

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.

So today we are joined by Fritjof Capra, a renowned physicist, system theorist, and author, known for his groundbreaking work in bridging science and spirituality.

Fritjof gained international acclaim with his seminal book, *The Tao of Physics*, published in 1975. He has authored several other influential books, including *The Web of Life*, *The Turning Points*, and *The Hidden Connections*. I think many people would agree with me that these books should be part of the reading requirements of every university around the world. Currently *The Systems View of Life*, one of the latest books which Fritjof Capra coauthored with Pierre Luigi, should be a reference for anyone interested in system thinking, as it dwells into ecological sustainability, system theory, and quantum theory.

So Fritjof Capra is a member of the Earth Charter International Council and also a founding director of the Center for Ecolitracy. Fritjof's work continues to inspire dialogue on how science and spirituality intersect, and how we can apply system thinking to address global challenges. It's an honor to have you here, Fritjof, and thank you so much. Hello, Mirian. It's a great pleasure to talk to you again. As you know, I'm a great admirer of the Earth Charter and very happy to contribute to the Earth Charter community, so I really look forward to our conversation.

Thank you. It's really an honor. I'm very happy to have this conversation with you. So for decades, you have been talking and writing about the need for paradigm shift from a mechanistic to a systemic and ecological view, a concept that is central, actually, to many of your books and also explored in the film *Mind Walk*. Could you comment on what this shift entails? I mean, this paradigm shift and whether you are observing some signs of its emergence? Well, I think the best way to summarize it is to say that at its very core, there is a profound change of metaphors from seeing the world as a machine to understanding it as a network.

The mechanistic worldview, seeing the world as a machine, originated in science in the 17th century during the scientific revolution with scientists like Galileo, Descartes, Newton and others. And the crowning achievement of this new science was Newton's mechanics. And so since science was identified with mechanics, the scientific phenomena were identified with mechanical phenomena. The world was seen as a machine. And this worldview was very successful and the science of Newton was very successful.

But in the 19th and 20th century, severe limitations showed the limitations in the 19th century were the discovery of electricity and magnetism, which could not be explained in a mechanical model. Darwin's evolution, which is a phenomenon of life that cannot be explained mechanistically. And then in the 20th century, we had the revolutions of quantum theory and relativity theory and a new science of life. And when you think of

the world as a network, everybody knows what a network is. It's a pattern of nodes and links, of nodes and relationships.

So to understand networks, we have to learn how to think in terms of relationships and in terms of patterns. And that is what is called systemic thinking in science or systems thinking. It originated in the early 20th century and then was raised to a new level with complexity theory in the 1970s and 80s, which is a new nonlinear mathematics using high speed computers that allowed scientists for the first time to model and understand the complexities of living systems. And so as a result, we have now a systemic understanding of life emerged in the last four decades, in the last 40 years, and which embodies what I call advanced systems thinking.

And so to summarize it very briefly, I have identified four principles of life which are manifest in all living systems, in living organisms, in social systems, in ecosystems, and so on. And the four principles of life are first of all the network that life organizes itself in networks. And then that these living networks are inherently regenerative, creative, and intelligent.

So these are qualities of life that could not be understood scientifically before 1980. But now we have this new science of life, this new systems view of life that incorporates an understanding of life's creativity, life's continual regeneration, and life's intelligence. And so this is a very new understanding of life at the forefront of science, which has not yet penetrated into many applications like in medicine, in economics, in management. In these fields, the mechanistic paradigm is still there as a metaphor.

So many medical doctors see the body as a machine. Many managers see a company as a machine. Many economists, practically all economists today, subscribe to this crazy idea of unlimited quantitative growth on a finite planet, which is a mechanistic linear view. So there's still a lot of work to do, but at the forefront of science, we have this beautiful new understanding of living networks that are inherently regenerative, creative, and intelligent. Indeed, certainly a doctor or a manager of a company, the majority of them, or a great majority, don't yet see it.

And despite this, we can say that there is a paradigm shift happening, given that increasingly more people are seeing things in a more systemic manner.

Do we understand that you agree with this and that you feel that this paradigm shift is happening currently? Absolutely. And it is happening because it has to happen, because as the world becomes more and more interconnected with the communication technologies that we have now, and with the whole digital world, we realize that our cultural environments are very complex, and we realize the importance of networks. You know, I remember when I was teaching at the University of California in Berkeley, maybe 30, 40 years ago, I had to explain to my students what a social network is.

If I were teaching now, they would just laugh if I did that, because our youth have grown up in social networks. So thinking in terms of networks is natural for them. That's actually one of my great hopes that, you know, the next generation and the one after that, they have grown up in networks, and they are systemic thinkers. Now, in the academic world,

we have increasingly small colleges and universities that teach systemic thinking, and we have pockets in the large universities where these courses are also being taught. And I know that because the book I wrote with Pierluigi Luisi, *The Systems View of Life*, is a textbook, and it is used in many colleges and universities as a basis for courses. Now, in the business world, the situation is similar.

There are pioneering small businesses, sometimes also big businesses that have this systemic approach.

In civil society, I think systems thinking is spread the widest. We have centers of learning and research institutes in civil society, where systemic solutions to the world's problems are being developed and applied and tested. And I think the leading systems thinkers today are found in this sector of society, civil society. And of course, you know, the Earth Charter is a big part of that.

I'm sorry to say that in politics, it's the worst, you know, because politicians tend to be short-sighted and power hungry. And that prevents them from really adopting a systemic perspective. I mean, there are exceptions, like your minister Marina Silva, for instance, who is a true systemic thinker, and there are others, but it's rare in politics. Indeed, it is. I am one of those who think system thinking or system literacy should be everywhere in every university. And probably that's one of the problems we have in the world is because many or most leaders are systems illiterate. Coming back to this issue about the ecological understanding, the need for deeper understanding on ecological principles that you have been advocating through your books, such as *The Web of Life* and *The Turning Point*.

Can you share with us a bit more about what are these ecological principles and how we can use in decision making through the different realms in social interactions?

All right. Well, what I call principles of ecology are principles of organization that have enabled ecosystems to sustain life for billions of years. So nature has sustained life since its emergence three and a half billion years ago by developing these principles of organization. And if we want to sustain human civilization, we need to learn from this wisdom of nature and design our human systems accordingly. So let me just mention a few of these very fundamental principles. The first key principle I've already mentioned is that life organizes itself in networks. And you see these principles of ecology can also be called principles of life.

They apply to all living systems, not only ecosystems, but when they apply to ecosystems, we call them ecological principles. So life organizes itself in networks. We have biological networks, we have social networks, and we have ecological networks. And an important insight, which is quite subtle, is that these living networks are not networks of structures, but are networks of processes. So we have chemical processes in biological networks, in a cell, for example, we have chemical reactions among the molecules. We have processes of communication in social networks. And we have processes of feeding of organisms, eating one another in ecological networks. And what all these processes have in common is that they are processes of regeneration.

And this is a very deep insight and is my second principle, important principle of ecology or principle of life. Life is inherently regenerative. Now, when you think of it, the regeneration of life in nature is well known. You just have to think of the turn of the seasons and new growth in every spring, that's regeneration of life. What is new in the system's view is the realization that this process of regeneration operates at all levels of complexity, down to the molecular networks in cells. So regeneration is the very essence of the life process. When regeneration stops, life stops. And even you could even say, from a more philosophical perspective, that regeneration is the purpose of life, or is the meaning of life. It's the very, very core process of life.

And this has several interesting consequences in order to be able to continually regenerate itself, to continually transform and replace its components, a living network needs to be given to continual flows of energy and matter. These processes of regeneration take energy, and they use material components. And so these flows of energy and matter, known as metabolic flows, are a key characteristic of life. Metabolism, this has been known for a long time, is a key characteristic of life. One of my scientific heroes is the microbiologist Lin-Margulis, who like to say, if it metabolizes, it's alive. If it doesn't metabolize, it's not alive.

A very clear distinction between living and non-living systems. Now, you see, from a systemic perspective, you can see that all these principles are really interconnected. That's what I'm trying to show you here. Now, the next point is that these metabolic flows go through networks, and that implies that there will be cyclical pathways. When you have a flow through a network, you can have cycles embedded in the network. And that is characteristic of all life. You have cycles embedded in living networks, and these cycles can act as feedback loops, which allows a living network to regulate itself and to organize itself. And in ecosystems, these cycles also have the role of recycling all matter throughout the ecosystems.

So we have continuous recycling of matter, which implies pervasive cooperation throughout the ecosystem. So all these qualities of ecology and these characteristics are interrelated. And the principles that I have mentioned so far are regenerative networks, metabolic flows, and ecological cycles. Now, I could elaborate much more and with further principles like diversity, for instance, but let's just make it a little bit and consider the consequences. Thank you. Let me ask you this. For many years, you have been talking about ecoliteracy and the importance of that. And I, of course, I agree with that.

How do you envision a leader who is ecologically literate making decisions? And why do you think that is important to foster? Yeah, well, a leader who is ecologically literate would, first of all, realize that unlimited quantitative growth on a finite planet is an absurdity. And this concept needs to be abandoned. What I'm advocating is a shift from quantitative to qualitative growth. Growth, of course, is a characteristic of life. But in nature, not everything grows all the time. So, you know, certain parts, say, in an ecosystem grow, reach maturity, others then decline, disintegrate, and release their components, which become sources for new growth. So there's this multi-dimensional, multifaceted growth, a balanced growth. And that's what we need for our economies.

We cannot, we have to qualify growth, which means that we need to decide which parts of the economy should grow or which part, which businesses should grow and which businesses should decline and be eliminated because they're harmful or toxic or wasteful. So that would be one part of ecological literacy in leadership. Another part would be to realize that in an ecosystem, all these cycles need a lot of energy. Where do they take the energy from? Well, from the sun. All energy flows from the sun. And again, we have to mimic that in our economies and businesses. We have to use solar energy and associated renewable energy forms as our energy sources. And here's some good news that solar and wind energy have grown by leaps and bounds in the last few years.

And solar energy for generation of electricity is rapidly becoming the most common and most efficient energy source. Fossil fuel energy for electricity has peaked in many countries, including all of Latin America. And so this is very, very good news. So if, let's say if someone wants to become a system thinker, what would that person need to know?

In other words, what are the characteristics of a system thinker? Well, the key difference, Mirian, would be that a systems thinker realizes that the world's major problems are all interdependent. None of them can be understood in isolation, whether we talk about energy or the environment or the climate emergency or economic inequality, or specifically the recent tragic reemergence of violence and war in many parts of the world. All these problems are systemic problems, which means that they are interconnected and interdependent, and they need corresponding systemic solutions. So a mechanistic thinker would focus on a singular problem, for instance, energy to maximize energy production without any concern about environmental consequences, health consequences, social consequences, and so on.

The systemic thinker would see all this as interrelated and design systemic solutions. And again, the good news is that the NGOs, the civil society organizations around the world, have created, developed, and designed hundreds of systemic solutions that have been tested and are available to be scaled up. In our book, *The Systems View of Life*, we spent 60 pages reviewing the most important and most effective systemic solutions that exist today. And so the problem we have today is not a technical problem, it's not a conceptual problem, it's a problem of political will and leadership. And in fact, you know, this is where the Earth Charter comes in, because you could ask, if we have all these solutions, why don't we apply them?

And we have to realize that the conceptual and intellectual part is not the whole story. There is also the emotional part, the part of values, the part of ethics. And so today, to take just, you know, climate change as an example, we are in a dramatic race between the deterioration of the climate and the development of renewable energies, which, as I have said before, grew enormously over the recent decades. And so the reason why there is this race and why we haven't applied renewable energies large scale and faced out fossil fuel energies is that the fossil fuel companies prefer to make short time profits, rather than saving the survival of human civilization and the planet. So it's a question of values, it's a question of ethics.

And so we need, with the systemic science of life, we need a corresponding ethics to be successful. And this is exactly what the Earth Charter is. So let's bring to the attention of our audience the book, The Systems View of Life.

In that book, you talk about the difficulty for humans to see how the current challenges are interconnected and interdependent, and the need for a really radical shift in our perceptions, our thinking and our values. Where do you see, again, you just mentioned that the role of ethics, values and worldviews in helping us all address the current challenges?

Well, it's really critical, because as I just said, we have all the knowledge, we have the systemic solutions to solve all the problems of the world. But instead of doing that, we try to resolve conflicts with violence and war, rather than with education, negotiation, diplomacy, persuasion and so on. So we need an ethical framework, a framework of values, and that's what I see the Earth Charter being. And as I think most of our listeners know, the Earth Charter is a collection of 16 ethical principles grouped in four groups.

And these ethical principles serve to build a sustainable, just and peaceful world. And that's exactly what we need. And Mirian, I'm really very impressed by the fact that the Earth Charter was designed in this very unique collaborative global process almost 25 years ago. And after 25 years, when you read it today, it's still as valid as it was when it was designed. I would say, if you read the text today every now and then, you would change a little bit of the language, because in 25 years, cultures have evolved new language. But these are minor changes.

The very essence of the principle is as valid as it was then. Yes. I agree with you that the core message, the core idea and the way in which it's articulated is still incredibly relevant. This morning, when I was thinking about our conversation, I had a vision that in the future, there could be an international court of ethics, you know, judging the behavior of individuals, communities, nations and so on. And the Earth Charter would be the document, the legal document that would use those guidelines, just as, let's say, the American Supreme Court uses the American Constitution as framework and decides whether an action is consistent with the Constitution or not. So this earth supreme court, this ethics supreme court could decide whether certain actions are consistent with the Earth Charter or not.

And that's sort of my dream. Oh, that's a good vision. And I have always seen it as a reference, you know, as a reference for decision making. But now you're seeing as a reference for at another level. Yeah, at the legal level. So a few years ago, Fritschhof, you developed a systems map of the Earth Charter. And actually, that helped us to, that gave us an idea to invite people through our courses to develop their own systems map as an exercise. And we do it actually all the time. Do we share your systems map? And we ask people to design their own system map as an exercise.

Can you comment on that systems map that you design in the value again, you see when you start seeing the interconnections and maybe the core also of how what should be at the core of our system? Well, first, let me let me tell our listeners that my most recent book is a collection of essays. And it's called patterns of connection. And it has an essay

on the Earth Charter in it. And in this essay, I published the systems map also. So if our listeners want to see it, you know, they can go to my book patterns of connection. And what I realized was that the creators of the Earth Charter realized the fundamental interdependence of the world's problems, and therefore realized the interdependence of the ethical framework of the ethical principles that are needed to solve our problems.

And so the the Earth Charter is a profoundly systemic document. So I took the four groups and and showed in this map how they are interconnected. Well, the first group says respect and care for the community of life. And to me, this is the the the group that gives the fundamental values of what is called often deep ecology. So the peeler, no, the first peeler of the Earth Charter. And the other three pillars then refer to the just sustainable and peaceful world. So they are about social justice, social and economic justice.

They are about ecological balance. And they are about democracy, non violence and peace. And so these principles then have these groups, each have four principles and the principles have sub principles. And it is very impressive that it is a very, very detailed map. Going into details like economics, design, management, education, human relationships, cultures of peace, gender equality, human dignity, poverty, I mean, all these all these issues are integrated in a systemic framework of these 16 principles. Well, thank you for sharing this. And it's certainly a wonderful exercise to look at the interconnections of each of the Earth Charter pillars and principles. Now, you have talked a lot about the intersection between science and spirituality and science, society and spirituality.

You once wrote ecology and spirituality are fundamentally connected because deep ecological awareness ultimately is spiritual awareness.

So can you comment on that on your views of this interconnection of science and spirituality? Yes, this, I mean, from a personal point of view, this is how I began my career as a writer, noticing parallels between the concepts of modern physics and the spiritual traditions of the far east, Hinduism, Buddhism and Taoism. And that's what I explored in my first book, the Tao physics. And by the way, next year will be the 50th anniversary of the publication of the Tao physics. And there will be special anniversary editions coming out for the 50th anniversary. So since that time, my views on science and spirituality and society have also evolved. And I have seen a connection, a very profound connection between spirituality and life. And to see that, the easiest way is to go to the root meaning of spirit.

Spirit from the Latin spiritus means breath.

And it refers to the breath of life. And so our spiritual moments are moments where we feel most alive. And I think we can relate to that. I think everybody can relate to that because we've all had moments where we felt totally alive, whether it is through the medium of art, listening to a beautiful symphony or a piece of jazz or other Indian music, for instance. One of my first spiritual experiences in the 1960s was listening to the Indian Sarod player, Aliyak Pakhan, which really moved me. And another example would be sports. And I have had experiences, I used to be a very good skier growing up in Austria. And I had experiences, profound spiritual experiences while skiing.

So the characteristics of these experiences are a profoundly felt oneness with the environment, a transcendence of the division between mind and body, between the self and the world. Everything melts into this beautiful oneness. And you experience a reality of rhythm, of movement, of just pure being. And so spirituality is an experience of aliveness. And so this connects it directly to the understanding of life, to the breath of life. And in ecology, this is emphasized particularly because ecology is the science of relationships. And it's the ecological relationships that connect everything. You have the famous saying from indigenous communities about living beings in nature that are considered as relations. They talk about nature as all my relations. That's a very famous saying, all my relations.

And so these relations interconnect everything in the universe. And an experience, a direct experience of this fundamental connectedness is what spirituality is. So ecology, I think at its deepest level, beyond concepts, just as pure experience, ecology as experience is spirituality. Thank you so much for sharing this. It's so beautiful, the connection of the sense of the deepest sense of oneness, spirituality and the connectedness, they're all together. And I can certainly relate to what you shared.

Well, we came to the end of our conversation today. My deepest admiration and gratitude to you, Fridjof. It has been a great pleasure. Thank you for spending all the time preparing these questions. And I think we really hit on some important points in a very short time. Yeah, absolutely. I really think every time I speak with you, I have a lot of new insights and inspiration. And thank you so much for all the best. Thank you.

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