



# Humans in the Global Ecosystem



## An Introduction to Sustainable Development

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## Preface I

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I would like to begin with a quotation from the German author Roger Willemsen, from his last piece of writing, 'Who We Are' (2016), the publication of which Willemsen himself did not live to see. 'We were the ones who knew but did not understand; full of information but without insight; brimful of knowledge, but poor in experience; and so we went on, not checking or constraining ourselves'—a grim preview of things to come and a shocking retrospective recognition of human ineptitude! Today I meet more people with similar forebodings because of their experience and perception of what is currently happening on and to our earth. The ongoing impacts of the various forms of interference into the ecosystems that sustain us have reached genuinely frightening proportions. The influence of our human civilization on the wonderfully ecologically constructed house of the earth is becoming, from a global perspective especially, ever more destructive and ever less repairable within human timescales. The geological epoch of the Anthropocene has begun. This raises the inescapable question: will *Homo sapiens*, endowed with reason and elevated above the animal kingdom, succeed in becoming once again a part of the earth's ecosystem, in self-subjugation to the laws of nature? This does not seem to be the case at the moment: our unique biosphere—this thin, vital skin—is being depleted like a stone quarry.

As a result, the Earth is ageing prematurely and rapidly, and apparently unstoppably—no longer naturally, but in response to the actions of humans and our 'advanced civilization'. The dramatic changes to the climate which can no longer be denied, the decline in the natural fertility of our soils, the decline in biodiversity are all compelling us to re-think and re-formulate our dealings with nature—which will remain the foundation for our subsistence in the future. This requires knowledge, combined with responsibility and practical application: knowledge regarding the diversity and functioning of the ecosystems on our earth and their interactions; knowledge, too, regarding how nature—driven by the principles of evolution—is able to continue to

develop, to optimize and thus to grow without collapsing; knowledge regarding nature's ability to adapt and to regenerate after so-called 'catastrophes'.

I am very grateful to the authors of this book for the fact that—25 years after the foundation of the Eberswalde University for Sustainable Development, and the beginning of its own evolution—they are addressing the topic of sustainable development in all its complexity. They begin with an analysis of the challenges as they confront us today, and this analysis results in a concept, a synthesis for durable environmental interaction between human beings and nature—the only sustainable path for human civilization. This requires an investigation into complex philosophical, ethical and psychological issues concerning the relationship between human beings and nature. Following on from this, the authors endeavour to devise approaches and solutions for sustainable action across the entire spectrum of our social system. This is followed by proposals for urgent transformations in all areas of society towards the goal of sustainability. This is a courageous project, taking forward a process that will—that must—have a greater importance for us in the future. The fact that such a young university, in its teaching and research, is facing up to the challenges posed by sustainability in all its complexity should serve, and should be acknowledged, as an example. The students, the graduates, will have reason to be grateful. More than ever, our university graduates need this kind of comprehensive understanding of nature, the basis for our existence. Because in nature, as in society, everything is interconnected. We understand more clearly now that the 'miracle' of evolution (of creation) is not essentially predatory, cut-throat competition; it is not 'grow or die', as is often proclaimed—alongside dubious invocations of Darwin—in our governing social system. Rather, in its essence, evolution is about the interplay, the interaction of the individual components, to which we also belong. This applies both to individual organisms and to the ecosystems which they together make up. Such complex interactions speak to the success of evolution, which has repeatedly shown itself capable of overcoming all manner of catastrophes so as to recreate itself in the wake of the great species extinctions of past geological epochs.

This book can—must—help to clarify the function and functionality of the natural economy, to show its capacity and its limits, to understand its vulnerability. In a time of ever more intensive use of nature's capital stock—whether through consumption of natural resources, land use or infrastructure—nature must not be the loser. For let us be clear: the pro-

ject of nature will go on in any event. My concern is for the project of humanity, which will ultimately prove to be weaker.

This book is a first start, an attempt—already highly persuasive in parts—not only to gather knowledge and to compress it but to combine knowledge with sustainable action, which means with responsibility. It is about the future of our human civilization, which will only succeed if we come to see ourselves once more as part of our biosphere, which in turn is no more and no less than sustainability; or, to put it in other words: our and the planet's future viability and future capacity to support our grandchildren.

Greifswald, in the early spring of 2018

*Prof. em. Dr. Michael Succow*

Michael Succow Foundation for the Protection of Nature

# Good or evil – are we capable of sustainability?

2.1

*Pierre L. Ibisch and Norbert Jung*



We are living beyond our means; we are ruining the foundation for our subsistence and that of other species — humanity has become a force that is shaping the planet. At the same time, we are making increasing efforts to reverse the trend and to change course towards sustainable development. It is clear that we are capable of both creating and solving problems. This raises the question of how these capabilities came about. In order to develop effective solutions for a shift to sustainability, we have to deal with the agent of (un)sustainability — the human being. How did we become a global power capable of shaping nature? Were we born to dominate the Earth and transform the global ecosystem? Many people are inclined to believe that humankind is an aberration of evolution, destroying what has been produced by millions of years of development. Are we good enough to bring the forces we ourselves have unleashed back under control, or are we by nature too evil to live in a truly sustainable way? And do these moral categories even apply, given that they always refer only to human behaviour?

## Introduction: our relatives

Humans and human culture as a product of biological evolution – humankind as part of nature

To understand how and what we are and what path we may take in the future, we need to understand where we come from. A first basic insight is that we humans and our culture have developed in a biological way in the course of evolution. We are ‘by nature cultural beings’ (Gehlen 2004, p. 80; see also Voland 2007; Wessel 2015). In that sense, even if the human mind can open up additional dimensions, everything man-made and all culture can be considered a part of nature. We and our culture are the result of our engagement with the ecosystem that has brought us into being, and with ourselves and our ideas. Even our ability to influence our own habitat does not elevate us above nature (Ibisch et al. 2010); it is a basic principle of all living things. This is also a key principle of the so-called ecosystem approach (▷ Chapter 4.1).

Our nearest relatives: chimpanzees and bonobos

Today, we know for certain that we belong to the group of primates, and that our closest living relatives are the African chimpanzee (*Pan troglodytes*) and the bonobo (*Pan paniscus*), with whom we share 99.6% of our genes. Our last common ancestors lived more than 4 million years ago (Prüfer et al. 2012). This finding is of great importance because while the way of life and the character of the chimpanzee and the bonobo differ very clearly from one another, they each have properties that are not foreign to us.





*Figure 1:*  
Chimpanzees (above)  
and bonobos (below)  
are humans' closest  
living relatives.  
(Zoologischer Garten  
Berlin,  
photos: P. Ibisch)

Chimpanzee males are aggressive, fighting for rank in the community and for access to females. Chimpanzees cooperate with each other to defend their territory: attacks on other groups quite often result in fatalities (Boesch et al. 2002). According to a study in Gombe National Park, 20% of chimpanzee deaths were due to chimpanzee violence (Williams et al. 2008). Perpetrators and victims are mostly males (Wilson et al. 2014). Infanticide carried out by males is relatively frequent (Furuichi 2011).

### *2.1 Good or evil – are we capable of sustainability?*

Among bonobos, on the other hand, evolution has evidently led to the suppression of aggression: the males subordinate themselves to the females and do not fight over rank. Bonobos do not cooperate in groups, and they do not attack others. They tend instead to be playful, and maintain an intense sexual behaviour, which does not always include a direct reproductive function, often with the same partners (Hare et al. 2012). Females maintain intensive social relationships with each other, which has been linked to the much more peaceful coexistence among bonobos (Furuichi 2011). Chimpanzees regularly hunt other animals, including primates. Similarly, organized hunting has been observed among bonobos, with females involved too (Hohmann & Fruth 2008)—which does not occur in chimpanzees.

Such, then, are our relatives, the evolutionary environment from which we are descended. It raises the question of what it is that makes us human, for all that we have in common with African anthropoid apes. Which path have human beings taken? Are our social behaviours, the propensity for violence towards our fellow humans and our environment, something we have in common with chimpanzees, or do we have the potential for a character that is more akin to the bonobos, more peaceful and ‘loving’? This question is not to suggest that bonobos are the good relatives and chimpanzees the bad ones—a moral evaluation of animals using human categories is always a mistake. In any event, we are not descended from them; we merely have common ancestors. The point is to develop a greater understanding of ourselves and our evolutionary roots, and especially for those peculiarities of our behaviour that can be considered ‘typically human’.

The  
emergence  
of modern  
hominids  
through  
environmental  
change

As with all other species, a systemic event in the course of the struggle of the great apes, including humans, with their changing surroundings and fluctuating living conditions—as well as with themselves and the consequences of their own actions—led to an open-ended but nevertheless directional evolution. The following is a plausible description of a possible history of interactions and consequences. Roughly 6 million years ago, a long-term trend towards dryer conditions and increasing environmental variability seems to have begun on the African continent (reinforced in the last 3 million years, Potts 2013). As a result, the rainforests, which are believed to have previously been more extensive, retreated to the western part of the continent, while the east saw the spread of dry forests and savannas. At the same time, sedimentary evidence suggests that in the east of the continent, above all in the region of the African Rift Valley, wetter and drier conditions alternated

relatively quickly. These ecological conditions caused a separation of the African great apes into two groups: the rainforest taxa of chimpanzees and bonobos in the tropical west and the hominids in the eastern savannas.

## The emergence of human beings was only possible through cooperation and fairness

Life in the open savanna favoured an upright gait (McHenry 2004). This made new uses for arms and hands possible; motor skills improved, the use of tools such as sticks and stones increased, food became more varied, and energy-rich meat—probably carrion at first, or prey killed by other animals (Aiello & Wells 2002; Stiner 2002)—played an increasingly significant part in the diet. The increased energy supply enabled the growth of the brain, the organ that accounts for up to 20% of energy use in modern humans (while accounting for only 2% of body weight, Engl & Attwell 2015). The availability of energy limits the capacity to process information. This is a classic case of positive feedback: increasing intellectual ability facilitated strategic food procurement, and the additional energy from better nutrition could then be invested in the development of the brain and intellect.

At some point, coordinated hunting in groups and the use of fire and weapons became more and more important. The increase in brain size led to the expansion of the skull. Combined with a narrowing of the birth canal, resulting from the upright gait as well as physiological reasons, this may have created evolutionary pressure for babies to be born earlier, as well as a need for support during labour (Rosenberg & Trevathan 1995; Trevathan 1996; Dunsworth et al. 2012). The early birth of totally helpless infants forged a durable mother-child relationship and promoted the cohesion of (extended) family groups. Ultimately, it would have become a positive selection advantage for child-raising women not only to be able to bind the father to the family for a longer period, but also to secure help from other family members. The social way of life already typical among ancestral primates would thereby have been strengthened. In the context of long-term close coexistence, coordinated hunting and a lifestyle based increasingly on the division of labour, communication steadily improved. The emergence of a complex language reinforced in turn not only the scope for cooperation and mutual support, but also intellectual ability; social intelligence ultimately made us human (Shultz et al. 2012). The raising of helpless infants seems to have

Evolutionary drivers lead to intelligence and a social way of life

Helpless newborns and intensive family life require high levels of cooperativity

played a key role in this process (Piantadosi & Kidd 2016). The triumph of *Homo sapiens* was made possible in evolution not by egoism, but by **▷ cooperativity**. It was the human capacity to form groups, which involved, among other things, social regulation and a sense of community.

**Cooperativity is the ability or tendency to cooperate.**

Thinking,  
knowledge,  
symbol systems

With the emergence of the human brain and language, biological systems were elevated to a new level of **▷ self-referentiality** and self-objectification (Gritschneider 2005)—that is, the ability to relate to and interact with oneself. Not only could individuals now interact better with one another, but they could also reflect in ever more complex ways on themselves, on their own actions and thoughts. It was only the development of language and words that enabled certain issues to be thought about at all. On the basis of information stored in the brain, completely ‘dematerialized’ thought systems began to develop: interactions between thoughts created new ideas—consciously and unconsciously (!)—and thereby accelerated the growth of knowledge. Since individually acquired knowledge could be passed on and discussed more effectively thanks to language, cultural development was also accelerated. Symbol systems and artistic creativity were engendered (Morriss-Kay 2010), which opened up ever more far-reaching opportunities to grapple with the world. In order to ensure their continued existence, however, these new self-referential ideas and cultural products had to be repeatedly tested against the practical experience of life with and in nature, and selected accordingly by reality.

**Self-referentiality is the ability to relate to oneself (feedback) and to respond to changes in the system, thereby developing a (stronger) identity that distinguishes the system more clearly from the environment.**

From  
cooperation  
to ethics

For all its benefits, long-term social coexistence in groups presumably represented a serious challenge from the very beginning. The closer and more beneficial the social coexistence of a species, the more both communication (exchange of messages, different forms of coordination, etc.) and cooperation (the purposeful coordination of actions between two or more living beings) have to develop and diversify. In the early social systems of the hominoids, aggression and competitive behaviour would have needed to be minimized to enable cooperation. After all, primates

are among the mammals which display the strongest forms of aggression (often deadly) towards their peers (Gómez et al. 2016); as mentioned earlier, violent conflicts between (predominantly male) individuals and also between groups are common among our closest relatives, the chimpanzees. Killing is a strategy for eliminating rivals among chimpanzees; it is used when the consequential costs are relatively low (Wilson et al. 2014). The evolution of personal relationships and pacifying rituals (e.g. greetings, dances, ceremonies) served to inhibit aggression. With increasing intelligence, the self-organization of the groups became more sophisticated, although hierarchical domination and leadership by powerful individuals predominated.

In human groups, antagonistic feelings and behaviours emerged, including both aggression and powerful forms of oppression, as well as unconditional love and cooperation. Finally, human beings, who became capable of ever more abstract thought, also became reflective beings with minds who could inhibit their immediate physical impulses and make rational decisions. Building on this capacity for objectivity, thought was also given to how things ought to be and how people ought to behave—the starting point for the development of ethical propositions. Many philosophers, like Max Scheler (1874–1928, German philosopher, anthropologist and sociologist), assume that as beings with minds, humans must have liberated themselves completely from their biology:

Reflective  
beings  
with minds

» So a 'being with a mind' is no longer bound by its drives and environment, but 'free of its environment' and, as we might say, 'open to the world'. [...] Such a being, moreover, is capable of elevating the given capacities with which it 'resists' and reacts to its environment, which belong to the animal alone and in which it is ecstatically subsumed, to the status of 'objects', and in principle to grasp the very nature of these objects without the limitations that this world of objects or its givenness suffers through being mediated by its vital instinctual system, sensory functions and sensory organs. The mind, therefore, is objectivity, determinability through the very nature of things. Only a living being capable of complete objectivity can 'have' a mind (Max Scheler 1927 in Scheler 1978, p. 38).

It cannot be denied that people only succeed in being (relatively) objective when they put aside their own needs and environmental constraints. However, many findings—for example, from neurobiology, evolutionary research, psychology and economics—demonstrate that people find

Ethics as  
a guarantor  
of survival

it difficult to achieve 'perfect' objectivity (▷ Chapter 2.1). But this does not disprove the theory that ▷ **morality** and ▷ **ethics** emerged for functional reasons. Since human culturality is a natural product, so too are the foundations of morality: such a highly social and self-reflective being needed or needs social behavioural regulation for coordinated action. Ethics is vital to our survival.

**Morality** describes the context-dependent sense in individuals or groups of what is considered appropriate and proper, which often becomes a behavioural standard within a society.

**Ethics** is the study and teaching of what is considered right and proper (morality and behaviour) as well as the norms and desirable and legitimate maxims of life conduct and human action.

**Norms** represent a set of values in a society based on moral concepts or formalized ethical principles. They are rules of conduct which are socially relatively constant and often legally binding.

**Typically human: fairness**

Game theory, a sub-discipline of economics, seeks to establish why and under what circumstances humans choose certain behaviours such as cooperation. This always involves the question of how selflessly or selfishly people act. Game-theoretical experiments with monkeys and children are informative in this regard. They seek, among other things, to prove whether individuals are prepared to set aside their own interests, whether they can act fairly and justly, and whether they may be willing to share scarce resources with others. For example, in some experiments sweets or other titbits must be shared equitably as a condition of any of the parties receiving them. It has been shown that both chimpanzees and bonobos struggle to make and recognize what are (from a human perspective) fair apportionments — they are ultimately selfish maximizers, while human beings recognize and generally respect social norms and rules of fairness (Jensen et al. 2007; Kaiser et al. 2012). Although chimpanzees can recognize unfair behaviour that disproportionately favours one individual, and they can show social disappointment, this does not lead to an ability to enact fair behaviour (Engelmann et al. 2017). And although they seem to recognize behaviour that violates social norms, such as infanticide, they do not intervene to prevent it (von Rohr et al. 2015). Bonobos are peace-loving, yet they certainly show respect for anti-social individuals (Krupenye & Hare 2018). Even young human beings, on

the other hand, can be seen to derive real enjoyment from the fact of others being helped (Hepach et al. 2012). Empathic behaviour—the ability, which can also be observed in some animals, to put oneself in another’s place and to take their side—is particularly pronounced in humans. Since this can already be observed in very small infants, we may regard it as a species-specific biological behavioural tendency (Haidt 2001; Blohm 2010). However, fair behaviour and the acceptance of unfair treatment are also clearly context-dependent. Local competition increases people’s willingness to demand fairness and reject unequal treatment (Barclay & Stoller 2014). It is unlikely that fairness in humans simply came about for its own sake; it is more probable that fairness emerged as a means of encouraging sustainable cooperation with fellow species members (Brosnan & de Waal 2014).

In the case of allegedly fair or unfair behaviours, it cannot be said that behaviour is good or bad if individuals are only aware of their actions and their consequences to a limited degree. A rule violation occurs only when there are social norms and someone is prepared to consciously break them while fully aware of the consequences (see Spitzer 2009). Interactions within human social groups became increasingly complex over time. Individuals must have realized, on the one hand, that it benefited their own position in society and access to resources if they protected others or helped them, for example as a chief—this enabled cooperation to be planned and carried out according to plan. At the same time, the necessity and the desire to establish one’s own position within the group obviously grew as groups began to significantly outgrow families in size (tribes typically have up to 150 members).

It is probably no coincidence that in very different human societies leaders and chiefs, but also other dignitaries and officials, have almost always ‘adorned themselves with borrowed plumage’ (feathers, striking robes, hats, crowns, etc.; see Fig. 2) or surrounded themselves with status symbols to signal their importance (Ibisch et al. 2010). In the course of the history of clothing, this later took on very sophisticated forms. This furthered not only the development of aesthetics and art appreciation but also the inclination to accumulate conspicuous possessions to convey their owner’s importance. This was the beginning of a consumption not driven by basic needs in materialistic societies—and thus also of less sustainable behaviour. In certain societies, membership and social participation were (and are) increasingly defined by symbolic possessions, such as prestigious housing, jewellery—but also sports shoes, cars and electronic devices.

**Position  
in society and  
status symbols**

**Consumption  
and possessions  
as status  
symbols**



*Figure 2: 'Adorned with borrowed plumage': Status symbols borrowed from nature and culturally repurposed endow people with a special significance in society. Indigenous costume from Sarawak. (National Museum of Malaysia, Kuala Lumpur, photo: P. Ibsich)*

### The discovery of evil and guilt

As abstract thought and symbolic systems grew in importance, which in turn may have boosted intellectual capacity, dissocial individuals soon learned to pretend to hold certain positions, or to create fake facts. For other group members, it then became important to be able to recognize and condemn acts of deception (Hamilton 1975). The competition between those who cheated and those who detected the scams fuelled the further development of mental faculties. At a certain point, human beings' growing intelligence led to the loss of their 'innocence'. Knowledge of oneself and of one's own mortality (i.e. awareness of the future and of death), but also the discovery of ignorance (in the sense of an awareness that there are many connections, but that one does not



understand them) led to an increasing sense of uncertainty. This uncertainty and corresponding insecurity may have been compensated to some extent by spirituality and religious behaviour within the framework of emerging moral systems. The recognition of death, and the identification with other living creatures through the recognition of kinship, extended empathy among hunters, who now incurred a sense of guilt for inflicting on animals what they themselves did not wish to suffer—violent death. This too may have been a source of spiritual and ritualistic behaviours, and another of the roots of art. Many of the oldest cave paintings depict hunting scenes and prey. Even in modern hunting, customs are maintained which express respect and honour for the killed animal (for example, the German tradition of ‘Strecke legen’ (‘laying out’), where killed animals are displayed in a ritualised way).

Even if people’s ideas about the future regularly lead to false predictions (Gilbert & Wilson 2007), it has become commonplace that ideas about an imagined future produce concrete consequences for current decisions and events. Future-oriented purposefulness and a complex, planned way of proceeding are typical human traits that promote both sustainable and unsustainable behaviour.

Increasing sociality and self-reflection brought about the self-taming, indeed the civilization, of what was an often violent primate, man. Early state formation was also the consequence of violence in tribal societies that repeatedly attacked each other (Fukuyama 2012). Up to a certain point at least, it is more bearable for individuals to be suppressed by hierarchical leaders than to live in fear of murderous hordes. The exercise of authority within the group at least promotes efficiency, through the separation of roles, and suppresses conflicts. In fact, evidence shows that the proclivity to peace also increased in the course of cultural development and the formation of ever more complex social systems (Gómez et al. 2016). Never in the history of humanity has it been as unlikely as it is today for individuals to suffer violent death. In general, the ability to plan with confidence, the security of basic supplies, health and life expectancy have all improved rapidly, especially in recent times. However, the way human beings are now enclosed in increasingly self-regulating social, fast-growing systems was bought at considerable cost: namely, at the expense of the proper functioning of the ecosystem (▷ Chapter 3.1).

The discovery  
of the future

Sociality and  
self-reflection  
lead to  
self-taming

## From biological to cultural evolution, and the growth of human power

### Cultural evolution

For a long time, human development depended solely on progress in biological evolution. This changed as social systems, composed of individuals capable of reflection who communicated with each other, intensified and took forward the cultural evolution which enabled survival techniques to be learned and passed on without individuals having to re-invent all the details of those techniques in their own lives. Complex social systems are characterized by emergent properties (▷ Chapter 1.3)—especially by culture, including technological progress, as well as future-oriented and systematic-planning thinking—which for humans simply brushed aside certain ecological-evolutionary restrictions that apply to other animal species.

### Humans spread across the world

Particularly important was the capacity of human beings to spread very rapidly across different ecosystem boundaries. Recent *Homo sapiens* fossil finds suggest the early colonization of not only Africa but also Southern Europe. The most notable difference from other animal species, which applied to several human species (*Homo erectus*, *Homo neanderthalensis*, *Homo sapiens*), was their ability to abruptly break out of their inherited ecological niche, that of the opportunistic hunter-gatherer of the savannas. The use of clothing, fire, tools and weapons enabled *Homo sapiens*, above all, to spread in a relatively short time into almost all biomes of the Earth—from hot deserts and oceanic islands to polar areas and high mountain regions. 300,000 years ago, they had already spread throughout much of Africa (Hublin et al. 2017). The appearance of *Homo sapiens* on other continents had far-reaching consequences for the ecosystems they colonized. Superior technology seems to have led to the displacement of other human species, such as the Neanderthals, which had been living in Europe until *Homo sapiens* arrived, probably 80,000 years ago. The immigrants probably also contributed to the eradication of large huntable species (Barnosky et al. 2004; Lorenzen et al. 2011).

### Humans become landowners, and develop an 'ethic of honour'

Following the loss of nutritional resources from hunting, modern humans (frequently convergently on different continents) succeeded in developing new sources of plant food and domesticating several animal species during the Neolithic Revolution. The development of agriculture increased the energetic efficiency of social systems. More food energy could be provided to more people with less effort and less manpower. Those who no longer had to devote themselves to agriculture could invest their newly freed intellectual capacities in the construction



## The noble savage, or: was it no better in the past?

Ever since the Enlightenment, controversy has raged over whether 'native peoples' still lived in harmony with nature and whether the destruction of our environment and unsustainable behaviour are therefore the products of culture. The German sociobiologist Eckhardt Voland emphatically refutes the hypothesis of a sustainability worldview among traditional ('indigenous') peoples (Voland 2006). Voland cites examples of over-exploitation which he believes demonstrate that even among today's traditional lifestyle peoples, such as the Maya, Yanomami, Piru and others, there is no such thing as a 'sustainable' approach, and that they use everything they can without regard to conservation. He offers a series of examples in which they have also destroyed the basis for their own subsistence. Citing Ridley in support, Voland considers 'serious evidence for the ecologically "noble savage" ...' to be very rare. The idea of the 'noble savage' who consciously and deliberately protects nature is modern romanticism, he argues. The legendary stance roughly expressed as 'forgive me, stag, for the fact that I had to kill you' comes, he says, from films. And even if such a ritual did exist, says Voland, 'the stag was dead in any case'. Voland's laconic tone alone should raise the suspicion that the intention here is to prove a point: traditional peoples were not much better than us... ! In contrast, Diamond (2006) and Roszak (1994) report many plausible examples of the sustainable use of natural resources among various traditional peoples, and even corresponding religious codes of conduct.

The sustainability philosopher Meyer-Abich, however, points to something important: the rituals of native peoples at least prevented or reduced overuse, he argues. If, in an animistic culture, a young couple wanted to cut down a tree in order to build a house, they had to justify this to the tree on the grounds of necessity. 'The justification, however, helped all the trees, since to fell them all would have been inexcusable' (Meyer-Abich 1987, p. 73). The green branch that hunters in our culture put in the mouth of a slain deer is also a remnant of a similar ritual of thanks. Such rituals at least demonstrate that people connected with nature know that nature gives them something, and that this brings with it reciprocal inner feel-

ings of obligation, responsibility and gratitude. The Christian ritual of giving fruit or food to needy people at the harvest or thanksgiving festival probably also arose originally from the inner desire to give something back (to someone or somewhere) when given something by Nature (here understood as divine). It is important to bear in mind the following:

1. Native peoples lived in a world in which everything had a soul and a being, and which was given meaning and purpose by an all-embracing world spirit; that is, in a systemic whole—a mindset which, because it was based in the systemic, tended to favour and support sustainability (see also Haskell 2017).

2. The psychological component of human sensibility towards nature influences our actions: emotionally sensitive hunters today still feel the need to somehow exonerate or unburden themselves after killing an animal. European hunting rituals are remnants of this.

3. Voland does not mention that the studies he cites were undertaken at a time when industrial society was already affecting the jungle peoples, and industrial thinking had probably already penetrated their mindset. The examples given by Diamond (2006) and Roszak (1994) contradict Voland's statements. Native mythologies were created out of an ongoing experience of nature, repeated over many thousands of instances, that entailed an understanding of carrying capacity and its cyclical nature. They took only as much as was needed, and nature was mostly content to give it (see Jung 2006).

Similarly not mentioned is the importance of sociality and the development of worldviews (which were almost exclusively sustainable, encompassing circulation, dependency, etc.) and myths in general. The animistic myths that have sustained prehistoric societies for tens of thousands of years are characterized by a spirit of co-responsibility (the individual as part of the whole) and by a summons to dialogue with Nature or its spirits, to giving and taking (sacrificial rituals, restrictive rites, prohibitions). It is therefore questionable whether sustainable action and thinking has anything at all to do with the moral categories of 'good' and 'evil'.

of ever more complex ordered social systems, which were becoming necessary in light of population growth. (Access to) land ownership became a central dimension of human economic activity; land theft and territorial invasion emerged as novel forms of injustice and created new grounds for conflict. An 'ethic of honour' arose, which was often underpinned by religion (Sumser 2016).

Increasing population density, through accelerating cultural exchange, resulted in ever more diverse occupations and different cultural techniques, which, in turn, have benefitted human and community well-being. Important achievements that further accelerated this development, via positive feedback loops, included not least the development of writing and mathematical systems, and later the systematic sciences. Through the manipulation and transformation of ecosystems, humans have succeeded in purposively altering their living conditions—the history of ecosystem management began; human beings seemed to raise themselves above nature (▷ Chapter 3.1). The pursuit of development was the attempt to cast off the shackles of local ecosystems. Cultural techniques such as religion helped people to deal with emerging contradictions. For a long time, it was possible to ignore negative feedback from over-exploited ecosystems, as people were sufficiently adaptable to find or open up new resources and areas of the world. Nevertheless, it is undoubtedly the case that for human beings the consequences of their own actions on the ecosystem became a selection factor far sooner than was the case with other species (Kivinen & Piironen 2018).

**Development as emancipation from the chains of local ecosystems**

## **From revolution to revolution: ever faster, more, bigger and better**

Evolution within the global ecosystem is always open-ended; it is a complex systemic process. By means of particular mechanisms—such as mutations in the case of species, a re-combination of components in ecosystems, or technological discoveries and inventions in social systems—systemic units bring about an innovation which, in interaction with other systems, leads to either more or less efficiency, resilience or adaptability, and can thus determine the sustainable continuation or failure of a system (▷ Chapter 1.3). Innovations often lead to major leaps forward in the progressive development of systems or of their performance, or of their geographic distribution. Such leaps also mark the biological and cultural evolution of human beings—some are often called 'revolutions'. The development of increasingly complex and successful

**System evolution and innovation**

Revolutions  
in the cultural  
evolution of  
human beings

social systems is leading to a significant acceleration in such ground-breaking innovations and revolutions.

The first revolutions on the path towards our becoming what we are today were associated, many millions of years ago, with (among other things) the adoption of an upright gait and with brain development. Then came (even before *Homo sapiens*), a few million years ago, the systematic use of tools and the instrumental use of fire for hunting, cooking, heating and making things. This led to a change in nutritional physiology, among other things. The development of agriculture around 10,000 to 15,000 years ago paved the way for population growth and the emergence of advanced civilizations, but it also set the stage for changes in the Earth's plant cover and for our conceptual decoupling from the ecosystem. Rising population densities fuelled cultural evolution, the ever-increasing use of the human intellect, and the emergence of science. Through feedback, ever greater population densities became possible. Finally came urbanization and, from the mid-18th century, the Industrial Revolution, with corresponding consequences for energy use, manufacturing and trade, transport, mobility and human prosperity. The development of the sciences also included the emergence of theories, ideas and discourses which exerted growing influence on world events and above all on further cultural evolution. Of particular importance in this context are the efforts to construe, from logical descriptive systems (theories), normative principles for human coexistence and the relationship between humans and the world.

Anonymous  
societies and  
states lead  
to alienation,  
over-exploitation  
and conflicts

With the emergence of more anonymous and more complex societies and states in which individuals could no longer personally know all other individuals, new sociological and cultural dimensions came into play; group territories and associated tribal knowledge diminished, the suppression and possession of other human beings arose, and self-determination over the use of what was produced and what was won from nature was lost as a result of alienated structures. No longer were the needs of the community alone decisive, but instead the luxury and comfort enjoyed by the rulers. This kind of anonymous social cultural development required an intensified exploitation of nature. Wars proliferated, and with them all kinds of other events, in an ever-growing confusion and complexity, as a result of the size of the population (state formation) and the growth of cities, so that systems of rule also became divorced from practical experience and concerns. Shortages resulting from over-exploitation were balanced out within human population systems (through armed raids and territorial conquests). Both the

growth of complexity and the tendency of powerful states to expand their spheres of influence (that is, access to resources) by military means continue unabated to this day. The consequent impossibility of comprehending the full scale of human impacts on nature, due especially to human existential alienation from the natural and social foundations of subsistence through industrialization and capital concentration, meant that the scope for direct feedback—that is, the experience of the consequences of one's own actions—has continually diminished. Environmental impacts have arisen that do not allow sensory feedback because they are not perceptible (CO<sub>2</sub>, O<sub>3</sub>, dioxin, climate change, etc.).

However, the increasing difficulty of maintaining an overview of global events is still some way from reaching its peak. Just a few decades ago, a cybernetic-informational revolution took place based on the automated processing of information. This caused the explosion of knowledge we are currently experiencing as well as the emergence of an Internet-based global knowledge or global culture, aided by globalized initiatives and companies such as Google and Wikipedia. This was followed just a few years ago by virtual social networks and ever more global real-time communication possibilities. In the last few years, it has become clear that human-computer interaction is increasingly influencing people's behaviour by automatically filtering and manipulating the way they handle information. In the meantime, the Internet has given us so-called social bots, virtual communication partners that try to influence our decisions. And the visions of artificial intelligence—at least at the level of self-referential algorithms that make decisions without needing people, and of the Internet of Things interacting with each other without human intervention—are almost with us. They pose unimaginable new challenges for our moral and ethical systems, which of course have to grow in line with our achievements and capabilities. Critical scientists point out the dangers of digitalization for mental and physical health—that it is testing human nature to its limits.

Humanity is rapidly creating new kinds of social systems and technologies that are supposed to increase its prosperity and reduce its vulnerability to the hardships of nature. However, all technologies also have unintended and often unforeseeable consequences that need to be assessed and managed. It is clear that it is not the technologies themselves—whether printing, rocket propulsion or the Internet—which are good or evil, but the social systems that use them (without always being aware of the consequences that may follow), or the individuals who manipulate or exploit social systems and technologies, for their own

The  
cybernetic-  
informational  
revolution

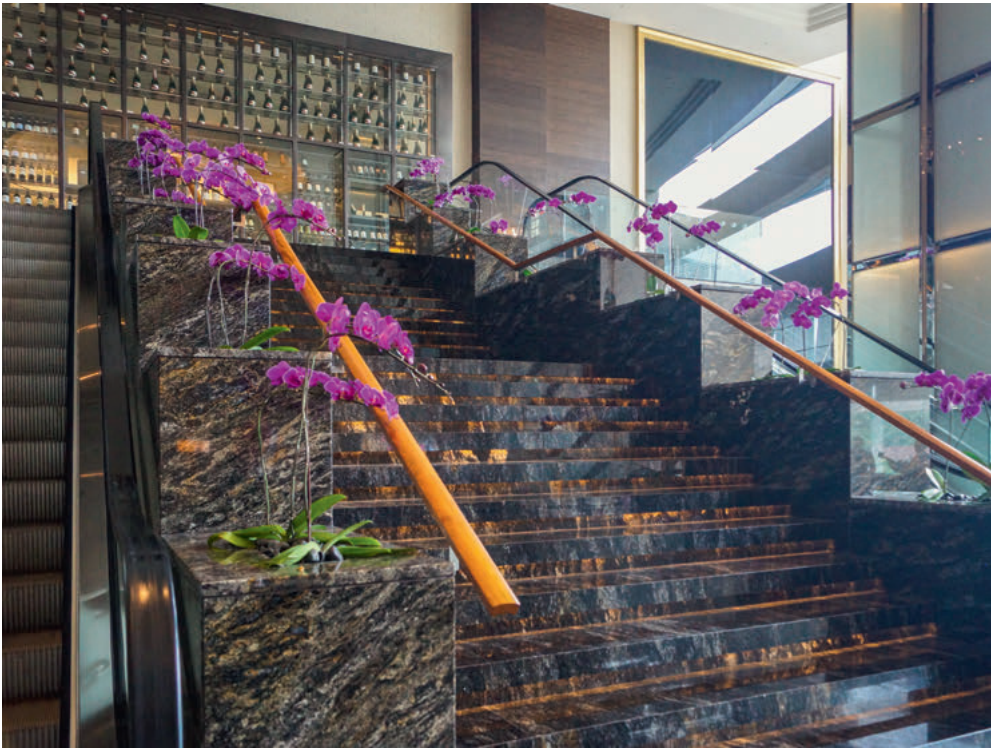
Faith in  
technology,  
alienation  
from nature,  
hybris



*Figure 3: Living in artificial worlds and relationship disorder: Technical feasibility and artistic emancipation from natural forms can increase the degree to which urban people are disconnected from nature. The emotional connection to a 'disorderly' organic environment not created by man is lost. (Parliamentary buildings in Berlin, photo: P. Ibisch)*

ends. The current proliferation of technological possibilities, especially with regard to digitalization and virtualization, is creating new instances of path dependency — that is, existing pathways of human development that cannot easily be abandoned. Above all, the incessant technological advances have led to a blind faith in technology, to ever greater alienation from nature and to an overestimation of humanity's capabilities that ignores the lessons of evolution (referred to as 'hybris' in Bateson 1985 [1972], p. 62 ff.). Art and architecture also reflect our gradual and increasing separation from nature and contribute to the fact that today a large proportion of people have fewer opportunities to experience nature (Fig. 3). In our air-conditioned dwellings, we still surround ourselves with elements of nature such as pets or ornamental plants, testimony to the remnants of a yearning for nature. But they also reaffirm our dominance, since their well-being depends on us (Fig. 4).





*Figure 4: Phalaenopsis orchids in a hotel lobby as citations of nature in our urban habitat. People still yearn to have elements of nature all around; but our sense of the complexity and dynamics of ecosystems is being lost. (photo: P. Ibisch)*


We now have to deal with an anthropogenic environment that is global and hyper-complex—and thus far beyond our Pleistocene perceptual horizon. It is a world we have ourselves created but which is increasingly overwhelming us. The many technological possibilities also mean that our social systems and the technological demands made on us by life require ever greater time resources. It is also becoming apparent that growing numbers of people in our modern, technological society are not at peace with themselves. A significant proportion of the population suffers from mental disorders such as anxiety, insomnia, addiction or depression (a total of 38% of the EU population suffers from at least one of 27 identified disorders in any given year, Wittchen et al. 2011). Perceived and diagnosed levels of stress in so-called ‘developed’ countries such as the USA are steadily increasing, for various reasons (APA 2016; 2017a; 2017b)—a possible indication that the needs and skills

**Is the world we have created now overwhelming us?**

set of *Homo sapiens* are being transgressed. This could also be related to the increase in drug use (not just in the USA), given that stress promotes drug dependence (Wall 2008). Electronic media represent an increasingly important source of stress (Kross et al. 2013).

## Is the sustainability revolution on its way?

### Humans as ambivalent beings

So what should we think of ourselves? Are we going to be able to effect the 'emergency stop' that is now ecologically indispensable, and the next revolution, the sustainability revolution, without throwing our societies into chaos through anti-humanistic action? It certainly looks as if we should not place our trust blindly in the 'human biological system'. From a genetic perspective, this system is optimized for life in non-anonymous tribal societies, for familiarity and personal relationships. Human behaviour is socially, culturally and biologically contingent—it results 'from a complex, dynamic and highly random interaction between environment, organism and genome' (Kösters 1993, p. 331). The biotic component is the least mutable in this case. Changes in the genome are relatively slow; we are, biologically speaking, still largely the hominid of the Pleistocene, whose path diverged from that of the chimpanzees and bonobos. We see in ourselves a great ambivalence, an inner strife resulting from the dual inheritance that makes us both aggressive-belligerent and empathic-peaceable, both destructive and creative-constructive. But our 'Pleistocene' genetic make-up has given us an amazing capacity for learning and above all for social cooperation and culture. These are central insights for our picture of ourselves, for our  **view of human nature**.



### Our view of human nature, our values and ethics as important conceptual foundations for sustainable living

*Our view of human nature:* The question of good and evil is a moral question. Morality is the basic grammar of human social behaviour, that is, the behaviour of people towards each other, or towards the group (Spitzer 2009 et al.). The roots of pro- or anti-social behaviour (e.g. one's predisposition towards giving help, justice, caring; Eibl-Eibesfeldt 1997; Blohm 2010 et al.) lie in our biological inheritance, but these predispositions can be individually suppressed or pro-

moted at the modifying cultural-social level (education, indoctrination, normative pressure) or raised to the status of (formal or informal) norms or laws at the societal level. Morality is thus not in the first instance a category which applies to a love of nature or to environmentally friendly behaviour.

A *view of human nature* encompasses the main drivers of human behaviour and therefore also the scope for changing it. Thus, a conception rooted in learning theory or behaviourism assumes that in principle all behaviour must be learned from birth (there is also a variant based in milieu theory which holds that socialization is the sole cause of all behaviour). This has proved to be reductionist and overly one-sided. From an interdisciplinary point of view (biology, psychology, sociology, philosophy), the view of the human being as a biopsychosocial unit is today considered the most complete (von Hayek 1979; Ciompi 1999 et al.; Wessel 2015). This holds that all behaviour is comprised of a basic biological disposition, a cultural-social modification thereof and individual psychological decisions—both rational and emotional (► Chapter 2.2). This reflects systemic interaction at different levels, and also corresponds to the fundamental interdisciplinarity required for sustainable development. In practice, everything depends on whether we view humans as controlled by others, or controlled from the outside (learning and socialization dogma), or alternatively as self-directed or controlled from within (personality), and on the attitude we take towards human beings in accordance with that view (Meyer-Abich 2012). The way we seek to exert political influence on them also depends on that view.

*Values* are perhaps the most complex psychological dimension because they are always a conglomeration of emotion, reason and behavioural disposition. They arise ‘passivistically’ through the experience of things, people, situations (Joas 1999; 2006). Values form the core of intrinsic motivation, i.e. of the personality. They are of particular importance for sustainable development, as they reach out beyond the present; they constitute a guideline for action even in new, unpredictable situations. It is possible to distinguish between ‘lower’ and ‘higher’ values. Having food every day, having a roof over one’s head and security are certainly very practical fundamental values. The basis of such values, but also of social ones, is given

by natural needs, as represented in Maslow's hierarchy of needs (physiological, safety, social relationships, esteem, self-actualization, Maslow 1943, 2016 [1954]; see also Heinrichs 2007, p. 182 ff.). The need for contact with nature has now been added (Gebhard 2009; Eser 2012; Skidelsky & Skidelsky 2013; Nussbaum 2014 [1999]). According to Skidelsky & Skidelsky (2013), basic human needs (for basic goods) must be clearly distinguished from wants, which can be artificially produced through indoctrination (advertising, unconscious learning, etc.) (▷ Chapter 2.2).

Certain values can be elevated at the societal level to the status of social, ethical or legal norms (e.g. the statutory obligation to provide emergency aid, caring for family members, or the prohibition against killing). Legal and social norms, in contrast to values, do not require an inner conviction on the part of individuals, and in fact can if necessary be enforced on them against their convictions. With regard to sustainable development, in the interests of the conceptual transformation now being widely called for, it might be worth asking whether the values currently propagated in politics and the public sphere are actually fit for such a purpose. The values of profit maximization, growth and perhaps also fundamental competition are unlikely to be found conducive to this goal (see Bateson 1970; Meadows & Seiler 2005). An appreciation of nature, however, requires emotional experience (Gebhard 2009; Jung 2012 and others).

*Ethics* must, if possible, be comprehensible to everyone and able to hold out the prospect of a good life. For example, people striving for sustainable development consider it unethical to ruthlessly decimate natural diversity (including resources) through the maximization of economic interests and excessive consumerism, thereby leaving behind a poorer world to our descendants. Immanuel Kant formulated as a (socio-)ethical maxim (the 'categorical imperative') that one should act as one would like others to do (Kant 2011 [1788]). Since this does not address the future consequences of one's own actions, Hans Jonas saw the need for a new 'ecological imperative': 'Act so that the effects of your action are not destructive for the future possibility of such life' (1984, p. 11). Building on this, the maxims identified in the wake of the 1992 UN Conference in Rio as promoting sustainable development were (distributional) justice, connect-

edness, moderation/sufficiency, preservation and enhancement of diversity and humility/frugality (Brown & Quiblier 1994). The 'intrinsic value of nature' (Gorke 2010) is therefore part of an ethics of sustainability. In stark contrast to this, the deadly sins identified by Pope Gregory I in the 7th century—greed/avarice, gluttony, envy, pride, lust, wrath (aggression) and sloth (acedia, or 'coldness of feeling')—have become socially acceptable in today's unsustainable society as a result of an unquestioned and unfettered liberality.

In modern society, our evolved pro-social disposition towards conformity and our openness to indoctrination (Lorenz 1973) has a flip side: we can be seduced by the power of opinion. For that reason, the idea of clearly distinguishing human (basic) needs from desires that can be artificially created through advertising, ready availability, fashion, etc. (Skidelsky & Skidelsky 2013) is a promising one for the sustainability debate. We should rely above all on our social intelligence, which has enabled us to form complex social systems that help us to keep our immediate instincts in check and to tame the chimpanzee-like aggression within us. This applies to groups of a manageable size. However, it is quite understandable that reciprocal altruism (which in tribal societies means, 'if I do something for others, I will probably get something from them in return') has weak biological drivers in an anonymous global society, because the corresponding biological behavioural disposition originally arose within tribal societies where, firstly, everyone knew each other (connectedness through acquaintance) and, secondly, everyone lived in a particular place, so that regular personal encounters were unavoidable. This is why others advocate not merely arguing on idealistic grounds that there is a moral obligation towards altruism (self-sacrifice for others), but also emphasizing the link between altruistic behaviour and beneficial 'rewards', i.e. the promotion of one's own interests (narcissistic gratification) (Mohrs 2002). The task of striking a balance between altruism and egoism with regard to sustainability is certainly a tricky one.

Social systems and cultural evolution enable us to make the best possible use of our ability to adapt and to learn, and of our 'civilizability'. However, our socio-culturally moderated reason is fickle; it is not firmly attached, and a relapse into barbarism is therefore possible at any time (see Welzer 2008). For that reason, these social systems have to be carefully nursed. They can arise spontaneously and become self-organizing,

Counting  
on social  
intelligence

Civilizability  
and political  
systems

but some are also deliberately created to serve a purpose. The history of humankind shows the development of ever more complex social systems on ever new levels nested within each other. From the level of simple rival hordes, socio-political evolution led via feudalism and empires to states and organizations marked by high levels of solidarity and cooperation. The more cooperatively the different social systems interact, and the better the balance between vertical and horizontal complexity (▷ Chapter 1.3), the more opportunities there are for rules and policies that promote sustainability. So even though it is possible for complex democratic systems to organize the unsustainable and radically marketized exploitation of resources without regard for the big picture (as can be observed in the current Western states), it is pluralistic systems that remain far more likely to have regard for many more aspects and to develop the appropriate checks and balances<sup>1</sup> (▷ Chapter 4.2). It is no coincidence that movements for democratization and ecologism often go together. It may be concluded from the above that a high degree of self-determination within territorial groups (municipalities) would be a good model for the future of social organization.

States –  
a curse and  
a (potential)  
blessing

In ideal state social systems, on the other hand, there is the potential for arriving at an appropriate balance between the creation of individual freedom and the maintenance of the integrity and functionality of the higher-order social and environmental systems. This balance, however, does not arise automatically, in and of itself; rather, it must be permanently supported by a narrative (i.e. meaningful and orientational story motifs). All experience shows that higher-order systems which organize morality and ethics (such as, traditionally, the churches) can be very powerful. They can function as counterweights to a one-sided focus on selfish profit maximization, organizing approaches based on collective altruism and acting as a 'social glue'. The creation and maintenance of appropriate contemporary systems that can bring out and promote the best in us is therefore indispensable. In contrast, the prevailing radicalized market ideology (Randers & Maxton 2016), which assumes that the individual satisfaction of needs and wants in free markets is the best engine of development, promotes our worst qualities: avarice, profit maximization and the accumulation of status symbols, regardless of the cost (to others).

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1 E.g. state separation of powers, bicameral parliaments, decentralization/federal structures, appellate jurisdiction systems.

We humans are creatures with two faces—accordingly, we will only achieve sustainability if we acknowledge our evolutionary heritage and develop a realistic view of human nature. Skills for sustainability—such as foresight and proactive behaviour, i.e. the ability to develop and incorporate scenarios into current decisions, and the ability generally to think in a fair and moral way—are developed when people are able to live in free, balanced and just systems—in other words, when they are able to be truly human. Human beings had developed a deep insight into the structure of nature and the consequences of human intervention by the time of the Neolithic Age, if not before. This created the possibility of living sustainably in and with nature through awareness of natural processes. This provides us with a key thesis:

Humans are naturally endowed with behaviours and thought patterns that enable careful and ‘sustainable’ ways of interacting with their equals and the environment, they are fundamentally ‘capable of sustainability’, especially if their external living conditions allow it. Their pronounced capacity for cooperation belongs as much to the set of typical human qualities as does their ability to empathize, the capacity to make external reality into an object of thought and to develop theories, and their pronounced ‘self-awareness’, the ‘animation of the mind’ (Scheler 1978) or the resulting capacity for ‘self-objectification’ (Gritschneider 2005, p. 112 f.).

People are able to inhibit their urges and to make objective, informed decisions. They can therefore also develop and apply an ecosystem ethics (▷ Chapter 4.1). At the same time, it is important to bear in mind a well-founded environmental psychological observation, namely that rational insight (knowledge) alone produces neither a change in attitude nor a change in behaviour (see Jung 2015) (▷ Chapter 2.1). Without motivation firmly based on emotion and fundamental beliefs (intrinsic motivation), the corresponding ethics and behaviour will be on a weak footing.

The solution lies in our nature. We just have to recognize it—and cultivate it. Is the sustainability revolution on its way? Only if we can think it into being, if we want it, and if we start it.

The term 'sustainability' is on everyone's lips, but nevertheless we struggle to transpose the idea into our economic and social structures. This book aims to provide an overview of the relevant discourses, but also — and above all — a stimulus for fresh thinking, with new suggestions for the defence and further development of the concept of sustainable development. It addresses the position of humans in the global (eco)system, and it interprets and applies sustainability as a multi- and inter-disciplinary concept. It is concerned as much with problem analysis as with proposed solutions and with the necessary conditions for sustainable development. The Eberswalde University for Sustainable Development (EUSD) is committed to a comprehensive implementation of sustainability, in all its complexity, in teaching, research, knowledge transfer and operational practice. It was the first German university to develop and implement, in a wide-ranging participatory process involving all staff and students, a detailed programme of sustainable development, and is considered a pioneer in this regard among German higher education institutions.

This textbook has grown out of a foundation course lecture on sustainable development at the Eberswalde University for Sustainable Development. The editors conceived the book from that starting point and developed and elaborated it with the help of many colleagues.



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