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Lessons from the Corona Crisis: New guiding principles required for environmental and sustainability policy? – a discussion paper

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Table of contents

Summary

The corona crisis is perceived by many as a historical watershed moment. A zoonotic disease led to the pandemic with the Sars-CoV-2 virus, which revealed the global interdependence between society, nature and economic activity. Their containment requires drastic measures and, as a consequence, new fundamental questions arise about the values of economic activity, the mutual responsibility between individuals but also between societies, and the relationship between humans and nature.

The corona pandemic underlines the vulnerability of economic and social (sub)systems as a result of globalization. It is becoming clear that the manageability of the effects depends on actual social conditions. Countries in the southern hemisphere in particular are generally much more affected by the health and economic impacts. The crisis shows the importance of system relevant sectors such as health care, social security systems and food supply. The question is raised once again whether, in principle, general well-being in a comprehensive sense is not more important than a focus on material prosperity. In the crisis, an adaptive state governance has proved necessary, as knowledge about Sars-CoV-2 has been continuously developing. Science has clearly made a significant and crucial contribution to enabling knowledge-based decision-making. At the same time, it is evident that successful crisis management requires the involvement and trust of the population and all societal stakeholders. IT-supported systems have proven to be helpful in crisis management.

These observations are also relevant to ongoing climate change and to other environmental crises. It should also be noted that other crisis phenomena such as wars and arms trade, fragile statehood, unfair trade relations and neo-colonial structures increase the vulnerability of societies. They need to be analyzed and considered in problem-solving efforts in order for transformation to sustainability to succeed.

Many of the prevailing principles and foundations of environmental and sustainability policy, such as the precautionary principle or the principle of "leave no one behind", remain indispensable in such an ambitious policy. Lessons from the corona crisis are, nevertheless, emerging, which make it seem necessary to question or supplement the foundations of environmental policy. The following guiding principles are particularly relevant in this context for an effective environmental and sustainability policy. They are intended to substantiate and/or supplement the applicable principles and overriding requirements:

Strengthening the nexus of environment and health
The nexus of environmental and health protection issues requires much more attention than was previously the case for all sectoral policies. The "One Health" approach should be used to put this guiding principle into practice.

Resilience of economic and social systems
The fragility and vulnerability of globalized economies to crises is reduced by strengthening the "resilience of economic and social systems". The corona crisis highlights that systems should not be optimized for effectiveness alone, and that buffers are urgently needed to improve resilience. Resilience is only achievable when the requirements of the sustainability goals "to leave no one behind" and the ecological limits are respected.

Structural justice
"Structural justice" means ensuring a good quality of life based on safe basic supply for all people worldwide. Structural justice could prevent the emergence of instability in systems.

Solidarity of action as an expression of social resilience
This guiding principle demands that all state, social and private actors, insofar as they initiate or implement environmental and sustainability policy measures, consider the effects of these measures on other stakeholders, especially their resilience.

Adaptive governance as a result of a constantly changing knowledge base
The "adaptive governance" is becoming more important because of increasing needs to make decisions in the face of constantly changing knowledge and to continually adapt them.

Maintaining and strengthening the capability to act of public institutions at all levels
Competent states and international organizations are required for crisis management and to coordinate and implement appropriate measures to ensure a transformation to sustainability. Local level institutions also require strengthening in this context.

Development of a Digital Culture
The potential of digitization needs to be systematically exploited to the fullest extent possible in terms of environmental protection, but also with regard to essential socio-ecological transformations. In this respect, a new digital culture is needed, which also actively determines the framework conditions for digitization.

The crises – the corona pandemic as well as the ongoing environmental crises – necessitate that environmental protection and sustainability are centre stage in political thinking and action. The guiding principles outlined above are supportive in this respect: It seems sensible to further develop these principles to the point of legislation in order to make them binding maxims for all policy areas – both nationally and internationally. They thus complement existing concepts and guiding principles, such as the UN Sustainable Development Goals (SDGs). The priority is to ensure resilience. The state is obliged, because of the various crises, to do justice to its elementary role in shaping and setting frameworks in an adaptive learning mode, thereby enabling and ensuring an organized self-regulation of society. The content of these new guiding principles however still needs to be substantiated and put into operational terms for individual sectors. This demands, among other things, more trans-disciplinary research that develops its results and proposed measures in dialogue with the societal stakeholders.

1 Introduction

The corona crisis is perceived by many as a historical watershed moment. A new type of virus, Sars-CoV-2, is forcing many states around the world to impose an extensive shutdown – at least temporarily – and thus largely restrict economic and social life. The development of the pandemic makes it likely that the number of infections and deaths will continue to rise considerably and, depending on how countries deal with the pandemic, will have further significant social and economic consequences.[1]

It is difficult to make a direct comparison with other profound historical incidents and catastrophes of the last 150 years, given that causes, contexts and effects differ so greatly. The extent of the economic effects alone, however, illustrates how profound the impact of the crisis will be. It is then evident that this pandemic, in its present form and its global dynamic pattern, represents a new phenomenon and is likely to have enormous, far-reaching and profound effects. This is exacerbated by the fact that the crisis is occurring at a time that has already been marked by an increased propensity to crisis over the past twenty years – on the one hand, by the direct effects such as natural disasters, wars and economic crises such as the financial crisis from 2007 onwards, but also by the fundamental crisis in modern society with its strong cultural dynamics.

Crises offer the opportunity for fundamental insights into the current social situation and for reforms and modernization efforts.[2] In the context of economic reconstruction programs, for example, a strengthening of "green" approaches is currently being discussed – a discussion that played only a marginal role in the financial crisis ten years ago[3].

Environmental policy should also use such a period of reflection to discuss the implications of the current crisis.

This paper would like to invite you to do so: It first discusses the main aspects of the corona crisis that have emerged so far, with a focus on the environment and sustainability.[4] On this basis, suggestions are formulated as to how environmental and sustainability policy could be further developed in the wake of the crisis.

The aim is to consciously develop new, innovative approaches based on the nature of the crisis and to initially place them alongside the existing goals and principles of environmental and sustainability policy. In the future, this discussion should help to strengthen environmental policy emerging from the corona crisis and to dovetail it with other societal needs of sustainability policy, which are gaining prominence as a result of the crisis.

1 See, for example references to the economic consequences: Welt online dated 14.04.2020: IMF predicts biggest global economic recession in 90 years – https://www.welt.de/wirtschaft/article207250323/Corona-Pandemie-IWF-erwartet-groessten-Wirtschaftseinbruch-seit-90-Jahren.html, and FAZ online dated 30.07.2020): Historic economic recession in Germany – https://www.faz.net/aktuell/wirtschaft/konjunktur/corona-folgen-historischer-einbruch-der-wirtschaft-in-deutschland-16882387.html, (accessed on 01.08.2020)

2 Nassehi, A (2010): Mit dem Taxi durch die Gesellschaft – Soziologische Storys (A taxi ride through society – sociological stories). Murmann Verlag, Hamburg

3 See for an overview UBA (2020): The New Green Consensus, and World Economic Forum (2020): The Future of Nature and Business Policy Companion -Recommendations for policymakers to reset towards a new nature economy. online: http://www3.weforum.org/docs/WEF_NNER_II_The_Future_of_Business_and_Nature_Policy_Companion_2020.pdf (assessed 04.08.2020)

4 The analysis is supplemented by additional UBA papers, see www.umweltbundesamt.de/corona-taskforce

2 Highlights of change in the corona crisis

This chapter seeks to explore what lessons the crisis teaches us for future environmental and sustainability policy. The first step is the determination of the most important aspects of the corona crisis currently observed and discussed. Subsequently, the corona crisis is discussed exemplarily in the context of climate change to make clear where the possible links between the corona crisis and environmental crises are situated. In addition, important ongoing and persistent crisis phenomena are taken into account. The results are summarized in an interim conclusion.

This analysis is to be seen as preliminary, as the corona crisis as well as the crisis management are still ongoing, and a final evaluation is therefore not yet possible. This applies both to the durability of the observed effects and to their impact on the environment and sustainability.

2.1 Political and social developments as a result of the corona pandemic

The following points are intended to highlight the complex and far-reaching effects of the corona crisis on society, the environment and the economy. In many cases, the crisis exacerbates existing trends or renders them more visible.

The focus of the consideration is based on developments in Germany, supplemented by a short global perspective in Chapter 2.1.3. Some of the developments are also evident in other countries, often in a different form.

2.1.1 Changed perception: Vulnerability, crisis and human-nature relations

The sociological discussion on the corona crisis often indicates the extent to which an acute crisis changes people's perceptions and creates new perspectives, reveals existing trends and deficits in society, and thus creates new perspectives for the future. This is also discernible in various aspects of the corona crisis.

Increased awareness of the propensity to crisis in modern times

The corona crisis is leading up to a discourse on the resilience of societies, also with regard to more long-term crisis phenomena such as climate change and environmental degradation (see Section 2.2). This gives new meaning to scientific discussions on the complexity of modern societies, as existing deficiencies become more visible than before.[5]

In particular, the vulnerability of economic interdependencies as a result of globalization became apparent. Fundamental questions that have so far mostly been set aside, such as the question of the socially desired form of a "good quality of life" for all generations, are increasingly being discussed in the public media. The economic debate on the crisis not only focuses on the tangible management of the consequences, but also on basic approaches to economic activity, such as the role of economic growth for good quality of life.[6]

New understanding of "system relevance" during the pandemic

The awareness of which persons and professional groups are important for the functioning of society has shifted with the crisis. Whereas in the financial crisis from 2007 onwards the term "system relevant" was used primarily for large banks and companies that primarily "keep the economy going", it became clear in the corona crisis that it is rather the nursing and health care professions and institutions as well as the basic supply of everyday goods that are essential for society. It also became clear that women are strongly represented in many of the occupational sectors concerned and that remuneration there is low.

Furthermore, the closure of daycare centers and schools placed an additional heavy burden on families, and here, too, women often took over the responsibility for care. This demonstrated the great

5 See for example: Nassehi, A. (2017): Die letzte Stunde der Wahrheit – Kritik der komplexitätsvergessenen Vernunft. (the last hour of truth – criticism of the lost complexity of reason). Murmann-Verlag, Hamburg; also Reckwitz, A. (2019): Das Ende der Illusionen – Politik, Ökonomie und Kultur in der Spätmoderne. (the end of illusions – politics, economy and culture in late modernity). Suhrkamp, Berlin

6 An example is the (professional) public discourse of numerous prominent (mainly German) economists about the crisis and its economic consequences on Twitter (hashtag #Econtwitter), which discusses numerous publications on the topic critically, but in a professional, open and constructive manner.

importance of educational institutions also in the question of caring for children for their parents and intensified the discussion about equal rights for men and women in society.[7]

Revaluation of the human-nature relationship
The cause of the pandemic is, based on current knowledge, a direct transmission of the virus from wild animals to humans.[8] Zoonotic diseases of this kind tend to increase – due to the destruction and utilization of wildlife habitats by humans and intensive animal husbandry and the resulting increasing dissolution of the boundary between humans and nature.[9] Clearly, safety systems, such as hygiene standards, were not sufficient to detect and contain the transfer of the virus to humans and its worldwide dispersion at an early stage. This overall problem has long been known to experts, but only occasionally led to consequences in public action (for example, with tried and tested pandemic concepts in some Asian countries).

In contrast to the reflection on other natural disasters or climate change, the global pandemic experience, the "stealth" of the spread of the virus and the possible direct impact on each individual seem to make people more aware of the fact that they are always part of nature (which in the end is ungovernable). The relevance of planetary boundaries as well as the risks of the increasing appropriation of nature gained more weight in public discussion.[10]

2.1.2 Developments in Germany

As of the beginning of August 2020, Germany has come through the first phase of the pandemic relatively unscathed, even though it was affected at an early stage due to its strong international ties. This has resulted in a number of developments that also appear relevant in the context of future environmental policy and which are briefly addressed here.[11] As developments in digitization are overarching, we address them separately (Section 2.1.4).

A powerful state and the role of society
In Germany, the state has proven to be efficient in many aspects of the corona crisis; it is perceived as the necessary "organizer" to secure and guarantee public goods, such as the health care system. It is clear that the crisis could not be managed without a proactive state. At the same time, the crisis also reveals deficiencies in the state's resources and infrastructure (e. g. in the education system). The issue of resilience to crisis events is discussed in many areas (e. g. supply chains, supply of medical goods and hospital beds, digital resources). Criticism was also levelled at the German government, as contrary to its own pandemic plans[12], it failed to take adequate precautions, e. g. with regard to medical protective equipment.

Furthermore, the need for the "adaptive" state under conditions of fundamental knowledge gaps and high uncertainty ("real-time policy") has become quite clear.[13] The response to the pandemic was characterised by intense pressure to act and high risks, such as overburdening the health system or damaging the economy to an excessive degree.

Willingness of citizens to act together
The public was prepared to accept considerable restrictions on economic and social life, at least in the initial phase of the crisis. The community spirit for collective crisis management initially prevailed when directly coping with the crisis. Society proved to be flexible and adaptable. It was not until after the first wave of the epidemic was under control that institu-

7 See in detail Klatt, A., Spengler, L., Schwirn, K. & C. Löwe (2020): Social impacts of the Covid 19 pandemic in Germany and possible consequences for environmental policy – German Environment Agency, Dessau-Roßlau
8 Based on the current state of research, see e. g. B. Andersen, K. G. et al. (2020): The proximal origin of SARS-CoV-2. Nature Medicine. DOI: 10.1038/s41591-020-0820-9
9 See Gibb, R. et al. (2020): Zoonotic host diversity increases in human-dominated ecosystems. Nature. DOI: 10.1038/s41586-020-2562-8
10 See Settele et al. (2020): COVID-19 Stimulus Measures Must Save Lives, Protect Livelihoods, and Safeguard Nature to Reduce the Risk of Future Pandemics. Online article from the standpoint of IPBES assessments: https://ipbes.net/covid19stimulus (Access: 05.06.2020), for the overall problem see also: Quammen, D. (2013): Spillover – Animal infections and the next human pandemic. WW Norton & Co
11 A detailed analysis of social trends in the pandemic and their potential impact on environmental policy is available from: Klatt, A. et al. (2020), footnote 7
12 Bundestag document 17/12051 of 03.01.2013
13 See Mukerji, N. & A. Mannino (2020) Covid 19: Über Philosophie in Echtzeit (On philosophy in real time) Reclam, Stuttgart

tional and individual particular interests began to reappear on the scene, also manifested in protests and lawsuits against measures taken.[14]

Role of science

Science provided an important orientation in the initial phase of the crisis, which was used by decision-makers in the normative decisions regarding the weighing up of different measures. The stronger the normative share of decision-making became and the more questions of distributive justice were affected, the more the influence of science receded. Also, not only virologists and epidemiologists received attention, but other disciplines such as economics and sociology were also broadly involved in discussions. As a result, the appreciation of science in society increased considerably, if only temporarily.[15]

Scientific knowledge and transparency play an important role in crisis communication to ensure that the importance of political decisions is understandable and an appropriate perception of the crisis within society. Conversely, science-based crisis communication also helped to demonstrate the possibilities and limits of science in a situation of acute danger.[16]

2.1.3 Global developments

The significance of the corona crisis for international environmental and sustainability policy is discussed in detail separately.[17] Here, only selected issues that are likely to have lasting and fundamental effects are addressed.

The crisis is initially drastic, leading to a significant increase in the mortality rate in many countries. In addition, it is also clear that there are long-term health consequences for man patients. In many countries of the southern hemisphere, the pandemic is still in its early stages (August 2020). The health consequences (mortality, long-term effects) will probably be even greater in these regions, as current estimates[18] and concrete developments in individual emerging countries such as Brazil and Chile already indicate.[19]

Furthermore, the fact that Sars-CoV-2 may become more infectious or cause stronger disease symptoms than before is a cause for concern. Other pandemics could also emerge as a result of zoonotic diseases. The associated risks need to be reassessed on the basis of current experience in such cases. An expansion of prevention measures is under discussion in many countries, subject to the availability of funds. The timing of availability and effectiveness of drugs and vaccines against the corona virus is also a decisive factor for crisis management options.[20]

The crisis has led to a shutdown in most countries leading to significant economic consequences. Countries of the northern hemisphere, however, are still relatively well placed to cushion the short-term economic consequences with comprehensive economic programs, even if the success of these measures depends on the progress of the pandemic. The G20 has already set up aid programs worth EUR 5 trillion.[21] The disruptions are much more dramatic in the countries of the southern hemisphere.[22] The causes often include weak health care and social security systems, limited financial scope, the decline in exports and the current large-scale flight of capital.[23] They will therefore depend on support from international organizations and the countries of the North. The associated national debt means a long-term high financial burden for everyone, which will probably have a negative impact on investment opportunity for decades to come.[24]

14 See also the results of the Mannheim Corona Study: https://www.uni-mannheim.de/gip/corona-studie/ (Access 01.08.2020)
15 See the Science in Dialogue survey: https://www.wissenschaft-im-dialog.de/projekte/wissenschaftsbarometer/wissenschaftsbarometer-corona-spezial/ (Access 18.06.2020)
16 See also: Neßhöver, C. & M. Koller (2020): Science and science-policy advice in post-normal times: chance and challenges.- CSC-Blog: https://www.csc-blog.org/en/science-and-science-policy-advice-post-normal-times-chance-and-challenges (Access 01.08.2020)
17 A detailed analysis of possible impacts of the pandemic on international environmental policy is available, see: Ginzky, H., Kosmol, J. & K. Schwirn (2020): International Environmental and Sustainability Policy During and After the Covid 19 Pandemic. Umweltbundesamt, Dessau-Roßlau
18 International Rescue Committee (2020): Covid-19 in humanitarian crises: A double emergency. Online: https://www.rescue.org/sites/default/files/document/4693/covid-19-doubleemergency-april2020.pdf (Access 18.06.2020)
19 The authors abstain from using current figures in view of the rapid progression of the pandemic. These are available in their most recent form in the Covid Dashboard of Johns Hopkins University (as per 01.08.2020): https://coronavirus.jhu.edu/map.html
20 See also: The Guardian dated 22.05.2020: https://www.theguardian.com/world/2020/may/22/why-we-might-not-get-a-coronavirus-vaccine (Access 28.05.2020)
21 G20 (2020): G20 Leaders' Statement – Extraordinary G20 Leaders' Summit Statement on COVID-19. online: https://g20.org/en/media/Documents/G20_Extraordinary%20G20%20Leaders%E2%80%99%20Summit_Statement_EN%20(3).pdf (Access 01.08.2020)
22 Ginzky, H., Kosmol, J. & K. Schwirn (2020), footnote 17
23 See for example Spiegel online dated 16.04.2020: https://www.spiegel.de/wirtschaft/soziales/corona-krise-kapitalflucht-aus-schwellenlaendern-staerker-als-zur-weltfinanzkrise-2008-a-42132876-7473-4dba-94de-5306e8a60809 (Access 01.08.2020)
24 see e. g. figures of the International Monetary Fund: https://blogs.imf.org/2020/05/20/tracking-the-9-trillion-global-fiscal-support-to-fight-covid-19/ (Access 18.06.2020)

Geopolitical shifts of power may occur or existing trends may be reinforced, depending on the course of the crisis in China, the USA, Europe and other parts of the world and the perception of the respective crisis management and the willingness to cooperate internationally. It is conceivable that individual tendencies toward de-globalization and division into spheres of power and cooperation will increase (e. g., previously initiated by trade conflicts with significant US involvement or the influence of China in the New Silk Road project), whereas there will be increased, possibly bilateral cooperation in other locations. This also becomes relevant for Europe when it is a matter of maintaining global influence alongside China and the USA.[25]

2.1.4 Digitization and new digital culture

The importance of information and digital communications technology for effective crisis management was emphatically underscored by the corona crisis. It became clear what information technology could contribute to an effective collection and processing of information as well as its evaluation based on certain criteria for the presentation of infection and mortality trends in order to implement the necessary measures on such a basis. This also applies in principle to the countries of the Southern hemisphere.

In addition, a part of "public life" has shifted to the digital space due to a strong expansion of digital social and everyday practices. This is reflected in the enormous growth rates in almost all digital parameters (e. g. data transfer, registrations on social platforms and in online trade, communication technology). The familiar dangers of digital media as a channel for misinformation and a space for the development of conspiracy theories have also become increasingly prevalent during the corona crisis.

As the use of digital means increased, the equipment of digital technologies and digital offers also revealed current shortcomings: Digital training programs and formats for schools and universities were often not available or their use had not been tested. Many public services could not be provided or only to a very limited extent due to a lack of technical administrative equipment. The question of digital access as a prerequisite for social participation, justice and inclusion (e. g. education) became particularly acute.[26] For example, children from poorer households were additionally disadvantaged in terms of educational opportunities due to the lack of private equipment or poor internet connection. In this regard, the corona crisis revealed more than ever the importance of digitization as a central aspect of general public service in which it is as yet not explicitly integrated from a legal standpoint.

The environmental effects of the increased use of digital services remain unclear. The energy demand of the services is high and seems to be growing inherently.[27] It is currently difficult to estimate the extent to which the additional demand translates into less environmental pollution, as people commute to work less and make fewer business trips, for example.[28]

At the same time, the development of the corona tracing app in Germany, for example, highlighted how digital technology should be considered a socio-cultural challenge (relevance to civil rights).

25 See e. g. Perthes, V. (2020): The corona crisis and international relations: Open questions and tentative assumptions.- SWR Point of View, online: https://www.swp-berlin.org/en/publication/the-corona-crisis-and-international-relations-open-questions-tentative-assumptions/ (Access 31.05.2020)

26 See e. g. Anger, C. & A. Plümmecke (2020): Home schooling and equal opportunities in education.- IW-Kurzbericht 4/2020, https://www.iwkoeln.de/studien/iw-kurzberichte/beitrag/christina-anger-axel-pluennecke-homeschooling-und-bildungsgerechtigkeit-464716.html (Access 01.08.2020)

27 Lange, S., Pohl, J. & T. Santarius (2020): Digitalization and energy consumption. Does ICT reduce energy demand?- Ecological Economics 176: 106760.

28 A detailed reflection on digitization and sustainability is available at: UBA – Federal Environment Agency (2019): Digitalisierung nachhaltiger gestalten – An impulse paper of the Federal Environment Agency (Designing sustainable digitization) – German Environment Agency, Dessau-Roßlau. Online: https://www.umweltbundesamt.de/publikationen/digitalisierung-nachhaltig-gestalten (Access 01.08.2020)

2.2 Corona crisis and climate change

The Global Risks Report of the World Economic Forum of January 2020 reports that environmental risks and pandemics currently dominate among the greatest risks of globalized society.[29] A pandemic was considered to be less likely there than climate change for example, but the effects were rated similarly high. This raises the question of the extent to which the corona crisis is related to other crisis phenomena in the environmental and sustainability context, or show similarities that allow conclusions to be drawn for concerted action. Climate change is an exemplary case here.[30] Similarities between corona crisis and climate change can be recognized for the following aspects:

- Both phenomena are caused by humans and their current lifestyles. Climate change is primarily due to the overuse of fossil fuels by humans; the corona crisis is probably due to the overuse of nature and the associated increasing dissolution of the boundary between humans and wildlife as well as global mobility. Crisis perception and crisis communication in both cases are increasingly communicated through the media and are strongly science-based. The scientific findings reproduced here are increasingly based on digital forms of data-based pattern recognition (modelling, algorithms) as well as on rationalities of action based on statistical and mathematical methods.[31]

- People are and will be affected very differently by the consequences of the corona crisis and climate change (economy of inequality). This applies to the international comparison between countries of the northern and southern hemispheres. This also applies, however, to the degree to which individual societies are affected. Questions of structural justice and distributive justice are thus becoming increasingly relevant.

- Measures require continual readjustment as there are still considerable gaps in knowledge of both phenomena. Adaptive governance seems necessary in the moderation of both crises so that new insights are able to lead to the adaptation of measures.

- Societies need to find political solutions to complex ethical and moral trade-offs for both the corona crisis and climate change. This means that the risks of countering the crisis should be weighed up against the risks of inaction, including the underlying uncertainties, and the results should be presented transparently in decision-making ("coherent risk practice").[32]

There are, however, important differences between the two crises:

- The duration: In the case of the corona crisis, the expectation is that the effects will diminish (at least in the medium term), provided that appropriate measures are taken or effective drugs and/or vaccines are ready for deployment. In contrast, the consequences of climate change may be long-term to irreversible (tipping points, fundamentally altered ecological parameters). The disappearance of island states in the Pacific Ocean due to rising sea levels is an example.

- Extent of possible consequences: It is possible that the climate crisis has much more dramatic effects, as the increase in temperatures will fundamentally change the ecological systems.

- In terms of possible measures: The range of measures for the corona crisis is currently relatively limited in its scope, since it is primarily a matter of restricting human contacts. Moreover, it has already been shown that the particularly restrictive measures need only be prescribed for a clear period of time. In principle, therefore, a higher level of acceptance is assumed, even if the differentiation of the measures raises questions of distribution and equal opportunities.
  The introduction of measures relating to the climate crisis, on the other hand, need to be

29 World Economic Forum (2020): Global Risks Report 2020.- WEF, Genf

30 Numerous articles and blogs deal with this comparison, see e. g. Weill, R. & M. Becker: https://www.fr.de/politik/corona-folgen-klimakrise-gerecht-loesen-13635402.html (Access 18.06.2020), Carstens; P.: https://www.geo.de/natur/nachhaltigkeit/22738-rtkl-corona-und-klimakrise-wir-koennen-auch-anders (Access 18.06.2020), Diefenbacher, H., Foltin; O. & V. Teichert: https://www.csc-blog.org/de/corona-pandemie-und-klimaschutz-einige-anregungen-zur-diskussion (Access 18.06.2020)

31 See Giordano, P. (2020): In Zeiten der Ansteckung (In times of contagion). Rowohlt, Hamburg

32 See Mukerji, N. & Mannino, A. (2020): Covid 19: What counts in the crisis. Über Philosophie in Echtzeit (On philosophy in real time) Reclam, Stuttgart

long-term and permanent. These demand massive individual, social and economic change. The complexity of the issue means that there are many approaches to solutions that need to be negotiated and continuously readjusted. In this respect, structural justice and distributional issues are also at stake, but these will have a much longer-term effect than the measures used to counter the spread of Sars-CoV-2.

Similar conclusions may be drawn for other complex environmental issues such as biodiversity loss or resource consumption. Here, too, effects and consequences are more permanent and complex and are not countered by short-term measures alone.

2.3 On the role of other man-made crisis phenomena

In addition to the corona crisis, there are other crisis phenomena that block or at least impede a successful environmental and sustainability policy. The corona crisis has an exacerbating effect, as it increases the vulnerability of societies. At the same time, however, it is also true that considerable progress has been achieved in recent decades in some areas, such as fighting poverty and hunger, as evidenced by the rise of the middle classes in many emerging countries.[33] More people are again, however, suffering under the effects of malnutrition as a result of the corona crisis.

The crisis phenomena are therefore briefly discussed below, with reference to the pandemic, in order to underscore the complexity of a transformation to sustainability within their context. Should a reorientation of environmental and sustainability policy prove necessary, an examination should also be undertaken to determine whether the ongoing crisis phenomena mentioned below would have consequences for this reorientation.

Warlike conflicts continue to be a central worldwide crisis phenomenon. Despite early appeals by the United Nations for a worldwide ceasefire[34], there is no sign of any easing of the situation with regard to warlike operations during the corona crisis. Ongoing hostilities impede a transformation to sustainability and efficient containment of the pandemic.

The arms industry and its exports are phenomena closely linked to military conflicts. It consumes enormous amounts of natural resources, and the share of global CO2 emissions caused by the production of arms is substantial. Exports of military products and services promote armed conflicts. Global arms expenditure has been increased massively for several years[35], tying up material and financial resources urgently needed for crisis management and transformation to sustainability.

There continues to be a number of largely dysfunctional states in Africa, though also in the Middle East and Asia. These countries lack the stakeholders in government and society who could coordinate a social transformation. This crisis phenomenon is also an impediment to both a successful environmental and sustainability policy and successful pandemic control.

The growth and profit maximization philosophy of the global financial markets led to various smaller but also larger crises, such as the banking and financial crisis from 2007 onwards. The financial sector is decoupled from real economic activity and even more so from prosperity indicators, thereby creating false incentives for private investment. They deprive states of financial resources for social tasks. Closely related to this on the real economic side are unjust trade relations and neo-colonial structures, which, for example, facilitate the illegal or illegitimate appropriation of land and soils in the southern hemisphere and considerably impede sustainable development on the ground.

Effective and developable agriculture is essential for every society to provide basic services for all citizens. Although the concepts for sustainable agriculture are well developed[36], various factors (land ownership issues, local conflicts) and natural disasters continue to cause shortages and associated hunger crises. The corona crisis could further endanger this basic supply, especially in regions of Africa, thus increasing dependence on imports.

33 Siehe Milanovic, B. (2012): Globalization and inequality. Edward Elgar, London
34 See https://news.un.org/en/story/2020/03/1059972 (Access 01.08.2020)
35 SIPRI (2020): Trends in World Military Expenditure – Factsheet. online: https://www.sipri.org/sites/default/files/2020-04/fs_2020_04_milex_0_0.pdf (Access 01.08.2020)
36 See e. g. The Economics of Ecosystems and Biodiversity for Agriculture and Food, online: http://teebweb.org/agrifood/ (Access 01.08.2020)

Closely related to this is the question of rising population figures. Social science findings underscore that economies are not able to stabilize and develop without effective birth control.[37] Social security systems and an increase in the general level of education in particular have proven to be stabilizing factors in the development of birth rates. Gender justice also plays an important role here, as in the points outlined above. Recommendations and incentives that oppose birth control – including those from religious institutions – considerably impede a transformation to sustainability. The extent to which the corona pandemic is likely to affect population development is not predictable at this stage.

2.4 Interim conclusion: New challenges and opportunities for environmental policy through corona

The corona crisis has made many people (in Germany) aware of the vulnerability of today's globalized society (cf. Chapter 2.1.1) and the limits of what appears to be total control of the system and of the personal environment it entails. Natural liberties and the availability of goods and services were curtailed, sometimes massively. The resulting insecurity collides with the already changing world in which classes and "losers and winners" are once again emerging more strongly.[38] Even though (in Germany) the political and social system has proven to be capable of action and be responsible during the crisis, it has also highlighted aspects that are also of fundamental importance for the future handling of environmental crises:

- Vulnerability of economic and social (sub)systems to external disruptions becomes apparent.
- Realization that the stability and ability to act of social and political systems ("systemic relevance"[39]) is not solely a matter of economic optimization.
- Crises affect people very differently depending on their position in society and often exacerbate existing inequalities.
- Adaptive governance by the state is necessary and feasible (even in the short term) with the involvement of societal stakeholders.
- The scientific community has an essential advisory contribution to make to the assessment of options for action, and other actors from civil society and business need to be involved to enable aspects of the practical feasibility of measures and their transparent communication.
- Digitization is gaining importance as a key element of social order and rationalization.

The comparison with climate change and the comments on other ongoing crisis phenomena underline that these problems, challenges and necessities had already existed previously. The corona crisis, however, has highlighted the urgency of the situation and will in part exacerbate the problems. There are also two additional points to be noted:

- The effects of climate change are set to be more dramatic than those of the corona pandemic. The same applies to the effects of other environmental crises. It is advisable, therefore, to pay close attention to measures in the corona crisis that exploit synergies in mitigating environmental crises.
- The other ongoing crisis phenomena also need to be addressed as otherwise the necessary transformation of the economic and social systems is not achievable. The challenge in this context is to combine reactive measures to the crises with active measures of transformation – not least in the communication of the measures.

37 See i. a. Lutz, W., Butz, W. P. & Samir, K. C. (2014): World Population and Human Capital in the Twenty-First Century. Oxford University Press, Oxford
38 Reckwitz, A. (2019): Das Ende der Illusionen – Politik, Ökonomie und Kultur in der Spätmoderne (The End of Illusions – Politics, Economy and Culture in Late Modernism).- Suhrkamp, Berlin, Chapter 2
39 Importance of systemically important infrastructure such as health care, technical infrastructure, food supply, etc.

3 New guiding principles required for environmental and sustainability policy?

Based on the explanations in Chapter 2, suggestions for new leitmotifs for future environmental and sustainability policy are presented below, which could assist in integrating the findings on the course of corona and the dynamics of its consequences.

The term "guiding principles" should be understood as primary requirements that need to be considered when shaping future environmental and sustainability policy. These guiding principles may relate to both content-related objectives and methodological requirements as well as the use of specific measures and instruments.

We consider that the guiding principles we propose are necessary to ensure that future environmental and sustainability policy is able to successfully master two central challenges:

- Management of the actual corona crisis and other future crises and
- the transformation towards climate compatibility and sustainability in general

in order to be an effective governing force, the guiding principles require broad recognition not only by political decision-makers but also by all other social stakeholders. Some considerations on the further development of the guiding principles are outlined in Chapter 4.

In the following, the new guiding principles are first introduced and explained, derived from the observations and conclusions in Chapter 2. This is followed by a brief discussion of the relationship to established principles and other overarching requirements of environmental and sustainability policy.

3.1 New guiding principles after corona

Initially it is important to emphasize that the proposed guiding principles are closely linked by content. This means that the following guiding principles only "function" as an overall concept.

Strengthening the nexus of environment and health

The 17 sustainability goals and 169 sub-goals of the United Nations Sustainability Agenda 2030 of 2015 (Agenda 2030) define commonly recognized requirements and goals of international environmental and sustainability policy.[40] Since the sustainability agenda places obligations on both industrialized and developing countries, it is possible to consider it a "new social contract".

The corona crisis has shown that the nexus between environmental and health protection requires greater attention. The quality of the environment has a significant impact on human health and well-being.[41] At the same time, the ever-increasing encroachment of humanity into natural areas and climate change are having a negative impact on ecosystems and their services for human well-being.[42] The coronavirus pandemic as a probable consequence of a zoonotic disease illustrates this connection. Apart from the result of insufficient attention to animal welfare and health, the considerable human interventions in nature are also a decisive factor in the higher risk of zoonotic diseases.[43]

The nexus of environmental and health protection needs to be incorporated into all sectoral policies. The "One-Health" approach should be used to translate this guiding principle[44] into operation. This is because the "One-Health" approach considers the

40 UN Sustainability Agenda see at https://sdgs.un.org/goals (Access 01.08.2020); For an explanation of the sustainability agenda, see Instead of many: Independent Group of Scientists appointed by the Secretary-General (2019): Global Sustainable Development Report 2019: The Future is Now – Science for Achieving Sustainable Development. United Nations, New York

41 WHO (2015): Connecting Global Priorities: Biodiversity and Human Health – A State of the Knowledge Review. online: https://www.who.int/globalchange/publications/biodiversity-human-health/en/ (Access 01.08.2020)

42 OECD (2012): OECD Environmental Outlook to 2050: The consequences of inaction. Online: https://www.oecd.org/berlin/publikationen/umweltausblick.htm (Access 01.08.2020)

43 Gibb, R. et al. (2020): Zoonotic host diversity increases in human-dominated ecosystems. Nature. DOI: 10.1038/s41586-020-2562-8

44 For the definition, see https://www.rki.de/DE/Content/Infekt/Antibiotikaresistenz/One-Health/One_Health-Konzept.html (Access 01.08.2020)

close connection between human and animal health, intact natural ecosystems, food and food security and agriculture.

The guiding principle incorporates the important insight from the corona crisis that health is an important motivating factor for individual action and that it is possible to combine this with environmentally friendly action.

Resilience of economic and social systems

Ensuring the "resilience of economic and social systems" should be a guiding principle of the future environmental and sustainability policy. The guiding principle refers to the ability of a system to react to and compensate for deviations from normal operation, in particular also as a result of exogenous shocks, with the aim of ensuring that the expected service of the system continues to be performed ("absorptive and adaptive capacity"). It is in addition necessary that the respective system is able to reflect itself and transform itself according to the external changes ("transformation ability").[45] This guiding principle applies to societies as a whole, but also to economic systems (such as business operations, supply chains and financial markets) and social systems (for example: health care systems, food supply systems, education). The resilience of the ecological systems should also be considered.[46]

The environmental and sustainability policy needs to ensure that deviations and mistakes are tolerable for the subsystems. In addition, it is a matter of maintaining and creating scope to react appropriately to phenomena that could not be predicted due to gaps in available knowledge.

The crisis has shown emphatically that systems should not be optimized for efficiency alone, but that buffers are urgently needed to improve resilience. Examples include the need for space for various activities (pop-up bike lanes and cafés) currently under discussion in many cities and the maintenance of secure and global supply chains that are tolerant of malfunctions.

The resilience requirement would also indirectly serve to avoid damage. The Stern report on climate policy[47] (already published in 2006) or e. g. the explanations of the "Economics of land degradation" initiative[48] clearly demonstrated that avoiding environmental damage is economically more beneficial than subsequent restoration.

One consequence of the new guiding principle of "resilience" should also be a change in the parameters for measuring prosperity. They could allow an assessment of whether basic needs are secured within ecological limits and how much more prosperity is achieved in excess of these limits. Core economic indicators such as gross domestic product, as the current crisis also shows, are unsuitable for this purpose. The familiar OECD indicators are an initial starting point.[49]

Structural justice

"Structural justice" means ensuring a good quality of life based on secure basic care for all people worldwide. This should and is able to ensure that each individual is basically able to act autonomously and in a self-determined manner.

In this respect, structural justice would also ensure that unstable societies are avoided, which in turn are capable of generating problems for international politics (e. g. political conflicts resulting from migration). The guiding principle of "structural justice" would thus support the resilience of economic and social systems.

An example: The expected deepening of the north-south divide as a result of the corona crisis is also likely to limit the northern countries' options for

45 See in this context the concept of "transformative resilience" developed by the Joint Research Center (JRC) of the EU Commission, at: https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/building-scientific-narrative-towards-more-resilient-eu-society-part-1-conceptual-framework (Access 01.08.2020)

46 For a summary of the extensive discussion of resilience in an ecological context, see: Weise, H., et al. (2020). Resilience trinity: safeguarding ecosystem functioning and services across three different time horizons and decision contexts. Oikos 129(4): 445–456.

47 Stern, N. et al. (2006): The Economics of Climate Change: the Stern Review.- http://www.lse.ac.uk/GranthamInstitute/publication/the-economics-of-climate-change-the-stern-review/ (Access 01.08.2020)

48 see Reports at https://www.eld-initiative.org/en/publications/eld-publications/ (Access 01.08.2020)

49 See: OECD Better Life Index: http://www.oecdbetterlifeindex.org/de/about/better-life-initiative/; Well-being Economy Alliance: https://www.oecd-ilibrary.org/docserver/9789264307292-en.pdf (Access 19.04.2020)

action. Should structural justice not be ensured, then the resilience of other systems (e. g., trade) is often affected.[50]

Solidarity of action as an expression of social resilience

This guiding principle demands that all state, social and private actors, insofar as they initiate or implement environmental and sustainability policy measures, consider the effects of these measures on other stakeholders, especially their resilience.

Since resilience of systems is necessary, stakeholders need to keep in mind when making decisions that the resilience of systems in other countries, for example, is also guaranteed. The guiding principle of "acting in solidarity" thus also supports the guiding principle of resilience. International trade, for example, would also need to be realigned accordingly.

The guiding principle refers to Kant's imperative "Do unto others as you would have them do unto you": to make one's own values and expectations the standard when dealing with others.

The corona crisis has shown (once again) that solidarity should be a guiding motive for action in crises, even if it conflicts (both individually and at the state level) with self-interest considerations. In current environmental policy, the motive can be found, for example, in the idea of a "just transition" and "leave no one behind" at both EU and UN level.

Adaptive governance as a result of a constantly changing knowledge base

The corona crisis shows that far-reaching measures had to be taken regularly when gaps in knowledge still existed and that the knowledge situation has changed continuously. As such, the measures would always require adjustment to new findings. The same applies to the climate and biodiversity crisis. A constantly changing state of knowledge therefore requires "adaptive governance" to be regarded as an important guiding principle. This guiding principle is intended to support the resilience of economic and social systems in the sense of coherent risk management. Adaptive governance is only possible when all stakeholders work together in a modus of "solidary cooperation".[51]

Adaptive governance requires transparency and a "digital culture" in order to achieve success.[52] This also means a stronger use of trans-disciplinary approaches for knowledge generation as a basis for decisions, as they are already widely tested and increasingly applied at the local and regional level (real laboratories and the like).

This kind of adaptive governance is not required for all policy areas: There will be numerous areas that are directly organized by politics and administration using established decision-making procedures (e. g. setting thresholds, awarding grants, traffic controls).

Maintaining and strengthening the capability to act of public institutions at all levels

States, as well as international institutions, have proven to be important and necessary crisis managers in the corona crisis. Empowered stakeholders at all levels and their effective interaction are essential to coordinate the discourse on appropriate measures and to ensure their implementation.[53] Empowerment is also required in order to be in a position to implement other guiding principles such as, in particular, "adaptive governance" or "digital culture" (see below).

Nonetheless, the public stakeholders are unable to bring about the necessary transformation on their own. In this respect, all civil society stakeholders and individuals have a responsibility to commit themselves to successful crisis management and transformation and to contribute their respective share accordingly. It became clear even during the lockdown in the wake of the coronavirus crisis that while the state is responsible for setting the framework, society itself is a decisive stakeholder in crisis management. The goal of setting a framework

50 The guiding principle of "structural justice" is linked to the debate on "environmental justice", for example in respect of participation rights. See e. g. Menton, M. et al. (2020). Environmental justice and the SDGs: from synergies to gaps and contradictions. Sustainability Science. DOI: 10.1007/s11625-020-00789-8

51 In this respect, the concept connects with the analysis of the Global Sustainability Development Report 2019, which discusses individual and collective action as an important lever for implementing the sustainability agenda, see: Independent Group of Scientists appointed by the Secretary-General (2019): Global Sustainable Development Report 2019: The Future is Now – Science for Achieving Sustainable Development. United Nations, New York

52 On the guiding principle of "digitality" directly following.

53 Governance is also discussed in the GSDR as an important lever, see Independent Group of Scientists appointed by the Secretary-General (2019), footnote 51

by the state is therefore to enable social actors to perform their tasks in accordance with the principle of cooperation in a new quality.[54]

Empowered stakeholders are needed above all at the level of the national state, in regional cooperation (e. g., European Union, African Union) and at the UN level. However, strengthening local structures, i. e. of cities and municipalities, is also of the utmost importance.[55] Cities and local authorities have a duty and responsibility to act as the state's "local problem solvers".[56] This demands not only the preservation and promotion of the individuality of cities and municipalities, but also the securing of their financial and political capacity to act.[57]

The legitimacy of public actors is crucial for their support in society. In this respect, comprehensible, knowledge-based and discursive (crisis) communication is also of crucial importance.

Digital culture/digitality

This guiding principle underlines the essential nature of a digital culture in achieving sustainability. "Digital culture" means a new form of system control (and thus an improved basis for a knowledge-based environmental policy). In this sense, it represents a new mode of social and cultural interaction and creativity that uses the possibilities of digitization, but also sets limits to it.[58]

The importance of using artificial intelligence tools for crisis management became apparent during the corona crisis. This potential needs to be systematically developed in regard to environmental and climate protection, but also with a regard to the necessary social-ecological transformations.

A prerequisite for this, however, is that the ongoing digitization is not only seen as a technical and infrastructural challenge but also as a socio-economic and cultural option. The use of artificial intelligence should rather be understood as a "public good" in order to ensure society's innovative capacity for sustainability. Accordingly, the state must establish framework conditions oriented toward the common good that guarantee general access to this "public good". The resilience of digital systems, especially the human ability to act in case of errors of the same, is an essential requirement that is to be safeguarded by the framework conditions.

The G20 states formulated initial requirements on the role of digital technologies in a "ministrial declaration" in July 2020 that should be considered: (1) inclusive growth for all, (2) welfare for all and fairness, (3) transparency and comprehensibility, (4) robustness, privacy and reliability and (5) accountability. [59]

54 See Ginzky, H. (2020): Reflections on stakeholder involvement according to corona: or – nothing is any good unless it gets done! https://www.csc-blog.org/en/international-environmental-and-sustainability-policy-during-and-after-covid-19-pandemic

55 See WBGU (2019): Our common digital future. WBGU Berlin; Sachs, J. D. et al. (2019): Six Transformations to achieve the Sustainable Development Goals. Nature Sustainability 2(9): 805–814.

56 See WBGU (2016): Humanity on the move – the transformative power of the cities.- online at https://www.wbgu.de/en/publications/publication/humanity-on-the-move-unlocking-the-transformative-power-of-cities

57 See respective recommendations in Gibis et al. (2020): Sustainable paths out of the economic crisis – protecting the environment and climate, securing employment, initiating socially acceptable transformation – German Environment Agency, Dessau-Roßlau

58 See, for example, the discussion initiated by WBGU on a charter for a sustainable digital age: https://www.wbgu.de/de/publikationen/charta (Access 01.08.2020)

59 Declaration by the G20 countries: https://g20.org/en/media/Documents/G20SS_Declaration_G20%20Digital%20Economy%20Ministers%20Meeting_EN.pdf (Access 01.08.2020)

3.2 Relationship of the new guiding principles to recognized principles and other overarching requirements of environmental and sustainability policy

The environmental and sustainability policy contains a number of principles or other general guidelines that should govern individual decisions, agreements and measures. These are partly legally embodied and partly merely politically agreed. Principles or other primary guidelines are found in national legal systems, in regional and international environmental law and in political agreements.[60]

The precautionary, polluter-pays, cooperation and common burden principles may be cited as key principles.[61] At least the first three principles are also recognized under international law, although the exact content of the principles is disputed.[62] EU law also recognizes the principle of integration, which defines environmental and sustainability policy as a cross-sectoral task and therefore requires that all other policy sectors take its requirements into account.[63]

In addition to the precautionary and polluter-pays principles, international environmental law also recognizes the principle of "common but differentiated responsibilities of industrialized and developing countries", which was at least incorporated into the three Rio treaties of the early 1990s.[64]

As a new international social contract, the United Nations' 2030 Agenda for Sustainable Development formulates overarching requirements for environmental and sustainability policy, although these are not legally binding. The "leave no one behind" principle is of particular importance here.[65] The principle demands that a sustainability policy must reach and include all people.[66]

The new guiding principles are not intended to challenge the mentioned principles and guidelines. After all, many of these, such as the precautionary principle or the sustainability goals, are indispensable for an ambitious environmental and sustainability policy. The new guiding principles are intended to substantiate and/or supplement the recognized principles and overarching guidelines. A new focus may also be necessary.

With respects to the Sustainable Development Goals, it can be said that the proposed guiding principles expand the view of environmental policy even further into an integrated consideration of the sustainability discourse and the Agenda 2030, but in some cases they go even further: There was a discussion even before the corona crisis, for example, about the fact that digital culture was not adequately reflected in the Agenda 2030.[67] It is also only marginally mentioned in the German sustainability strategy. There is a real need to think beyond the direct positive and negative effects of digitization on the environment and sustainability and to work towards a sustainable digitized society.[68]

Similarly, approaches to strengthening resilience are only found in scattered form and in individual thematic sustainability goals. Resilience is not used here as a defined concept, but rather as a desirable characteristic in the context of poverty, infrastructure, climate adaptation agriculture and cities.[69]

The guiding principles of structural justice and solidarity of action are also to be seen as guiding principles for Agenda 2030, although they are not explicitly formulated and prioritized there due to different views of "justice" in the world.[70]

60 On the development of the governing targets of environmental policy, see Radkau, J. (2011): Die Ära der Ökologie – eine Weltgeschichte (The era of ecology – a world history). – C.H.Beck, Munich
61 Instead of many: Klöpfer, M. (2016): Umnweltrecht (Environmental Law), 4th edition. – C.H.Beck, Munich
62 There is no consensus at international level regarding principle of care. Some countries, including the USA, assume only a caring approach.
63 Articles 11 and 191 TFEU (Treaty on the Functioning of the European Union).
64 It is debatable whether this principle is already valid under customary international law.
65 See the explanatory statements of the United Nations at: https://unsdg.un.org/2030-agenda/universal-values/leave-no-one-behind (Access 08.06.2020)
66 The German Sustainability Strategy also embraces some of these principles and, with its management rules, provides starting points for implementing the guiding principles discussed here: https://www.bundesregierung.de/breg-de/themen/nachhaltigkeitspolitik/eine-strategie-begleitet-uns/managementkonzept (Access 01.08.2020)
67 WBGU (2019), Sachs et al. (2019), footnote 55
68 WBGU (2019), footnote 55
69 Bahadur, A. et al. (2015). Resilience in the SDGs.- ODI Briefing August 2015: 1–7. Online: https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9780.pdf (Access 09.06.2020)
70 On the analysis of the concept of "justice" in SDGs, see Menton et al. (2020), footnote 50. Menton et al. also point to existing gaps and contradictions in the SDGs with regard to environmental justice.

The guiding principle of "strengthening environmental and health policy" is understood as a kind of prioritization of objectives within the framework of the Sustainability Agenda 2030.

In terms of the four central principles – precautionary principle, polluter-pays principle, cooperation principle and common burden principle – the following statements could be drawn:

The guiding principle of resilience is to be seen as a substantiation of the precautionary principle, but it also extents beyond this when it formulates a qualitative requirement for the systems themselves.

The guiding principles of "adaptive governance" and "state institutions capable of action" are to be understood as a substantiation of the precautionary and cooperation principle. At the same time, they formulate requirements that were not covered by these principles.

The new guiding principles proposed here are therefore compatible with the Agenda 2030 and other recognized principles, but above all they exceed them conceptually and also emphasize the importance of environmental issues as the basis for achieving all SDGs.[71]

71 See also the Review: Scharlemann, J. P. W. et al. (2020). Towards understanding interactions between Sustainable Development Goals: the role of environment–human linkages. Sustainability Science. DOI: 10.1007/s11625-020-00799-6

4 How to move further? Theses for a new environmental and sustainability policy

The analysis of the corona crisis, under consideration of climate change and other crisis phenomena, enables certain recommendations to be formulated regarding a fundamentally altered conception of environmental and sustainability policy, based on the new guiding principles. There are six points in particular that should be mentioned here from the authors' viewpoint.

Environmental protection and sustainability as central requirements of policy: Environmental protection and sustainability need to move to the center of politics as an action-guiding decision matrix that extends far beyond the long-established "mainstreaming" – both to demand and enforce compliance with the planetary boundaries and to find flexible, innovative and continually adapted solutions. A key political challenge is to identify solutions that, despite the enormous complexity of the challenges, strike a good balance between the needs of people and environmental protection and thus offer a positive and viable picture of the future.

Resilience as a guiding principle: Resilience (ecological, social, economic) should be the essential fundamental guiding principle of future environmental and sustainability policy. Thus, it sets a counterpoint to the logic of (primarily economically defined) efficiency that has long dominated – without completely ignoring the idea of efficiency of course. A successful implementation of the guiding principle of resilience depends for success on the other guiding principles being acknowledged as guidance for action and implemented accordingly.

Legal status: Guiding principles, which are intended to achieve an actual steering effect, require social consensus. Social stakeholders, political decision-makers and society as a whole are required to agree on the guiding principles and accept them as signposts that guide their actions. A legalization of some of the guiding principles, for example by supplementing and/or updating Article 20a of the Basic Law or Article 191 of the Treaty on the Functioning of the European Union (TFEU), or by international agreements, is a suitable mechanism for achieving or securing such a consensus.

Role of the state, adaptive governance and civil society stakeholders: The coronavirus and climate crisis lead to great uncertainty in society. State governance must therefore provide a direction for "hope for improvement" in the sense of a "positive and sustainable picture of the future". The state is obliged, because of the various crises, to do justice to its elementary role in shaping and setting frameworks in an adaptive learning mode, thereby enabling and ensuring an organized self-regulation of society. Societal stakeholders will need to be involved accordingly.

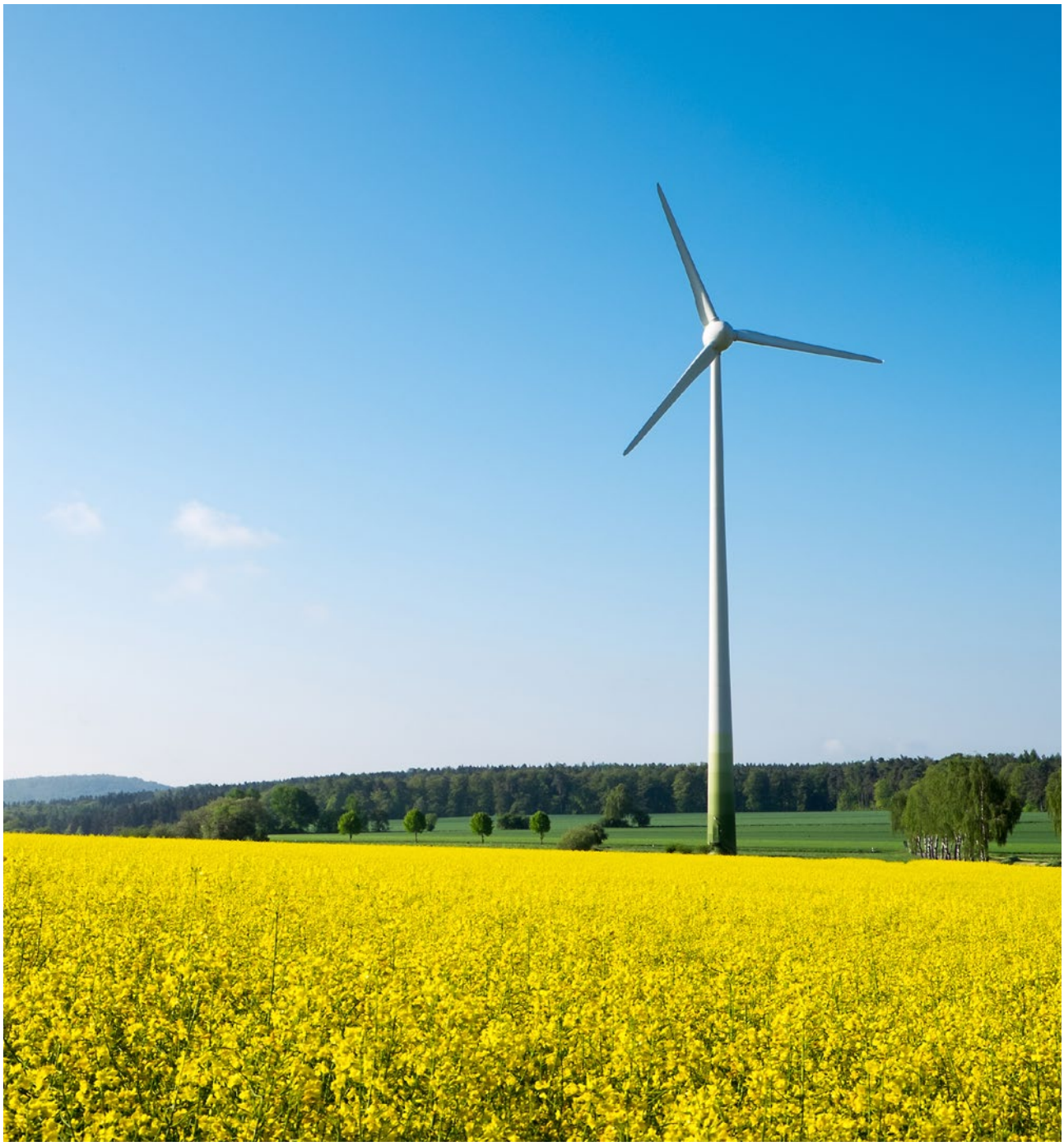
Need for new operational practice: This new value and orientation of environmental and sustainability policy requires translation, formulation and operational practice for the various thematic areas of environmental protection and sustainability policy, nationally, in the EU context and with regard to international cooperation.

Strengthening of trans-disciplinary research and consulting: To develop this new operational practices, trans-disciplinary research activities, which build on the discourse with social stakeholders, are becoming increasingly necessary – in addition to continuing the disciplinary and interdisciplinary environmental research. A considerable expansion of their range is imperative.

Likewise, policy advice should become more integrative and adopt trans-disciplinary formats more strongly. This should be done in the sense of a post-normal approach, in which science recognizes that today's complex socio-ecological problems require a consultative approach that actively involves non-research stakeholders in the entire advice process.[72] This is only partially happening so far.

We view the proposed guiding principles and the recommendations for the further development of the environmental policy's self-image addressed here as an invitation to a more in-depth discussion of environmental policy "after corona". In view of the far-reaching changes brought about by the corona crisis, most of which will only become apparent in the coming years, such a discussion (not solely for environmental policy, but for all policy areas) seems essential.

72 As orientation for the post-normal science approach, see: Funtowicz, S. & J. Ravetz (1993): Science for the post-normal age. Futures 25: 739–755



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