6. Thinking of children and grandchildren. Sustainability as intergenerational justice

In the preceding chapters, we have laid the foundations for a Christian Creation ethic. At the same time, it was clear from the first chapter that the enormous dominance of the economy must not be overlooked if real solutions are to be found. So how can the insights gained from environmental ethics be transferred to economic and social concepts? How can we succeed in combining environmental and economic policy? Since the 1980s, this question has been answered by the concept of sustainable development. In a good three and a half decades, it has become very popular and has spread worldwide—but at least in the ecological field it has not yet had much effect. Perhaps these two observations are more closely and deeply connected than one might think: Is the reference to sustainable development perhaps so popular precisely because the concept is dazzling and everyone can extract from it what suits him or her?

As will be shown, there is some truth in this assumption. Nevertheless, Markus Vogt is right when he classifies the principle of sustainability as a "'missing link' between faith in Creation and the social discourse on environment and development" (Markus Vogt 2016, 132). For the faith in Creation needs translating into the structural logic of society, politics and economy. Conversely, social structures need a depth dimension in order not to fall into a "flattening into mere management rules" (Markus Vogt 2016, 132).

Not only does the sustainability principle act as a link between faith and society, but also between the economy, ecology and social issues, as well as between ethics and politics. Basically, the sustainability principle is the link between the most diverse social subsystems, scientific discourses and ideological convictions. Everyone can agree on the principle of sustainability. However, links are not easy to grasp. That is why in the following chapter I will look at the history and content of the concept of sustainability in order to then explore its concreteness for climate protection, biodiversity conservation and population policy. Finally, it can be stated more precisely what significance sustainability can have in the overall context of a Christian Creation ethic.

6.1 History of the concept and idea of sustainable development

To begin with, the history of the concept and idea of sustainable development should be outlined (cf. e.g. Helga Eblinghaus/ Armin Stickler 1996, 37–47; Hans J. Münk 1998; Markus Vogt 2009, 110–133 and most recently Ben Purvis et al. 2019). "Sustainable development", sometimes also translated as "future-proof" or "permanently environmentally sound development", contains two elements of very different origin:

Sustainability (German Nachhaltigkeit) is a term originally used in general language that became established as a terminus technicus in German forestry in the second half of the 18th century (Herbert Killian 1994). The background to this was the devastating overexploitation of forests in the 16th and 17th centuries, caused by the extreme expansion of salt, metal, porcelain and glass processing, which at that time still had to satisfy its enormous energy needs largely with wood. German forests were "fairly filled with bare patches" (Hans Carl von Carlowitz 2013, 113). This catastrophic damage to the economic basis of the burgeoning industry that accompanied the overexploitation and destruction of the forests coincides in terms of the history of ideas with the Enlightenment's claim to want to ensure humanly comprehensive progress through long-term and sensible planning.

In this sense, the Saxon chief miner Hans Carl von Carlowitz (1645 Oberrabenstein–1714 Freiberg/Saxony) asks in his work "Silvicultura oeconomica", published in 1713, "how to achieve such conservation and cultivation of wood / that there is continuous, constant and sustainable use / because it is an indispensable thing / without which the land may not remain in its esse [= being]." (Hans Carl von Carlowitz 2013, 9 and 216) Sustainability here is a forestry concept intended to ensure the lasting economic use of the number one energy resource. At the same time, however, Carlowitz is driven by a strong religious, pietistic motivation (cf. Joachim Hamberger in: Hans Carl von Carlowitz 2013, 45): the first words on the title page of the book are "with God" (Hans Carl von Carlowitz 2013, 93), the first letters of the preliminary report "B.C.D." (Hans Carl von Carlowitz 2013, 97), i.e. "bono cum Deo", "with the good God"[17]. God himself is mentioned 130 times in the text of the book (Joachim Hamberg-

17 Joachim Hamberger (in: Hans Carl von Carlowitz 2013, 45 footnote 196) translates the expression as "on good terms with God", but this fails to recognise the inversion common in Latin. The phrase "bono cum Deo" was an established idiom after the time of Renaissance humanism.

er, in: Hans Carl von Carlowitz 2013, 45). Above all, however, after a brief description of the situation, Carlowitz immediately turns to the question of "special respect for forests and trees" in the second chapter of the book (Hans Carl von Carlowitz 2013, 114–126). Carlowitz demands this respect by referring to pagan cults, but also to Greco-Roman philosophy and the Bible. He is aware that an approach oriented purely towards economic benefit is hardly sufficiently motivating to manage forests sustainably.

Carlowitz's solution to the problem of sustainability in a forest is comparatively simple: the utilisation rate, i.e. the amount of wood removed from a forest, must not exceed the regeneration rate, i.e. the amount of wood that grows in the same period. Despite this simple and plausible consideration, it took a long time for the concept to spread. In the end, its road to success only began when, thanks to the spread of the railway, hard coal could be transported over long distances and subsequently replaced wood as the primary energy source (Herbert Killian 1994). At this time, namely during the Romantic period, people began to rave about German forests and to ascribe aesthetic and spiritual values to them beyond economics. As a result, the ecological dimension of sustainable forestry also gained more attention. During his visit to the forestry faculty in Tharandt/Saxony, the American eco-pioneer Aldo Leopold (cf. chapter 5.4) finally got to know the concept.

Development, the second paradigm, has conquered economics, sociology and biology, and from there most other branches of science, especially since the 19th century. Charles Darwin's theory of evolution, for example, would be inconceivable without thinking in terms of development. As a rule, the term is understood in an optimistic, linear way and uncritically interpreted as development for the better. It also leads to a one-dimensional understanding of development as a purely economic and technical variable. Beyond these examples of one-sidedness, however, the paradigm of progress can guide action in a positive way. At any rate, this is the idea behind Paul VI's 1967 encyclical "Populorum progressio on the development of peoples", which critically interprets the idea of progress and development, breaks down its economic, materialistic and Eurocentric limitations, and calls for holistic human development (PP 14; 34).

In the 1970s, a transfer of the two concepts of *sustainability and development* took place, which aimed to make them jointly fruitful for the challenge of global environmental problems. In June 1972, the "UN Conference on the Human Environment" convened in Stockholm, the first world summit dedicated to ecological issues. Its basic idea was to make the desired development of the poorer countries environmentally

friendly. A quarter of a year earlier, in March 1972, the Club of Rome had presented its study on the future of the world economy, prepared at the Massachusetts Institute of Technology, entitled "Limits to Growth". The term "sustainable" appears in it a total of seven times (Donella H. Meadows et al. 1972, 24,157–158, 165, 168–169). The study hit the entire Western world like a bomb and created a snowball effect (Ben Purvis et al. 2019, 682). Thus, as early as 1974, the World Council of Churches' commission "The Future of Man and Society" spoke of the goal of a "just, participatory and sustainable society" (Markus Vogt 2009, 25, 180–181).

With the so-called Brundtland Report "Our Common Future", published in 1987 by a UN commission chaired by Norwegian Prime Minister Gro Harlem Brundtland, the concept of *sustainable development* established itself as the central paradigm of the environmental debate. Sustainable development is a formulaic compromise that bridges the very contradictory views of the eleven members from industrialised and developing countries respectively. Its approach is based on the realisation that only an economic and social order that is oriented towards international and intergenerational justice and takes into account the finiteness of nature is sustainable. Although the solution to the problem was, at most, rudimentarily considered in the report, the perception of the problem was conceptually fixed and a paradigm shift in environmental and development policy was initiated. From then on, the two fields belonged inseparably together.

The *ecumenical assemblies of the conciliar process* in Dresden and Basel in 1989, which took place a little later, explicitly cite the Brundtland Report (EAD 10/(1), (7) and (23) as well as EAD 11/(10), EEA 87d and j). However, while Dresden uses the Brundtland Report from the beginning as one of the supporting bases of its analyses and approaches to solutions, in Basel the report was only introduced into the final text at the last moment, which prevents it systematically penetrating environmental ethical reflections from the idea of sustainability. In the ecumenical assembly of Stuttgart in 1988, the term sustainability is not used, but the idea of sustainability runs like a thread through the document. Sustainable development thus became the guiding principle of Church statements as late as in the 1980s, shortly after the publication of "Our Common Future", which is a sign of its resounding impact.

The Brundtland Report clearly understands sustainable development as development with economic growth (cf. chapter 8.4). For poorer countries, this is understandable and probably also correct, but it is understood globally in the report. It says: "What is needed now is a new era of economic growth—growth that is forceful and at the same time socially

and environmentally sustainable." (United Nations 1987, 7) Because of this growth orientation, the World Council of Churches has withdrawn from further sustainability discourses (Markus Vogt 2009, 162). This is because a decided orientation towards growth runs diametrically counter to the original idea that sustainability means the recognition of "limits to growth". "Instead of suggesting a society should live within limits, the term 'sustainable' now calls for evading limits, making economic growth sustainable." (John B. Cobb 2005, 1613)

At the *UN Conference on Environment and Development* (UNCED) in Rio de Janeiro in 1992, sustainable development was further upgraded: Agenda 21, which was adopted there, elevated the concept to a central political guiding principle, which is now also considered a *solution approach* and is to encompass all policy areas as a cross-cutting issue. Not only is environmental and development policy to be placed under the guiding idea of sustainable development, but so is policy as a whole. This is a qualitative redefinition and not only a quantitative expansion of the concept (Hans J. Münk 1998, 234). The ecological question is taken out of its isolation and embedded in an overall concept of ethics or politics.

More than twenty years after Rio, the term and concept of sustainable development were incorporated so naturally into Pope Francis' 2015 *encyclical Laudato si'* that no major explanations are needed. The Pope intends "to bring the whole human family together to seek a sustainable and integral development" (LS 13; cf. also LS 18; 52; 102; 207). Such a development includes, on the one hand, the integration of ecological concerns into social and economic processes (LS 141 with reference to Principle 4 of the Rio UNCED) and, on the other hand, "solidarity between generations" (LS 159; 192). A special concern of Francis is sustainable agriculture (LS 164; 181) as well as the "sustainable use of natural resources" (LS 191; 140). Contrary to the "great acceleration" (cf. chapter 2.6), sustainable development can sometimes mean a deliberately slowed down development (LS 193). Finally, a few months before the climate conference in Paris in 2015, the Pope urges us to finally implement the impulses of the UNCED in Rio (LS 167; 169). By taking up two principles from Rio, Francis fully joins the concern of the international community in terms of content (LS 141 cites Principle 4, LS 186 Principle 15). From the highest level, the Church is (finally!) joining the great alliance of governments, non-governmental organisations and societies forged in Rio.

The idea of so-called "*Sustainable Development Goals*" (SDGs) was conceived at the Rio+20 Conference in 2012, and the "2030 Agenda for Sustainable Development" was adopted at a UN summit at the end of

September 2015. All 193 member states of the United Nations committed to working towards achieving the 17 SDGs with a total of 169 targets by 2030. Measuring instruments are to continuously map the progress of the individual countries and make it verifiable. In principle, this is a progress. However, the 17 goals and 169 sub-goals are not only confusing, but also have a considerable bias in favour of economic and social sustainability and against environmental sustainability. This is exacerbated when one analyses the prioritisation of the goals, which corresponds to their numbering: ecological sustainability comes into play for the first time under Goal 6 "Clean Water" and Goal 7 "Clean Energy"—two environmental goals that are clearly anthropocentristically conceived in the targets. Climate protection as a concern that can be interpreted either anthropocentristically, biocentristically or ecocentristically is far back in the catalogue as Goal 13. And the only two decidedly biocentristic or ecocentristic goals 14 "Life under water" and 15 "Life on land", which address non-human life, are almost at the bottom of the ranking. Only Goal 16 "Peace, justice and strong institutions", which is most contested between rich and poor countries, and Goal 17 "Partnership for the Goals", which is inevitably in last place for formal reasons, are still behind.

So far, there has been no profound scientific reflection on the rationale and architecture of the 17 goals. The scientific community has jumped on the SDG bandwagon very pragmatically (in part also imposed from above or lured with research funds) and uses it to fund research projects for the implementation of individual sub-goals, but does not question their overall architecture and the guiding vision of the 17 goals. This is a glaring deficiency seven years after their adoption. The evaluation of the SDGs poses a classic dilemma for environmental ethics: if it is too negative, it will contribute to the non-implementation of the goals, which no one can wish for. If it is too positive, it will help to cement ecological underexposure. Of course, it is good that a way has finally been found for all nations to work together on meaningful goals and hold each other accountable, but ecologically, the SDGs are very deficient. It will be necessary to examine how far this is due to the overall concept of sustainable development, which will be subjected to systematic reflection in the following section.

6.2 Systematic reflection on the concept of sustainable development

How can the concept of sustainable development be defined more precisely in terms of content? We can by no means trace here the highly complex

and extraordinarily multidisciplinary discussions that have taken place since 1987. In them, scientific, technological, economic and social options merge into an amalgam, the presentation of which would far exceed our scope. Thus, only a few core elements and options can be pointed out and discussed.

Four problems arise with the extension of the forestry sustainability concept to the earth's ecosystem (Hans G. Nutzinger 1997, 273–274):

1) With regard to *fossil raw materials*, it is impossible in the short and medium term to realise sustainability as defined by Carlowitz, because this would entail the total renunciation of these resources. This is because fossil raw materials grow so slowly that their rate of use would have to be zero.
2) The concept of sustainability in forestry refers to a single raw material: wood. At best, it will be differentiated according to different types of trees and wood. If sustainability is to become an overall concept in dealing with the earth's ecosystem, however, one has to deal with an *infinite number of different raw materials.* At the same time, the complex material interactions must be taken into account: There are considerable feedback effects between individual ecological systems via water, soil and air. Moreover, the different raw materials can be substituted for each other to some extent. As a result, the concept of sustainability loses its simplicity as well as its precision.
3) In addition, the *interactions of different actors* need to be considered. Assigning responsibility for global environmental degradation is extremely difficult. While a forest is private property and the responsibility for its sustainable use can be assigned to the forest owner, the goods of a healthy environment are almost exclusively public goods. They belong to everyone, and everyone shares responsibility. This, however, makes the attribution of responsibility difficult (cf. chapter 8.1).
4) While Carlowitz conceived the sustainability concept in purely economic terms and ecological and social consequences came into view only in this perspective, i.e. indirectly, the *expansion of the sustainability concept* goes beyond the purely economic framework. Ecological and social aspects come into view as independent perspectives for their own sake and demand a solution. This raises the question of how the three dimensions of the economy, ecology and social affairs relate to each other.

To see the term sustainability as "a landfill for all ecosocial wish lists" (Robert Goodland/ Herman Daly 1996, 1002) does not seem entirely absurd. Some scholars recognise an oxymoron, a contradiction in terms in

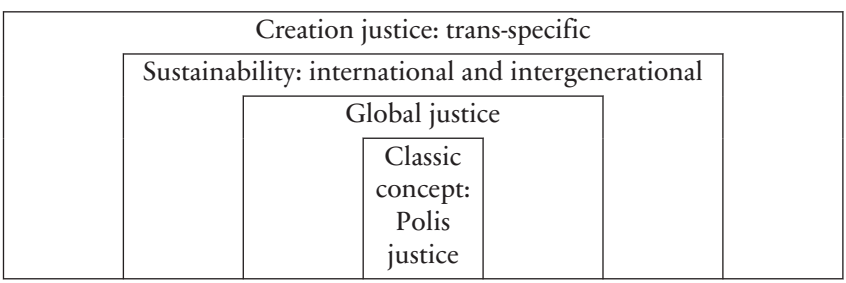
the combinations "sustainable development" and/or "sustainable growth" (Herman E. Daly 1991, 401–407; likewise Robert Goodland/Herman Daly 1996, 1003; cf. Ben Purvis et al. 2019, 691). As promising as the concept of sustainability may have seemed at first, it is proving difficult to adapt it to our global ecological challenges.

6.2.1 Sustainable development as a concept of justice

The Brundtland Report's definition of sustainable development has become widely accepted: Sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (Volker Hauff 1987, 46)

Although this definition is rather formal in character and relatively open in content, it marks a basic ethical decision for a *concept of justice* that includes all living and future human beings. Compared to earlier concepts of justice, this definition expands the subject matter immensely: It is anthropocentristically conceived, but due to the spatio-temporal dissolution of boundaries, it is a great step forward. For thousands of years, justice was discussed within the boundaries of a political entity, the classical Greek polis. Even John Rawls' theory of justice is explicitly limited to this, although Rawls considers an extension to the global dimension and to non-human living beings possible in principle. At least this global dimension moved into the focus of debates in the 1960s at the latest. The Brundtland Report goes one step further and includes future generations of humanity. However, the biblical model of global justice for all living beings and for all futures, as explicitly laid out in the story of God's covenant with Noah and Creation in Gen. 9, has not yet been achieved. In contrast to biblical biocentrism, the concept of sustainable development remains anthropocentristic.

Chart: The growing scope of notions of justice



This is where the first limitation of the concept becomes apparent: while it is a huge advantage for the transformation of the economy to use an anthropocentristic concept because it is more easily accepted in economic circles, it also poses the great danger of permanently cementing the exclusion of the needs of non-human living beings.

Another weakness of the Brundtland definition is that, to date, it has not even been rudimentarily clarified what can and cannot be considered relevant human "needs". The definition pretends that this is simple and clear. In reality, a clean criteriology would be needed to distinguish between (elementary and legitimate) needs and (beyond that, at most, optional) desires.

As we have already seen (cf. chapter 6.1), the concept of sustainable development established at the United Nations since the Brundtland Report envisages development with global economic growth. From this we must conclude that in case of conflict, economic and social concerns are given priority over ecological ones. The likelihood that a growth-oriented concept of sustainability will achieve what it sets out to do is reduced (Arne Næss 1997, 66).

Finally, the concept of sustainability still contains a great deal of vagueness today. In 1996, barely ten years after the Brundtland Report, the Chief Economist of the World Bank, Herman E. Daly, considered the concept of sustainability "dangerously vague" (Herman E. Daly 1996, 1). This characteristic of the Brundtland definition had allowed for a broad consensus, which might have been a good political strategy at the moment of initial ignition. Less than a decade later, however, this vagueness of the term was no longer a basis for consensus, but a "hotbed of dissent" (Herman E. Daly 1996, 2). Little has changed in this regard to this day (Ben Purvis et al. 2019, 685). In the following sections, therefore, a little more clarity and conceptual acuity will be established.

6.2.2 The three "pillars" of sustainability

One component of almost all definitions of sustainability is the talk of three "pillars" of sustainability. These are *ecology, the economy and social issues*. Sometimes a fourth or even a fifth pillar is added (Ben Purvis et al. 2019, 685), but none of the proposed additions has really gained acceptance. The three-pillar approach may therefore be regarded as sufficiently recognised. It has its origins in the "World Conservation Strategy", which the United Nations Environment Programme (UNEP) drew up in 1980

together with two international environmental organisations (IUCN and WWF). In it, the general goal is defined that social, economic and ecological factors must be taken into account equally in a future-oriented policy (IUCN/ UNEP/ WWF 1980, 1). This thesis is also reflected twelve years later in Agenda 21 of the UNCED in Rio. On a scientific level, for the first time in 1987, Becky J. Brown and colleagues demanded that the term sustainability must be considered from three perspectives (Becky J. Brown et al. 1987, 716–717). A little later, Edward Barbier turned this into three pillars to represent the interaction of three systems—the biological, the economic and the social (Edward Barbier 1987, 101–110).

In academic discourse, the question of what the three entities actually are (Ben Purvis et al. 2019, 689–690) remains unresolved: are they three interacting systems, each with its own system rationality, three formal academic perspectives, each with its own skills and knowledge, or three main material goals of political action? Each of these three interpretations is represented by numerous authors, and so far it has not been possible to agree on any of them.

In addition, other *pictorial representations*, which of course also want to express other relationships between the three areas, soon start to compete with the column model:

- Three pillars symbolise three systems or methods that stand side by side and are independent of each other.
- Three interlocking circles postulate hierarchisation: the ecological system encompasses the other two; the social system encompasses the economic one.
- Three intersecting circles signal three equal systems or perspectives that have intersections both in pairs and all three together. Sustainability in the comprehensive sense would then be precisely this intersection of all three "sub-forms of sustainability".

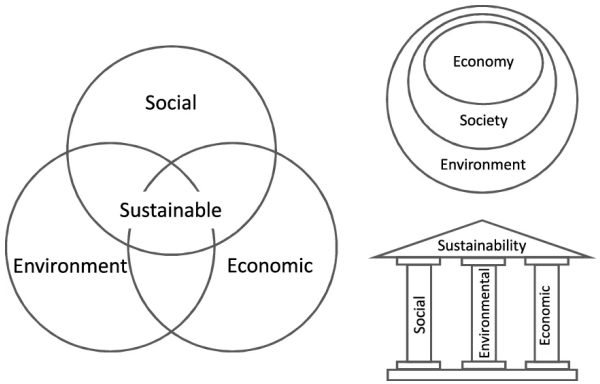


Figure: Common graphical representations of the "three pillars of sustainability" (taken from: Ben Purvis et al. 2019, 682)

To date, there is no generally accepted conceptualisation of the three pillars, which is frustrating for those wishing to operationalise the sustainability concept (Ben Purvis et al. 2019, 681) because "Much of the public discourse around sustainability [...] is organised around this business-based conceptualization of the three-circle rubric without much disciplined thought about how it does and does not translate into a more comprehensive understanding of sustainability" (Paul B. Thompson 2017[2], unfortunately the book has no page references).

The question of the different weighting of eco-social sustainability on the one hand and economic sustainability on the other remains particularly controversial (Markus J. Milne 1996, 137). All sustainability approaches seem to have in common the effort to reform the traditional economy in theory and practice (Ben Purvis et al. 2019, 691). However, opinions differ widely on how far to go and how deep the need for reform of the economy is. Whether ecological or economic sustainability ultimately takes precedence, or whether the two are formally on an equal footing, is hotly disputed.

In the face of this massive disagreement, the interdisciplinary approach of the World Bank's Chief Ecologist and Chief Economist, Robert Goodland and Herman Daly (1996), seems to me to be the smartest: they use the image of the three overlapping circles and interpret the three circles as *three perspectives on reality*. Each perspective is examined *separately and autonomously* by the scientific disciplines assigned to it. This results in clarifications of what is economically sustainable, what is ecologically sustainable and what is socially sustainable. The three groups of scientific

disciplines must then search for the intersection or overlapping areas in interdisciplinary discourse (Robert Goodland/ Herman Daly 1996, 1002; similarly, Markus Vogt 2009, 142–143). This task remains difficult enough. However, since the three perspectives are considered formally equal and are autonomous in their perspectives, the debate as to whether ecological or economic sustainability takes precedence is superfluous. Each of the three perspectives has a veto right over the other two—thus, the equality of the sciences is taken seriously. None of the three aspects can fall by the wayside. This is indispensable from a biocentrist perspective (Guido Montani 2007, 25–60).

6.2.3 What is replaceable? Strong versus weak sustainability

Since the publications by Robert Goodland and Herman Daly in 1996, the economic question of how far environmental resources can be replaced by anthropogenic goods has served as a litmus test for evaluating concrete sustainability concepts. The terminology used here is that of "capital", which reveals the economic perspective of the question. Of course, this perspective has been linked to modern biology and ecology from the beginning. Darwin's theory of evolution would be just as unthinkable without the adoption of economic paradigms as ecology as a biological sub-discipline. A distinction is made between natural capital (natural resources), physical capital (things produced by humans), social capital (interpersonal relationships and structures) and human capital (knowledge and skills acquired by a person). To what extent can the capitals of different categories be substituted with others so that the needs of future generations can receive equal consideration as the needs of people living now? That is the guiding question.

Usually, the following four levels are distinguished between when answering these questions (cf. Robert Goodland/ Herman Daly 1996; Herman E. Daly 1996)[18]:

– *Weak sustainability*: All categories of capital can be replaced by all others. The only important thing is that their sum remains constant. This would mean that nature can be destroyed to any extent at any time, as long as only man-made things, social or human capital of the same

18 Hans Diefenbacher 2001, 69–72 proposes a slightly modified scale in terms of terminology and content, but I will not introduce it here specifically, as it does not yield significantly different results.

value are created. Economically, one has to say that weak sustainability is the minimum to be able to speak of sustainability at all. At the same time, it can be said that most countries in the world are already operating sustainably from a purely economic perspective (Konrad Ott 2016, 83).

- *Medium sustainability*: All categories of capital are only replaceable with all others within certain limits. In this case, one would already have clearly limited the substitutability of natural capital. For example, one could consider the substitutability of oil with human wealth to be responsible as long as a certain amount of oil remains in the ground. However, one would then have to justify why exactly this amount of oil should remain in the ground. One possible argument could be to keep certain options open for future generations as a precautionary measure that we do not even foresee today—this is called a "safe minimum standard" (Konrad Ott 2016, 83). However, this would still leave open the question of how this minimum of security can be defined in more detail. The argument is very vague and subjective—and therefore certainly not the silver bullet of sustainability.
- *Strong sustainability*: Capitals of different categories are not interchangeable unless they fulfil the same systemic functions. This should be extremely rare because the eco-systemic functions of a given natural resource are usually highly complex. Strong sustainability is thus oriented towards the almost complete preservation of natural capital. This model is favoured by Goodland and Daly (as well as Hans Diefenbacher and Konrad Ott). Markus Vogt also affirms it as a goal but suggests defining a transitional period in which medium sustainability is still accepted (Markus Vogt 2009, 137). From a pragmatic point of view, the model will probably not work without such transition periods. However, experience teaches that such periods are often pushed back when they have been achieved or are imminent. Politically, they can at best only be effective if their transgression immediately leads to noticeable sanctions.
- *Absurdly strong sustainability*: In this model, there is no economically acceptable substitution at all, which would hardly be feasible in everyday life and can be justified neither economically nor ethically in this totality.

Why is the substitution question so central? Within economics, it is an important touchstone for what is economically reasonable—irrespective of the environmental debate. In the context of a sustainability discourse that asks in theory of science about the relationship between ecological,

economic and social aspects, it gains additional relevance because it allows indirect indications of the autonomy and independence of the ecological perspective. The concepts of weak and medium sustainability subordinate ecology to economy. Conversely, the concept of absurdly strong sustainability subordinates the economy to ecology. Only the concept of strong sustainability allows the two perspectives to stand side by side on an equal footing and autonomously. It is therefore the only one that agrees with the interpretation of the "three pillars" or overlapping circles proposed here as three autonomous, equal scientific perspectives.

An ethical argument must be added to the scientific argument: Environmental ethics does not think in terms of capitals, but in terms of goods (Konrad Ott 2016, 82). Goods, even if they are only related to humans, also include those that cannot be captured in monetary values and therefore remain economically invisible. These, in turn, include both human "dependencies on nature" and certain eudaimonistic "forms of enjoying nature", i.e. forms that are conducive to human happiness and well-being (Konrad Ott 2016, 82). Ethically, therefore, "it is also a question of whether we *want to* substitute natural goods for artefacts in the sphere of our practical interaction with nature" (Konrad Ott 2016, 85). Would it do us good, for example, if we were to largely replace the sound of the sea or the singing of birds with artificial stimuli? Ott assumes that at least a considerable number of people would answer this question in the negative, and this number would already have to be taken into account in an anthropocentristic argument. However, Ott also lets it be known that he is open to a non-anthropocentristic argument, which would be even stricter anyway.

6.2.4 The five rules of ecological sustainability

At least in the German-speaking world, *five rules* have been found for the determination of ecological sustainability on the basis of the preceding considerations, which are widely accepted. The first three rules achieved a breakthrough in 1990 through the economists (!) David Pearce and Kerry Turner (1990, 45–46). The fourth rule was drawn up by the Enquête Commission "Protection of People and the Environment" of the German Bundestag in 1994, and the fifth rule was added shortly afterwards by the German government's Expert Council on the Environment. In their subsequently published version, these rules read (cf. Deutscher Bundestag (ed.) 1998, 25.223):

(1) "The rate of depletion of renewable resources should not exceed their rate of regeneration. This corresponds to the requirement to maintain ecological performance, i.e. (at least) to maintain the ecological real capital defined by the functions.
(2) Non-renewable resources shall only be used to the extent that a physically and functionally equivalent substitute is created in the form of renewable resources or higher productivity of both renewable and non-renewable resources.
(3) Substance inputs into the environment should be oriented towards the load-bearing capacity of the environmental media, whereby all functions are to be taken into account, not least also the "silent" and more sensitive regulatory function.
(4) The timing of anthropogenic inputs or interventions in the environment must be in balance with the timing of natural processes relevant to the environmental response capacity.
(5) Hazards and unacceptable risks to human health from anthropogenic impacts shall be avoided.

On the content of the rules:

(1) The first rule describes the so-called "sustainable yield" of renewable resources. It is immediately obvious: Only the interest, not the capital stock, of renewable resources may be used. It is obvious that this rule corresponds to the concept of strong sustainability and does not pose any problem for economists.
(2) The second rule defines "quasi-sustainability" for non-renewable resources. The extent of their use results from the sum of the additionally developed and functionally equivalent renewable resources and the increases in efficiency in the use of all equivalent resources. The study "Sustainable Germany" drops the second alternative in this rule (BUND/Misereor (eds.) 1996, 30). This refers to the already discussed question of how far fossil resources should be substituted with efficiency increases. Are we allowed to consume more fossil resources today if we leave more efficient technology to our descendants in return? In any case, the danger of excessive application of this rule must be kept in mind, otherwise it moves from strong to medium sustainability—which would not be the option advocated here.
(3) The third rule of so-called "critical loads" mitigates the danger that the second is interpreted too generously. This is because the most important area of non-renewable resources is fossil fuels, whose use is always associated with greenhouse gas emissions. The upper limit of their use therefore results less from the question of how much oil or

natural gas we must leave to future generations than from the question of how much greenhouse gases the earth can offset in a given period of time. In fact, then, this will be the central sustainability rule. It defines what is called "sustainable waste disposal".

(4) Finally, the fourth rule, added by the Enquête Commission, takes into account that natural cycles react with a certain delay. This slowness of nature must be taken into account when setting limit values. In this respect, rule four tightens rule three.

(5) The fifth rule emerged from the debate on the sustainability of nuclear energy. Quite a few countries see this technology as the key to sustainable development because it significantly reduces resource consumption and greenhouse gas emissions without having to lower human living standards. It thus promises sustainability as a free gift. But its long-term risks, not only for human health, are considerable. Here, the German Advisory Council on the Environment, which added this rule, unequivocally indicates that it does not accept such a solution.

The rules are—although found in the context of the anthropocentristically conceived sustainability discourse—biocentristic, for in Rule (1) as well as in Rule (3) and Rule (4), the perspective is set on ecological functions, and explicitly on all ecological functions. In fact, these will include functions that have an impact on humans, at most via long detours, but are of direct existential importance for other living beings. It seems easier to think anthropocentristically from philosophical theory than from concrete ecological practice. Surprising as it may be, the question is serious: can there ever be strong ecological sustainability that remains within the narrow horizon of anthropocentrism in which it originally arose?

As far as the academic reception of the rules is concerned, the first three by David Pearce and Kerry Turner are practically standard in the sustainability debate worldwide. The other two, on the other hand, have unfortunately not yet found their way out of the German-speaking world into the international arena. For all five rules, however, it is often the case that they are referred to but not presented in detail or discussed in depth. The handbook by Georg Müller-Christ "Nachhaltiges Management" (Georg Müller-Christ 2020[3], 266) is paradigmatic. Now in its third edition, it is a standard work for studies and practice in business administration. If the sustainability rules are only presented there, but not discussed controversially, this can only mean that they are not yet hurting companies—although hardly any company is likely to comply with all the rules. Chapter 8 will therefore ask how the state can promote this pain when rules are violated.

6.2.5 The concept of sustainability and holistically based biocentrism

The preceding analysis shows that a concept of sustainability that thinks broadly enough inevitably goes beyond the narrow limits of its anthropocentristic location and must integrate biocentristic criteria. Because of the interconnectedness of natural processes, sustainability cannot be defined as benefiting only humans. It must take all living beings into account and preserve the functional integrity of species, ecosystems and biomes. Arne Næss' (1990, 96) claim that biocentrism and sustainable development are mutually exclusive concepts must therefore be differentiated between: On the level of theory this assertion is correct, but on the level of practice it is not. For while the practice level determines concrete action, the theory level influences the motivation of those acting. The normative concept of strong sustainability may therefore be sufficient to justify the desired environmental behaviour. However, it remains deficient if people need to be motivated to act in this way.

A second argument in favour of the biocentristic containment of the concept of sustainable development refers to the narrower limits of ecological sustainability, which leave less room for weak interpretations. If sustainability is conceived anthropocentristically, the ecological limits of the five rules of sustainability can be interpreted more elastically. Then the economic and social "pillars" gain the upper hand over the ecological one (Guido Montani 2007, 25–60). In addition, it is easier to create too much trust in human technology and established institutions. The dynamics of anthropocentristically interpreted sustainability concepts tend more towards technical efficiency than towards nature-oriented sufficiency (Martha J. Groom et al. (eds.) 2006[3], 593). This ultimately favours an attitude of "techno-arrogance" (Gary K. Meffe 1992, 350–354). If, on the other hand, sustainability is defined biocentristically, an action is only sustainable if it does not threaten to extinguish other, non-human life. The biocentrist framework thus steers the idea of sustainability more clearly and unambiguously in the direction of strong sustainability (Guido Montani 2007, 25–60).

Finally, a biocentristically contained conception of sustainability is more resistant to a relapse or persistence in the classical exclusive or dominant orientation towards economic growth. Sustainable development is not the same as sustainable growth. The latter—at least in purely quantitative terms and understood at the global level—is not compatible with ecological sustainability (Martha J. Groom et al. (eds.) 2006[3], 592). In a modern, diverse society, however, its limits must be sought and enforced through

complex regulatory mechanisms. This requires both structural reforms and cultural paradigm shifts (Guido Montani 2007, 25–60). The latter can be provided much better by holistically based biocentrism than by classical anthropocentrism.

The successes from three decades of political and social sustainability debates and concepts clearly lie more in the social than in the ecological sphere (Martha J. Groom et al. (eds.) 2006[3], 622–623). If a theory may be judged by its fruits, then it is indeed urgently time to explode the anthropocentristic concept of sustainability and embed it in holistically based biocentrism. What this means in concrete terms for the two greatest challenges, climate protection and the preservation of biodiversity, will be examined in the following.

6.3 Sustainable climate protection

In the description of the greatest ecological challenges of the present in chapter 2.4, we already identified the phenomenon of anthropogenic global warming as one of the two main problems in dealing with planetary boundaries and took a detailed look at its causes. Compared to pre-industrial levels, we have currently already reached global warming of 1 degree Celsius (IPCC 2018, 4). We will reach the 1.5 degrees targeted as a maximum under "business as usual" between 2030 and 2052 (IPCC 2018, 4). And by 2100, even the commitments made so far by the parties to the Paris Climate Agreement would cause global warming of well over 2 degrees Celsius (IPCC 2018, vi)—an estimated 3 to 4 degrees.

Such warming is unacceptable. The main reason for it is the so-called tipping points (IPCC 2018, 262–264). These are threshold values at which an ecosystem that is important for the Earth's climate suddenly changes in such a way that we can no longer calculate the resulting impacts. If these limits are exceeded, processes are triggered that humans can no longer control or reverse: These are "points of no return"! Climate research names the following in particular as such tipping points: complete loss of year-round Arctic ice, forestation of the tundra, thawing of the permafrost, increase in the intensity of the Asian monsoon, massive reduction of rain in the deforested rainforest areas and thus further loss of rainforest dying due to drought, and increased death of the boreal forests. Most of these tipping points can be fairly safely avoided below 1.5 degrees of warming and remain reasonably unlikely even below 2 degrees but are highly likely to occur between 3 and 4 degrees. This is precisely why the 1.5 degree

target is not an arbitrary mark but owes its existence to clearly identifiable risk trade-offs.

In addition to the larger safety margin from tipping points, achieving the 1.5 degree target offers a number of other milder consequences compared to the 2 degree target (IPCC 2018, 7–8):

- The rise in sea level will only be about 50 instead of about 60 centimetres—quite a relevant difference in the case of storms and storm surges.
- Species loss will be significantly lower, e.g. only 6 instead of 18 per cent of all insect species and 8 instead of 16 per cent of plant species will die.
- The thawed permafrost soils will cover 2 million square kilometres fewer.
- The Arctic will be ice-free only once per century instead of once per decade.
- Coral reefs will only die at a rate of 70 to 90 per cent instead of 100 per cent.

What is the target for anthropogenic greenhouse gas emissions? Global CO_2 neutrality ("*net zero*") should be achieved by 2050 at the latest, with a reduction of 45 per cent in 2030 compared to 2010 (IPCC 2018, 12). In the year the 2018 report was published, this corresponded to a residual budget of 580 gigatonnes of carbon dioxide equivalents. The chance that global warming will not exceed 1.5 degrees is then 50 per cent. If the residual budget is cut to 420 gigatonnes of carbon dioxide equivalents and "net zero" is already achieved in 2040, the chances of a maximum of 1.5 degrees of global warming increase to 66 per cent (IPCC 2018, 33). For orientation: in 2019, global greenhouse gas emissions were 37 gigatonnes of carbon dioxide equivalents. So, we only have a residual budget of about ten to fifteen instances of such annual consumption for the next 30 years. The challenge is enormous.

Now, we identified the concept of sustainability as an internationally and intergenerationally expanded concept of justice. Current consumption levels are very unevenly distributed globally. In the Middle East, each person emits over 20 tonnes of carbon dioxide equivalents per year, in Canada and the USA around 15, in Europe 6 to 9, in China 7, but in India only 2 and in Africa only 1 tonne. While there have been slight declines in Europe, emissions in most other countries in the world continue to rise—currently at a global rate of 1.1 per cent per year. So not only are we miles away from "net zero", but we are even following a path in the opposite direction. Indeed, the target should be roughly the current level of India: 1.5 tonnes of carbon dioxide equivalent per person per year. The ethical principle of "equity" requires roughly equal per capita consumption for

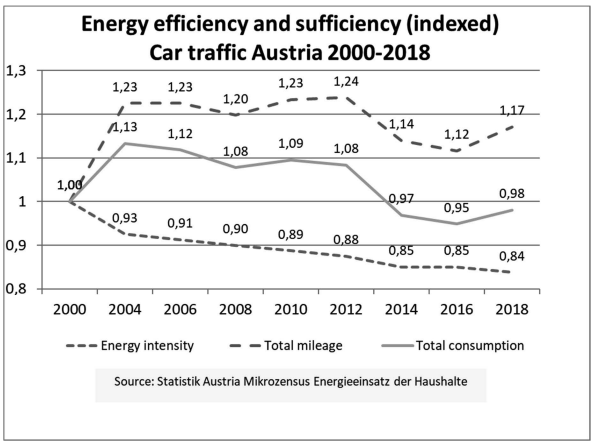
each person. Africa and the poorest countries in Asia are therefore still allowed to increase their levels, while practically the entire rest of the world must drastically reduce its levels.

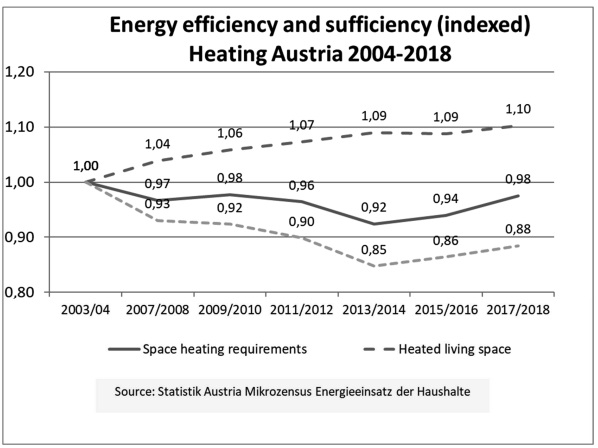
The development path proposed by the IPCC is accordingly ambitious: It "requires rapid and far-reaching transitions in energy, land use, urban development and infrastructure (including transport and buildings) and industry" (IPCC 2018, 15).

- Electricity must come from 70 to 85 per cent renewable sources by 2050, 8 per cent from natural gas power plants with carbon capture storage (the capture of carbon dioxide that is either injected into cavities deep in the earth or otherwise processed) and almost 0 per cent from coal (IPCC 2018, 15–16). A significant reduction in energy consumption in all sectors is essential.
- Industrial emissions must be reduced by 65 to 90 per cent.
- Buildings must cover 55 to 75 per cent of their energy needs electrically.
- The share of "low-emission transport" must be increased from 5 to 35 to 65 per cent.
- Large areas of current pastureland need to be converted into fields for energy crop cultivation and, above all, into forests.

It is easy to imagine that such fundamental changes will not leave their mark on people's lifestyles. In fact, it is easy to see why the industrialised countries have been treading water on climate protection for 30 years: All the savings made through technical efficiency improvements are eaten up by the ever-increasing demands of people. This is shown in the following two graphs using two examples:

- The efficiency of Austrian passenger cars improved noticeably from 2000 to 2018. Although the average car has become bigger and heavier, it needs 16 percentage points less energy for 1 kilometre of driving. At the same time, however, Austrians drove 17 per cent more kilometres in 2018—which de facto amounts to consuming practically the same amount of energy as in 2000.
- The situation is very similar in terms of heating living spaces. Energy intensity per floor area was reduced by 12 percentage points from 2004 to 2018 through building insulation and better heating systems. At the same time, the living space per person increased by 10 per cent—which also amounts to a zero-sum game.





Figures: Increases in technical efficiency and human demands and the resulting energy consumption in the car and residential heating sectors. Graphics by the author, figures from: http://www.statistik.at/web_de/statistiken/energie_umwelt_innovation_mobilitaet/energie_und_umwelt/energie/energieeinsatz_der_haushalte/index.html and http://www.statistik.at/web_de/statistiken/menschen_und_gesellschaft/wohnen/wohnsituation/081235.html (retrieved: 1.2.21).

In other words, this is not due to a lack of technical efficiency. Industry and technology have done their homework to a considerable extent. It is rather due to the lack of sufficiency of people. No sooner has a gain in efficiency occurred than people claim it for themselves instead of passing it on to the environment. This so-called "rebound effect" has been predicted

since 1865 and is also called Jevons' Paradox after its discoverer[19]. Sustainable climate protection is therefore primarily *a sufficiency problem* and not an efficiency problem. The "Gospel of Eco-Efficiency", as it was called in Samuel P. Hays 1959 and later popularised by Joan Martinez-Alier (2002, 1) does not work. On the contrary: from an economic point of view, efficiency is even a driver of growth (Helmut Haberl et al. 2011, 9).

The question is: Who dares to say so? Demanding sufficiency is uncomfortable—some political parties have already lost elections this way. It is therefore not surprising that the *IPCC is* rather cautious in this respect. It says: "Demand-side measures are key elements of 1.5°C pathways. Lifestyle choices lowering energy demand and the land- and greenhouse-gas intensity of food consumption can further support achievement of 1.5°C pathways." (IPCC 2018, 34 and 97). Demand-side measures are referred to as a "key element"—presumably meaning demand from industry to produce lower-resource products. Personal lifestyle changes, especially in the areas of energy and nutrition, can "additionally support" the achievement of the 1.5 degree target, it is then said. One senses how shy and coy the world's 3,000 most renowned climate researchers are about addressing the issue of lifestyle. It seems almost grotesque that they then even claim that such lifestyle changes are already taking place "around the world" and have led to significant reductions (IPCC 2018, 42.317). In this case, only the wish can have been the father of the thought, trying to write a global success story out of local showcase projects.

In total, only 8 pages are devoted to the topic of lifestyle and behavioural change in the 630-page report (IPCC 2018, 362–369, chapter 4.4.3). In the introduction, the report makes one clear statement: "Humans are at the centre of global climate change: their actions cause anthropogenic climate change, and social change is key to effectively responding to climate change [...] Consistent pathways assume substantial changes in behaviour." (IPCC 2018, 362). A little later, however, we learn that people like efficiency measures more than sufficiency measures because they "cost" them less effort (IPCC 2018, 364). And the advice that follows reveals the IPCC's concentrated courage- and helplessness: The capacity of poorer people to take action should be strengthened, and knowledge and motivation should be promoted. Where action is taken together, everyone is more motivated (IPCC 2018, 365). Negative feelings about global warm-

19 William Stanley Jevons 1865, 103: "It is wholly a confusion of ideas to suppose that the economic use of fuel is equivalent to a diminished consumption. The very contrary is the truth."

ing could help—the greater the concern, the more people would do (IPCC 2018, 365). Policymakers prefer technical solutions, but "they fall short of their true potential if their social and psychological implications are overlooked" (IPCC 2018, 366). Price incentives are therefore important—extrinsic motivation should accompany intrinsic motivation (IPCC 2018, 367).

This intrinsic motivation for sufficiency is invoked once in a powerful appeal for values research: "The profound transformations that would be needed to integrate sustainable development and 1.5°C-compatible pathways call for examining the values, ethics, attitudes and behaviours that underpin societies. Infusing values that promote sustainable development, overcome individual economic interests and go beyond economic growth, encourage desirable and transformative visions, and care for the less fortunate is part and parcel of climate-resilient and sustainable development pathways. This entails helping societies and individuals to strive for sufficiency in resource consumption within planetary boundaries alongside sustainable and equitable well-being." (IPCC 2018, 475)

The fact that religions do not appear in the IPCC report probably has more strategic than substantive reasons. One wants to avoid additional fronts. Nevertheless, Pope Francis' *encyclical Laudato si'* is infinitely more courageous and clear when it comes to personal lifestyles—and at the same time highly integrative with regard to environmentally-minded people of all religions and world views. Personal lifestyle and consumer habits are at the heart of the encyclical. They are embedded in a holistic understanding of social progress, as Paul VI had already advocated in Populorum progressio 1967 (LS 46). The common narrative of progress in modernity, on the other hand, is exposed as a "myth" (LS 60; 78; 210). "The call to seek other ways of understanding the economy and progress" is one of the lines of argumentation running through the encyclical (LS 16; cf. 112–113; 191; 194).

Francis begins with the impossibility of maintaining the material consumption of the industrialised countries in a sustainable world: "We all know that it is not possible to sustain the present level of consumption in developed countries and wealthier sectors of society... The exploitation of the planet has already exceeded acceptable limits ...." (LS 27). Several times he addresses the overstepping of planetary limits: "The pace of consumption, waste and environmental change has so stretched the planet's capacity that our contemporary lifestyle, unsustainable as it is, can only precipitate catastrophes." (LS 161)

From this insight Francis concludes that a fundamental change in consumption patterns is indispensable: "Every effort to protect and improve our world entails profound changes in 'lifestyles, models of production and consumption, and the established structures of power which today govern societies'(CA 58)." (LS 5) And again, "Humanity is called to recognize the need for changes of lifestyle, production and consumption, in order to combat this warming or at least the human causes which produce or aggravate it." (LS 23)

But Francis also knows about the inner resistance to abandoning habits acquired over long periods of time: People would rather deny or play down global warming than make it the yardstick for their own actions. "Such evasiveness serves as a licence to carrying on with our present lifestyles and models of production and consumption. This is the way human beings contrive to feed their self-destructive vices." (LS 59). There is a compulsion to consume rather than freedom to consume (LS 203), because: "The emptier a person's heart is, the more he or she needs things to buy, own and consume. It becomes almost impossible to accept the limits imposed by reality. In this horizon, a genuine sense of the common good also disappears." (LS 204)

Finally, Francis focuses on global inequalities and recalls the equity principle of equal emission and consumption rights for all people. Climate justice or, even more broadly, Creation justice is essential for him: "We know how unsustainable is [*sic*] the behaviour of those who constantly consume and destroy, while others are not yet able to live in a way worthy of their human dignity. That is why the time has come to accept decreased growth in some parts of the world, in order to provide resources for other places to experience healthy growth." (LS 193). The following chapters 7 to 9 will deepen how the path to lower consumption can be followed.

6.4 Sustainable biodiversity conservation

While the climate problem can be solved anthropocentristically, at least at the level of justification, and needs holistically based biocentrism mainly for the sake of motivation, it is clearly different with the second key problem of sustainability, the preservation of biodiversity. Here, as we will see, anthropocentrism already reaches its limits at the level of justification. For in individual cases, it will not always be possible to prove that a particular species or ecosystem really serves the survival or enjoyment of humanity.

This is one reason why preserving biodiversity is even more difficult than climate protection.

As already mentioned, the UNCED Biodiversity Convention of Rio 1992 defines it as follows: "Biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems". (United Nations 1992, Art. 2; cf. chapter 2.5). Accordingly, biodiversity is understood as the diversity of life forms in all their forms (genes, species, ecosystems and additionally landscapes) and their relationships to each other.

Biodiversity is currently under massive threat. As we saw in chapter 2.5, of all the nine planetary boundaries, this one has been exceeded the most—far more than that of global warming. In view of the sixth human-induced mass extinction in the history of the earth, the first question that arises is therefore the value and significance of biological diversity (cf. on the following: Michael Rosenberger 2018a): Is it worth preserving, and if so: why? In answering this question, it is important to avoid succumbing to the so-called naturalistic fallacy. Biological diversity is not valuable simply because it was produced in natural processes. No direct conclusion can be drawn from what is to what ought to be.

The answer to the question of the value of diversity can first of all be given with regard to its functions, i.e. on the basis of utility considerations. This corresponds to the so-called "*ecosystem approach*", which Pope Francis also largely follows in Laudato si'. Usually, four categories of ecosystem services are mentioned (TEEB 2010, 45–46):

- Utilities such as the supply of food, raw materials, fresh water and remedies.
- Regulatory services such as regulation of local climate and air quality, carbon capture and storage, mitigation of extreme events such as floods, storms and landslides, waste water treatment (mainly by microorganisms), erosion prevention and soil fertility conservation, pollination of plants and biological pest control.
- Supporting services such as the provision of habitats for animal and plant species or the conservation of genetic diversity.
- Cultural benefits of an aesthetic, mental, spiritual or other nature, such as recreation, health, stimulation for artistic and cultural creation, spirituality, identity and sense of belonging.

Ecosystems can only provide these services comprehensively if they themselves are present in great diversity (the third level of biodiversity). How-

ever, their diversity and stability depend on the diversity of species and gene combinations (the first two levels of biodiversity). The earth as the comprehensive house of life thus needs biodiversity at all three (or, if landscapes are included, four) levels in order to be able to provide its services optimally. Therefore, from an anthropocentristic perspective, there are already good reasons for preserving biodiversity. These can be structured according to the three "pillars" of sustainability:

Ecological reasons: From the perspective of modern ecology, the diversity of species and genes is an indispensable condition for higher organisms to have been able to develop and survive in the course of evolution. More complex organisms need relatively constant environmental conditions, and these only prevail in diverse communities. Diversity is a guarantee for the survival of higher organisms, including humans. A continuation of the current rate of species extinction would not only result in the domino-like collapse of many ecosystems in the medium term but would certainly also cost the lives of many people, possibly even leading to the extinction of humankind. "We are all dependent on one another." (LS 42, cf. also LS 34)

Economic reasons: Almost all the ecosystem services mentioned can in principle be quantified in monetary terms. They have an economic dimension. This is not exhaustive—there are aspects of biodiversity that by definition exceed any economic calculation. Nevertheless, this does not exclude economic considerations. On the contrary: in view of the fact that the economy is the dominant subsystem of society in postmodernity, the significance of biodiversity must also, and even above all, be quantified in economic terms (cf. chapter 8).

The importance of biodiversity for agriculture (LS 34) and food security has a particularly direct impact in this respect (Rüdiger Wittig/ Manfred Niekisch 2014, 252). For thousands of years, primitive peoples have used high percentages of the organisms living on their territory to safeguard their livelihoods. This is certainly the most important provisioning service of biodiversity in economic terms. However, the regulatory services listed above also have high economic significance (Rüdiger Wittig/ Manfred Niekisch 2014, 252). Finally, the monetary value of cultural services should not be underestimated.

Pope Francis draws particular attention to future economic fields by highlighting the potential of biodiversity for medicine and pharmacy. The future of biotechnology lies in the exploitation of genetic and species diversity, linked to the use of the knowledge of the effects of individual plants or animals that has been handed down over centuries or even millennia. Thus, the diverse animal and plant species "may constitute

extremely important resources in the future, not only for food but also for curing disease and other uses." Similarly, the diverse genes are "resources in years ahead for meeting human needs and regulating environmental problems" (LS 32).

From an economic point of view, a value analysis of biodiversity is an indispensable precondition for rational decision-making. This is exactly what the project "The Economics of Ecosystems and Biodiversity" (TEEB) is about. "The TEEB study was initiated in Potsdam in 2007 by the environment ministers of the G8+5 countries and looks at the global economic benefits of biodiversity and the costs of biodiversity loss due to failure to take conservation action compared to the costs of effective conservation." (TEEB 2010,3) This is because "from an economic point of view, the flows of ecosystem services can be seen as 'dividends' accruing to society from natural capital. Maintaining the natural capital stock enables these flows to be provided in the future on a sustainable basis, and thus contributes to continued human well-being." (TEEB 2010,9)

Social and cultural reasons: Just as (almost) all services of diverse ecosystems can be viewed ecologically and economically, they can also all be viewed under socio-cultural aspects (LS 190): In service to man, insofar as he is precisely not only homo oeconomicus and not only part of the earth's ecosystem, but at the same time also a socially living, creative, discovering, inventive and profound human being. He not only wants to survive but takes pleasure in the beauty of nature and sees in its diversity and richness of variety an aspect that constitutes this beauty. Humans can see and get to know the diversity of life; they can experience it and perceive its message (LS 33). Biodiversity has a significant recreational value, an educational value as well as an artistic and spiritual value, indeed an identity-forming value.

Of course, the cultural and aesthetic value of biodiversity is very subjective and bound to the respective culture (Rüdiger Wittig/ Manfred Niekisch 2014, 249–253). Moreover, nature often serves as a mere backdrop and is even damaged for the sake of other "cultural values" (motocross, mountain biking, etc.). After all, it is not the biodiversity of an ecosystem as such that provides a sense of home and identity, but its character, its uniqueness and distinctiveness.

As irreplaceable as reasons are in controversial environmental debates: they do not touch the heart. Only very intimate spirituality can do that. Its Christian form recognises in the diversity of Creation an image of the manifold, infinite Creator God. The doctrine of the Trinity of God says at its core that God is life overflowing out of and into himself, love

transcending itself and yet always remaining with itself or returning to itself. This incomprehensible fullness of divine life and love is reflected in the exuberant creativity of the creatures. In them, it becomes comprehensible and tangible to man (LS 86): "Mountains have heights and they are plentiful, vast, beautiful, graceful, bright and fragrant. These mountains are what my Beloved is to me. Lonely valleys are quiet, pleasant, cool, shady and flowing with fresh water; in the variety of their groves and in the sweet song of the birds, they afford abundant recreation and delight to the senses, and in their solitude and silence, they refresh us and give rest. These valleys are what my Beloved is to me.." (LS 234; quoting John of the Cross, Cántico espiritual B XIV, 6–7).

Diversity transcends any measurable value because God himself is diversity. His love cannot be quantified in values, because love is precisely that which cannot be grasped, measured or calculated. Nevertheless, this spiritual depth view of love does not replace rational argumentation with measurable values but complements and deepens it: even if there were living beings that had no use whatsoever, we should not simply destroy them.

If it can be assumed that the preservation of biodiversity is ethically imperative, then the question arises as to the way forward. The threat to diversity is a problem for society as a whole and an international problem that can only be solved in a joint effort by everyone. That is why the heads of government present at the UNCED in Rio in 1992 signed a convention on biodiversity that is binding under international law, which deals not only with the protection of biodiversity and ecosystems, but also with the equitable distribution of their economic costs and yields. The sustainable use of ecosystems, access to genetic resources and financial and technological cooperation are to be subjected to regulation that strives for an economic balance between poor and rich countries as well as between landowners and the general public.

In general, two strategies emerged in Rio, each with its own meaning. They can be summed up in striking formulas:

– Protection *from* use and
– Protection *by* use.

The current debate, dominated mainly by US scientists, is very much focused on the first strategy of *protection from use*, in the form of the establishment and expansion of *protected areas*[20]. "Protected areas are the

20 Strictly speaking, the principle of "protection from use" includes not only territorial protection, but also the protection of certain species regardless of location.

cornerstone of biodiversity conservation [...] Where networks of protected areas are large, connected, well managed, and distributed across diverse habitats, they sustain populations of threatened and functionally important species and ecosystems more effectively than other land uses." (Eric Dinerstein et al. 2017, 534) This quotation already indicates the essential criteria for a policy of protected areas: They should cover large areas so that the animal and plant populations living in them have sufficient habitats and can display a high level of genetic diversity. They must be connected via so-called "migration corridors" so that populations from different protected areas can mix and thus ensure genetic stability. They need good management so that possible undesirable developments can be recognised and corrected at an early stage. And they should have a large variety of habitats for different animal and plant species, so that some protected areas are suitable as habitats for each species.

The prize question in this first strategy of protected areas is, of course, how many large protected areas are needed globally. The Brundtland Report of 1987 gave an initial answer to this question, stating that "the total expansion of protected areas needs to be at least tripled if it is to constitute a representative sample of Earth's ecosystems" (United Nations 1987, Ch. 6, No. 72) The number of protected areas worldwide should be tripled, from about 3 to 4 per cent at that time to 10 to 12 per cent. From a political point of view, tripling is an ambitious goal, and scientifically, there were no serious estimates at that time. Moreover, the Brundtland Report assumed that non-protected agricultural and forest land would continue to be used at the usual moderate intensity. However, this intensity has increased considerably in recent decades, and, in addition, enormous areas of rainforest have been cleared. In this respect, it is clear that 10 per cent in terms of protected areas cannot be enough.

At the sixth Conference of the Parties to the Convention on Biological Diversity (COP-6) in The Hague in 2002, however, something very strange happened: the parties to the Convention no longer agreed on a share of protected areas as a target, but only declared their intention to achieve a "significant reduction" in the loss of biodiversity by 2010. In other words: the disastrous development was to be slowed down but not stopped. And with "significant" a very non-committal term was chosen. It was not until 2010, at the now tenth Conference of the Parties (COP-10) in Nagoya

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Rare plants may not be picked or dug up, rare animals may not be killed—not even where they come into conflict with human interests, like the wolf. I will skip this important block of biodiversity protection for reasons of space.

in the Japanese province of Aichi, that this mistake was recognised and rectified. The "Aichi Target 11" states that at least 17 per cent of land and freshwater areas and at least 10 per cent of coastal and marine areas should be protected by 2020. And—this is hard to believe—the target seems achievable. In 2016, according to the UN Environment Programme World Conservation Monitoring Centre and the International Union for Conservation of Nature, 14.7 per cent of the world's land and freshwater areas were already protected (UNEP-WCMC/ IUCN 2016, 30). The figures for 2020 were still pending at the time of this book's manuscript submission.

However, a scientifically based goal is still missing. The CBD treaty process does not ask what is scientifically necessary, but only what is politically possible (Harvey Locke 2013, 15). In contrast, Reed Noss and Allen Cooperrider formulated four goals as early as 1994 against which the protection of areas is to be measured (Reed F. Noss/ Allen Cooperrider 1994; quoted from Eric Dinerstein et al. 2017, 535):

(1) "represent all native ecosystem types and successional stages across their natural range of variation,
(2) maintain viable populations of all native species in natural patterns of abundance and distribution,
(3) maintain ecological and evolutionary processes,
(4) address environmental change to maintain the evolutionary potential of lineages."

These four criteria have been unanimously accepted in the scientific community. In recent years, many have added another point, which is the new number 4 and moves the former number 4 to the fifth position: (4) "maximise carbon sequestration by natural ecosystems". With this attention to the sequestration of carbon through ecosystems, a bridge is built to climate protection, which in view of the also faltering climate protection programmes makes sense and is factually completely true anyway.

Depending on the region, Noss and Cooperrider (1994, 157–173) give a necessary area share of protected areas of 25 to 75 per cent of the total area. This leads to the somewhat simplistic, yet at the same time more striking formulation that has become the slogan of a broad movement and the name of an organisation since the year 2000: *Nature Needs Half* (https://natureneedshalf.org/). The idea is that by 2030, half of the planet's land area should be protected (cf. e.g. Edward O. Wilson 2003 and Robert L. Pressey et al. 2003). This demand has meanwhile been calculated in complicated procedures (e.g. Eric Dinerstein et al. 2017).

Before rushing to judgement on the Nature Needs Half claim, it is important to clarify what "protected" means in this context. The IUCN's World Commission on Protected Areas defined the protected status of natural areas at its Almeria Summit in 2007 as "a specifically delineated area designated and managed to achieve the conservation of nature and the maintenance of associated ecosystem services and cultural values through legal or other effective means." (Nigel Dudley/ Sue Stolton (eds.) 2008, 189) It is therefore about the conservation of both ecosystem services and cultural values. This is a relatively open, broad definition of nature conservation. It also includes, for example, nature parks, which according to the regulations are established primarily for human recreation.

Since 1933, the International Union for Conservation of Nature (IUCN) has been categorising protected areas, which it is constantly developing and standardising in order to establish comparability in view of the completely different legislation of individual countries. At present, this categorisation looks as follows:

- Category Ia Strict Nature Reserve or Ib Wilderness Area: A protected area managed primarily for the purposes of research or for the protection of large, unimpacted wilderness areas. Strict Protection.
- Category II National Park: A large, protected area, at least in its core zone, that has not been altered by human intervention and is used primarily for ecosystem protection and recreational purposes. Strict protection.
- Category III Natural Monument or Feature: A single, naturally occurring landscape feature that is protected. Strict protection.
- Category IV Habitat/Species Management Area: An area designated for the protection of rare species and their habitats, and for which management interventions are targeted. High level of protection through management, which may or may not mean use.
- Category V Protected Landscape/Seascape: An area whose general appearance is preserved for tourism and recreation. Low protection by use.
- Category VI Protected area with sustainable use of natural resources (resource conservation area or cultural landscape with management, biosphere reserve): An area managed for the sustainable use of natural ecosystems and habitats. This explicitly refers to cultural landscapes shaped by humans. Medium protection through use.

While the first three categories entail an almost complete ban on human intervention and thus offer very strict protection, the last three categories by definition contain human design measures. In Category IV, these are

predominantly or entirely geared to the species and habitats to be protected, for example when it comes to so-called "cultural followers", i.e. species that find themselves where a certain form of human culture is cultivated. Categories V and VI, on the other hand, are predominantly concerned with human interests: A picturesque landscape (V) serves recreation and tourism, sustainable landscape use (VI) a regional, environmentally friendly economy.

Now, in most countries, about half of all protected areas are in categories V and VI. The fact that Nature Needs Half counts them has doubled the rate. For Austria, for example, the organisation counts 28 per cent of protected areas in all six categories instead of 17 per cent in the first four categories. For Germany, it is even 38 instead of 16 per cent. The demand for the protection of half of the global land area thus loses a lot of its terror.

However, this broad interpretation creates a problem with regard to the second strategy, *protection by use*. Categories V and VI follow exactly this strategy but are lumped together with the first four and are nominally no longer distinguishable from them. Moreover, the (completely erroneous) impression could arise that the remaining second half of the global land area can be ruthlessly exploited and cultivated ever more intensively. This is precisely the view of some multinational agricultural corporations, who see this as confirmation of their line of the last few decades towards ever higher-bred high-yield varieties and ever more "effective" sprays and fertilisers. The more intensively agriculture works on its land, they argue, the less land it needs and the more it can return the surplus to nature.

In this respect, one should say for the sake of clarity: *Nature needs all!* The ecological standard of near-natural, environmentally friendly agriculture and forestry must be raised step by step and prescribed by law worldwide. A biodiversity strategy worthy of the name cannot possibly be satisfied with improvements on half the land. In principle, this is also the conviction of the process of the parties to the CBD. Surprisingly, however, this idea is hardly reflected in the current international scientific discussion on biodiversity. This must change urgently, as sustainable biodiversity conservation can only be successfully achieved by combining the two components of unused protected areas and farmland that promotes biodiversity.

Because the four-point plan for the implementation of sustainable forestry in Chapter 11 of Agenda 21 was not legally binding and thus insufficient from the point of view of the environmental movement, it turned the Forest Stewardship Council (FSC), which had already existed in

California since 1990, into an international organisation under the leadership of WWF, Greenpeace, trade unions and representatives of indigenous peoples in 1993. Since then, it has certified wood from sustainable forestry so that a higher price can be obtained for it on the market. At the same time, high ecological and social standards were set for certification. The rainforest zone in particular should thus be given the opportunity to forego the clearing of its forests and yet develop a stable source of income. It is a fact that many certifications by the FSC are open to criticism and led to Greenpeace's withdrawal in 2018. But the FSC's approach of protecting forests through ecologically compatible use is not fundamentally questioned by anyone. To establish it better in political agendas as well is one of the major challenges. Greening forestry and agricultural policy is one of the royal roads to true sustainability.

If agriculture and forestry are to be much more ecologised, the question of who pays for it cannot be left out (see chapter 8 for more details). After all, as commercial enterprises, companies in these sectors are dependent on adequate revenues. Some of the higher costs will be recouped through higher prices as soon as imports from countries with lower environmental standards are subject to punitive tariffs (which is possible under current WTO rules). But part of it cannot be regulated by the market economy because the regional differences are too high. Milk from alpine pasture farming will always be more expensive than milk from pasture farming in the lowlands if environmental standards are the same. Here and only here are state subsidies appropriate and necessary. The ecosystem services of ecological alpine farming must be remunerated by the general public.

Climate protection and biodiversity conservation often go hand in hand and support each other. Global warming is one of the main causes of the sixth mass extinction, which requires many animal and plant species to migrate, which they cannot manage at the necessary speed. Climate protection therefore helps to stabilise ecosystems. Conversely, healthy ecosystems are one of the largest carbon stores on earth—forest ecosystems as well as grassland ecosystems. Many semi-natural ecosystems can also absorb water and heat very efficiently and thus cool microclimates. Nevertheless, climate protection and biodiversity conservation can sometimes come into conflict. This is particularly important to consider for certain forms of renewable energy production: Hydropower can destroy the ecosystems of a flowing watercourse. Wind power can disrupt bird migration routes. Biomass production can promote monocultures and intensive agriculture. In such cases, a careful assessment must balance the opportunities and risks involved in achieving both objectives and decide on this basis. Often,

solutions can be found that meet both concerns. Where this is not the case, biodiversity should—ceteris paribus—be given priority over climate, for, according to the unanimous assessment of experts, its planetary boundary has already been exceeded much further than that of the climate.

We need to realise that biodiversity loss is an even greater challenge to sustainable development than global warming. The tipping points in ecosystems are much more difficult to calculate than in climate systems. The damage done to date by irreversibly lost species and ecosystems is much higher than the damage to the greenhouse of the earth. The motivation to really achieve something is much harder. And for some of the measures to protect biodiversity, an anthropocentristic approach fails because of our lack of knowledge. Holistically based biocentrism, on the other hand, which reverses the obligation to justify, has an easier time in this respect and at the same time provides more emotional potential. It is more "spiritual" than the sober, cool anthropocentrism. As important as it is to also (!) use anthropocentristic arguments in dialogue with the economy and society, it would be fatal to stop there.

6.5 Sustainability and population policy

In the Anglo-Saxon world, the NGO "Population matters" (https://populationmatters.org/) has been making headlines for some years: By not having a child, one could save the world's climate 58.6 tonnes of carbon dioxide equivalents per year. Therefore, population planning is the most effective climate protection. The organisation is supported by well-known celebrities, among them David Attenborough, Jane Goodall, Paul Ehrlich and James Lovelock.

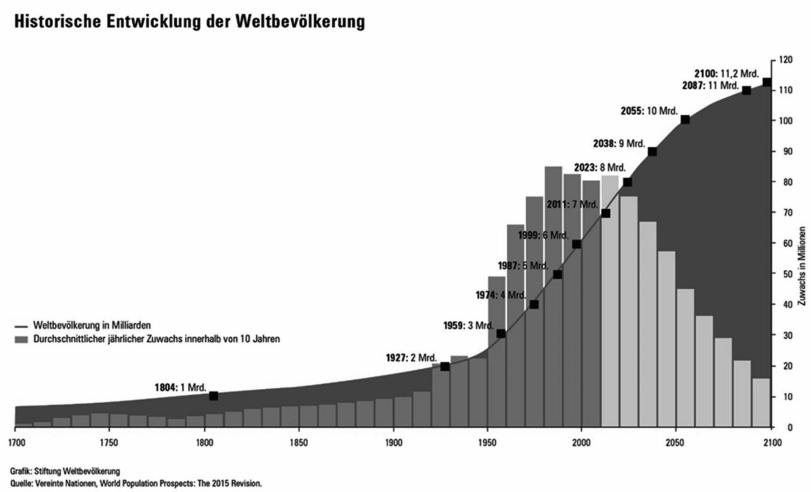
The calculation of "Population matters" (scientifically documented in Seth Wynes/Kimberly A. Nicholas 2017, 1–9, citing Paul A. Murtaugh/Michael G. Schlax 2009, 14–20) goes like this: The ethical premise is that every human being is responsible for all the greenhouse gas emissions of their descendants. The question is then asked how many subsequent emissions ("carbon legacies") are caused by the decision to father a single child (who subsequently begets another child, etc.). Each parent is assigned half of the child's emissions, a quarter of the grandchild's emissions, and so on. The amount calculated by this method for an average British person is then divided by the estimated years of life of the person now living. The result is 58.6 tonnes of carbon dioxide equivalent per year.

Now, this method alone is highly questionable scientifically. In contrast to their source Murtaugh/Schlax 2009, Wynes and Nicholas (and "Population Matters", which follows them) completely neglect the temporal distribution of greenhouse gases. They thus attribute greenhouse gas emissions in the year 2200 to the year 2017. The question arises as to what scientific knowledge they want to gain from this. Moreover, it remains completely speculative how many greenhouse gases the average British person will emit in the year 2200. Calculating such gases with the quantities emitted today and then claiming that this would be the best climate protection for today (!) is simply nonsense. Anyone who calculates in this way absolves all childless people of any effort to lead a sustainable lifestyle.

Nevertheless, the concern of "Population Matters" does not end there. It is true that humanity's burden on planet Earth is made up of three components: standard of living (sufficiency), efficiency and population size. The more people strive for a high standard of living without being efficient, the more the planet is burdened. In principle, it is therefore correct that a concept of sustainable development must also ask about population development and plan for it accordingly. The question, however, is how this can be done.

Let's first look at the forecasts: The United Nations expects there to be 11.2 billion people by the end of the century. According to their very cautious forecast, this will also be about the maximum value, so that the number will go down again from then on. Much earlier, namely in a few years, global population growth will slow down (represented in the chart by the grey bars). While between 1987 and 2023 one billion people were added every 12 years, according to this estimate the next billion will take 15 years—from 2023 to 2038—and the one after that even 17 years—from 2038 to 2055. Many experts even suspect that the decline will be much stronger than predicted by the United Nations and that we might already reach the maximum in 2070, which would then be below 10 billion people.

Table: Historic development of world population; red line = world population (billions), grey bars = annual average growth over ten years (graph: Stiftung Weltbevölkerung, source: United Nations)



Nevertheless, even 10 billion people are too many for the planet if they want to live reasonably well. From an ecosystem perspective, it is helpful to quantify the biomass of all vertebrates on earth: while 10,000 years ago 99 per cent of the biomass came from wild animals and only 1 per cent from humans, today it is the other way round: 1 per cent of the biomass comes from wild animals, 67 per cent from farm animals and 32 per cent from humans. The price of the gigantic expansion of humans and their animal food resources is therefore the displacement of their resource competition in the form of wild animals. Now, for a long time this displacement was not conscious, and there were hardly any opportunities for birth and population planning. Today, however, when we have these opportunities, the question arises as to how many people we should expect the planet to support in the long term. It is obvious that it must be fewer than today. However, it is arbitrary to give an exact number as long as the other two parameters of the calculation, i.e. lifestyle and technical efficiency, have not been determined. Moreover, population planning has long-term horizons: if one child more or fewer is brought into the world today, this will only have a noticeable impact on the overall development of the climate and biodiversity in two to three generations. The time horizons of sustainable development, on the other hand, are much shorter:

we are talking about climate and biodiversity targets that must be achieved by 2050 at the latest. That is not even one human generation away.

Nevertheless, in order to gain perspectives, a more precise analysis of the population development that is currently occurring and will occur in the near future is necessary (according to UN investigations or estimates):

- In *industrialised countries*, the birth rate is already mostly well below 2.1, the value required for a constant population. This means that without immigration, the populations in industrialised countries will shrink at least in the medium term. Many are already shrinking today.
- In the *emerging countries*, too, the birth rate is already mostly below 2.1, but their populations are still growing for the most part because the middle cohorts of current parents (aged between 20 and 45) are very strong. Admittedly, the population will also decline there in the foreseeable future, from around 2040 or 2050, in China even from 2020.
- The development in the *developing countries*, especially in sub-Saharan Africa, is completely different: here the birth rate is currently still well above 2.1, albeit with a downward trend. The populations of these countries are currently still growing strongly but will reach their peaks before the end of this century.
- Two important factors for population growth, especially in poor countries, are falling infant mortality and rising life expectancy. In Nigeria, for example, life expectancy in 1950 was still below 35 years, in 2000 it was already above 45 years and in 2020 it will already be 55 years. In 2100, the UN estimates it to be around 70 years. In other words, from 1950 to 2100, Nigeria will experience a doubling of life expectancy and, as a result only of this, a doubling of its living population. Population growth is thus by no means only a question of birth rate, but also one of medical progress and better nutrition.

Nevertheless, it is undisputed that the birth rate must also fall in those countries where it is currently still particularly high. And this is where access to contraceptive knowledge and means plays a significant role: while on all continents except Africa between two thirds and three quarters of women of childbearing age have access to such knowledge and means (most in Catholic Latin America, by the way!), in sub-Saharan Africa it is only one quarter to one third—even though women there also wish to be able to decide whether they have children or not (Deutsche Stiftung Weltbevölkerung, press release of 26.9.2017). The political focus must therefore be on Africa—all other continents are already developing in the right direction.

In 1965, the Second Vatican Council, in its pastoral constitution Gaudium et Spes, emphasised that there are good reasons for couples to limit the number of their children. Parents were responsible, within the limits of the methods permitted, to make a reflected and conscious decision (GS 51). This statement meant a paradigm shift in Catholic sexual morality, for now active control of fertility on the part of the partners was not only permitted, but even demanded. This paradigm shift has borne fruit in Catholic countries outside Africa—the development in Latin America could not be explained without it. Church schools, marriage preparation courses and youth programmes have raised awareness about a mindful and enlightened approach to one's own fertility—and have been successful. Even Pope Paul VI could not prevent this with the encyclical Humanae Vitae "on the right order of the transmiss"on of human life" in 1968. Although the encyclical prohibits s"-called "artificial contraceptives" (HV 14), it urges responsible parenthood as an important task for married couples and lists health, economic, psychological and social criteria for determining the responsible number of children (HV 10).

A decisive insight of the last decades is that population policy must be holistic (Johannes Müller 2016, 56–57). It must not be imposed without respecting the autonomy of people and cultures. Coercive state measures or neo-colonialist influences from rich countries contradict the dignity of those affected and the sovereignty of their states. In positive terms, a holistic approach means first and foremost education. Without well-educated young people, education on responsible parenthood cannot be realised. This includes the ability to talk about one's own ideas for the future in a partnership and to make joint decisions. A second important aspect is the fight against poverty and debt relief, fair world trade and the raising of living standards and job opportunities. The better people's basic material security is, the less they feel financially dependent on their own children. Finally, the third major area is the promotion of women and their self-confidence (women's empowerment). Men traditionally care little about family planning, indeed in some societies they insist on sexual intercourse without condoms for reasons of tradition. Women need to be empowered here to hold men accountable. These three core elements of a holistic population policy prove that it must ultimately be understood and conceived as an integral part of development policy.

As mentioned, the time horizons of population planning measures are extremely long-term. We will only see a significantly lower world population than today in one to one and a half centuries (Johannes Müller 2016, 47). In this respect, there is a suspicion that the strong insistence on

population planning by some social groups in industrialised countries is deliberately trying to obscure the view of the actual challenges of sustainable development in the present. It is probably no coincidence that in recent years representatives of the political right have become spokespeople for sustainable population planning. It is precisely these intellectual currents that Pope Francis criticises: "To blame population growth instead of extreme and selective consumerism on the part of some, is one way of refusing to face the issues. It is an attempt to legitimize the present model of distribution, where a minority believes that it has the right to consume in a way which can never be universalized..." (LS 50).

Francis insists on climate justice in the sense of equity all the more insistently in the very next paragraph: "A true "ecological debt" exists, particularly between the global north and south, connected to commercial imbalances with effects on the environment, and the disproportionate use of natural resources by certain countries over long periods of time." (LS 51) This statement is very apt, for, as shown earlier, 80 per cent of greenhouse gases are emitted by 20 per cent of people and, conversely, only 20 per cent of greenhouse gases are emitted by 80 per cent of people. Given this massive imbalance, the industrialised North must be very cautious about population growth in the South. "That is why the New Zealand bishops asked what the commandment 'Thou shalt not kill' means when 'twenty percent of the world's population consumes resources at a rate that robs the poor nations and future generations of what they need to survive'." (LS 95, quoting Bishops' Conference of New Zealand, Statement on Environmental Issues, 1.9.2006)

Demographic developments take an infinitely long time—measured against the time horizons set by global warming and biodiversity loss. Lifestyle changes and efficiency improvements are possible much faster—and must be possible faster if the Paris target is to be even approximated.

6.6 *Sustainability as a link between different discourses*

As mentioned at the beginning of this chapter, Markus Vogt (2016, 132) describes the principle of sustainability as a "'missing link' between faith in creation and the social discourse on environment and development". Vogt sees this confirmed by the Worldwatch Institute in Washington, which clearly emphasises that the major religions must assume co-responsibility so that a change of course to sustainable development can succeed. Religions offer far-sighted, long-term spiritual and ethical orientation.

Through their worldwide spread, they provide for global community building and institutional anchoring. They invite participation in the ritual creation of meaning (Gary Gardner 2003, 291–327). Seen in this light, the sustainability discourse is decidedly "religion-producing" (Markus Vogt 2016, 144; cf. also Markus Vogt 2009, 38). However, religions must be careful to act altruistically and offer their service selflessly, without ulterior motives.

But interpreting the concept of sustainability as a link for different discourses also means something for its place in the whole of environmental ethics. I'll expand a little on this and move to the pictorial level for a moment: all rolling units on a railway have a coupling. Since 1840 (!), the coupling used on most European railway vehicles has been the so-called UIC standard coupling, which must be operated by hand. It has a prescribed shape and height above the top of the rail so that all locomotives and wagons of the same gauge equipped with it can be coupled together. Its replacement by an automatic coupler has been sought for many decades but has not yet been able to gain acceptance because hundreds of thousands of vehicles from all over Europe would have to be converted within a very short time. However, it looks like digitalisation is now heralding the end of the manual coupler.

The standard railway coupling is an excellent metaphor to see where the possibilities and limits of the principle of sustainability lie for environmental ethics. A coupling must be strong and resilient so that it does not break. Sometimes several thousand tonnes hang on the hook and cause great pulling forces. In the literal sense, an enormous amount depends on the coupling. However, a coupling is worth nothing without the wagons it connects. The real substance of a train is not the couplings, but the waggons that transport goods or people.

Markus Vogt hits the mark when he compares the sustainability principle to such a coupling. The sustainability discourse can connect and hold together very different social and natural systems. Much therefore depends on it. But the real part is not the link, the coupling, but the waggon, i.e. the social or natural system: the ecosystem; the social system; the system of art, culture, spirituality and religion; the economic system. It is certainly not easy to hold these very contradictory systems together. Sometimes the link will be strained to breaking point. What is more, the discourse has a purely serving function—it is not an end in itself.

In the structure of this book, the sustainability chapter is right in the middle. Before that, we have developed the fundamentals: scientific, spiritual–theological and philosophical–ethical. In the following, we will draw

conclusions, spiritual, economic–structural–ethical and individual–virtue-based–ethical ones, and finally spiritual ones a second time. They, the foundations as well as the consequences, are the actual substance of environmental ethics. The sustainability discourse is its link, its universal coupling. In the best case, it recedes behind the systems it links and fulfils its task invisibly. However, it can only do this if the different systems mutually recognise each other and meet each other openly. Whether the path to a good future fails does not have to be due to the sustainability concept.