The Earth - a living being

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I don't know if you knew: we live on a "planet of chickens". Today, there are about 23 billion chickens on Earth. This means there are about three times as many chickens as there are people. They are mistaken for humans. There has never been a bird species that was so common. This also means that the mass of these chickens far exceeds that of wild birds. The stocks of the latter are in decline. In the USA, almost a third of all birds have disappeared in the last 50 years, and in Germany the 'mass' of insects has decreased by 75%. Not only are we experiencing human-wrought climate change, we are also experiencing a 'man-made' "mass extinction", the like of which has probably not happened in 50 million years. Biological diversity is disappearing at an unprecedented rate. There is now more manufactured material, such as concrete, asphalt, plastic, metal, paper and glass, than the biomass of all living things combined. And the insidious thing is, we don't even notice it.

It's like this: let's imagine that from tomorrow there will be no more people on Earth. Even in a million years, one would still notice in the geological deposits that an extraordinary event must have taken place – a fundamental and unprecedented transformation of nature. From geology we know of 5 mass extinctions. We are currently experiencing the sixth. You could say, 'So what? We've already seen this five times. No, because the difference is that there were no volcanic eruptions and asteroid impacts; we humans are the cause.

It's dramatic

In the summer of 2021, the forests in Greece and Türkiye burned at temperatures of almost 50 degrees Celsius. And the west coast of the USA also burned to an apocalyptic extent, just like a year before. In the same year, Storm Bernd brought torrential rain to Central and Western Europe. The floods, for example on the Ahr and the Erft, resulted in unprecedented levels of destruction.

Through 2022, we were able to observe many, no less extreme weather events, and severe weather disasters in many parts of the world in 2022. For example, the hottest summer in Europe since weather records began (which brought a heat record of over 40 degrees Celsius in Hamburg and London, among others), the heat wave in Antarctica, the extremely low water levels of the Rhine or the Po, for example, and the dramatic floods in Pakistan, which affected 33 million people. The forest dieback in Germany and Central Europe in the 1980s was harmless compared to what is currently happening to the local forests. They are simply drying up and dying. You can see dead, brown spruce trees in the plantations everywhere. According to the forest damage

report from 2023 in BaWÜ[1], 60% of beech woodlands are considered significantly damaged. This has never happened here before. A major cause is human-wrought climate change. The extreme drought of recent years has been devastating for the trees. The year 2023 will probably be the hottest year in the last 125,000 years (EU Climate Change Service).

And the other dominant topic of the last three years, the corona pandemic, has also made the problem clear like gazing through a magnifying glass. As humanity, we are now waging a war against everything that is life.

Apparently, humans can only destroy, and it would be best for the Earth if they disappeared again. We can read that from many authors now. Yes, we have this side. But there is a second side, a constructive side that can work in partnership with life.

This is what I want to talk about - the life of the Earth and about cooperation with it.

But what is life?

Since we live ourselves, we should know what life is. But it's not that easy to say something about what life is. Why are we so sure about a stone that it is not alive and therefore, dead, and about a plant that it is alive? What happens to a stone that we find in the forest or the rocks in the mountains; what is its future? A stone will eventually weather. This is where various processes come into play. It will contract imperceptibly, due to the frost, and expand again when it is hot in the summer. This weakens its structure, and it will break down over time. The water will also attack it and the frost will blast it. If the stone falls into a river, it will be carried away by the water, and the stones in a raging river will grind against each other. In this way, sands and clays are formed, or the substances dissolve into (salt) ions, which then react with each other again. So, what is the future of a stone that may be considered a representative of all dead objects? At some point it will have decayed, that is, its spatial structure will dissolve, and then all possible chemical reactions will take place. The substances of the dead world move towards a state in which all possible chemical reactions take place in such a way that the lowest possible energy level is reached, and the greatest possible spatial chaos occurs. Chemical equilibria are created and then finally, change ceases. What does this mean for the future of the Earth? When the sun extinguishes in the far distant future, and life has disappeared, then all substances will decay (spatial chaos), all possible chemical reactions will take place, everything will solidify, and it will be dark and cold. This is the future of all dead matter.

[1] Baden-Württemberg

The dunes in a desert are blown together by the wind from the crushed rocks. There we can see what was outlined above. At the same time, the dunes show that the death process of decay on the Earth is not completed. The material from the rock decay is reduced to 'final' chaos, but rather, a high-level sorting takes place. Otherwise, you would only have clay (Nagelfluh[2] or debris), everywhere. A dune is highly sorted by grain size. A river selects and sorts even more precisely than the wind; every little corner in the river deposits shows a certain grain size and specific gravity. Ultimately, if there is life on Earth, everything returns to the great cycles. Our Earth is alive through and through, not just because of the living creatures, but as a whole.

How different everything is with a living plant. It shows us in a pure way what life is.

When we see a plant, a fern frond, a moss pad, a lily of the valley or a tree, anywhere the plant is green, it can photosynthesize. The brown, dead leaves of the trees on the forest floor, the brown pine needles, the fallen wooden branches, you can immediately see they are no longer alive. Photosynthesis is the fundamental life process on Earth.

The plant forms an organic substance from dead substances. It absorbs the dead substances – water and carbon dioxide (and minerals) – and, with the help of the sun (solar energy), forms the first living substance, a sugar – glucose – through the process of photosynthesis.

Life therefore leads to the formation of substances that have a higher spatial order than water and carbon dioxide, and which have a higher energy level than their starting materials.

In contrast to plants, animals or humans cannot conduct photosynthesis themselves. Instead, creatures consume plants, or the meat of animals that have eaten plants. In the final analysis, all life processes of living beings on Earth are based on the basic life process of photosynthesis. This is how all living things maintain a relatively stable chemical imbalance. This chemical imbalance (higher spatial order and a higher energy level) has at the same time a certain dynamic because it is constantly maintained and regulated in this imbalance. Therefore, we must view this stable chemical imbalance as an unstable equilibrium, which we can call homeostasis. The tensions that arise in this process are constantly maintained. There must be no energetic balance. Because what happens when life gives way? Then, the laws of the external world simply revert and apply again. The body breaks down and returns to the material cycle of the external world.

We don't know how to reverse this fundamental process!!!

Before we look at the Earth itself, let's take a look at people.

[2] a conglomerate of rock, sand and calcareous - or lime-containing - binders.

Our early childhood

A human egg cell is fertilized. After the first cell division of the fertilized egg, two cells are created. All the cells that will form from one cell are called embryoblasts in biology. Only from this will the embryo with its appendages, such as the amniotic sac (amnion), the yolk sac and the embryonic urinary bladder (allantois), be formed. However, this embryoblast only develops slightly in the first few days. The cells that will become the child are initially holding back in development, as if they were still waiting for something. This must seem strange at first. The so-called trophoblast will form from the second cell. It is this which, initially, grows above all else. This will become the child's external covering organs during pregnancy. Without these shells, or layers, the embryo cannot develop. These shells form a protective environment, a periphery in which the central embryo, can develop. The outer covering organ for the embryo, which we call the chorion, arises from the trophoblast.

It is important to keep in mind that, in addition to the embryo itself, all its coverings (trophoblast) are made up of tissue. The growing living being, in our case the human embryo, the child, first forms its own shell, a periphery, an environment. This periphery creates and enables a milieu in which the centre-piece - the embryo – can form. Peripheral life creates the environment that central life needs.

Development of the Earth

Let's try and imagine the conditions on Earth in the early days of its existence – very extreme and very inhospitable. They were truly infernal conditions. The atmosphere was filled with toxic gases, such as CO2, ash and soot. These gases obscured the then still weak rays of the sun. There was still a lot of rock debris around the Earth, left over from the formation of the solar system and when the Earth was constantly bombarded. The ghostly twilight was often illuminated by flashes of light as these rocks entered the atmosphere, poisonous to all life, and burned up. The Earth rotated extremely quickly. The day only lasted 5 to 6 hours. About four billion years ago, the situation calmed down. Save for a few volcanic islands, the Earth was completely covered by water. The sea was out of control.

The much closer moon had a much more noticeable effect on the vast bodies of water in the ocean basins, causing seawater to slosh back and forth with the force of tsunamis. The undersea Earth's crust was riddled with large fractures, and the swelling magma caused the sea to boil up in places. It was a feverish, restless world without balance.

Despite these nightmarish conditions, life took hold of the physical materials on Earth. How exactly this happened is still hidden in a mysterious darkness. These first materials to take hold of life were probably the viroids and viruses.

With the emergence of the first life on Earth around 4 billion years ago (4000 million years), bacteria also emerged. We can trace this to around 3.8 billion years ago. These bacteria were already able to photosynthesize and formed the first molecular oxygen. What happens when a very reactive gas that is largely unknown on Earth comes into the world? We can hardly imagine the drama of this. The ocean waters were filled with reduced sulphur compounds and ferrous ions and other compounds that immediately reacted with the new gas. "About 57% of the oxygen was bound in iron compounds, e.g. hematite (Fe2O3), or magnetite (Fe3O4), which sedimented as banded iron ores. And around 38% of the oxygen was bound in sulphur compounds." (Schad, A. 2019: 178 f). Only 4% of the oxygen formed was initially available to the atmosphere. Today's oxygen value was only reached around 350 million years ago in the Carboniferous era (Storch et al. 2013: 88 f).

In addition, dolomite (calcium-magnesium carbonate) was created through the reaction between the large amount of carbon dioxide in the primeval atmosphere with calcium and magnesium. This removed a lot of carbon dioxide from the primordial atmosphere. It was not until the Cambrian period that pure limestone appeared in significant quantities (Storch et al. 2013: 94 f).

In addition, the bacteria and protozoa themselves directly contributed to, or promoted rock formation, such as in banded iron ores – for example in Australia – or in the formation of stromatolites or limestone. First of all, it is the formation of rocks that led to the conditions on Earth developing in such a way that they became more favourable for life. Water and air were 'purified'.

We also have to remember that without oxygen no ozone layer can form. However, the ozone layer is an essential prerequisite for living beings to be able to colonize the surface of our planet. Ozone protects life from ultraviolet radiation from space. Furthermore, without ozone there would soon be no more water on Earth. Ultraviolet radiation splits water into hydrogen and oxygen. The highly volatile hydrogen escapes into space. In the absence of the ozone layer, the oxygen would react with iron, hydrogen sulphide or methane as described above. In the end, empty, bone-dry ocean basins would be left behind. Cheers to oxygen. The ozone layer that protects life is formed by life itself!

Throughout the Precambrian period (that's over 3 billion years ago), microbes reshaped the Earth. With the help of rock formation, the chemistry and temperatures on Earth were brought into 'order' until more stable chemical conditions for life arose.

In a second step, in addition to the ongoing rock formation, the unicellular algae and later the multicellular plants also contributed to the living conditions on Earth becoming favourable for the life of higher plants, and then also, higher animals. The plant world has "internalized" the life processes. Only in the flower does a spiritual

quality seem to touch the plant in all its aspects. The animals have a soul-element as their own interiority. Only humans can tame the soul so that they have their own, individual dignity. We owe our existence, in an unexpected way, to the peripheral life shell of the Earth, just as the embryo owes its existence to its enveloping organs, the trophoblast.

Life characteristics of the Earth

Today, we not only see the Earth as lifeless, but we often live with the idea that life is just a certain combination of processes that we can observe in detail in the dead world. However, empirical scientific research has now developed so far that it can describe properties and characteristics of organisms that are specific to life processes. These specific characteristics and properties of life cannot be reduced to inorganic principles. This means that inanimate systems and objects typically do not show these properties.

Autonomy and balance

Part of life is that every living being differs from its surroundings and its environment, and therefore, maintains its own autonomy. This sounds banal, but it is an essential characteristic of life. As soon as this "being different" from the environment ceases, the organism is dead because the process of forming autonomy has ceased. A living organism therefore maintains its own internal environment in relation to its surroundings. The body constantly ensures that a chemical imbalance is maintained in relation to the environment. But the body keeps this chemical imbalance constant. In biology we call this homeostasis.

We are also familiar with the homeostasis and regulatory processes that secure our own autonomy from the Earth. This is shown in two examples:

-Black smokers/White smokers

-Respiration circuit.

Example 1: Black smokers / White smokers: salt content

Where the Earth's plates drift apart, a gap constantly arises in the Earth's crust. Here, the so-called mid-ocean ridges arise. This phenomenon is called Black Smoker and White Smoker. These are hot springs that have temperatures of over 400°C.

The emerging water contains many sulphides (these are sulphur compounds), but also other salts, mainly iron, manganese, copper and zinc. If this hot water enriched with dissolved metals meets the 2°C cold water on the sea floor of the mid-ocean ridges, ores are precipitated as it cools. These sedimentation clouds form the characteristic and eponymous black 'smoke plumes'. The sedimentation itself creates chimneys, cones and many other deposits in the surrounding area. The chimneys have an

average height of 25 meters. The water that emerges here must come from somewhere. It is the sea water itself that is sucked into the ocean sediment in the depths so that it eventually emerges from these sources. Seawater is purified as it flows through the sediments, like in a kidney.

By filtering the salt from the seawater, the black smokers and white smokers help ensure that the salinity of the sea remains constant. Because the rivers constantly transport small amounts of salt into the world's oceans, so the salinity would actually increase. This, in turn, would be devastating for most organisms that live in the sea. Life in the sea is only possible through processes that keep the salinity in the sea constant. A real-life achievement.

Example 2: Circulation: Breathing

An example of this is the respiration control circuit between plants on the one hand and animals and rock formation processes on the other. In this global control loop, plants carry out photosynthesis. In doing so, they consume carbon dioxide and form oxygen. The amount of oxygen produced by plants is significantly greater than that consumed by animals. The animals consume oxygen and produce carbon dioxide. At the same time, a lot of oxygen is consumed by the formation of rocks. An unstable equilibrium between the formation and consumption of oxygen is not created by animals alone, but rather with the help of the Earth, in this case the formation of rocks. So, we can say, the oxygen content in our atmosphere is around 20 percent. Oxygen is a very reactive element that reacts very easily with other elements. It would therefore have to disappear from the atmosphere very quickly if it were not constantly made available, especially through the life process of photosynthesis. By supplying oxygen, the stable chemical imbalance (the unstable flow equilibrium), in our atmosphere is constantly maintained. That couldn’t exist in a world without life.

Sensitivity: constant temperature

The sun has become increasingly hotter over the last 4 billion years. The temperatures on Earth should have risen significantly. However, throughout these vast periods of time, the stronger solar radiation has always been compensated for by certain processes. One of the parameters that influence the climate on Earth is CO2. It has been repeatedly removed from the atmosphere through the formation of lime, coal, crude oil and natural gas, with the result that temperatures on Earth remain constant. The Earth was, therefore, able to respond to changes in the cosmic environment and keep the internal environment stable. An impressive achievement. We only know this from birds and mammals.

Today we are reversing these processes to a certain extent. We burn lime for construction, we burn the aforementioned fossil fuels in many activities. This gives us

certainty that there is human-caused climate change. On the other hand, we can learn from this that the ability of the Earth to keep its own body temperature constant is very strong. However, we should urgently change our lifestyle.

Individual activity

We can consider the fact that the Earth moves around the sun in its own activity. This is how the year comes about. The movement of the sun through the cosmos and the movement of the Earth around the sun result in a helical path for the orbit of the Earth through space. We can think of the screw as an expression of life as it is typical of all physiological substances formed by life.

The rotation of the Earth around its own axis is also an expression of the Earth's own activity. This in turn has consequences for other processes, e.g. the Earth's magnetic field and the northern lights.

There are convection currents in the liquid outer core. Due to the heat in the Earth's inner core, material flows upwards, cools slightly, and sinks back down (the Earth's own activity). Due to the rotational movement of the Earth, these currents are deflected by the Coriolis force and forced onto helical paths. This creates the Earth's strong magnetic field, which is so vital to life (Seyfried, 2005: 78 f).

The Earth's magnetosphere shields Earthly life from deadly high-energy cosmic rays and solar winds. The ionized matter from the cosmos and the sun is directed along the magnetic field lines around the Earth. Only in the polar regions can increased amounts of these particle showers enter the atmosphere and trigger auroral storms there. The boundary layers of the magnetic field oriented towards the sun are at rest. The near-Earth electromagnetic circulation systems rotate together with the Earth, and thereby, become rhythmic waves that emit vortices. Here, once again, we encounter the phenomenon of vortex formation due to the Earth's own activity. These vortices form when the solar wind meets the living Earth. Where the field lines of the Earth's magnetic field force these solar particles to enter the atmosphere, the northern lights light up. In this sense, the shape of the northern lights is an expression of the life of the Earth.

How do we get out of this predicament?

We already mentioned climate change at the beginning. It is caused by humans. This represents the destructive side of humanity. But there is a second aspect of human nature. A constructive side. This is discussed below.

Cultural landscape as an ecological organism

We can look back and admire how our forefathers founded villages. Christoph Vahle describes this in detail in a study (Vahle 1991). Village settlements arose in the border

area between moist lowlands and drier soils. As the distance from the village centre increases, a "cultural gradient" emerges that can be divided into three concentric circles. Vegetable growing is in the immediate vicinity of the village. The plants are bred in such a way that you primarily want to use their leaves, e.g. cabbage. Blooming takes a back seat. In the second circle, on the drier side, we find the grain fields that initially grow intensively and form the grains. The more the grain stalks dry out, the more the colourful flowers of the accompanying flora appear, such as poppies, cornflowers, or field thistle. This tendency increases in the third circle. The sheep pastures with their poor grasslands have small-leaved vegetation with an abundance of flowers. The severe nutrient removal here in the outer circle means that the vegetation reacts very sensitively to the smallest differences in site conditions. The vegetation seems to perceive these conditions very precisely. This is not the case with the strongly vegetative plants in the inner circle. They look the same everywhere and do not reflect local conditions.

In biology we often talk about the animal pole and the vegetative pole of a developing organism. The structural processes take place in the vegetative area, while in the animal area the perceptual and degradative processes of the sensory-nervous system take place. In between, the circulatory and respiratory systems function as an intermediary. Classical ecology has long since discovered this fundamental threefold structure that characterizes every organism. Ecology speaks of producers (mostly constructive plants), decomposers (degrading bacteria and fungi), and consumers (animals and humans; as long as they live, maintain the balance between construction and degradation). We can aptly describe the cultural landscape as an organism. Human cultural activity differentiates the district into three circles, each of which is dominated by one of the processes mentioned. The cultural landscape is a cultural event. Culturally active people make nature more diverse than it would be without them. The human being can develop nature further. The number of wild plants in Europe has almost doubled in the past 5,000 years. With the industrial revolution we begin to turn against life on Earth and the number of species began to decline drastically.

The creation of cultivated plants is another example of the collaboration and development of nature with and through human beings. These plants were not only bred by humans. They cannot survive long-term without human care. This is a marked and evolution-promoting act by human beings. A look at the crops that we grow shows this. Spelt, emmer, wheat, barley, oats, rye, peas and lentils, broad beans, types of turnips and radishes, rapeseed, plums and quince come from the Middle East and the Mediterranean region. There are also carrots, celery, fennel and asparagus. South and Central America enrich our diet with corn, potatoes, tomatoes, hot peppers, bush and runner beans, sunflowers, Jerusalem artichokes and pumpkin. Last but not least,

tobacco is also one of them. Cucumber and eggplant come from India, peach and apricot from China. Many of these species are so common to us that we believe they come from here. Central Europe contributes almost nothing. It might be the case that apples, pears and cherries were refined in Central Europe.

Now you have to be clear

"All cultivated plants can only survive under the nurturing hand of humans; without care they would quickly disappear again. ……" This applies in particular to cultivated plant communities – the association of different plants in the fruit and vegetable gardens, and also, as was common in the past, in the fields. You can still see this mixed crop cultivation here and there today in 'backward' areas, for example in the Romanian foothills of the Carpathians, where corn and beans, potatoes and chard grow in a colourful mix, and pumpkins grow in between. Of course, these communities include the animals, primarily cattle, which provide the fertilizer.

In this 'traditional' format, new ecosystems emerged that did not exist before, and which were unable to exist in the original, untransformed nature. On the one hand, the human being is a fully integrated part of the village farm or garden, but on the other hand it is much more than that. The human activity also embraced the producing, forming and maintaining factors, of course, in accordance with the natural conditions of the soil, the climate, and so forth." (Suchantke 1993: 111 f).

The Earth needs people

And so, the cultural landscape cannot exist without people. As a first step, humans destroyed nature by clearing the original forest. But it didn't stop there. People then created a landscape that was much more diverse, varied and rich in species than would ever be possible without human input. Human beings and the Earth are, therefore, very capable of working together. People can take the Earth with them on a shared 'cultural development'. In this type of development, both partners need each other. The result of this joint development is diversity in the landscape and new animal and plant species. A development that promotes life: the life of the Earth, the life of animals and plants and, last but not least, the life of humans.

As early as 1993, James Lovelock wrote: "What is important is the health of the planet and not that of any single type of organism. …. The health of the Earth is most at risk due to the tremendous changes in the natural ecosystem. Agriculture, forestry and, to a lesser extent, fishing are seen as the main source of this environmental damage." (Lovelock 1993: 18 f). Little has changed to this day.

Today's so-called modern agriculture is turning the landscape into a "cultural desert." A corn field where only one type of corn grows is a poor place for life. The diversity of the cultural landscape that has been developed over thousands of years is being

levelled out. We buy the high yield by poisoning the landscape and killing many "undesirable" creatures. That is too high a price to pay. Industrial agriculture is not only destroying our livelihoods, but also our future. We urgently need to convert agriculture to organic farming. Avoiding artificial fertilizers and lots of poison is not a return to the past. This is a serious misunderstanding. It's about agriculture that works economically and efficiently, and about good harvests. It's about agriculture that doesn't destroy the world. If we switch to organic farming at the current pace, we'll be ready in a hundred years. Until then the Earth is a desert. We need agriculture without artificial fertilizers, without herbicides, without pesticides.

" .... it works if you are prepared to accept nature as a teacher: ground crops such as white clover or red clover serve as natural fertilizer, legumes such as lupins or alfalfa enrich the soil with nitrogen, and the cultivation of mixed crops acts as biological pest control , because plants protect each other - just like onions and carrots, which have always been the best neighbours in the field. .... Since 1900, the number of cultivated plants that provide us with food security has declined by seventy-five percent in Europe alone, and things are not looking any better for the future. High-performance agriculture is largely to blame, far ahead of climate change, pollution, and the spread of invasive species.

Humans have cultivated them throughout history, providing two-thirds of the world's harvests.

A study based on data from the U.S. Department of Agriculture showed that seed companies in the United States sold 307 different varieties of corn in the early twentieth century. Eighty years later there were just twelve. For peas this fell from 408 to 25, for cucumbers from 285 to 16 and for salads from 497 to 36 varieties." (Strobel 2021).

This loss of variety, species diversity and genetic diversity is shocking. Over the course of centuries, even millennia, agriculture that worked with the Earth had led to a different type of apple, a different type of pear, a different breed of pig being bred in almost every village. This admirable diversity was an expression of the fact that the plants and animals were optimally adapted to the local conditions. This meant they were more resistant to pests and produced higher yields. High-performance agriculture has led to exactly the opposite. The 'select' plants and animals used today can only produce high yields if the world is destroyed with a lot of poison and artificial fertilizer. If we were to price in the real costs of the agricultural industry for the environment, the climate and health it would quickly become clear: farming like this is far too expensive, we can't afford it.

Biodynamic agriculture has shown for 100 years that it is possible to produce wholesome food without poisoning or destroying the environment. It is true that the returns are lower. But since there are no costs for herbicides, fungicides, insecticides,

and the vast amounts of mineral fertilizers that harm the environment, the economic balance is quite positive.

It's true, we have a side of us that destroys nature. We have gotten into the habit of looking primarily at this side. But we also have another side that can work together with nature, as described above.

We have to decide what world we want. We will have to question the dogma of eternal economic growth, because the laws of nature rule it out.

Working together with nature means preserving, for example, a Central European cultural landscape, including the preservation of species - diversity. This is one of agriculture's primary tasks. But it can only fulfil this task if society considers this task to be necessary and creates the necessary legal framework, and also provides the necessary financial resources. This is many times cheaper than financing the consequences of environmental destruction and climate change.

There is no cultural area in which it cannot be shown that people can work together with nature and have done so over extended periods of time. If you want to find out more information here, you can read a lot about it in the already mentioned book by Andres Suchantke, "Partnership with Nature".

Every culture had its sacred places in nature: a tree, a grove, a rock. These places were untouchable. Partha Dasgupta, professor of development and environmental economics at the University of Cambridge, suggests that national parks and nature reserves should be understood as sacred places insofar as they are untouchable for human exploitation (Grefe & Habekuß 2021: 33 f). This requirement could be transferred to agricultural areas. Agriculture that does not exploit nature but works with it, making it more diverse, would give the Earth and nature back its dignity and give it its own value that is non-negotiable. It depends on us, each individual.

"But call from over there

The voices of the spirits

The voices of the masters:

Don't neglect to practise

The forces of good."

Johann Wolfgang von Goethe, *Symbolum*, verses 21-25

References

- Böhning-Gaese, Kathrin, Bauer, Friederike (2023): Vom Verschwinden der Arten. Klett-Cotta.
- Grefe, Christiane und Habekuß, Fritz: Bei Natur versagt der Markt. Interview mit Sir Partha, Dasgupta. DIE ZEIT, Nr. 32, 5. August 2021, S. 33.
- Lovelock, James (1993): Das Gaia-Prinzip. Die Biographie unseres Planeten. S. 18. Nomos, Verlagsgesellschaft, Frankfurt a.M., Leipzig.
- Rosslenbroich, Bernd (2018):Eigenschaften des Lebendigen - Schritte zu einem eigenständigen Begriff des Organismus. In: Ebersbach, René, Heusser, Peter, Weinzirl, Johannes (Hrsg): Was ist Leben? Aktuelles zur Wirkursache und Erkenntnis des Lebendigen. Wittener Kolloquium Humanismus, Medizin und Philosophie, Band 5, Würzburg, S. 13-54.
- Schad, Albrecht (2019): Der Geographieunterricht an Waldorfschulen. und sein Verhältnis zur modernen Wissenschaft. S. 178 f. In: Hüttig, Albrecht: Wissenschaften im Wandel. S. 149-184. Berliner Wissenschaftsverlag.
- Schad, Albrecht (2023): Vom Leben unserer Erde. Verlag Freies Geistesleben
- Storch, Volker, Welsch, Ulrich, Wink, Michael (2013): Evolutionsbiologie. Springer-Verlag Berlin Heidelberg 2013.
- Strobel, Jacob y Serra (2021): Die hausgemachte Selbstzerstörung. Interview mit Felix Prinz zu Löwenstein. FAZ, Seite 12, Samstag, 31. Juli 2021, Nr.175.
- Suchantke, Andreas (1993): Partnerschaft mit der Natur - Entscheidung für das kommende Jahrtausend. S. 118-119. Verlag Urachhaus, Stuttgart.