

**MICHELLE ENGLISH:** Greetings. And welcome to today's virtual MIT Starr Forum, "Amazon Burning COVID-19, Ghost of Climate Future." I'm Michelle English.

And on behalf of the Center for International Studies, I am honored to have with us today Dr. Carlos Nobre and Elizabeth Leeds. I'd like to thank our co-sponsors, the Center for International Studies and the MIT Brazil program.

And my colleagues, Laura Kerwin and Rosabelli Coelho-Keyssar, for their help in making this event possible. We had long been looking forward to bringing Dr. Nobre to MIT. Of course, we could have never predicted a pandemic would prevent this from happening.

"Whether we like it or not, the world has changed. It looks completely different now from how it did a few months ago. It may never look the same again. We have to choose a new way forward." Those are the words of Greta Thunberg at an Earth Day event celebration on Wednesday.

My hope is that we will choose a new way forward. And I'm certain that Dr. Nobre will help us choose wisely. Before we get started, I'd like to invite you to future Starr forums, including next Thursday, for a talk on violence against women with human rights experts, including our very Hala Aldosari.

Finally, I'd like to point out that we have time for Q&A at the end of this talk. Please use the Q&A feature on the toolbar to submit your questions. At last, it is an honor for me to introduce our moderator, Dr. Elizabeth Leeds. Dr. Leeds is a Senior Fellow at the Washington Office for Latin America, where she advises work on citizen security and human rights in Brazil.

She has served as a Ford Foundation Program Officer in the foundation's Brazil office, and is the co-founder and honorary president of the Brazilian Forum for Public Safety. From 1989 to 1997, she served as the Executive Director of the Center for International Studies. And she received a PhD in political science from MIT. Please join me in welcoming Dr. Leeds.

**ELIZABETH LEEDS:** Thank you, Michelle. I would like to welcome everyone to this most timely Starr Forum. Timely not only because of the subject, the threat to the Amazon in climate change and its relation to COVID-19. Also, because of the relevance in the commemoration of International Earth Day, which Michelle mentioned, which was officially on Wednesday. of course, everyone, every day

should be Earth Day.

It's a tremendous honor to welcome Professor Carlos Nobre to MIT, his Alma mater, to CIS, and to this virtual Starr Forum. [NON-ENGLISH SPEECH] Professor Nobre who is speaking to us from Sao Paolo, is the former chair of the Scientific Committee of the international Geosphere-Biosphere Programme.

He's the former director of Brazil's Center for Earth System Science, a former scientific director of the National Institute for Climate Change Research. He's chair of the Brazilian Panel on Climate chair, and co-chair of the Science Panel of the Amazon. His research interests include tropical meteorology, climate modeling, and global environmental change. Professor Nobre received his PhD from MIT, as Michelle mentioned. So please, join me now in welcoming Professor Nobre. And I want to remind everyone, as just to reiterate, to submit your questions by clicking on the Q&A button on the bottom toolbar.

**CARLOS NOBRE:** Good afternoon to all. Initially, let me thank MIT, the Starr Forum, for this kind invitation. If not for the pandemic, I would be enjoying spring in Cambridge, Massachusetts. But anyway, we will have to learn how to live under this crisis. And perhaps we will come out of this crisis much better as humanity.

So the question that was posed to me was whether Amazon burning and COVID-19, are they ghosts of a climate future for the planet, for humankind? And I will try to address those two issues. And I will anticipate my answer, yes, they are ghosts, two of climate future for humankind.

Let me start with a quick, very quick introduction of the history of Amazon occupation development. When the Europeans came to South America 500 years ago, the Indigenous population, the Amazon, was estimated between 5 and 10 million people. Natives always have considered the forest and the wildlife as a cultural and spiritual value. On top of that, keeping the forest almost totally undisturbed was also a way to reach an ecological balance with millions and millions of microorganisms that inhabit tropical forests. And there were practically no large-scale cases of zoonotic diseases. That would have devastated Indigenous populations. They were in balance with the ecosystems, with all its integrity.

The main cause of almost extinction of the Indigenous populations in Brazil was not slavery or assassination. By 1940, there were only 70,000 Indigenous people in Brazil from several million, up to 10 million, to 70,000. They were going extinct.

In fact, the main reason for that, it was contagion through diseases brought about by Europeans. There were many episodes of miners, land grabbers, or land speculators giving gifts such as clothes, to Indigenous communities contaminated with pathogens such as measles. That provoked unspeakable genocides. That was the main reason for the almost disappearance of Indigenous populations in Brazil. Also, many other parts of the Americas.

The resource-intensive mode of development of the Amazon since the 1970s was based on the false premise that there is no economic value in the forest. The forest was named Green Hell. [NON-ENGLISH], the military government of Brazil, coin in 1972, was "The occupation of the Amazon will follow the cattle footsteps."

Indeed, that's what happened. We're around 70% of cleared forest in the Amazon, and as a very low-productivity cattle ranch. A cultural mental blindness of the total importance of maintaining the forest has dominated the political power of most Amazonian countries today, even today.

Science is more and more demonstrating that all benefits of keeping tropical forests standing. They are, of course, a natural mitigation of climate change for retaining hundreds of billions of carbon in the biomass, and acting as a very important carbon sink.

There is a tremendous potential for an innovative bioeconomy. And a bioeconomy of forests standing and rivers flowing. And science is trying to unfold to that potential.

Now, the pandemic does not leave any doubts about the necessity of keeping tropical ecosystems in balance to reduce the risk of a continuous succession of epidemics and pandemics. The Amazon is burning. Our house, on fire.

Let me address a little bit, the importance of forests, tropical forests. In particular tropical forests are unique ecosystems, in terms of its interaction with the atmosphere. They exist where there is a lot of rain, and short dry seasons. Usually shorter than three months. That's why they're called rainforests.

They are not only a passive response to a climate driver of larger rainfall in the tropics. They, in fact, create conditions for more rain. It's almost an evolutionary mechanism for survival.

They keep evaporation all year round at very high levels in the Amazon. The water vapor inject in the atmosphere increases rainfall levels. Especially during the dry months of the year.

Therefore, the forest, by drawing soil moisture deep down with a deep rooting system, creates the conditions to more rain, and for its own maintenance. In sum, the forest very efficiently recycle water and increase overall rainfall by 15% to 25%, primarily during the dry season.

That makes the inside canopy environment very wet. And fires rarely propagate inside the forest, the undisturbed forest. That is, the Amazonian forest is resilient, even to lightning strikes that ignite fires in many dry forests and savannas across the globe. Like the bushfires in Australia. The fires in California forests, Siberia, et cetera.

But the forest is under three anthropogenic drivers of change, acting simultaneously and synergistically. The first one is regional deforestation. That reduces the water recycling process and increases surface temperature. About 70% of the Amazon Forest has been cleared. And another 6% to 10% is in various stages of degradation, fragmentation.

Second, climate change and total global warming also increases temperature, has increased about 1.5 degrees, the temperature in the Amazon. And also, has an overall effect of increasing the seasonality of rainfall, with an annual decline of most of the Amazon Basin. The third anthropogenic driver is warmer temperatures, forest degradation, and proximity to man-made fires also has increased significantly the vulnerability of the forest fires.

As I mentioned before, undisturbed forests are very wet. Even a lightning-ignited fire would not propagate. But now, the Amazon forest is becoming more and more vulnerable to fires. These three drivers have been large tracts of the forest, very close, are bringing very large tracts of the forest very close to a tipping point. I will explain.

Observations review that worrying picture of the proximity to a tipping point. Over Southern and Eastern Amazon, the dry season has increased by three to four weeks over the last 30 years, with longer dry season in areas heavily deforested. Temperature during the dry season is much warmer, two to three degrees in those areas.

Evapotranspiration over those areas, the evaporation plus transpiration, has also decreased. Also, this carbon sink, this natural behavior of tropical forests. All forests in the world, but also tropical forests. The carbon sink strength is dangerously declining in those areas. This is Southern, Eastern Amazon, mostly in Brazil.

In the 1980s and '90s, the Amazon was a sink of two billion tons of carbon dioxide from the atmosphere. Which was about 7% and 8% of total emissions of carbon dioxide. Today that

number is much less. And some tracts of the forest in Southern Amazon have become carbon source.

So the combination of warmer temperatures, fragmentation, increased deforestation, and man-made fires has created the conditions for much more forest fires. That is becoming much more vulnerable to fires, the forest is becoming. And the most worry observation is that in the Southern and Eastern Amazon, species of trees which are typical of very wet climates, they are showing a higher mortality rate. It seems that this process of a large-scale change is already occurring, or about to occur. So considering all those things together, science today indicates that between 50% to 70% of the Amazon Forest is very, very near an irreversible tipping point of savanization, may be turned over, a dry savanna, in 30 to 50 years.

That would mean losing something like 200 billion to 300 billion tons of carbon dioxide, complicating even more reaching the Paris Agreement goals. It would also mean a gigantic loss of tens of thousands of plants and animal species. And of course, spilling over an incredible number of microorganisms, increasing tremendously the risk of future epidemics and pandemics.

The situation today is very worrying. Deforestation rates almost doubled in the last 12 months. And fire reach a 10-year record last August. Pollution caused by the fires last year in the Amazon made the Amazon, in August, the most polluted place on Earth.

And we know, let's say just looking at how COVID-19's vulnerability of people to pollution. Polluted cities like New York City, the risks of death by the virus is much higher. So that might happen again during this year's burning season.

Let me move now to talk a little bit about the COVID-19. When and where the next pandemic will emerge. What is really a likely path to our next zoonotic pandemic?

Ecological imbalance make it quick and effective for pathogens, virus bacterias and other pathogens with high host plasticity to move. To birds, bats, rats, monkeys, insects, cattle, pigs, chicken, et cetera. And then, animal to human, spillover viruses. And amplification of human-to-human transmission, as we've seen happening unfolding at a gargantuan scale during this pandemic.

This is the case for many of the well-known epidemics and pandemics in the last perhaps 100 years, but certainly in the last 40 years. HIV, Ebola, bird flu, swine flu, MERS, SARS, Rift Valley

fever, West Nile virus, Zika virus, dengue, Chikungunya, and the new coronavirus.

Dangerous zoonoses is really appearing every four months. Tropical deforestation and fires change radically the complex ecological balance between microorganisms and animals. Corridors of contagion are constantly and growingly being created by miners, hunters, colonists, timber loggers, land grabbers, that can carry new pathogens to urban centers and spread quickly and eventually, globally.

Wet markets, bushmeat, illegal trade of wildlife, all of that is present in the Amazon. Really, it's not clear why no global zoonotic pandemic originated in the Amazon to date. Since all factors of disturbance and risk are present in there. Perhaps sheer luck, one might say.

Let me just address briefly one very serious issue that we are very concerned here in South America, in the Amazon, which is the vulnerability of Indigenous population in the Amazon, to COVID-19. The national crisis in Brazil and other Amazonian countries, due to this pandemic, has led to a relaxation of law enforcement in the Amazon against illegal mining in Indigenous territories. And land speculation and grabbing. That was a process that was going on for several years, did not start with this lack of law enforcement. 80% to 90% of deforestation fires in the Amazon are illegal. So it's a wild west type of environment.

COVID-19 can seriously bring serious threats to Indigenous and traditional population a study published this week indicated that of over 80,000 Indigenous population are under the risk of death due to this new coronavirus. Which is something like 8% of the total Indigenous population in Brazil. That can only be avoided with a very strict lockdown of those communities until the pandemic is completely over. And of course, health assistance to those populations, something very rare. So very large tract of Indigenous populations are at a greater risk in Brazil today from this pandemic.

Why these two things, Amazon burning and pandemics may combine and are becoming ghosts of a climate future. Any failure of not reaching the targets of the Paris Agreement, of keeping the global temperature increase below 2 degrees, may present tremendous risks to the planet. For the Amazon, as I mentioned before, global climate change, deforestation, increased vulnerability of fire, puts the tropical forests at the brink of a tipping point of large-scale savanization. That might happen over three to five decades, resulting in a gigantic spillover of viruses, bacteria, and other pathogens to humans, increasing dangerously the risk of unpredictable zoonotic epidemics and pandemics.

COVID-19 is the most serious warning that we must seek, immediately, sustainable pathways for humankind. That calls for restoration of ecological balance of all ecosystems. But particularly, tropical ecosystems. That's where it houses millions of different species of virus, bacteria, and other potential pathogens.

Massive forest restoration also brings the natural climate change mitigation solution. One hectare of restored forest in the Amazon removes between 12 and 15 tons of carbon dioxide from the atmosphere a year for about 25 years, a natural climate change mitigation solution.

COVID-19 has brought to all of us, globally, the enormous sacrifice of flattening the contagion curve to save lives, given the capacity of health care units. The Earth has also, limit to its capacity. Climate change presents a great risk of exceeding such capacity.

We must also flatten that curve of risks by reducing emissions of greenhouse gases urgently, and increasing removals of greenhouse gases from the atmosphere. Particularly carbon dioxide through a massive forest restoration program, a global forest restoration program. And this forest restoration program is very important to happen also, in the Amazon.

As I mentioned, the Amazon, large fraction, perhaps 50% to 70%, might be turned into a dry savanna within three to five decades. One way to fight that back, to reduce the risk-- not to eliminate it, but to reduce-- is to restore large fractions of the forest areas. As I mentioned, cattle ranches, livestock farming is very low productivity in the Amazon. Less than 1 head of cattle per hectare.

So if we move to a sustainable intensification of existing activities there we may have a very large area, something like 300,000, 400,000 square kilometers. We have to restore forests, particularly in Southern and Eastern Amazon, to try to reboot, let's call it reboot, the water cycle. Reboot the capacity of the forest to recycle water efficiently, to increase rainfall in those areas, to reduce the increase in the dry season length.

So that's one way, one strategy. Does not really guarantee saving the forest. But at least we have to move in that direction. Let me just conclude by saying, with respect to the Amazon, climate change and pandemics, we are already at a crossroads, very close to an irreversible tipping point.

One clear learning from the pandemics is that we have to listen to science, as Greta Thunberg has been echoing, for climate science. Listen to climate science. A recent Gallup poll indicated

that trust in science has been high all over the globe. Perhaps one of the few good news that the pandemics is bringing about.

And the growing anti-science and fake science movement is somewhat weaker, but did not disappear. Protecting human life is showing global collaboration of the scientific communities of almost all countries. Lessons learned from this pandemic must serve to prepare all of us to face the gargantuan risks that climate change poses to life on Earth, and to our own survival.

We must right away raise planetary health at the same level of importance as human health. In that way, protecting tropical forests, especially the Amazon, is a urgently-necessary global endeavor, to be carried out by all Amazonian countries. And by all of humanity. Let's raise the voice of science to guide us for a sustainable future. And all our voice in unison, to save the Amazon. Thank you very much.

**ELIZABETH  
LEEDS:**

Thank you very much, Professor Nobre, for this inspiring talk. Which has also inspired a number of questions from our listeners and our viewers. But I would like to start off with one question, which is related, in a way, to your last point, your last statement, about raising the voice of science.

You've mentioned that it is common knowledge around the world that marginalized sectors of the population, low-income communities, prisoners, migrants, and especially Indigenous populations, are the most vulnerable and ultimately suffer disproportionately from COVID-19. In the case of the Amazon diseases, you mentioned measles. There's also diabetes, tuberculosis, malaria, HIV. These are all risk factors for a disproportionate percentage of the population. And we know that the removal of the protection of this population, whether it's through mining, farming, cattle grazing, as well as by the reduced powers of FUNAI, the Indigenous affairs ministry, also drastically affect climate change.

So my question is, what is the likelihood of significant opposition and pushback to these destructive policies? Either from within Brazil, or from international organizations, or people outside the country.

**CARLOS NOBRE:** That's a very good question. Actually, I would love to answer your question very optimistically, saying yes, this global concern about pandemics is changing our perceptions about many things, about risks. People, in general, they were not as concerned about the risks that we are inflicting to the balance, ecosystem's balance, ecological balancing, its integrity. And now, we are all thinking about that.

Finally, the voice of science is being heard much more. And as I mentioned, apparently the anti-science, fake science movement that was growing like crazy in the last five, seven years, is not speaking out. Including things like which seems to be an absurd today, and anti-vaccine movements.

However, how to translate that into empowering all these people. So this is not a simple matter. I would say I hope that we could really just use this global concern about how important it is to keep ecological integrity, that we move to a different type of agriculture. That we also move, let's say, to a different type of economy.

There are a lot of studies and some examples showing a circular economy is the way into the future. A circular economy requires much, much less minerals, much less primary products that really are at the heart of these destruction of tropical forests. So I hope that we will more quickly move out of the unsustainable path that humanity was taking, most of humanity, most of the countries, for centuries. That we will really adhere to a sustainable path.

Of course, that depends on the populations. The populations have to push for that. We see some good news coming from European countries. They are discussing moving out of the pandemic, out of the economic crisis, on to a Green Deal. We are seeing that, some other countries discussing that.

Not all of the countries. Unfortunately, this is not a discussion that has reached the level that we think we should have reached in US, but also in Brazil. And in other Amazonian countries, it's mixed.

There are countries which are more concerned. Like Colombia, are countries which have protected forests much more effectively, Suriname, Guyana, French Guiana. But this is not a consensus in the Amazon. In Brazil, where most of the Amazon is located, 63% of the forest is in Brazil. And still, there is this big debate. But I hope, I'm really hopeful, that the world will come out of the pandemic with a different, very, very different perception of the way we should relate to nature, to Indigenous populations, to other minorities, to traditional people.

Also, I mentioned to you this study that was released this week, about the risk of 81,000 Indigenous people to death. But also, this is not Indigenous people only. The riverine populations all over the Amazon, they are very susceptible to contamination, and also to die.

So we are at the brink of a critical moment. If we fight that back, if we flatten this curve of pandemic, and collectively we do that as a national, an international movement, really abiding by science, being guided by the best science, and perhaps we will emerge in a new world, in which climate change denial movements will lose power. Because it's really something that for us, in science, it seems to be almost impossible to understand. Because how solid is that climate science?

Still, we are moving towards the Paris Agreement goals very, very slowly. We are putting the planet at a great risk. The risk of climate change, uncontrolled climate change, is even unthinkable.

Unthinkable. We cannot even predict what's going to happen in the planet if we lose equilibrium in ecosystems, if the Amazon forest disappears, if all tropical forests disappear. So it's a different world. We cannot even think or dream about, or even find out. Even science would have a very hard time predicting the outcomes. But it will be terrible.

So really, I think I'm optimistic. In all my life, I had never seen a global concern. Seeking a balanced way of progressing, perhaps that will make us really go on board a sustainable pathway.

Science is showing a lot of the ways we can have food security. We can have energy security. We can have water security without disturbing the planet as we are doing.

Science is providing solutions. A lot of scientists, and particularly MIT, which is a technologic-oriented powerful house of science, is studying, promoting solutions. But we are not adopting those solutions at the pace that we need. I hope the pandemic will raise the flag. And we will really abide by what a safe way for the future of the planet requires.

**ELIZABETH  
LEEDS:**

Thank you. And now let's move onto the questions from our viewers. We have many. And I will try to be just in my selection of these questions. The first one is from an anonymous attendee. "Given the increases in deforestation we've seen in recent months in the Amazon, what should we expect in the burning season? How might COVID affect land use in the Amazon for the remainder of this year?"

**CARLOS NOBRE:** Well, before the pandemic, of course we were very concerned. Because in Brazil, there is a political discourse coming from the president. Coming from sometimes high-level politicians, like some Amazonian Brazilian Amazon state governors. Not all. There is a mix of political

discourses.

But in a way that going back, actually, to the '70s, the military discourse, which was not very popular for several decades. In Brazil, there was a reduction of deforestation from 2005, 2012, 83%. Then it stabilized for several years. Then it start increasing, 2016. And then exploded in 2019, and early 2020.

So the projections were not really very optimistic. Projections were aligned with this political discourse. The illegality will even flourish even more. A TV show in the last Sunday, got an interview with people grabbing Indigenous land. And this guy gave in his interview to this reporter, said, "I heard the president's speech, that we have to take the Amazon lands. Because the Indigenous people do nothing."

So that communication, which is completely misguided and even illegal, it goes against the law, was really creating incentives for a model of development that we would like to see in the distant past, decades ago. We thought we're abandoning that model. But it's coming back. Let's say, the projections were not very good.

And the pandemic means less law enforcement agents. All the law enforcement agents older than 60 years, they are obliged to stay confined at home for health reasons, correct concerns. However, I think the pandemic is bringing something new, is bringing the risk to all those populations.

The contact of illegal gold diggers, illegal miners, illegal land grabbers, to Indigenous communities, to riverine communities, can really bring the death rate to a catastrophic level. So I hope the government, all governments, the state governments, federal governments, federal police, environmental enforcement agents, will also do their best.

Satellite monitoring of what's going on in the Amazon daily shows all the illegality. Daily, daily if you want to act, you just base on this very good information. You go out in the field. And you can really decrease the reason of the high decline in deforestation rates, 2005 2012, many studies show, was law enforcement.

So we have really to talk very loudly, to ask for law enforcement. And really to take the crises, the pandemic, in a way to avoid a catastrophe. So I'm not saying we are going to avoid that catastrophe. But this is one opportunity we have to reap, and really to see ways to go out, to be very critical if deforestation and fires increase in the next few months.

**ELIZABETH**

**LEEDS:**

Thank you. There's another question which is quite interesting, having to do with the seemingly reduction of pollution during this time of COVID-19. Because people are driving less. Economic activity has decreased. SO the question is, "There seems to be a lot of positive sentiments regarding COVID helping with climate change with the economic slowdowns, less travel, et cetera. So I'm curious if you think this is really a significant impact? And do you think it could lead to complacency for societies to think that this shutdown is enough to tackle climate change, at least for now?"

**CARLOS NOBRE:** Yeah, that's a good question. I was born in Sao Paulo, and Sao Paulo city, in 1950s, a long time ago. And I tell you, I don't recall in my childhood-- I left Sao Paulo when I was 17. So that is 1951 to 1969. --I don't recall having seen a sunset as beautiful as the sunsets of two weeks ago. Because pollution was reduced, something like 50% to 60%.

Most of the pollution in Sao Paulo city comes from fossil fuel combustion. Engines, buses, trucks, cars. I'm sure many studies are being carried out to get a good metric on the benefits, on health benefits. We know, globally speaking, about 4 million people die prematurely in the world due to air pollution. Mostly from fossil fuel combustion. And from external air pollution.

Certainly this is true everywhere in the world. So it's really very clear that we can't move towards that. So the pandemic also gives this opportunity, symbolic opportunity. Because it's very difficult to predict that as the pandemic is over, pollution will not go back to the previous levels.

However, we can now see all generations, all people living, particularly in big cities, they are seeing with their eyes beautiful sunsets, clear skies. Animals coming back. Birds, insects. I can see here, even in my hometown here, near San Paolo, we see many, many more birds, insects. So the ecosystem is regaining strength.

So it's a short vision, a shortcut of a vision that what we would like to see. So I hope these many studies will come out soon, scientific studies showing, measuring the benefits of this narrow window of opportunity to see what the future would look like if we abandon fossil fuels and other pollutants. And we can do that. As I mentioned, technology has shown solutions. They make sense environmentally. They make sense economically. We are just very slow in adopting.

For instance, electrification of the fleet. In countries like Brazil, where most of the energy,

electricity, is generated not on fossil fuel fire power plants. It's water and also, more and more wind energy as well. So if we switched to electrified fleets, we reduced tremendously the pollution, increases the health of all Brazilians. That, we can see.

The pandemic, we will never be able to have that example. That we would be convinced. We have to show, scientifically, the benefits. Then I hope the populations of all over the world, including developed countries, including China, will press for moving towards a fossil-fuel-free world. Which is necessary, mandatory, for keeping the warming, global warming, under control, less than 2 degrees. But also, will increase tremendously the health of the population.

**ELIZABETH  
LEEDS:**

Thank you, Carlos. It's very frustrating. There are some wonderful questions, and many of them. So I'm know I'm going to have to neglect a large number of them. But let me ask this one, which is "What is being done in Brazil to protect the Indigenous population? Particularly given the new appointment of an evangelical missionary to head FUNAI."

**CARLOS NOBRE:** Yes, this is very worried. When this new government came into office they tried some things that do not make sense at all. Changing the Indigenous Affairs Bureau, FUNAI, from Ministry of Justice to Ministry of Agriculture.

Then the Supreme Court vetoed that. It went back to Justice, changing all the leadership of this agency. And clearly demonstrating that protecting Indigenous rights was no longer a priority. Many of these authorities, including the president, giving speeches, calling the Indigenous ways of life, Indigenous culture, as primitive.

He said, I quote, "We have to take them out of the zoos. Indigenous territories are zoos." Then, more recently, they appointed evangelical missionary for one division of FUNAI which deals with isolated Indigenous groups.

There are unknown number of isolated groups which refuse to get in touch. They've been suffering a lot in the past. So they took the decision to be isolated. There is perhaps over 120 groups all over the Amazon Basin. Perhaps 35 or 40 groups in Brazil, identified.

And there is a doubt. Because one serious issue throughout this contact of Indigenous people, it was with the evangelical missionaries. They always tried to get close to the Indigenous populations, to write versions of the Bible in Indigenous languages, to convert to Christianity, Indigenous groups. So they were very close.

So this closeness of these people actually was also a factor in the past off transmission,

disease transmissions, a very serious impact also. So we don't know what this new head of this division will do. But certainly, appointing evangelical missionary for that probably meant symbolically that still, in the heads of these people, you have to convert all Indigenous groups to Christianity.

Which is really something which goes completely against respecting human rights of the Indigenous population. We have to respect they have their own culture, their own beliefs, their own religions. So why we think our beliefs, our religion, is superior? This is a concern. We are really concerned about that. We have to see what his actions will be.

**ELIZABETH  
LEEDS:**

OK. I think we have time for one more question. If I'm wrong, Michelle and Laura, please let me know. This is a question from somebody representing the investment and financial industry.

It says the following, "We in the investment industry are promoting the role of capital in influencing decisions. If nature is not valued in investing in business, then expect more deforestation. What support from the Brazilian or the global investment community have you seen, if any? And are you hopeful?" And this viewer wants to thank you for your work and sharing your insights today.

**CARLOS NOBRE:** This is a very important question. In the uptick in forest fires last year in the Amazon, we had raised that issue. Which was kind of always discussed but had never reached a global perspective, a global concern. So a lot of impact investment companies, funds, they got together.

For instance, the association, Principles of Responsible Investment, PRI, they got together. And they start really becoming more serious about do not support investments in the global tropics, in particular in the Amazon, which would lead to more deforestation. So the concept of deforestation-free supply chains gain a lot of weight. A lot of convincing power towards the investment, the impact investment.

So impact investment is becoming more and more important. But there are many investment impact investments, investment funds, for instance, which do not fund coal-fired power plants. This is very important.

Also, we are seeing, more and more, now the concern about not investing in activities which would drive further deforestation, further disappearance of tropical forests. So this is essential.

This is essential. And that has to be side by side with consumers decisions.

If consumers were really very careful about looking at the origin of a product which comes from Brazil, Amazonian countries, rainforests, African countries, Southeast Asia, Indonesia, et cetera, and they really require a certificate of origin, a certificate that did not lead to more deforestation, more fires. Deforestation would decline very rapidly.

Because there is so much wasted cleared areas. As I mentioned, this ridiculous low productivity of livestock farming in Brazil, as a whole. But also, in the Amazon, particularly in the Amazon. You could have much more production even of grains, using no more than 50% of the cleared area.

Then, what I think impact investment funds should also pay attention, is the potential of these new what we call standing forests bioeconomy. The standing forests agroecological systems producing açaí berry, producing cocoa, producing Brazil nuts and a large number of other products from the forests, are much more lucrative than cattle, than soy. They maintain the forest standing. They improve the livelihoods of all those people working in those agroecological systems.

Also, they provide something that we need as human beings more and more in this century. We need to improve our health by diversity in foods. We have really to open, completely. We eat only a few. 85% of protein and calories intake of 6 billion people in the world comes from only 12 products, 5 animal protein products and 7 grains.

So we have really to open up. And the tropical forests have an infinite potential of producing many, many more products. For food, for beverage, for industry. So that's the economy investment funds have to be concerned.

It's a new economy. But the economic potential and the social inclusiveness of this new economy is vastly superior than the current economy of mining and of agricultural products. So I would really encourage the person who asked this question to bring to discussion the tremendous economic potential of a standing forest economy.

**ELIZABETH**

Thank you so much, Professor Nobre. And before we close the forum, would you like to make any final comments before we say goodbye?

**LEEDS:**

**CARLOS NOBRE:** Yes. I just want to make one comment, because this was organized by MIT. One idea that

came to my mind, because I did my PhD at MIT-- at that time it was called Meteorology Department at the Green building, beautiful building. --from 1977 to '82.

Then of course, MIT always was in my mind. During the 5 and 1/2 years that I spent at MIT, got to get to know many people from engineering, from physics, from technologists, even from biology. So I could see what wonderful creative environments MIT is. Inspiring environment for not only forming as scientists. But also, creative new ideas. And MIT, after that, has become one of the leaders in finding solutions for a sustainable planet.

So it occurred to me, and I start discussing this not very much. But still, it's an idea that I hope I will be able to motivate some people, including MIT. Why don't we create an MIT in the Amazon?

Why don't we create a school where the quality of MIT in the Amazon? Associate with MIT. MIT could help in the creation of this. Let's bring high-tech school of forming also, scientists forming the entrepreneurs that we need in the Amazon for sustainability, doing the state-of-the-art research that really is the basis for any new economic model, understanding what's going on in the Amazon.

Why not have a a university or a school? I prefer to call a technological Institute. We are actually calling an Amazonian MIT, or AMIT, Amazon Institute of Technology.

So I would like really to end this very nice conversation with you really raising this issue. Why? Because we need to find a sustainability pathway for the Amazon. We need to improve the quality, the size, the strength of science and technology in the Amazon.

So it's not only necessary to do outside of the Amazon. We have to bring this capacity to bear into the Amazon. So my final remark would be to save the Amazon, not only a global endeavor, a very urgent one. But also, we have to bring knowledge.

We have to construct a knowledge of society. And having an Amazon MIT would certainly help that a lot. I want to thank you very much, Professor Leeds, and all colleagues, for giving me the opportunity to talk to you.

**ELIZABETH**

**LEEDS:**

And thank you, once again, for this inspiring talk. And your inspiring answers to all these questions. I remind you, once more, that our next Starr Forum will be on April 30th at 1:00 PM, Eastern Standard Time, on the theme of "Violence Against Girls & Women, the Case of Saudi Arabia." Details of the event are available on the CIS website. Thank you all.

[MUSIC PLAYING]