

Welcome to Turning Conscience Into Action, the Earth Charter podcast. Join Mirian Vilela, Earth Charter International Executive Director, in her fascinating conversations with great thinkers, scholars and activists from around the world who are working in the fields of sustainability, ethics, education and social transformation. Our purpose is to generate new insights on how to face current global challenges and inspire informed action.

Hello everyone. Today we are having a conversation with Harald Lesch, a famous German astrophysicist, natural philosopher, television presenter, professor of physics at the Ludwig Maximilian University of Munich, and he is also a professor of natural philosophy at the Munich University of Philosophy.

For many years, Harald has presented a number of television series on climate change. He has received many awards over the years, including the 2023 Order of Merit of the Federal Republic of Germany. Thank you for joining us today, Harald. My pleasure. Thank you for having me here. You co-authored two books, one around 2019, titled, *If Not Now, When Then*, then in 2023 you also co-authored a book called *Understanding Climate Change*. So much of our conversation today will build on them. So we would like to ask you to open this conversation by sharing with us, both as a scientist and a natural philosopher, what makes our planet so unique through your eyes.

How many hours do we have? Well, I'm from time to time, I am performing concerts with eight musicians and I always start with that the gods of the Milky Way are extremely impressed by one planet, which is, has a name, Blue Diamond, or a pale blue dot, and which is supposed to be one of the absolutely masterpieces in the Milky Way, because it has all the abilities to allow for life, not only for simple life, but also for complicated life. And when you look at the different functions we have as humans, then you can, of course, automatically say there must be very special conditions on the planet to allow a person like us to survive on this planet for a long time and to develop and simply to live here.

And so this is, I would say, the starting point from the point of astrophysics, of course, when you look for other planets, extra solar planets, you always compare it with the Earth, and so far we haven't found anything like that. And from the point of philosophy, of course, it's the question of what kind of relations do we have with our surrounding world and what we say in German, *Natur*, Nature? What is Nature for us? What value do we give Nature and do we use it only as an economic circumstance, which we can use like ever we want to do it, or is it something more?

Is it absolutely responsible for our existence? And the starting point, of course, for my philosophical studies are always ethical, namely the question, how should we act? How should we deal with Nature? How should we deal with our human surroundings, so to say? And so these are both poles and the pole positions, of course, because from an astrophysical point of view, I have changed my view by 180 degrees. Instead of looking into the universe, now I've changed by 180 degrees and look on this one planet and see what, for example, my perspective in many talks I give is the perspective of an extraterrestrial.

What was an extraterrestrial spacecraft measured over, let's say, the last few hundred years, and they would, of course, have measured that the mean average temperature has increased, that the glaciers are melting, that something is happening with the biosphere, that something changes in the atmosphere, and so they maybe, say, somehow would really recognize that something is going on on this planet, which is not very good for life, so that they would also, of course, they would also have recognized somehow that something is going on with the phenomenon of life, that we are losing more and more special species.

And so they would say, maybe it hasn't worked. So if there is a master plan in the Milky Way, that they will find all the planets which allow for life, and maybe they have also have already recognized more than one Earth, then maybe we are joining the galactic club, but we have to make it. And so in a kind, it's to go to a bottleneck, we have to go to a bottleneck, and we are in a bottleneck situation, because when you continue like this, then the temperatures will increase so much, that many of us in future will still, will have difficulties to survive.

Yes. So it's a critical situation, and that is why I go as a scientist to communication. So from a cosmic context, Earth is really very special. My goodness, yes. When you look at, there are these famous pictures from the Apollo astronauts in the late 60s and early 70s, but also the pictures from the space station. When you look at this wonderful planet, you see how thin the atmosphere is, how wonderful this planet looks like, then it is not to understand why as creatures who live on the surface of this planet, we are, well, dealing with this planet in such a traumatic and, well, not very good way, I would say.

So if we could only open our eyes and really understand this beauty and how special it is, we could give more of it. Yes, value it. Simply value it. That's it. Yes. So how would you describe, Harald, the current state of human consciousness regarding our interconnection with all life? What do you think are, do you think we are evolving toward a deeper ecological consciousness or still there is something missing fundamentally in terms of our consciousness? Well, if you look, we are more than 8 billion people on the planet and for many of us, all these technical and scientific problems have no, absolutely no value.

It doesn't mean anything to them because they have to somehow survive. They have to deal with everyday life in a very existential way. They have to try to find something to eat. They have to find clear water for their own and for their family and for their children, etc., etc. So when we talk about the reactions, the active part of humans, of humans, then we talk about the rich countries and we talk about them in a way, how do they deal with nature? Because in the poor countries, people cannot do something different from what they do everyday.

But when you look at the rich countries, they have the possibility, they have options to act different. So when we talk about something like, let's say an evolution towards some more planetary feeling or so, then first of all, these rich countries are the ones we have to ask for. And then you look at, when you look at them like Germany, for example, Europe, United States, etc., etc., then it's only a minority of the population, which is really different. They're really dealing with it. Most people simply follow the money, I would say.

So that is so simple as it is, so brutal as it sounds, it's the economy, it's the economy which tells everything. And of course, actually, I would say there is another new part, which is even more dangerous for climate, that is artificial intelligence. It's not, of course, the software itself, but it's the energy consumption. The more we use AI on the planet, the more energy is necessary. And actually, we can already see that how many percentage of the planetary energy is used for AI applications.

And this is increasing exponentially. And exponential growth is a dramatic evolution, and we cannot allow for that. If you have an exponential evolution in your body, then it's cancer, so to say. So this is a very, very dangerous and deadly thing. So actually, my impression is that over some years, or maybe even a decade, of awareness for the planet, we have lost much of it. And we are more dealing with AI applications, we are more dealing with, of course, with conflicts. And in Europe, we have a catastrophic war between Russia and Ukraine.

We have conflicts all over the world, which are, in a way, simply taking away the awareness for the planet. Yes, multi-crisis situations. Nevertheless, the rich countries, they have options, and they are the ones who have to act. It is Europe, it's the United States, China, of course, is now in the last 20 years becoming one. So this is, so to say, it's a negative side. The positive side is that this economic drive is also the, I would say, the central engine for the renewable energies, because renewable energies, the extension of the renewable energies all over the world is also exponential.

There is an exponential growth for photovoltaic, for wind, etc. So renewables are extensively now expanding all over the world. So obviously, if we are lucky, then finally, the economy will tell, will win. On the other hand, we see in the government, for example, from the United States, but also for governments in Europe, etc., that they want somehow to go back to fossil resources, which is complete nonsense, especially from the economical side, because a kilowatt hour of electric energy is simply much cheaper when you do that by photovoltaics and winds instead of nuclear or even by fossils.

So coal, oil and gas. So in a way, actually, it is the fight of good and bad in, in, in this, on the same battlefield, namely that economy can decide to go into a bright future if you look for climate protection, but also on the other hand, it can kill us because when AI, AI applications are too fast, then we need more and more energy. So then the extension of renewable energies is not fast enough to balance the cost, the energy costs, which AI drives us. So actually, we are on the, on the margin to something, maybe we make it or not.

On the other hand, there is always the scientific report, what is the state of the art concerning nature of our planet? And they tell us it's becoming hotter. We are 1.62 degrees above the level of the pre-industrial area, at least in Europe. We have a heating rate actually of 0.26 degrees per decade. So you can already calculate that in 40 years, we have one degree more. This would be 2.26 degrees Celsius, which is, it will be a disaster world. We have flooding, glacier melting, et cetera. So there is always this, this news part.

So nature tells us, so nature is always telling us a lot when we, when we measure it. And on the other hand, it's a kind of how do we react? And from, how should I say that in a, in a medical metaphor, metaphorically speaking, if you are a patient and you go to a doctor and you have a kind of an illness, you have these two pieces. We first, first of all diagnosis. And in diagnosis, science is extremely relevant because it tells us all the vital parameters of the planet. And the second part is of course, the therapy.

Now what do we do? We know you are ill. Now what are the, what are the recommendations of the doctor? How can, can he help you or she helps you? And obviously in this part, namely the therapy part, there is a lot of contradiction and because it's political issue. It's a connection between politics, economics, and also I would say sociological factors, how societies react to such a pressure, to such a critical pressure situation like we actually face it. Yes. So economy seems to be a major drive for changes, but energy is also at the heart.

How we understand the role of energy in addressing climate change, but also even economic decisions. So for someone unfamiliar with climate change or climate science, how would you explain the greenhouse effect in its impact on daily life, on their life? Could you give us brief, basic, accessible introduction to climate change? Well, first of all, one has to recognize what would happen, for example, silly question, seems like a silly question. What would the earth look like if it would have no atmosphere?

So there is the sun radiating with its light onto our Earth's planet and there is no atmosphere. Now physics tells you that in radiation equilibrium, our planet would have a temperature of about minus 18 degrees Celsius. So our planet would be a white ice sphere. White surfaces reflect the solar light very intensively, so our planet would not ever be, would be an ice sphere and that's it, a dead planet, white and cold. Now why do we have a mean average temperature of about 15 degrees plus, so the difference is 33 degrees Celsius?

That is called the natural greenhouse effect and it's only driven by tiny molecules. It is not driven by oxygen and nitrogen. They of course, they are the constitution about 99% of our atmosphere, but they are not reacting to the kind of radiation which comes from the Earth's surface because the visible solar light goes through the atmosphere, heats the Earth's surface and so we get infrared radiation coming from the Earth's surface and now it is absorbed by molecules like water, CO₂, methane and other ones.

So these are tiny concentrations. We measure for example CO₂ concentrations in parts per million and whenever I give a talk and say we have 427 parts per million CO₂ molecules and they are responsible for a heating process of plus 33 degrees, people say come on this can't be true, this can't be true, this is nothing, these are trace elements, this is nothing, come on. But that's exactly the case. This already tells you that this is a very, very delicate balance of these gases like CO₂ or methane or water, water vapor of course and so whereas water vapor has a circuit which is, water is a very vital element.

Water is because it's raining, you have this vapor phase, you have ice of course, but CO₂ stays in the atmosphere for several hundreds of years. Even some parts of it will stay there for thousands of years and it does only, it only absorbs the radiation coming from the Earth's surface and it's re-radiating it to the surface again and it's radiating it into the universe. That's the greenhouse effect. And so since there are only, it only needs a few

hundred parts per million for this heating process, it tells you if we increase that by a big amount we will have of course much, much higher temperatures on this.

That's exactly what we actually face. For example, I was born in 1960. So in the last 65 years we increased the amount of carbon dioxide by 50% with respect to the pre-industrial area. This is an acceleration which never happened in the last 56 million years. So of course no homo sapiens has ever experienced a world like we actually experience it. So it was never so hot, it was never such a big amount of CO₂ in the atmosphere. This is an experiment which the human humanity is facing which is absolutely new.

We have no rules for that. We have no plans for that, no strategies, etc. This is really pressing and forcing us into a transformation where we have to really dramatically reduce our CO₂ emission. And so actually you already know what the first step must be for a therapy for climate protection, that is reduce any kind of emission of CO₂ because CO₂ will stay there for a long, long, long time. And one of the big reactions is fire. The big wildfires all over the globe are producing a huge amount of carbon monoxide and carbon dioxide.

But also all these tipping points in nature are now reacting because we have changed the boundary conditions, the thermodynamic boundary conditions for everything which happens on Earth. And this belongs to ice, so the glaciers are melting. This belongs to the weather phenomenon, which means the weather which is everyday weather, whereas climate is this average over 30 years. Nobody is talking about climate normally every day. But here in Germany of course we have this saying, oh the weather today, etc.

So you can talk with your neighbor about the weather but you cannot talk with your neighbor about climate because it's a statistical issue. So we face extreme weather conditions all over the world. We face more storms, we face more drought, we face situations where we have for more than three or four months no rain in Europe or we face too much rain. So we are flooding. Everything which is on the extreme side is now increasing in number and in intensity. When you look for the pictures all over, I can always say, I will always talk about Europe.

I know that in other parts of the world it is even more serious. But for Europe I have all the numbers and the pictures, so to say, in my mind. When you look at the flooding in Spain and the fires in Italy all over around the Mediterranean part you see the northern hemisphere is on fire and the southern hemisphere even more. Well, scientists have been saying this for decades now. You have been communicating about ecological stress and systemic solutions for years. So what have you learned from this experience of trying to communicate about this?

Do you have any tips for all of us who are interested in this or to better communicate about this in such a way that those who are not interested would start paying attention to this? This is a good question. Well, you know, I try it with all my possibilities, all my craftsmanship I have as a scientist, as a communicator. So I do it with music. So before example, present a program, Vivaldi's Quattro Stagioni. And I talk about how our planet Earth is for parts during the year and how this changed through climate change.

This already touches an audience which normally has no interest in this part because it's a conservative classical music. On the other hand, I do comics. So I do a lot of YouTube videos to get the young people. So I really, I think it is fair to say that I almost touch every generation in Germany with what I do. But on the action side, there is also a part of the population in Germany which is extremely conservative and they don't want any changes which are somehow related to the word transformation.

And this of course belongs to the fact that Germany is a very rich country. Of course we have a part of a poor population but we are rich. And when you ask rich people to change something, they automatically are afraid of losing something because they are rich, they are successful in what they were doing. And look at the German car industry for example. German cars, my goodness, premium ones, BMW, Mercedes-Benz, etc., etc. Everybody wants that. But actually these are always engines, say, burn oil.

And so this is absolutely not the right industry for the future. The industry for future concerning mobility, car mobility is electric engines, battery-driven cars. And so for Germany, this is a disastrous perspective that we have to, one of our most important industrial parts, has to change completely. So this is only one part. So now the tip is, or the hint is to find always good new stories. You need a storytelling which is positive. So but how to find that? So for example, we talk a lot about in Germany now about planetary health and individual health.

Health and climate and global warming is an issue which you automatically understand that. Without any scientific background, the health issue is something which is moving very intensively in Germany. So talk about the consequences if the world will become warmer and warmer. Everybody knows that, that you become weaker, that you simply get ill when it is too hot. All your body functions are somehow related to the outside temperature. And it comes even to the, if it is catastrophic, then you are no longer able to control your body temperature by sweating.

That is what we say in Germany. I don't know the English word, but in Germany we say kühlgrenztemperatur. So this is a combination of temperature and humidity. If this is too high, you have no chance to survive anymore. And so we have already some places in the Middle East where this happened some days during the years and when it is becoming warmer and warmer, these regions where the number of days above deadly threshold are increasing, then of course it will be an absolute catastrophe for the human there.

So health for example is a good point. These in medical questions are always very, very sensible and you can make something. And also of course, as I said, the economic ones, but this is not so touching as this individual health. Your individual health is somehow related to what is going on on this planet. And this of course is nutrition then and what you drink and what you eat and how you live and how you drive and how you communicate, how much energy you use, etc. These all will change the conditions on this planet so much that the basis for your existence is damaged.

And so this is for example a good one. On the other hand, let me say one thing, what is very important is to go to school, talk with children, talk with the young people and tell them what kind of future they will have to expect because CO₂ will stay there for a long,

long time. Even in far future, the humans will have to deal with a new reality. As Bruno Latour told that many years ago, there is a new reality we have to face. We have somehow also to deal with this kind of one. So we have city development.

We have to green our cities. We have to green our countries. Costa Rica does a very good job when they reforest all the time. So we have to do a lot and we have also to talk about that in a, I would say in a very, very positive way. You have to make jokes. You have to think about fairy tale, fantasy stories that every small river, you follow the river until the river starts at that point. And then you go there open and try to imagine a world where we have already managed all that. We are going to, how should the world look like?

Which is climate protecting, which is a climate protecting world. We have photovoltaic everywhere. We have windmills everywhere. Our agriculture is ecological. We don't eat so much meat anymore. We are driving this electrical vehicles, etc., etc. We are not flying so much anymore. We are much more aware of how we deal with nature because we have understood that planetary health is our health. Maybe we can make that insist. It is very romantic. I know it's naive, but it's the only way to deal with a situation where you are in front of the Himalayas are massive and they tell you, you have to climb up to the Mount Everest without oxygen and you are absolutely untrained, but you have to.

So the only thing we can do is to do it together in groups and also to talk with people in villages that have this kind of, what is the English word for, *Gnossenschaften*? You know when people are going together, this community economic factories. I don't know the English word for that when you have this kind of *kommunale*, *communats*. Corporate, cooperatives. Yeah, yeah, right, right. Corporatives. Yes, yes. So people really take part on it and they make money with it. When they have the windmills and the photovoltaics around and in Germany, for example, we deal with *agri-pefaus*.

That means we have a photovoltaic above agricultural areas and this on heights on three meter or four meter heights. And so the farmers can make money with the solar light, transforming into electric energy and with the crops which is growing on the ground on the soil. So there are many combinations, but you have to find what we say in German narratives. You have to find big stories, not small stories, big stories like Apollo projects to tell the people this is something where we have to go together and we can reach only the goal together.

It is not a thing of a few, but it's always together because that is happiness, so to say, to do it in groups. And when you talk with psychologists who are specialists, especially in this ecological psychology, how to deal with transformations, then it is always the word together. Now, together, together, together. We have to do that in groups. This is the only way to survive and to adopt and to frame it positively. Yes. Yeah, like the idea of connecting to health, especially human health, even more so than the effects into economy when we are able to connect, communicate how climate change is affecting and will even more so affect human health.

So let's talk about good examples. As you mentioned, it is important to bring some positivity in this. And what are the promising technological or systemic solutions that you are seeing that are addressing already the climate crisis, such as renewable energy? Do

you have any good example or examples of what is positively happening to address the challenge of climate change from the perspective of mitigation or adaptation or technologies? Well, let me first start with an observation I made, namely that I recognize that in Germany, the climate practice is much better than the official discussion about the climate practice.

For example, we have more than 60% of renewable energies in our electric system. Some years ago, there were politicians who said, well, our electric system only allows, let's say, 10% or not more. Now we are already at 60%. And in a few years, we will have 80%. We will completely go to an electric system, which is completely on renewables. And so we need storage, battery storage, of course, because as everybody knows, during the night, you have no photovoltaic energy. So we need that. So what is very optimistic?

If I look into the United States, California is very optimistic. They already made that a one third of their electric system. They can put that in a battery storage. So the development on the battery side is extremely on the exponential growth. Batteries will get cheaper. They will get more attractive for corporatives also.

So the village, for example, has its own energy storage in form of battery containers. This already happens in California and is already a very, very important example. So California is a wonderful example for the transformation in energy. Texas, which is a Republican governed state in the US, is also going the green way instead of going the coal way. So obviously, whatever Orange one you know who I'm mentioning would say, it doesn't make sense to drill, drill, drill. Maybe it makes no sense. So in a way, I think that the economy, even the United States, will shift that towards renewable energies.

The same is true in Europe. Even so, governments try to delay that and somehow lengthen the periods of transformation. I think that everything on that part will go faster than we think. Of course, the question is, is it enough? What we actually see is not a very high degree of interest in the population about climate change and about climate protection in terms of energy changing the energy system. It is still a matter of a small part of the population which are somehow related to that. So we have a communication, we have to face a new time interval where we have to communicate better and better and better to get encouragement and to somehow inspire people to go ahead and to do that.

So in Germany, for example, we have a few villages which are very prominent examples where they produce eight to ten times more energy than they use and they make money with it. And the money inflow into a village means they can invest the money again for kindergarten and for hospitals and for school and for infrastructure, etc. And some people, they get more attractive. So young families come and they are already then a part of the network. And so this is a self-sustaining process and we have several nice examples and I can only tell you the German name of it which is Wilpolzried, which is in Bavaria here.

And it's a wonderful example that an extremely conservative group of people here in Bavaria say, decided 20 years ago, how can we make money without village? We have no source, money source.

Let's say we have this small mountain, maybe we put a windmill on it. Maybe we put another windmill on it. So they start with an investment and then you know nothing is more attractive than success. And so a successful windmill put people together. They have now 11 windmills. They have photovoltaic on every roof. They have all kinds of connections, etc. And this is one of these examples. When you take your time and you simply recognize what should we do with it, then if you take your time and you really think about the diagnosis and then you ask yourself, what can I do?

Not only the pharmaceutical issue, but how can I change my life? Maybe you will do it step by step. And another something which is even more important is that your behavior should not be deal with perfectionism. It is not to reach the goal within like this and then on top in 100% equality. You will always go with a principle which is called a 2080. With you do with 20% of work, you get 80% of the goal you want to reach. So you have already changed the world and then you can go the next step iteratively asking.

And maybe there is a step back again, but as long as you move and you always drive it into the same directions, you can discuss within your group about the ways, but you should never discuss about the goal. The goal should be well defined and clear for everybody. There should be a convergent common interest of everybody. That is the goal we want to reach. As I said, this kind of Apollo thinking, we want to go bring up somebody to the moon, not to Mars, not to Jupiter, Saturn or somewhere. No, it's the moon which we want to reach.

And for climate protection, it's absolutely clear we have to somehow stop heating the global warming at two degrees. Otherwise it will be very, very, very difficult for many people on this planet to survive. You see that Australia, for example, they have to somehow give people plates because they come from islands, which are no longer islands because they are underwater. We have to help everybody who is somehow driven by this migration pressure that the temperatures are too high, the sea level is too high, etc. etc.

So you made it very clear on the importance of having a common shared specific goal to work on a specific goal, clear specific goal. So do you think it's possible to enter a stage of the common goal of phasing out fossil fuels? You mean that we can completely neglect, that we can no longer use fossil fuels? You mean that? Yeah.

We will have this kind of co-ways. So you know, there is an increase of battery driven mobility already, and we have this kind of heating systems, what we call in heat pumps. So of course there are enough technical possibilities. They are expensive. For many people in the world, they would be too expensive. So we have to give them as a gift to Africa. We have to give it to the poor people.

Simply present it as a gift, this technology. We have to give that. That is, I think this is one of the most difficult issues for rich countries. It's very, very important for the rich countries. They have to change their behavior. When you look on the kind of distribution of money all over the world, you know that in the rich countries, we also have a kind of imbalance because there are more and more rich people and the majority is not getting richer. But so you have a kind of an accumulation process of money.

When you look at this big billionaires, they have hundreds of billions. Imagine that. Hundreds of billions in the 19th century took almost 100 years to accumulate a billion. Now some of them, they do that within a few years like this. And then they invest the money and make money with money instead of using it for something which is real, which is real here on earth. We have even billionaires who want to terraform mass, which is completely nonsense. If we can convince rich people in rich countries at least to invest their money into renewable energies, this would be a social tipping point because it's really the money which makes a difference.

Instead of buying gold and silver, etc., etc., like we actually face it on the markets, people should invest their money into real things, not into money. They should put it into ecological agriculture, into photovoltaic, into windmills, but not into crypto currencies or something like that, which is completely virtual.

You're mentioning something that has to do with the sense of responsibility.

All of us, we have some sort of responsibility to deal with these shared challenges of humanity. But we have different levels of responsibility. Some have more capacity and responsibility than others. Now on another question, you often emphasize the urgency of systemic change. What role do you see for education in all of that, especially ethical and scientific education in helping to shape the transition, the transition that is needed? What do you see the role of education in all of that?

We have all these different school subjects, for example, mathematics, literature, and arts, and languages, etc., etc. And here we have a systemic issue. That means it's interdisciplinary, it's even transdisciplinary. It means you cannot, you can no longer educate pupils by saying, now learn this, and then you learn this, and then you learn this. No, you have to present a picture, a global picture, a broad picture about an issue, and then as far as you can put everything together, what is necessary to solve problems within this systemic view.

So interdisciplinarity is one of the major issues. We have to change our educational system into something from one issue additive to another to one issue of all. For example, the word Anthropocene, the Earth era dominant by men, by humans. This is a good deductical way of putting together chemistry, biology, physics, literature, art, sports, health, etc., etc. So it is like a big umbrella issue. And I think this is very, very much necessary to present this kind of systemic view. In German schools, we would put that also into geography.

So geography should be one of the major issues now, telling everybody on what planet you are living, with whom you are living together, all over the globe. And then to say, well, if they put more CO₂ in the atmosphere in Asia, this is something for all of us. This is our atmosphere is a system of combined system. It is not, it is interrelated. We have networks. We have all kind of coupling processes. So we cannot simply ignore what is happening on the world. No. But we, and also our contribution to, for example, greenhouse gases, even if it is only a few percent, it makes a difference.

In complex system, everything makes a difference. That is one of the big signatures of complexity. This is this wonderful butterfly, butterfly saying from Lawrence that the

butterfly can change the world. Well, it can change and of course, and this is also, by the way, something which is promising because then maybe you are the butterfly. Everybody, one of everybody on earth can be the butterfly because all the other ones have only waited for you as somebody who is inspiring and telling them, okay, you are the butterfly.

We always thought we could do that, but we never were active enough. We were never have enough courage to do that. But you tell us we should do it, then we do it. So that is also the big chance you have as a communicator. You can drive people to do something because, oh, yes, what he's saying is actually, exactly that what I was always thinking, but I never had courage enough to say that. You know what I mean?

You can bring people to do something with communication. So education could be an important mechanism or way to park the butterflies or to awaken our butterfly spirits so that everybody could understand the role each one of us could play in this interconnectedness. This is very, very important. I think to bring children as soon and as intense as possible in contact with nature, to see what kind of flowers are there, what kind of trees, what kind of animals, and how sensible and sensitive everything is and how beautiful it is.

My goodness, it is a paradise.

And so we are responsible for this paradise, especially since we do science. And science tells us what is there, what is, what out is there? Of course, as a subject, as a person, I have my inner world, I have my dreams, my hopes, et cetera, et cetera. But when you do science, you get something external objective. That means we can talk about it because it is in numbers, it's in diagrams. And so it is something different because science tells us that is what is there. And now it's not only that science tells us what it is, but it also what will appear when we do that and that.

So it's kind of logic of science because we have this series. They are predicting something. Then we have this, we have series like whatever you want in physics, for example, quantum mechanics and general relativity, if you like. But even more, we have all put that into techniques. This is also something one has to recognize or at least to memorize that we use our fundamental knowing about nature in terms of technical applications. And the technical applications say that our theories about nature are correct.

Otherwise, our techniques would not work. This is a big proof every day when you use electric circuits, a transformer somewhere, you are saying special relativity is correct, quantum mechanics is correct, electricity is correct, thermodynamics is correct. Our knowledge about the constitution of matter is correct. Otherwise, all these special functions we use would not work. Pharmaceuticals would not work if we wouldn't have part of a truth about the combination, how we put molecules together. We always forget that.

That our surrounding, for example, in Germany is completely made by science. It's by science because it's made by techniques and techniques is based on science. So science gives you a responsibility. The more we know, the stronger and higher is our responsibility not to continue like we did in the last 200 years. That is so simple, is it? So education

really as a minimum needs to awaken our capacity to be in awe, admiration of the beauty and magnificence of this world.

Now in your book, if that's titled, *If Not Now*, and then, you invited readers to act according to the Earth Charter's 16 principles. Yes. Would you share with us a little bit about that and how do you see the Earth Charter helping to bridge the gap between science and ethics and our more responsibilities? All these can drive actions. The Earth Charter is the perfect book, small book for the therapy, how to deal with the planet. It tells you almost everything. It tells you how we should deal with nature.

It tells you how we should deal with everything which is living on the planet, especially with the humans. It tells you how we should make politics. This is the most complete number of goals which you can identify to say, okay, that is what we should do. That is all I can say. I mean, everybody in school all over the world should learn the Earth Charter. This should be something like a *Ketrum Kensio* for everybody, that everybody should know that everybody should know we are the ones who have defined these goals, and they are the goals we all want to reach.

That's it. That is why it is so important that we should put it in every school all over the world.

It can help us as an instrument to expand our planetary consciousness and how we relate to one another. And related to the large living. Everybody should use it. We should have films about it in every advertisement all over the world. We should show it every day and every news. Before something happens in the news, first of all, let's remember the Earth Charter. It must be pushed into people's mind and they should never forget that. I think this is one moment in time where at least a part of the humans have recognized that is the goal we should reach.

That exactly is the goal we should reach. This is the Moon which I was talking about. You know? Yeah, the shared goal.

And also engaging people to envision the future. Now, every year we have a COP for the past 30 years. It started in Germany 30 years ago and now we are just very close to going through COP 30. What are in your view, what should really happen or change to make these global summits more effective?

This is a good question. I don't actually know the German position. I assume, I fear that this will be a very, let's say, passive position. It is no longer a government which we have which is following, let's say, a clear ecological agenda. No, no, there is more economic agenda and of course security agenda because of the conflict and then the war in Ukraine.

I think, I don't expect very much from the next COP.

I think that there should be an alliance of countries who want to change something. Let's say, it is like on the village level, so to say, collect people who want to do something, collect countries who want to do something, collect organizations who want to do something and do it. Don't ask for any kind of larger frame in which you can work. Start,

be successful and then automatically the others will follow. There is no more attraction than success. If you show up with something which is successful, then the other will recognize it.

Do communication as much as you can. Use all the channels to talk about success, the success of your project. Tell them, look, this has worked. Show them the errors, show them all the other problems because then maybe they don't repeat the problems and don't repeat the errors. Show them, go along, do something and every CO₂ molecule which is not in the atmosphere is a good CO₂ molecule. Whatever you can, as small as it is, it is always good. Since we are in a complex system, everything which matters matters.

And I think COP is very good because we are on a globe, so we have to connect each other somehow. It is on the political side very important because then we have at least an organization. We have an organizational infrastructure in which we can discuss and sort of say organize this kind of collections of small groups. When they go together, Costa Rica should find a neighbor. Maybe they find a neighbor somewhere else but go along, build the windmills, build the photovoltaics, continue, continue, continue, continue.

Everything which is on the renewable side is good. Everything which somehow protects nature is good on earth, on the seas, in the oceans, everywhere. This is all I can say because it is so big. The issue is so big, really big in the sense of great. It is not, it is diverse, it is complex but it is also great. So all you can do as an individual is to find other ones to do something. When you are part of an organization, find other organizations. And so there is an architecture of complexity and this architecture is hierarchical.

So you have to find on your hierarchy scale, you have to find the compounds with which you can cooperate. This is important. And then continue, go along, maybe in a few years people will recognize, oh, somehow we get more and more renewables and it is really changing. And what happened in April this year was already surprising. China has reduced its CO₂ emission. Nobody has expected that. They are reducing their CO₂ emission. India is reducing their CO₂ emission. Nobody in Europe was expecting that but actually so it has a result.

It changes. We have no other hopes than to continue, do our job, do on this scale where we can have influence. We should influence. That is all we can do. Well, thank you so much Harald for taking your time to talk with us today. I have great admiration for the work you have done over the years. We come to an end of our conversation today and I was going to ask you what do you think we should do to turn our conscience into action but I think you already shared by saying look for success stories.

Yes, yes, yes. And show us a success story because it creates traction. You know, we all love success. When something is going, we want something and then we are really successful in reaching the goal.

And we are the animal who can do something. We can act, not only react. We should never forget that. So what really happens successfully? Well, thank you so much for being with us today and I hope to see you soon in the news and in your upcoming books. Thank you very much.