

E. W. Udo Küppers

Ingenious Principles Of Nature

Do We Reckon With Nature Or
Nature Reckons With Us

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I dedicate this book to
Lias, Zoe, Tomte, Mathilde
and all the grandchildren,
to which we – through our fault – leave a nature,
that makes their self-determined lives noticeably more difficult.

Preface

The content of this book – as obviously as the title points in one direction – is *not* intended to make you, dear readers, obsessed with nature. Even if the current threatening state of our basis of existence, the earth, and – closely connected to it – its richness of species or its interconnected biodiversity gives ample reason for many to long for a “return to nature.” But nature and technology cannot be separated! Therefore, in addition to natural phenomena, political, economic, and social phenomena also permeate the book chapters.

On the other hand, what is wrong with remembering romantic verses like those in the “Abendlied” by Matthias Claudius, when we sacrifice forests that have grown over millions of years, as fundamental life-givers, for the sake of short-term filthy lucre and thus irrevocably destroy them?

The moon has risen,
The gold stars are shining
In the sky bright and clear;
The forest stands black and silent,
And from the hills rises
The white mist wonderful.
Matthias Claudius (1778)

For today’s dancing *lords of mankind* (see Chap. 8) around the golden economic “calf” of the earth and its increasing destruction, Matthias Claudius likewise holds ready in the fourth stanza a wisdom which, related to

catastrophic forest conditions in the eighteenth century,¹ is not dissimilar to today's:

We proud human children
Are vain poor sinners
And don't know much at all;
We spin air webs,
And seek many arts,
And get further from the goal.

The insight that runs through this book is:

As ingenious as the principles of nature may seem to us, their forward-looking practical application in our living and working environment around the globe is a political issue.

Our gaze is directed towards the future, but without leaving out the past and the present, and this raises two central questions:

1. In view of the fact that everything on our planet has limits, but that these limits are transgressed in such a selfish way by the human species and have led and continue to lead to catastrophes of the greatest magnitude, the first question arises:

How can this harmful activity be stopped? In other words: How can human reason be steered in the direction of sustainable development and the branches of life on which we sit be treated with considerably more respect, even though we are already in the process of sawing them off, in part with relish?

Examples of these local and global disasters visible to everyone in all walks of life are:

- Plastic-polluted oceans and resulting fish kills, as well as harmful micro-plastic particles incorporated along the food chain to humans
- Economically driven monocultures are partly responsible for the fact that former fertile land areas are now permanently barren, devastated and destroyed

¹ In the Outline of the Forest History of Central Europe, from 3000 BC to the present, the period of the eighteenth century is described as the last great clearing period of the forest, by thinned and plundered forests. See <https://www.sdw-rems-murr.de/mein-wald/waldgeschichte/historisch/> (Accessed 12/10/2018).

- Increasingly poisoned air to breathe, due to emissions of carbon dioxide (CO₂), nitrogen oxide (NO₂), methane (CH₄), sulfur dioxide (SO₂), and particulate matter, especially in urban areas, and consequently increase in circulatory diseases
- Cheap but “tasteless” food produced by industrial mass production; clear trend towards a “throw-away society,” not least due to industrialized “obsolescence” or planned installation of wear parts with a short service life
- Global climate change is clearly demonstrated by devastating, sometimes surprising effects in many areas of our social life and work

Politicians, as representatives of the people or state leaders, publicly present themselves as capable of action and concerned about the common good of the citizens. CEOs of national and multinational companies publicly emphasize their generous commitment through “declarations of self-commitment” to the protection of nature and the environment in the market, to the welfare of the workforce and customers. However, all of them are internally prisoners of their organizational structure, in two ways.

On the one hand, there is an extraordinary lack of necessary adaptability in an ever-dynamic, networked, and increasingly complex environment. For decades, this has been expressed primarily through entrenched and rigid hierarchical structures, in which senior executives live up to the *Peter Principle*² (Peter and Hull 2015).

On the other hand, these actors are characterized by a specific lack of self-reflection. This is not infrequently coupled with short-term, routine causal or monocausal success strategies, which ultimately fall victim to the dynamics of the environment. This is easily recognizable by the fact that socially burdensome consequences of various kinds, which occur due to a lack of change of perspective, mask the desired solutions for success. In sum, this juxtaposition leads to more burdensome effects than beneficial progress for our basis of life and work.

Asking for specific examples? Here are three dominant ones:

- The strengthening and realization of the socially so extraordinarily important education sector for all native and immigrant citizens of Germany has been on the drip of politics for decades, with minimal progress, whoever forms the government. But this does not prevent politicians of all stripes from proclaiming year after year with full fervor an “educational republic”

²The Peter Principle, original from 1970, named after Canadian teacher Laurence J. Peter states, “In a hierarchy, each employee tends to rise to his level of incompetence” (Peter and Hull 2015, p. 25).

of Germany. The opposite of an “uneducated republic” is shown with great regularity.

- The population has been drifting apart for years into a few rich or super-rich on the one hand and an unacceptable overwhelming majority of poor and existence-threatened people on the other, and so far the actors in the political arena have not come up with any goal-oriented sustainable solutions, except for occasional, *highly lazy* compromises. On the contrary! It seems that the social kit in society is becoming even more fragile at an accelerated pace. The far-reaching consequences of this policy would be disastrous.
- Politicians are fatally playing a risky game of aftercare for their population, often in close cooperation with industry, although risk prevention is the real order of the day. This policy is clearly recognizable in the handling of climate change (see below), which still a fanatical but powerful minority of climate deniers in politics and the *fossil* energy industry with their new tools *fake news* do not see or do not want to see.

Aftercare politicians recognize the seriousness of the situation too late due to their often static viewpoints and lack of change in perspective from emerging social problems. The child has fallen into the well, so we are trying to bring it up again. It would be better if it had never fallen in in the first place!

What kind of elected politicians are these, who without a well-founded *politician’s apprenticeship*, passed by qualitative and quantitative examination criteria, feel qualified to make far-reaching decisions about millions of citizens, without well-founded, effective feedback control mechanisms? Anyone who, as an acting politician, has sworn to avert harm from the people and practices the opposite, often accompanied by enormous consequential problems and consequential costs, has missed any justification for exercising the profession. He should go or be gone!

What the Austrian alpinist and extreme climber Paul Preuß (1886–1913) formulated as the six principles – in particular the sixth – for safe climbing, also applies in a figurative sense to today’s people in a position of social responsibility (italic additions refer to people acting in the present):

Among the highest principles is the principle of safety (*sustainability*). But not the spasmodic correction of one’s own *insecurity* (*lack of self-reflection*) achieved by artificial aids, but that primary security which should be based in every climber (*every leader*) in the correct assessment of his ability to his will.³

³<https://de.wikipedia.org/wiki/PaulPreuß/> (Accessed 11 Dec. 2018).

2. In view of the incontrovertible fact that, according to all scientific findings – actually, common sense is enough if we take a clear look at our immediate and wider environment – “business as usual” will not lead to any sustainable beneficial progress for the majority of people, the second question arises:

Which paths or detours do we have to take consistently in order to learn to understand the complex and highly complex interrelationships of our previous proposals for solutions better than we have been able to do so far? In addition to this, we can also ask: Do any role models exist that can guide us to find ways out of the self-created chaotic conditions of coexistence on our planet?

Literally at this point, we encounter with our thoughts, our creative impulses, and our intelligence, the long-established ingenious principles secured by the highest quality control, the fundamental properties of nature. It is these that have ensured the progress and survival of existences for billions of years up to the present, and for about a quarter of a million years that of *Homo sapiens*, the wise man.

The actual purpose of this book is to consult the ingenious principles of nature for our man-made problems in order to create desirable strategies for sustainable, resilient, and fault-tolerant products, processes, and organizations. This book is the last of a trilogy (Part 1: *Systemic Bionics*, 2015; Part 2: *The End of Indulgence*, 2018, both Springer, Wiesbaden), through which runs the common thread of a postulate that, with the title, and especially with the subtitle of this book, expresses the core of our necessary thinking and acting on our limited planet Earth.

Until far into the future, there is no adequate alternative to our evolution on Earth. Therefore it is not only an imperative of reason but a fundamental question of existence for all living beings on our planet to make use of the ingenious principles of nature. Their perfect, evolutionary interaction – also with inanimate nature – has led to the fact that our present “technical,” “organizational,” “economic,” and “social” services have come into being and that per se superior nature-compatible services are available free of charge.

We humans are readily capable of, and already on our way to, destroying and annihilating this evolutionary treasure of immeasurable wealth with all our might in the shortest possible time. In any case – with probability bordering on certainty – the progressive process of evolution, on its intricate and interconnected developmental paths, will skillfully adapt and evolve in the emerging Anthropocene and humanoid age – whether with or without human intervention is of little importance!

The unchallenged fact that we, as part of evolution, have so far been able to preserve our native earth as *the* very basis of life, to fulfil our manifold goals and desires, and to realize progress of unimagined proportions, despite minor and major opposition, seems in many respects to be seriously endangered. It is, in the literal sense, a struggle for existence. A significant – if not the most significant – driver of this struggle is climate, or climate change.

Numerous results of scientific investigations impressively explained connections between politicians, industrialists of the fossil energy industry as “climate deniers” on the one hand and the proponents of climate change on the other hand. They show the concentrated power for the domination of opinion that is taking place. Worth mentioning are the reports of the Intergovernmental Panel on Climate Change⁴ (IPCC), Hans Joachim Schellnhubers’ work from 2015 on “self-immolation” in which he highlights the “fatal triangular relationship between climate, man and carbon,” or that of climate researcher Michael E. Mann and cartoonist Tom Toles “The Madhouse Effect,” German: Der Tollhaus Effekt (2018).

Are we already at a threshold with our Earth where perhaps the crossing of a multitude of complexly interconnected, so-called *tipping points*⁵ leaves no door open for us to use the ingenious principles of nature for our continued existence – significantly more sustainably than before and perhaps for the last time?

Our evolutionary further development and climate change, which many people can recognize and sometimes painfully experience, are inextricably linked. Nature with its ingenious principles is a strong driver of progress on our Earth. Deniers of climate change in conjunction with people who cultivate a creationist⁶ mindset, which is directed against evolution and thus also against the ingenious principles of nature, will not change anything about this.

With this book, I would also like to address all those who are not, or not yet, committed to sustainable progress on the only basis of life we have. There are many ways to do this:

- Through personal commitment to a way of life that is compatible with nature
- As part of an initiative against environmental and nature destruction

⁴<http://www.ipcc.ch> (Accessed 12 Dec. 2018).

⁵Tipping points are critical points or moments on often linear lines of development at which, due to feedback effects, further development takes a completely different, usually accelerated and destructive course. A return before the tipping point then seems impossible.

⁶Creationists believe in the literal interpretation of the biblical creation story and deny Darwin’s theory of natural selection, which places our evolution by natural selection on a broad verifiable foundation.

- As a loud mouthpiece against political and economic ignorance with short-sighted misguided thinking and acting, such as the denial of indisputable facts
- And last but not least, by looking at the ingenious forms, structures, techniques, optimal strategies, and skillful fault-tolerant organizational processes that nature provides us free of charge for our adapted use of progress (Nachtigall and Wisser 2015 and 2013, respectively; Küppers 2015; Blüchel and Malik 2006; Malik 2007; Küppers and Tributsch 2002 and many others)

It depends on whether we are willing and able to decipher the *still* existing, unimaginably large treasure of helpful natural solutions and to use them for ourselves in a sustainable way.

Ingenious natural principles with sustainable progress, proven over millions of years, are juxtaposed with man-made activities which – in terms of time, geologically speaking, virtually in the blink of an eye – are in the process of shaping and destroying nature and the environment in a way that is unworthy of life. How will we decide with our conscious and subconscious minds: Do we reckon with nature or without it?

Bremen, Germany

E. W. Udo Küppers

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1

Introduction

Abstract Why does the evolutionary development in our nature lead to the fact that it has been developing steadily for about 4 billion years, despite the acceptance of five massive setbacks in the diversity of species?

The Wolf and the Goat.

Let's agree on an economic basis:

I will not eat your grass, and in return you give me your flesh in good.

Karel Čapek

Analogy: Man and Nature.

Let's agree on an economic basis:

I'm not destroying your progress, and in return you're giving me your biodiversity in good.

E. W. Udo Küppers

There may be times when we are powerless to prevent injustice.

But there must never be a time when we don't protest.

Elie Wiesel

I am not a linear existence.

Gerhard Polt

Karel Čapek, Czech writer (1890–1938). Citation source: Peace Library, Anti-War Museum, 10405 Berlin

Elie Wiesel Romanian-American writer, university lecturer and publicist. Citation source: Peace Library, Anti-War Museum, 10405 Berlin

Gerhard Polt studied Scandinavian studies in Gothenburg and Munich. He is known as a cabaret artist, actor, poet and philosopher to a wide audience in and beyond Germany.

Why does the evolutionary development in our nature lead to the fact that it has been developing steadily for about 4 billion years, despite the acceptance of five massive setbacks in the diversity of species (Kolbert 2015, p. 24)?

Modern humans, who according to the latest findings have existed for around 250,000–300,000 years (Hublin et al. 2017), have played a very special role in this dynamically stable development path, which is still based on an inconceivably large diversity of species, of which we know only fractions. In more recent developmental history, this has led to the realization that humans have given themselves their own time period – presumably from about 1950 onwards – namely that of the Anthropocene (Crutzen 2002). Many human developments, which since the beginning of the “Industrial Revolution through the steam engine”, in the late eighteenth century, up to the present of the “digitalization of man and machine” (Küppers 2018) have achieved enormous technical-economic progress, produce at the same time an enormous “rucksack” full of destructive influences on nature, the environment and thus also on our ability to survive.

In a geologically insignificant period of time, perhaps comparable to the blink of an eye to the average age of a human being of about 70 years, we are in the process of pulling the rug out from under our feet, in the truest sense of the word, through the creeping disappearance of species, the evolutionary foundation, without abrupt extinction.

We have risen to the position of apparent master over an evolutionary development lasting billions of years and actively intervene in fundamental networks, functionalities and, not least, natural principles with destructive effects and consequences.

With a strategy of monocausal short-sighted thinking and acting – short term missent – we are thus successively destroying the essence, the basis of our life, without which our evolutionary further development is also endangered.

The strong and numerically large heterogeneous or incompatible procedures, which will guide our biological further development – despite achieved and continued social, technical and economic progress by human intelligence – into stable dynamic tracks in the future, seems to be in danger. Decisively involved in this are developments in the field of digitalization and

its willing anticipatory companions of algorithmic “Big Data”, “Deep Learning” and “Artificial Intelligence”¹ (cf. Küppers 2018, Chaps. 3 and 4).

It is still not at all foreseeable what effects the artificial – man-made – intelligence will have on the natural intelligence of the evolutionary development in our nature.

In view of the ever more clearly recognizable natural and environmental destructions (cf. Schellnhuber 2015; Renn and Scherer 2015, among others), which are carrying out their catastrophic work through human ill-considered interventions in the basis of our lives, it is doubtful whether digitized strategies can at all stop, or at least slow down, anthropocene development in all habitats of our planet.

At this point we look back to the question at the beginning of the chapter. Would – despite all visible natural and environmental problems – an orientation towards natural principles help us to strengthen our ability to survive, thereby counteracting anthropocene effects? Could this be achieved by investing our creative human intelligence in developments that consistently follow the laws of a sustainable and prudent strategy – long term farseeing?

Based on the current inglorious state of our planet, which in retrospect has been created by an accumulation of human misguided monocausalities – paths of straightforward progress similar to the path of a horse with blinkers – it seems imperative and forward-looking to turn our dominant, all-swallowing, economic market strategies on their heads.

The philosopher Philipp Blohm speaks of a *market as a capricious God*, of a *market as a short-sighted God* and of a *market as a jealous God* (Blohm 2017,

¹ It means:

Algorithms: They are a unique well-defined sequence of computational rules or operations that lead to the solution of a problem. Algorithms can be implemented in computer programs. Thus, given a defined input, a defined output or solution is obtained. The value of a given algorithm determines its performance, the accuracy of its results, its scope, its compactness, and the speed at which it operates (Source: Penrose, R. (2002) Computational thinking. Spektrum Akademischer Verlag, Heidelberg, Berlin, p. 16).

Big Data: large amounts of data that can only be captured in powers of ten, e.g. 10¹³.

Deep learning: English for “deep learning”. Used as an optimization method in connection with artificial neural networks – KNN.

Artificial Intelligence: German for “Artificial Intelligence KI”. AI is a branch of computer science. It is attempted to develop programs through algorithms that are modeled on the human neuron network and its processes. The aim is to simulate intelligent behaviour in machines or robots (source for Big Data, Deep Learning and Artificial Intelligence: Küppers, E. W. U. (2018) Die humanoide Herausforderung, Glossar, Springer, Wiesbaden).

p. 76–77). There is no hesitation in agreeing with this. In the midst of the analogue-digital transformation process “[...] it is hardly possible to buy into this market anew unless you are a mafioso, oligarch or app developer”² (Blohm 2017, p. 68).

It is far more beneficial for our future to take new paths and detours in order to ask: How can we anticipatorily avoid problems and risks for our further development in all areas of society, instead of always panting after new innovations with consequential problems on the well-trodden search paths with short-sighted causalities and entrenched routines.

It is the exact opposite of previous social solution strategies, which in an increasingly complex environment are themselves more likely to be recognized as a problem than as sustainable real solution alternatives.

Let us better reckon with nature and see in the following chapters what fundamental and workable principles nature has created. What extraordinary achievements the organizing of nature with its networked, innumerable individuals and species has driven their competitive and cooperative interaction to the highest qualities through principles that have stood the test of time. Chapters 2 and 3 give impressive examples of this.

If evolutionary development is capable of successively increasing its quality potential over billions of years, what should we humans – who are part of this development – wait for to use its ingenious development strategies and principles for our own survival in times of crisis? From the point of view of climate change and the Anthropocene, it would be better to speak of catastrophic effects and destructions of complete, formerly populated areas, which need to be reduced or avoided in a precautionary manner. The contents of Chaps. 4, 5 and 6 provide numerous answers for a nature-inspired, networked and sustainable practice in human design spaces.

²App developer is one of many new professions brought by the digitalization of our society.

They are people who create small “useful” programs for users of electronic media such as mobile phones or the Internet in order to offer them Internet search processes, medical self-protocols of their health and other facilitations in dealing with digitalization, regardless of any real benefit! (Source: Küppers, E. W. U. (2018) *The Humanoid Challenge*, Glossary, Springer, Wiesbaden).

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Part I

The Inexhaustible Wealth of Evolutionary Adaptive Solutions



2

How Do We Get to Know Nature Better?

Abstract How do we get to know nature better? By presenting it in its wholeness or interconnectedness, at least as well as we understand it so far. We understand it only in its functional divergence and biodiversity similar to a blink of an eye in relation to our own lifespan.

One of the greatest, if not the greatest polymath, to whom even Charles Darwin paid homage, is remembered: Alexander von Humboldt. At the very least, however, Humboldt's travel descriptions inspired Darwin in his own work, *Origin of Species* (Werner 2009, pp. 68–95). To Alexander von Humboldt go back the insights of “interactions” in nature, which we still largely lack today in solving our problems.

Cycles and networks of effects, visualized using the example of an organism tree or a biocoenosis forest, show us life-sustaining interrelationships, which we humans destroy excessively and unreflectively with mindless growth compulsions and thus put our own survival at risk. Far-sighted problem-preventing thinking and action as opposed to short-sighted misguided thinking and action is therefore the central thread running through this book.

2.1 Alexander von Humboldt, a Naturalist and Polymath

This year, 2019, as this book is being written, marks the 250th anniversary of *Alexander von Humboldt's* birth on September 14. To commemorate his overwhelming achievements, especially on his nature explorations through Latin America, is not only due to his universal understanding of the processes of nature and further scientific knowledge from many disciplines that we use today as a matter of course. Manfred Osten, the long-time Secretary General of the Alexander von Humboldt Foundation in Bonn, summarises these as follows in his contribution in honour of the 250th anniversary of Alexander von Humboldt's birth (Osten 2019, p. 29):

There are texts on some 30 scientific disciplines, including those disciplines – such as climatology, geography, ecology, oceanography, cartography, plant geography, ancient American studies, alpine studies and regional geography – that count Humboldt as one of their intellectual fathers.

It goes on to say (*ibid*):

Humboldt proves to be an exceedingly “healthy one” (in allusion to the illness he endured, d. A.) for the future of our planet. For in his work he relentlessly predicts the symptoms of that “disease” which today reveals itself in the form of massive collateral damage as a result of anthropogenic interventions in *myriads of “interactions”* (italics emphasis mine) of nature. And Humboldt did not hesitate to name the real cause of this planetary disease: “He who does not feel nature will forever remain a stranger to it.” Yes, he even ventured, with regard to the “interactions” of the “phenomena of nature,” the hint of a future new anthropology: namely, that the, “phenomena of nature,” “are at the same time moral for the heart that gratefully feels them.” Humboldt is the yet to be discovered bearer of hope for a completely new “view” of nature. For what he, with the title of his bestseller of 1808, “*Ansichten der Natur*” (see currently Humboldt 2019; Wulf 2015; d. A.), urgently suggests to those born after him, is the securing of nature's prestige through its (sensual) reputation. It is the intertwining of its prestige with sensation, which is essential for nature's survival, and which manifests itself in the unity of admiring calculation and calculating admiration. It is the “view of nature” extended by aesthetic reason, in which the realm of objects unites with the realm of sensations in the “enjoyment of nature” – where data unite with poetry and a representational thinking to that sensual science that Humboldt exemplarily unfolds as a possible other science of nature, especially in the second “*Kosmos*” volume. With this, a quotation attributed to

Humboldt could be read anew – namely in the light of a new “view” of nature and the world, which Humboldt recommends to the 21st century: “*The most dangerous world view is the view of people who have never looked at the world*”. (italics added by the author)

Two observations can be made about Alexander von Humboldt for today’s crisis-ridden Anthropocene – with increasing destruction of nature – whereby it remains to be noted that these insights were already gained over 200 years ago, but humanity has obviously learned little or nothing from them:

Nature lives and develops only through its *myriads of “interactions”* in animate and between animate and non-animate nature. Through our anthropogenic destruction we endanger ourselves to a great extent.

Alexander von Humboldt: “The most dangerous world view is the view of people who have never looked at the world.” (Source: East 2019, p. 29).

2.2 Thinking in Cycles and Networks of Effects

Finding an answer to the question that introduces in this chapter is as simple as it is incomprehensibly complex. The findings of Alexander von Humboldt on his Latin American travels show this very clearly.

It is simple because things happen before our eyes that are familiar to us over a long period of time. These include the ever-present seasons that make leaves on trees appear in varied shades of green in the summer. In autumn, leaves change color in fanciful yellow and brown patterns, falling off trees and becoming huge piles of biomass available to other living things for various purposes. For nature does not waste a thousandth of an ounce of material. Nature, as far as her intelligent economy of material processing is concerned, has been unbeaten for millions of years. As winter approaches, there is a pause in growth for the trees, which, with new shoots for leaves, prepare again the following spring to produce a luxuriant canopy of leaves under which many more plants and animals exist. Last but not least, we also benefit from the atmosphere of a forest, which offers us rest from everyday stress, relaxed hiking, food offerings such as mushrooms and much more.

The cycle of the forest is a typical, ever-recurring, and yet from year to year changing in many individual characteristics. The regularity of irregularity is what makes nature so fantastic when you get involved with it. For it is the declared aim of the author to accompany you, dear readers, on the way to a better understanding of nature with its unimaginably extensive and ingenious achievements.

In between, take a look at the following four Figs. 2.1, 2.2, 2.3 and 2.4, which are taken from Frederic Vester's window book "Ein Baum ist mehr als ein Baum" (A tree is more than a tree) (Kösel, Munich, 2nd edition, 1986). Figure 2.1 shows a tree in its living environment, while Fig. 2.2 directs the view to the overall interconnectedness of the tree.

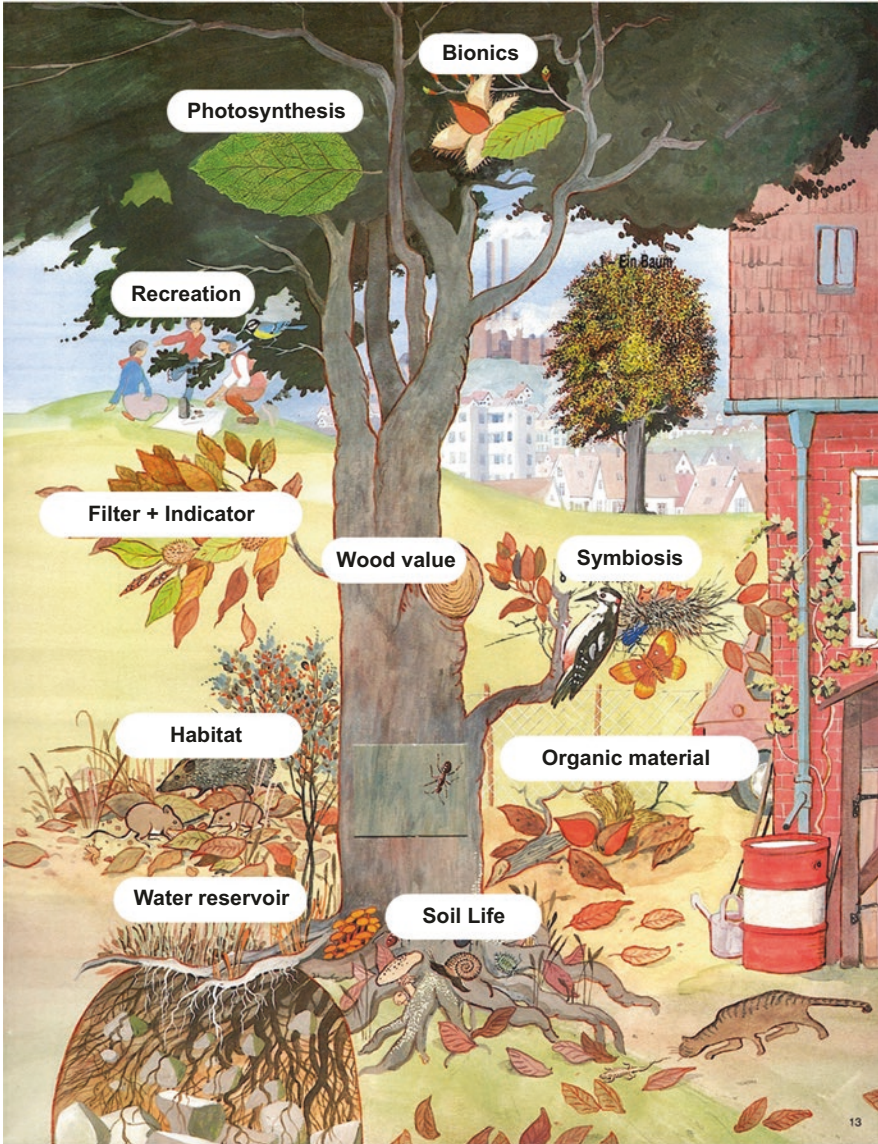


Fig. 2.1 A tree in its living environment according to F. Vester (1986, p. 13), texts highlighted by the author

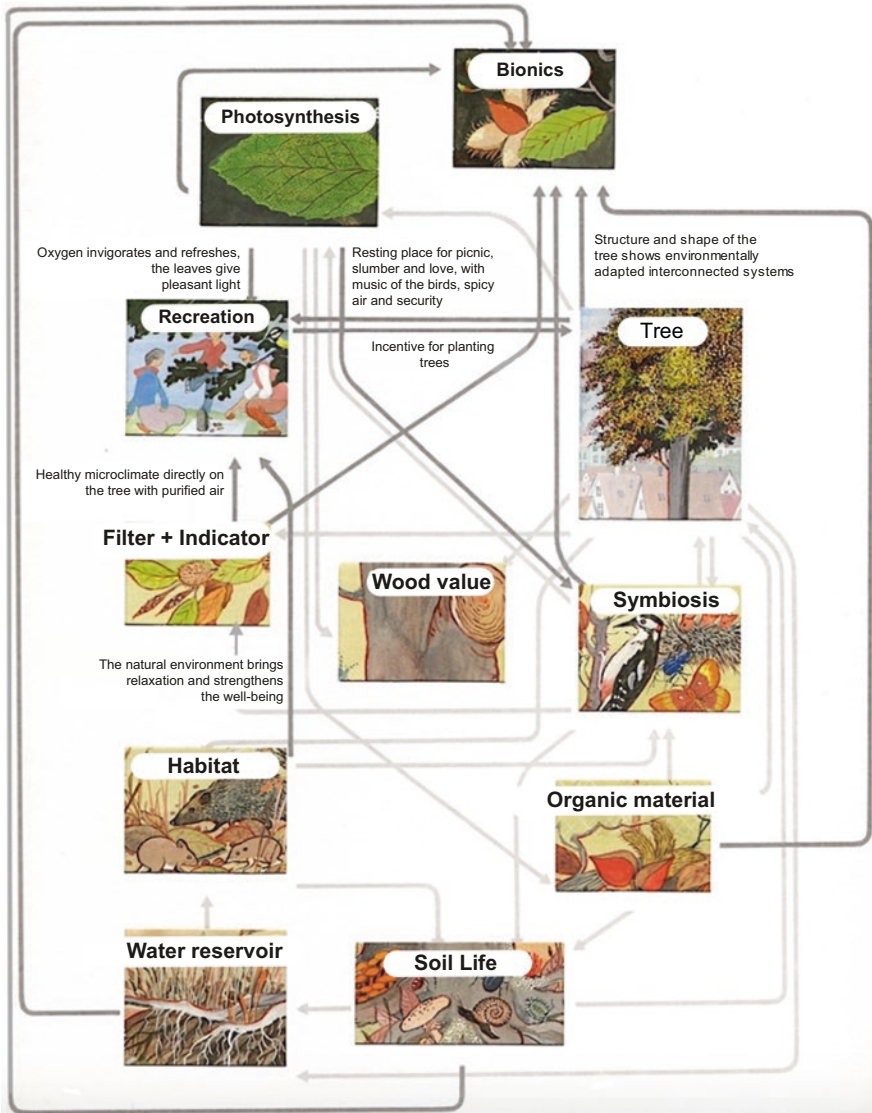


Fig. 2.2 Total cross-linking of a tree according to F. Vester (1986, p. 11 and 13), texts partly highlighted by the author

The same view can be seen in Figs. 2.3 and 2.4. Figure 2.3 shows a forest in its living environment, whereas Fig. 2.4 focuses on the overall connectivity of a forest.

What is a tree after all? This question is often heard from people who see the economic value of the tree as a piece of round wood from which boards