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Factfulness Sustainability

What you should know about Ecological Crises and Resource Consumption

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Preface to the English Edition

This book was first published in German a year ago, in March 2021. From the start, however, it was written and intended for an international audience, and so I am very glad that it is now available in English.

As two years have passed since I finished the original manuscript, I have updated the figures and conclusions, where applicable, with the latest available information. It was quite interesting to see that all major ecological trends described in this book are corroborated by these new data.

With this presentation of the essential facts about the main sustainability issues of our time, for the world as well as for the USA and the EU, I hope to achieve two goals:

- Correct the distorted and gloomy picture constantly conveyed by most media on these issues – the future here is much brighter than you might think.
- Convince the reader that economic development, higher living standards and market economies are not the problem (as often suggested), but rather part of the solution – also, and in particular, with respect to changing our energy systems to CO_2-free energies in the next decades.

If my work contributes just a tiny bit to a more rational, fact-based view of the world, I will be greatly rewarded.

It is a pleasure to thank Springer-Verlag and especially Margit Maly for making this English edition possible.

Gernsheim
Hessen, Germany
April 2022

Thomas Unnerstall

Preface to the German Edition

The story of this book begins in a train station-bookstore in November 2018. I just want to take a quick look to see if there are any new books on energy transition/climate protection (the topic I have mainly written about up to now), but then a title catches my eye: "Mankind is abolishing itself." "What a statement" I think to myself and take a closer look. It's by Harald Lesch, a well-known scientist, and it's about humanity's consumption of resources, about global ecological crises, about climate change. The cover is emblazoned with a red sticker: SPIEGEL Bestseller. Enough arguments to buy the book.

A few hours later, I'm sitting in the train, reading sentences like "Excessive resource consumption in Germany," "We're fishing the seas empty," "The planet is dying of thirst," "The rainforest is burning" – and I start to have doubts. Why do I doubt? First, the author's arguments for these far-reaching statements seem to me to be incomplete and unsystematic; second, I have recently read another book ("Dare the future" by M. Horx) which is much more positive about the future relationship between man and nature. "Now, who is right?" I mutter to myself. Over the next few weeks, the decision matures in me to actually get to the

bottom of this question: What is the real state of our planet, how serious are environmental damage and resource consumption by humans – judged as systematically as possible and strictly on the basis of all available facts? Do we need the "radical change" that H. Lesch calls for in his book and that many other authors call for?

Of course, I did not realize at the time what this undertaking actually entailed, that it would take up the next two years of my life. But I have not regretted the decision. It was always exciting to pin down and understand the relevant data and contexts behind the questions at stake: "How much iron has mankind consumed so far, and what percentage of total iron stocks is that?"; "To what degree is future food production really threatened by soil erosion?"; "How has species extinction developed in recent decades?"; "What does the 'ecological footprint' of mankind actually mean?"; "Would it be sustainable if every human being consumed as much energy as we do in the West?"; and many more. And there were many surprises: Often, when all the facts were on the table in front of me after weeks or months of research, I found that the data yielded a completely different picture than the one given or at least suggested in most media (and partly in H. Lesch's book) about the respective question.

The book you are holding in your hand (real or via screen) is the result of this path. I am looking forward to your judgement.

* * *

My first thanks regarding this book must go to the inventors of the Internet. It would have been practically impossible to write such a book 30 years ago: The necessary data, statistics and research results (if available at all) would have been buried in individual libraries around the globe, almost

impossible to find … a hopeless undertaking. Today, in principle, any person – completely independent of social circumstances, of his or her culture and religion, of origin and gender – with Internet access and enough time can write such a book; all relevant databases, reports and scientific articles are available online. (We can be curious what effects this fantastic availability and thus democratization of almost the entire knowledge of mankind, unimaginable only a few decades ago, might have in the next decades.)

I would like to express my sincere thanks to my friends Ulrich Parlitz, Manuel Rink, Annette Schild and Corinna Spott, who critically read the manuscript and greatly enriched it with numerous hints, suggestions and objections. Ulrich Dieckert, Jessica Korth and Harald Notter also helped me in developing my thoughts.

Finally, a big thank you is due to Barbara Lühker and Margit Maly for the trustful and constructive cooperation with Springer-Verlag.

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Thomas Unnerstall

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Introduction

On July 28th, 2022, the time had come once again: "Earth Overshoot Day" 2022 was proclaimed. Every year, "Earth Overshoot Day" is the day on which humanity – according to the generally accepted concept of the "ecological footprint" – has used up the Earth's resources allotted to it for the year. From that day on, the statement goes, humanity lives ecologically "on credit," plundering the planet in an unsustainable way. Or, to put it the other way around: humanity would need 1.8 Earths to maintain its current level of consumption in the long term, and the trend is rising. The situation is said to be even worse with regard to the Western way of life: by the same token, the USA would need five Earths, the EU countries still three.

Figure 1.1, which illustrates this statement, has been printed countless times in the world's media: it shows that, already since 1970, there has been this "overshoot" of human consumption over the sustainably available resources of planet Earth. So far, so clear.

Really?

Take a closer look at this figure. The picture is clearly dominated by the red area, which stands for CO_2 emissions. Quite obviously, the whole problem of greenhouse gases and climate change plays a major, even a decisive role in the aforementioned statements. Taking *this* ecological

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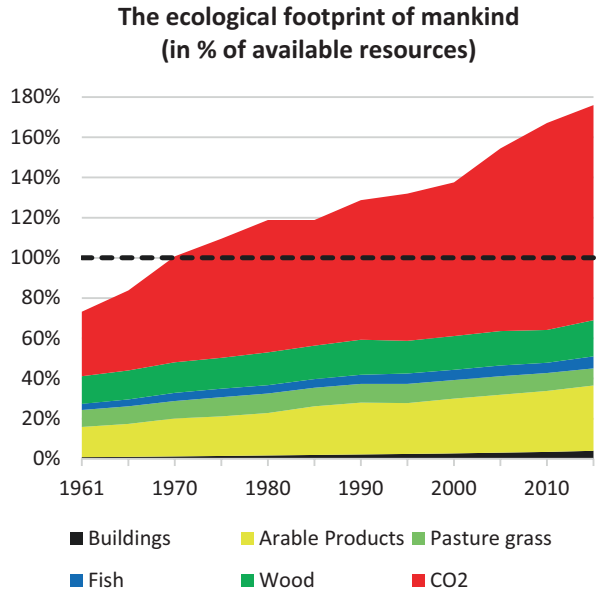

Fig. 1.1 Humanity's "ecological footprint" as a percentage of the Earth's available renewable resources (the so-called "biocapacity"). The more precise definitions are explained in Chap. 11. (Sources: Global Footprint Network, own calculations)

issue out of the picture, we look at Fig. 1.2, the so-called "non-energy" ecological footprint of mankind.[1]

This figure now says something completely different: The resource consumption of mankind with regard to arable land, pasture land, fishing grounds and forests is actually fine: we consume less than 70% of the available resources of the planet. What's more, even in 2050 – when there will be almost 10 billion people – humanity will most likely not consume more than 80% of these available natural resources[2]; except for the issue of CO_2 emissions.

[1] I adopt this notion from Randers (2012).

[2] See Chap. 11 for the explanation.

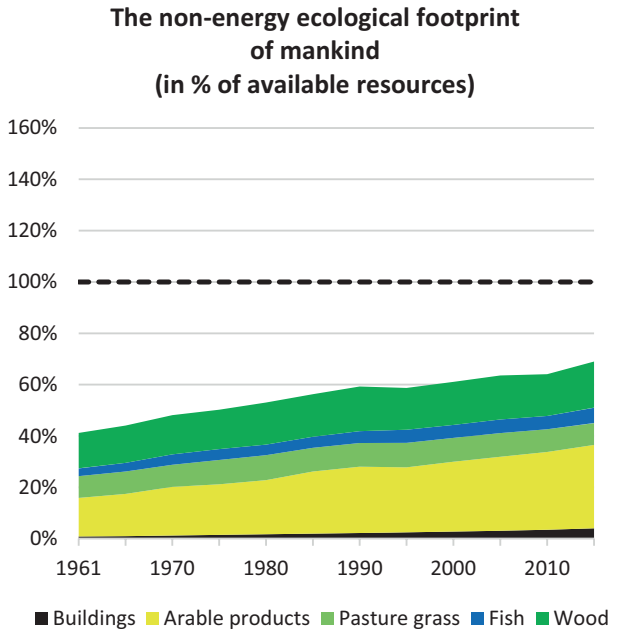

Fig. 1.2 The "ecological footprint" of humanity, as a percentage of the Earth's available renewable resources, excluding the carbon footprint. The more detailed definitions are explained in Chap. 11. (Sources: Global Footprint Network, own calculations)

This question "Really?," that is, a second and sobre look at the numerous statistics on today's global ecological hotspots – often referred to as "ecological crises" – is the **core of this book**. Just as it is worth questioning the headline

"Humanity consumes 1.8 Earths",

it is worth taking a closer look at the equally common headlines (as a selection):

"Rainforests are disappearing at a breathtaking rate"

"Humanity is causing the sixth mass extinction in Earth's history"
"By 2050, there will be more plastic than fish in the world's oceans"
"In the next decades, drinking water will become scarce"
"The earth's raw materials are running out"

That is precisely what I will do in this book, often with surprising results. I will discuss the essential ecological issues that have been on the agenda in the last decades at the relevant global institutions – organizations of the UN; internationally active NGOs like Greenpeace, WWF, IUCN; international think tanks and others – as well as in public debates and in the media.

In doing so, I will not present any new data or scientific findings on the ecological state of the Earth. The methodological approach is rather to look at the existing data and graphics more closely and neutrally than is usually done, and to put them into the right context. In this way, piece by piece, the book sketches a new picture of the impact of man on nature, of the Earth's available resources for the world economy and world consumption, and of the development of ecological hotspots up to 2050. It is a picture rather different from the one we all regularly get from the media.

The **second intention** of this book also suggests itself from the comparison of Figs. 1.1 and 1.2. CO_2 emissions and the global warming they cause clearly dominate humanity's ecological footprint; and climate change has also dominated the socio-political discussions about (ecological) sustainability in our time for a number of years now. Indeed, there is rare unanimity – at least in terms of understanding and declarations of political goals – among almost all the world's governments: climate change is an absolutely serious, very urgent challenge for humanity.

I am convinced, and assume in this book, that this assessment is true. Against this background, the book explores the question of how serious and how urgent, *compared to climate change*, the other sustainability issues really are – resource consumption, scarcity of raw materials, species extinction, rainforest deforestation, plastic waste. Do they also threaten our livelihoods to a similar extent?

To put it more boldly: Are all of these problems more or less equally bad, and are we therefore doomed, heading toward ecological catastrophe one way or another in the course of the twenty-first century? Or are there essential differences and, consequently, essential priorities for action?

The book provides a clear answer to this question.

In the debates about the impact of human life, economy and consumption on ecosystems and thus also on our own livelihoods, the focus is often on **the West**. The Western countries – primarily the USA and the European Union (EU) – are often said to be the main culprits for the irresponsible exploitation of nature. The capitalist, profit-oriented economic system, the excessive, ever-increasing consumption, and in the end the entire Western lifestyle – these factors are alleged to have led to the ecological crises of the present and to be incompatible with a sustainable way of life that respects ecosystems, animals and plants. This then results in the claim that a "great transformation" is indispensable[3] – in other words, a fundamental reform of our way of doing business, consuming and living.

Similar to the above-mentioned headlines about rainforests, species extinction, plastic waste, and raw material shortages, this narrative has become engrained in the consciousness worldwide – and especially in the minds of many of those who follow current events closely, read books like

[3] Cf. Schneidewind (2018).

this one, and are concerned about the future of our children and grandchildren.

The **third intention of** the book is to ask, again, "Is this really true?" Do the relevant scientific findings, data, and statistics really allow us to draw these conclusions? In order to answer this question, for every topic I will present not only the relevant global data, but also the respective figures related to the West, more specifically to the U.S. and the EU combined.[4]

The **structure of** this book is different from usual: I put the main conclusions at the beginning.

Thus, Part I consists of three theses, which I substantiate on the basis of a summary of the following parts II to IV. They answer the following questions:

- What are the priorities for the global ecological problems?
- Is the Western economic system and way of life really "unsustainable"?
- What is the record so far with respect to the political and social efforts to improve the environment?

Part II then deals with the biological foundations of human existence on earth. Here, the focus is on the question of whether enough arable land, food and drinking water are available for a growing world population.

In Part III, the essential building blocks for human economic activity on the planet are scrutinized: energy and raw materials. Global consumption of oil, gas and coal, as well as iron, copper, aluminum, phosphorus and others, has exploded in the last 50 years. Will we soon reach "the limits of growth"?

[4] Of course, it would have been possible to present the data for the USA and for the EU separately. I have refrained from doing so in order not to add to the already considerable density of information. All data on the EU refer to the EU of 28 countries, i.e., including Great Britain.

Finally, Part IV is devoted to the central ecological hotspots (with the exception of climate change) that have been in the focus of world attention for the past 20–30 years:

- humanity's ecological footprint,
- biodiversity and species extinction,
- forest loss/deforestation of rainforests,
- plastic waste in the world's oceans,
- dead zones and P/N cycle,
- pollution by harmful substances.

For each of these issues, I present the historical development over the past 50–60 years, the status quo and the expected development in the next decades. Each chapter here concludes with an assessment of the long term impacts on our planet's ecosystems and on the livelihoods of future generations, often also addressing the effects of climate change.

The whole book solely rests on information, data, and research available online. Most of the chapters are based on reports and/or databases of international organizations: FAO, World Bank, UNEP, IUCN, Global Footprint Network, World Wildlife Fund, World Steel Association, etc. From time to time, I have also made use of websites that provide the public with information that has already been prepared, e.g. www.worldometers.info and www.ourworldindata.org. Not infrequently, it was also necessary to include the relevant research literature in order to complete the overall picture with current findings or additional contexts. The numerous illustrations are based throughout on the figures and data from the sources indicated in each case; however, in most cases these have been newly compiled and categorized ("own calculations").

With this book, my aim is provide an overview of the status, perspectives and importance of the central ecological hotspots of our time in an easily accessible form. The structure, language and style of the book have been chosen to meet this goal:

- Each chapter focuses on the (in my view) most important aspects and contexts of the topic in question. To do this, it was necessary to simplify complex issues considerably and to dispense with many differentiations that might be important or even indispensable from the point of view of a particular expert.
- In many cases, more detailed figures or additional aspects have been relegated to the footnotes. You can therefore decide for yourself to what extent you wish to take in this additional information.
- All figures are generously rounded to promote a focus on the essentials and quick comparisons. The appropriate markings ("circa," "roughly," "around") have often been omitted.
- In the so-called "excursions" I have deepened the topic of a chapter by means of an example or an aspect which seemed to me to be particularly concise or impressive. However, they are not necessary for understanding the main text.

A well-founded overview of ecological sustainability in this first half of the twenty-first century on about 250 pages – in view of the abundance of relevant topics, this is only possible if one restricts oneself to the essentials, to overarching statements and assessments. Conversely, this means that I was forced to leave many important aspects unmentioned: particular grievances, local developments against the general trend, personal fates of affected people.

But "leaving unmentioned" does not mean "ignoring" or "dismissing as negligible." If, for example, I assert an overall positive development for a certain problem on the basis of the relevant statistics, this does not mean that I deny existing negative tendencies. It only means that, according to the available data, the positive tendencies for this issue predominate. To state a positive development also does not mean to tacitly accept the remaining shortcomings – it can rather help to direct the focus of action to these very grievances.

The book is written in this spirit.

Part I

Three Conclusions

2

The Most Important Challenge Is: Switching from Fossil to CO_2-Free Energy Sources

A Dream

Let us dream for a moment at the beginning of this book. We are entering a fictitious world that differs from our real world only in one – but, as we will see, quite decisive – point: In this world, the problem of climate change does not exist. And it doesn't exist because mankind began to seriously curb CO_2 emissions 20 or 30 years ago, so that global warming has been limited to about 1 degree Celsius.[1] In this fictitious world, what are the future prospects up to 2100 (it is hardly possible to look further in a substantiated way) for the planet's ecosystems and for the foundations of human life and economic activity?

To answer this question, I will first briefly summarize the chapters of Parts II-IV, i.e. give an overview of the future projections derived there (cf. Figure 2.1).

[1] Example: If between 2000 and 2010 the large increase in CO_2 emissions (about 10 billion tons) had been avoided by the use of PV, wind and nuclear energy instead of coal in electricity generation, and emissions were reduced to zero between 2010 and 2040, humanity would have emitted as much CO_2 on the whole as it has in reality to date. Such a scenario would have been feasible at relatively limited financial cost.

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