societal and planetary.

Diana Chapman Walsh (01:14:57):

And finally, finally, thanks to all of you who have tuned in to spend this time with us all over the world. We're very grateful to you. You have our admiration and go forward. Let's do this work together. Thank you.

His Holiness the Dalai Lama (01:15:19):

Is it this talk that gives me opportunity seeing many my old friends' face.

Diana Chapman Walsh (01:15:31):

Yes.

His Holiness the Dalai Lama (01:15:33):

Including their nose. So these are topic responsibility for everybody.

Diana Chapman Walsh (01:15:52):

Yes.

His Holiness the Dalai Lama (01:15:53):

I promise you, I commitment this continuously carry and then my brother, sisters here. You also you should think seriously about this matter. Then especially the Swedish young girl. Very hopeful sign. Such young really now showing seriously about this matter is very, very encouraging. So anyway, I think I may say when I met former president of America, Obama, out of discussions then I told him, "You are younger than me, so after me you please carry these ideas continuously." And he promised. So similarly here, you see a younger sister, so please carry these responsibility about humanity, about world. Please carry continuously. Thank you. Thank you. Bye bye.

Diana Chapman Walsh (01:17:50):

Thank you your Holiness. Bye bye. Thank you so very much.

His Holiness the Dalai Lama (01:17:53):

Thank you.