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Hintergrundstudie

**Biodiversity and Soil  
as Global Commons  
International Governance  
and the Role of Germany**

Dr. Uta Eser, Büro für Umweltethik

**BÜRO FÜR  
UMWELTETHIK**



## Zur Studie

### Hintergrund

#### Wie können Global Commons besser geschützt und nachhaltiger genutzt werden, insbesondere im Rahmen der Deutschen Nachhaltigkeitsstrategie:

Unter anderem diese Frage bearbeitet die Wissenschaftsplattform Nachhaltigkeit 2030 mit dem Ziel, wissenschaftlich basierte Handlungsempfehlungen für politische Akteure zu entwickeln. Zu diesem Zweck hat sich 2017 über die Plattform die Arbeitsgruppe „Global Commons“ formiert, geleitet von Prof. Martin Visbeck (Co-Vorsitzender der Wissenschaftsplattform) und Prof. Aletta Bonn (Deutsches Zentrum für integrative Biodiversitätsforschung). In diesem Rahmen wurden unter anderem vier Hintergrundstudien zu vier Global-Commons-Bereichen von der Plattform in Auftrag gegeben (Süßwasser, Meere, Wälder, Biodiversität/Böden). Das vorliegende Papier „Biodiversity and Soil as Global Commons International Governance and the Role of Germany“ ist eine von ihnen. Maßgeblich für die weitere AG-Arbeit ist ein breiter interdisziplinärer Austausch mit der Wissenschaft sowie transdisziplinärer Austausch mit Politik, Wirtschaft und Zivilgesellschaft in mehreren Schritten.

### Zitierhinweis

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# Biodiversity and Soil as Global Commons

International Governance and the Role of Germany



Report to the *Wissenschaftsplattform Nachhaltigkeit 2030*

Dr. Uta Eser, *Büro für Umweltethik*

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## 1 Summary

The study at hand explores Germany's role in the governance of biodiversity and soil as global commons. It aims to make recommendations for future political action in, with and by Germany regarding the improvement of global governance of these commons.

In view of the limited scope of the study both in time and length, the report makes no claim to be complete. Rather than reiterating the extensive empirical evidence on biodiversity and soil, it focusses essentially on the specifics of the methodological approach, namely the *perspective of global commons*. To prepare the conceptual foundation for this endeavour, *chapter 2* explains the commons approach. It briefly sketches the ideational shift from the 'tragedy of the commons' to the 'opportunity of the commons' and relates global commons to the political principle of 'common but differentiated responsibility' (CBDR) developed in the CBD process.

A huge body of literature demonstrates the *commons function of biodiversity and soil*. It provides ample evidence for a) the importance of biodiversity and soil for human well-being, b) the ongoing unchecked loss thereof and c) the anthropogenic drivers of these losses. *Chapter 3* highlights illustrative chunks of this evidence that demonstrate the critical state of biodiversity and soil in the Anthropocene. It describes the concept of ecosystem services as a communication tool that shall demonstrate the existential importance of these global commons to policy makers. A section on drivers narrows the focus of analysis to changes and conflicts in *land use*, arguing that this issue is especially interesting from a commons perspective, for land is usually owned by someone, either private persons or public bodies, whereas the biodiversity and soil to be found on that land constitute global commons. Thus, the relevant governance question is: how can private, local, or national land use decisions take into account biodiversity and soil - as global commons - for the benefit of all?

This question is treated in *chapter 4* that discusses the *global governance of biodiversity and soil*. To begin with, this chapter elucidates the difference between a collective and a distributive understanding of the plural subject 'all' and illuminates problems of collective action. It goes on to provide a framework for the global commons that offers an analytical perspective on the three UN Conventions relevant for biodiversity and soil: the CBD, the UNCCD, and the UNFCCC. Contributions of biodiversity and soil to the Agenda 2030 with a special emphasis on interactions between SDG 15 and other SDGs are presented in the final section of this chapter.

*Germany's role* in the global governance of biodiversity and soil is analysed in *chapter 5*. Although Germany has a strong reputation for being environmentally concerned, there is a gap between the country's green rhetoric and its de facto contribution to unsustainable patterns of production and consumption. This is the case not only within Germany but even more so in regard to measures taken by Germany: policies that aim at economical or societal goals, but have an inadvertently adverse effect on environmental goals of biodiversity conservation and soil protection. More often than not, environmental concerns are subordinated to short-term economic interests of particular groups or powerful actors. Policy coherence still is a huge desideratum in German policy making, as is resolute implementation of already existing regulations.

With regard to potential tensions between national and global as well as between public and private interests, *chapter 6* scrutinizes the Agenda 2030 for *transformations* that are crucial for the advancement of global biodiversity and soil governance. It discusses sustainable production and consumption (SDG 12), stakeholder participation (SDG 17), and education (SDG 4) as potential levers of change. It is argued that all of these endeavours need to be explicitly geared to the long-term collective benefit of all humans which may require sacrifices of all individually.

The final *chapter 7* provides concluding recommendations for *concrete measures* that Germany can take to support successful governance of biodiversity and soil as global commons.





## 2 Introduction: Global Commons in the Anthropocene

### 2.1 The tragedy of the commons

Fifty years ago, the prestigious journal *Science* published Garret Hardin's landmark paper "The tragedy of the commons". "Freedom in a common means ruin to all" - this was, in a nutshell, the essential claim of Hardin's critique of the commons (Hardin 1968:1244). Hardin's analysis basically discredited the idea of commons. He regarded commons *per se* as being condemned to overexploitation and saw only two possible ways to avoid this tragedy: selling them off as private property or keeping them as public property and allocating individual use rights (Hardin 1968: 1245). Ever since, the deterioration of existentially important natural commons through excessive human use has been a recurring topic of the environmental discourse. In the meantime, there has been a notable change in the political and economic implications of the term's use, however, from 'the tragedy' to 'the opportunity' of the commons (GEF/IUCN 2017).

### 2.2 The opportunity of the commons

Today's affirmative use of the concept of commons goes back to Nobel laureate Elinor Ostrom. In her 1990 book "Governing the commons", the political economist demonstrated that not all commons were doomed to failure, but could operate successfully under certain conditions. Based on empirical studies, she identified eight "design principles" that enabled sustainable management of commons (Ostrom 1990:88ff). While Ostrom's work focused on local common-pool resources, the concept of global commons broadens the analysis. The relevant terms are defined as follows (Buck 1998:191ff.):

- ❖ **Common-pool resources (CPR):** Subtractable resources managed under a property regime in which a legally defined user pool cannot be efficiently excluded from the resource domain
- ❖ **Commons:** Resource domains in which common-pool resources are found (for example, Antarctica or outer space)
- ❖ **Global commons:** Resource domains to which all nations have legal access, such as outer space

In contrast to global commons, international commons are resource domains shared by several nations, such as the Mediterranean Sea and Antarctica. Susan Buck considers this distinction relevant because international commons are exclusionary while global commons are not.

### 2.3 The New Global Commons in the Anthropocene

Recently, the concept of the global commons has been developed further, with notions of the 'Anthropocene' (Crutzen/Stroemer 2000), 'Planetary Boundaries' (Steffen et al. 2015) and 'Planetary Stewardship' (Steffen et al. 2011) being integrated. A working paper of the *International Institute for Applied Systems Analysis* (IIASA) that advocates a broader concept of global commons provides the theoretical background for the study at hand. Concerned about imminent threats to the life-sustaining systems of planet Earth, the paper proposes an inclusive and holistic approach that considers the stability and resilience of the Earth system as a 'New Global Commons':

"We argue that humanity must be the steward of the planet's natural resources - the ecosystems, biomes and processes that regulate the stability and resilience of the Earth system, for example the carbon cycle. These are what we term the new 'Global Commons in the Anthropocene'" (Nakicenovic et al. 2016: iv).

Worried about the dynamic equilibrium that has allowed a global civilization to flourish, the authors make a bold normative claim: "A stable and resilient Earth system is the common heritage of all humanity and every child's birthright" (ibid: 1). The authors' "aspirational and holistic narrative" is explicitly attributed to the United Nations' Sustainable Development Goals (SDGs) and the UN 2030 Agenda that, according to the paper, "acknowledges, *for the first time*, that developed nations must act rapidly to protect the resilience of the Earth system while developing



nations need to achieve a just and safe future for all with dignity and equity” (ibid: 24, my emphasis).

This appraisal tends to overestimate the novelty of the approach, however. Many of the supposedly “new” insights of the paper have a long-standing history in the environmental discourse. As some of this history proves relevant when it comes to global governance of biodiversity and soil, we need to quickly review the United Nations’ discourse on the global environment since 1972.

## 2.4 Common but differentiated responsibility (CBDR)

The precarious balance between *national sovereignty* on the one hand and *the common good of mankind* (as it was called then) on the other hand is a recurring topic in the UN discourse on the environment. In a summary of the debate, the Secretary-General of the Stockholm Conference, Maurice F. Strong, stressed the need for “new concepts of sovereignty, based not on the surrender of national sovereignties but on better means of exercising them collectively, and with a greater sense of responsibility for the common good” (United Nations 1972:45). Ever since, balancing national and global interests as well as private and public interests has been a core issue of global governance. With regard to the centrality of this balance, the recommendations strived for in this study need to be made with an awareness of the sophisticated conceptual consensus that has enabled international cooperation for decades.

The phrase “common heritage of humankind” denotes an especially sensitive topic. In 1992, at the legendary *UN Conference on Environment and Development* in Rio de Janeiro, the developing nations had rejected this terminology in the negotiations preceding the *Convention on Biological Diversity* (CBD). The wording, they insisted, disguised the fact that biodiversity and the financial and technological means to protect and use it were not distributed equally around the globe - nor were the causes of and reasons for the deterioration of biodiversity. These reservations gave rise to a principle that was constitutive for the UN process for many years: the *Principle of Common but Differentiated Responsibilities* - CBDR for short. The Rio declaration defined this principle as follows:

“Principle 7: States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth’s ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.” (UNCED 1992)

The CBDR principle is considered one of the milestones of the Earth summit (Martens 2014). Although it guided international environment-related cooperation, the principle was initially not included in the development agenda. Having been absent in the Millennium Development Goals (MDGs), the inclusion of the CBDR principle in the Agenda 2030 was highly contested in the negotiations preceding its adoption, but it ultimately proved to be a crucial step towards its finalisation (Jiang 2016:180).

## 2.5 Points to consider

What do the aforementioned conceptual considerations mean for the task at hand? It is essential to keep the following points in mind when developing recommendations for the governance of biodiversity and soil as global commons:

- ❖ ‘Commons’ *sensu* Ostrom is a spatial concept. It denotes resource domains to which all nations have legal access. In contrast to this concept, biodiversity and soil are subtractable global-pool resources whose user pool is humanity as a whole. Being “grounded” on land, these common-pool resources are managed under different kinds of property regimes, some of which effectively exclude some people.
- ❖ Successful management of these resources requires taking into account the global implications of governance decisions on all levels: from local to national to regional to global. At

the same time, national sovereignty and the principle of common but differentiated responsibility are indispensable principles of global policy making.

- ❖ Thus, the tension between (private or communal or national) *property of land* on the one hand and, on the other, the *commons function of biodiversity and soil* associated with that land is centre stage.
- ❖ The perspective of ‘the new global commons in the Anthropocene’ is being used here as a heuristic that helps to uncover *tensions between individual and collective interests*. In the chapter on global governance, special emphasis will be given to notorious conflicts of interests, namely national vs. global, private vs. public, and short-term vs. long-term.

## 3 Commons function of biodiversity and soil

### 3.1 How we are losing biodiversity and soil: empirical evidence

When E.O. Wilson and other renowned biologists organised the *National Forum on BioDiversity* in Washington D.C. in 1986, they had a clearly political mission. According to Dan Janzen, the conference was “explicitly designed to make Congress aware of this complexity of species that we’re losing” (Takacs 1996:37). Ever since, the loss of biodiversity and soil and its negative impact on human well-being have been demonstrated in many scientific endeavours: the *Millennium Ecosystem Assessment* (MA 2003, MA 2005a,b), the *Global Biodiversity Outlooks* (Secretariat of the Convention on Biological Diversity 2001, 2006, 2010, and 2014), the reports of *The Economy of Ecosystems and Biodiversity* initiative (TEEB), the assessments of the *Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services* (IPBES), the report of the *Intergovernmental Technical Panel on Soils* (FAO 2015) and the *Global Land Outlook* (UNCCD 2017) -- to mention only the most important ones. Table 1 offers an overview of relevant reports (→ Annex). On thousands of pages, scientists have provided evidence not only for the loss of biological diversity and the degradation of land but also for the huge societal, cultural and economic costs related to these losses. Many of these reports also elaborate on interdependencies between biodiversity and soil. For example, the importance of biodiversity for soil formation, soil fertility and prevention of soil erosion, which are commonly presented as supporting and regulating ecosystem services (see below), is underscored.

Most of the aforementioned endeavours include executive summaries, some of which, like the TEEB studies, are explicitly designed for different target audiences. Most of them also feature **unequivocal key messages** on the current status and trends of biodiversity and soil. A few examples may illustrate the broad consensus that urgent action in favour of biodiversity and soil is needed in order to ensure human well-being on the planet:

“Currently, degradation of the Earth’s land surface through human activities is negatively impacting the well-being of at least 3.2 billion people, pushing the planet towards a sixth mass species extinction, and costing more than 10 per cent of the annual global gross product in loss of biodiversity and ecosystem services.” (IPBES assessment on land degradation, IPBES 2018:10)

“A significant proportion of managed and natural ecosystems are degrading: over the last two decades, approximately 20 per cent of the Earth’s vegetated surface shows persistent declining trends in productivity, mainly as a result of land/water use and management practices.” (GLO, executive summary, UNCCD 2017b)

“The overwhelming conclusion of the first-ever comprehensive report on the world’s soil resources, [...] is that the majority of the world’s soil resources are in only fair, poor or very poor condition [...] and that conditions are getting worse in far more cases than they are improving.” (FAO Soil report, FAO 2015b:1)

“Changes in biodiversity due to human activities were more rapid in the past 50 years than at any time in human history, and the drivers of change that cause biodiversity loss and lead to changes in ecosystem services are either steady, show no evidence of declining over time, or are increasing in intensity” (Biodiversity Synthesis of the Millennium Ecosystem Assessment, MA 2005b: vi)

“Some 10-20 % of drylands are already degraded (medium certainty). Based on these rough estimates, about 1-6 % of the dryland people live in desertified areas, while a much larger number is under threat from further desertification.” (Desertification synthesis of the Millennium Ecosystem Assessment, MA 2005: 19)

“Many ecosystems that are rich biologically and promising in material benefits are severely threatened. Vast stocks of biological diversity are in danger of disappearing just as science is learning how to exploit genetic variability through the advances of genetic engineering. Numerous studies document this crisis with examples from tropical forests, temperate forests, mangrove forests, coral reefs, savannas, grasslands, and arid zones.” (World Commission on Environment and Development 1987: 125).

The last quote is from “Our common Future”, the report of the *World Commission on Environment and Development* (WCED) that coined and propagated the concept of **sustainable development** (SD) in 1987. Until then, the loss of biodiversity and soil were considered mainly environmental problems. With the merging of environmental and developmental concerns in the concept of SD and its ample adoption at the *UN Conference on Environment and Development* (UNCED) in Rio in 1992, their destructive effects on human development became a major interest ever after.

### 3.2 How biodiversity and soil support human life: Ecosystem Services

To demonstrate the societal and economic harm related to biodiversity loss, the *Millennium Ecosystem Assessment* made use of the concept of *ecosystem services* (ES). This concept has been provided by biologists for communication purposes (Daily 1997) and has been widely applied ever since. In a nutshell, it claims that biodiversity is indispensable for the proper functioning of ecosystems which, in turn, is indispensable for the provision of elementary services to society. Figure 1 shows the Millennium Assessment's emblematic scheme that relates supporting, provisioning, regulating, and cultural services to human well-being (MA 2005b:19).

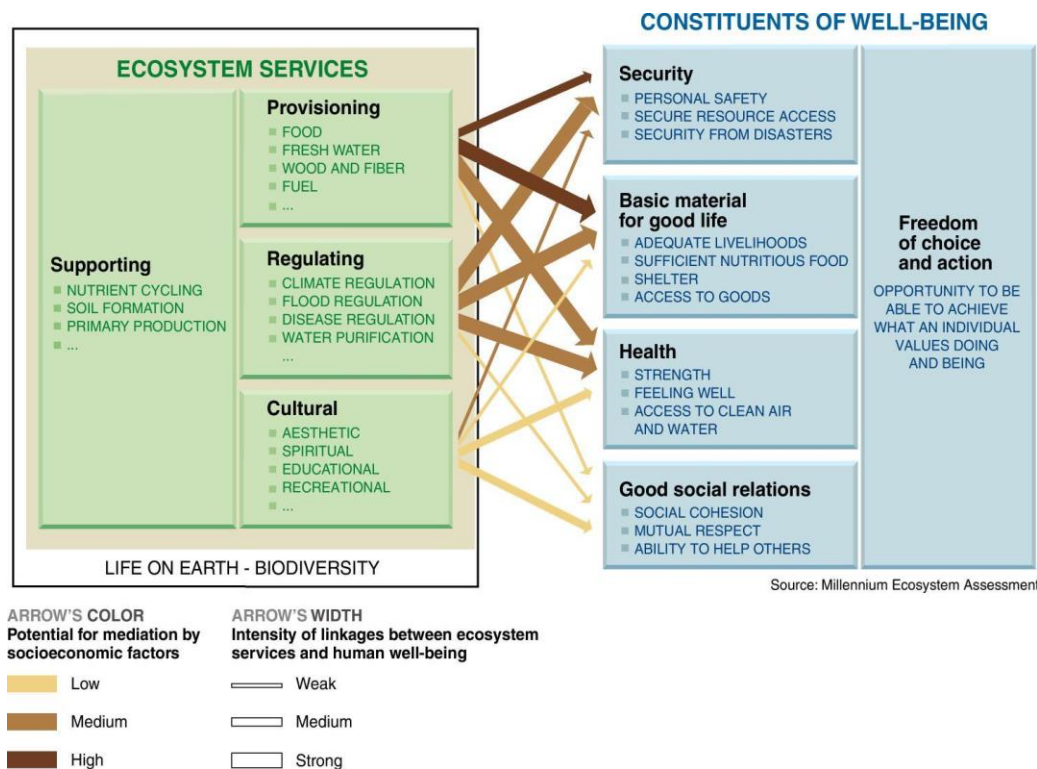


Fig. 1: The MA's emblematic ecosystem services scheme

The ES concept is primarily a communication tool; it is intended to convince decision makers to act in favour of biodiversity because they understand its crucial importance for society and for the economy. Accordingly, the graphical representation of ecosystem services is an essential element of biodiversity communication today, and the abstract theoretical concept is often illustrated by pictograms to render the idea even more accessible to a general public. As an example, figure 2 shows an ES illustration from the 2016 *Living Planet Report* (WWF 2016: 51).

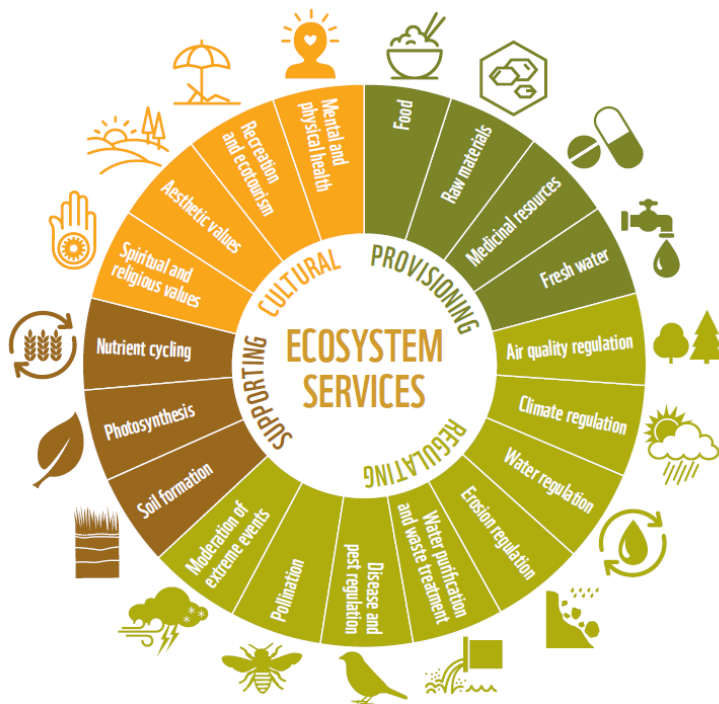


Fig. 2: A presentation of ecosystem services in the Living Planet Report

The ES concept also covers soil issues; soil formation and nutrient cycling are among the supporting services that ecosystems provide, while prevention of erosion is among the regulating services. In recent years, ecosystem services provided by the functional diversity of soil biota have received increasing amounts of attention, e.g. by the foundation of the *Global Soil Biodiversity Initiative* (GSBI) in 2011. A recently published global review of links between soils and ecosystem services provided the illustrative representation of the relations between soil properties, soil functions, ecosystem services and human well-being shown in figure 3 (Adhikari/Hartemink 2016: 103).

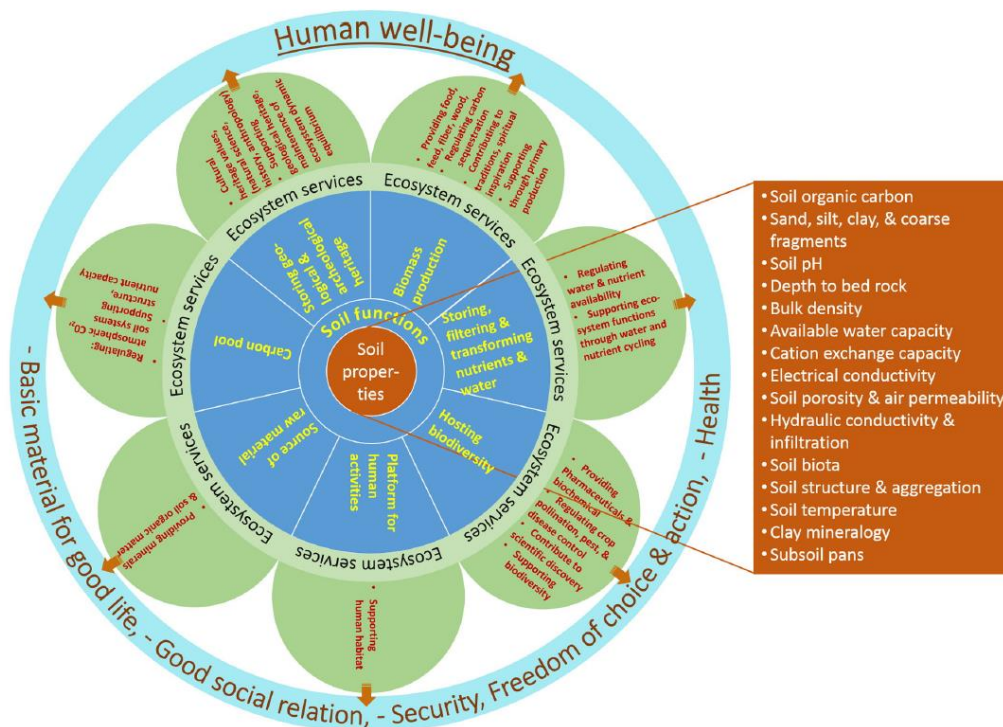


Fig. 3: Relation between soil properties, soil functions, ecosystem services and human well-being



This brief overview shall suffice to demonstrate that information on the current status and trends of biodiversity and soils as well as on the societal and economic impacts of their loss and deterioration is broadly available. With regard to this ample evidence, Rockström et al. (2009) have presented both the loss of biological diversity and the deterioration of soils as serious threats to human well-being. In their iconic representation of the planetary boundaries, the loss of genetic diversity and the extraction of atmospheric nitrogen are depicted as red areas where human activities have already exceeded safe margins (see figure 4).

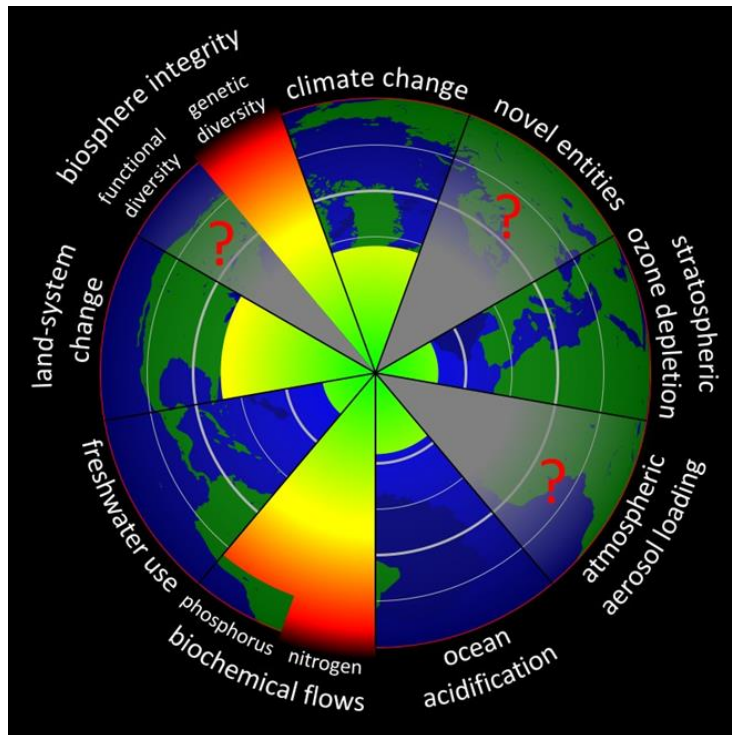


Fig. 4: Planetary boundaries according to Rockström et al. 2009 and Steffen et al. 2015; (Wikimedia Commons)

### 3.3 Why we are losing biodiversity and soil: conflicts in land use

Not only does the abovementioned body of literature demonstrate the extent and consequences of the loss of biodiversity and soils; it also names a plethora of causes. The Millennium Assessment distinguished between ***direct and indirect drivers of change***, with the former term being understood as referring to processes that have immediate impacts on biodiversity and ecosystem services (like changes in land use or species introductions), and the latter indicating societal developments that underlie and trigger the direct drivers (e.g. global trade or production and consumption patterns). Figure 5 demonstrates how these drivers interact with ES and each other and affect human well-being on various spatial and temporal scales, with arrows indicating where strategic interventions could revert the current trend (MA 2005b: iii).

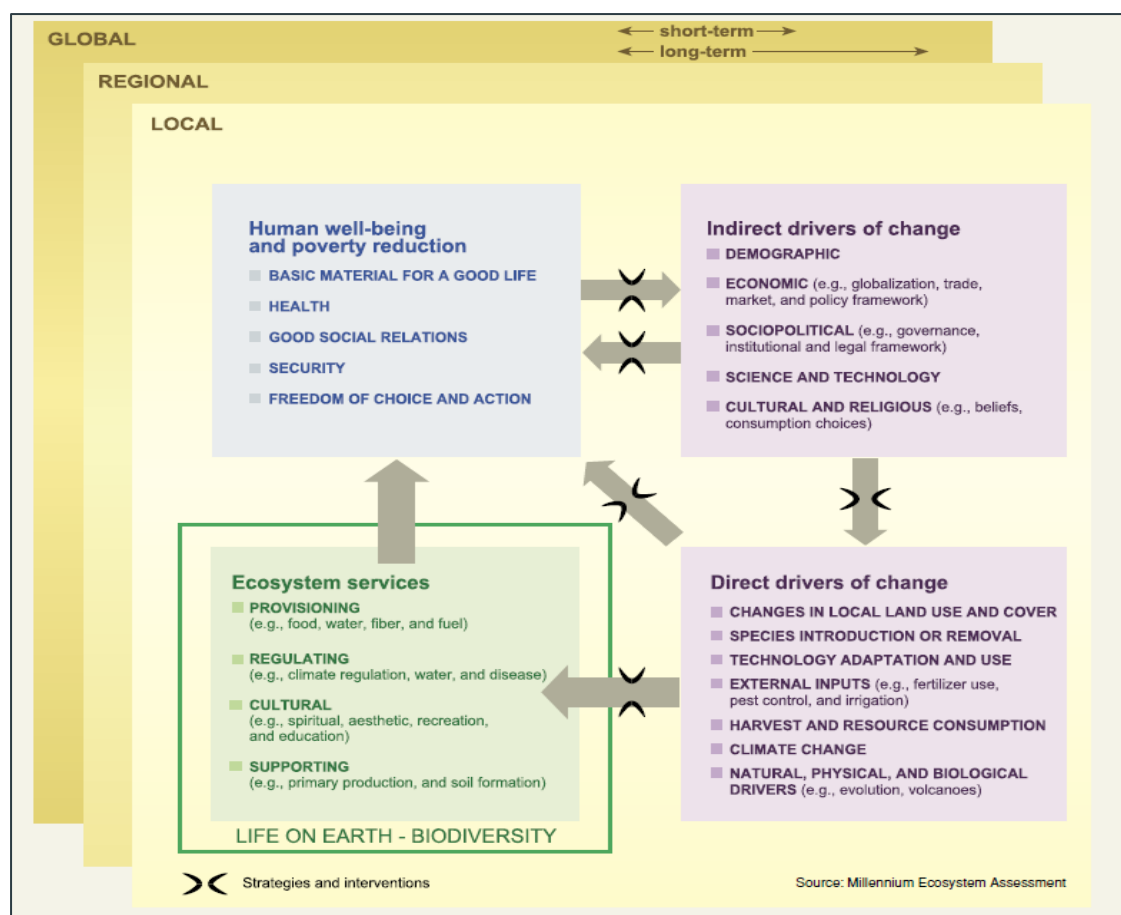


Fig. 5: Biodiversity, ecosystem services, human well-being and drivers of change according to the MA

While some of the drivers are more relevant for biodiversity and others for soils, there is a broad overlap that features drivers which affect biodiversity and soil in equal measure, namely in regard to the use of land. In favour of a clear focus, further analysis in this paper will concentrate on this intersection, regarding “land” as the common denominator for the most pressing issues concerning decline of biodiversity and soil degradation. Figure 6 shows a depiction of the Global Land Outlook that demonstrates how land is adversely affected by various kinds of human actions that have negative impacts on both biodiversity and soils (UNCCD 2017:117).

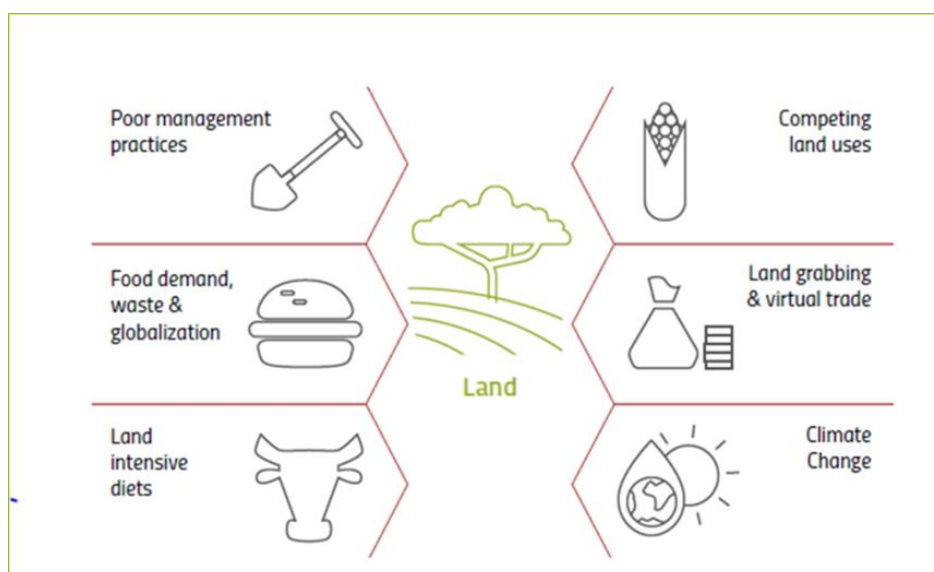


Fig. 6: Land as common denominator of pressing issues in biodiversity and soil according to the GLO



This focus on land was chosen with regard to the commons function of biodiversity and soil. While biodiversity and soil are common-pool goods for which subtractability is very pronounced and exclusion difficult (Buck 1998:5), land is typically a private good which makes exclusion easy. Most land is someone's property. 'Property' here means, "an aggregate of rights which are guaranteed and protected by the government" (Black's Law dictionary in Buck 1998:3). Unlike established global commons like the high seas or outer space, the majority of land belongs to someone, either a nation, a state, a community, a company or an individual. And this is the crux of the matter: by using land as a private good, individuals, communities and nations appropriate shares of two global commons - biodiversity and soil -, ones to which all humans have the same right. According to Rockström (2011) this means that those who appropriate a larger share than others have the responsibility to transparently report this to all others nations as well as to agree with all others on mechanisms to ensure that the aggregate use of this global commons will remain within safe boundaries.

The protection of common-pool resources triggers conflicts between private-use interests and the common good - and those have to be regarded as the **key challenge for governance**. This is true for conflicts within nations (e.g. between private and public interests) as well as for conflicts between nations (national vs. global interests).

The UNCCD defines land as "the terrestrial bioproductive system that comprises soil, vegetation, other biota, and the ecological and hydrological processes that operate within the system" (UN 1992:4). However, unlike 'biodiversity' and 'soil', that are (relatively speaking) scientifically defined concepts, 'land' is an everyday life phenomenon experienced by all, yet in very different manners. The *Global Land Outlook* provides an infographic that illustrates the problem; perceptions of the meaning and value of land vary depending on the perspectives of different actors (→ figure 7, UNCCD 2017:22-23).

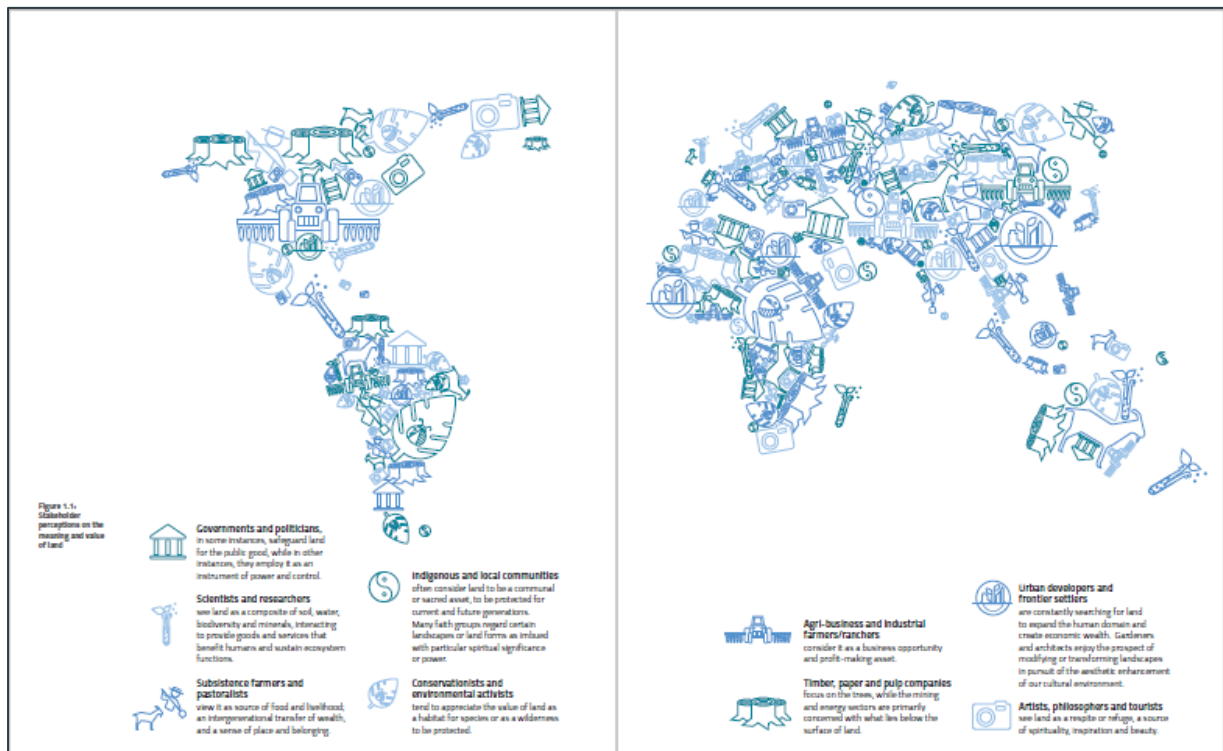


Fig. 7: Different stakeholder perceptions of the meaning and values of land as presented by the GLO

The figure presents the following perceptions:

- ❖ “Governments and politicians, in some instances, safeguard land for the public good, while in other instances, they employ it as an instrument of power and control and financial gain

- ❖ *Scientists and researchers* see land as a composite of soil, water, biodiversity and minerals, interacting to provide goods and services that benefit humans and sustain ecosystem functions
- ❖ *Subsistence farmers and pastoralists* view it as source of food and livelihood; an intergenerational transfer of wealth, and a sense of place and belonging.
- ❖ *Indigenous and local communities* often consider land to be a communal or sacred asset, to be protected for current and future generations. Many faith groups regard certain landscapes or land forms as imbued with particular spiritual significance or power.
- ❖ *Conservationists and environmental activists* tend to appreciate the value of land as a habitat for species or as a wilderness to be protected.
- ❖ *Agribusiness and industrial farmers/ranchers* consider it as a business opportunity and profit-making asset.
- ❖ *Timber, paper and pulp companies* focus on the trees, while the mining and energy sectors are primarily concerned with what lies below the surface of land.
- ❖ *Urban developers and frontier settlers* are constantly searching for land to expand the human domain and create economic wealth. Gardeners and architects enjoy the prospect of modifying or transforming landscapes in pursuit of the aesthetic enhancement of our cultural environment.
- ❖ *Artists, philosophers and tourists* see land as a respite or refuge, a source of spirituality, inspiration and beauty.” (UNCCD 2017:22-23)

Land is a subtractable resource. This means that one appropriator's use of the resource diminishes the amount of the resource left for others (Buck 1998:4). Consequentially, the different perspectives named above do not co-exist peacefully, but give rise to conflicts. These conflicts can hardly be resolved on an equal footing because some perspectives are dominant while others are marginal, some interests are protected by (property) rights while others are not, and some actors are economically strong or politically powerful while others are not. To ensure long-term conservation of biodiversity and soil as common-pool resources governance structures are needed that balance short-term partial interests against the common good in order to achieve the greatest benefit of all.

## 4. Global Governance of biodiversity and soil

### 4.1 For the benefit of all: problems of collective language and action

The previous chapter concluded that to successfully govern biodiversity and soil as global commons, short-term partial interests need to be traded off against the common good *for the benefit of all*. Therefore, a chapter on governance needs to begin by clarifying what the phrase “the benefit of all” means. Thus, we will explore the difference between the distributive and collective meaning of plural subjects and some well-known problems of collective action before we can consider principles that guide sustainable governance of commons.

#### *Collective language*

Out of concern about ‘our common heritage’ or ‘our common future’, the environmental discourse makes use of a collective language that tends to blur disparities between different users and perspectives. ‘Humans’, ‘humanity’, ‘humankind’, ‘we’ or ‘all’ are plural subjects. Such plural subjects can have two meanings: a collective meaning (i.e. ‘all together’) and a distributive meaning (i.e. ‘each and every individual’). The difference between the two is crucial for the successful governance of commons, because the interests of ‘all’ in its collective sense are different from the interests of ‘all’ in a distributive sense. Let us use an example to illustrate this important point. The EU campaign “We are all in this together” was meant to create public support for the EU biodiversity strategy. In its citizen summary, the European Commission (2011) explained the benefits of the strategy to the EU citizens as follows:

- “Who will benefit and how?
- Europeans working in *sectors that depend on biodiversity* and ecosystem services.
- *All European citizens* - because we all benefit directly and indirectly from the goods and services that nature provides.
- *People outside the EU* - as the EU helps to avert global biodiversity loss.” (European Commission 2011)

The claim that “we all benefit” from better protection of biodiversity and soil is a key message of most of the reports referred to in the previous chapter. However, this message is only true in the collective understanding of the word ‘we’; as a collective, we all benefit from the conservation of biodiversity and soil. Yet, in a distributive understanding, some members of the collective will have to refrain from enjoying certain individual benefits in order to ensure the joint benefit of all. At present, many European farmers and citizens benefit from practices that do not help to avert global biodiversity loss but rather to maximise short-term profits and minimise prices (see Eser et al. 2014).

The German philosopher Julian Nida-Rümelin (2011) distinguished between the collective meaning of “all” and the distributive meaning of “all” by indexing them as  $all_c$  (c=collective) and  $all_d$  (d=distributive). With regard to politics he stressed that the confusion between these two concepts of “all” makes room for ideology because it conceals possible conflicts of interest. Applying this terminology to Ostrom’s design principles for the commons, one can say that the secret of sustainable commons are rules that regulate how much of a collective good the individual is allowed to appropriate with respect to the rights of all other users. In other words, to successfully govern the commons,  $all_d$  have to follow rules that guarantee the long-term well-being of  $all_c$ .

#### *Collective action*

Collective language is also displayed in a slogan that Pavan Sukhdev, the leader of the TEEB studies, coined to explain the TEEB approach: “We use nature because it’s valuable, but we lose it because it’s free” (TEEB undated). This collective use of ‘we’ obstructs the view of distributive aspects. In many cases, the ones that use a particular piece of nature in a particular manner are not identical with the ones that lose the possibility of using this piece in a different manner - for example for recreation or as a habitat for wild species.

In equating “free access” with the state of being “doomed to failure”, Sukhdev invokes Hardin’s concept of the commons. In this line of economic reasoning, problems of collective action are considered as ultimate drivers of environmental degradation: the problem of marginality, the free-

rider problem and the prisoner's dilemma. All of these problems demonstrate the difficulty of coordinating individuals' behaviour so as to not compromise long-term collective interests.

- ❖ '*Marginality*' refers to the fact that the individual's action *per se* is neither praiseworthy nor reprehensible. Rather, the aggregate effects of many individual actions matter for the commons - for better or for worse.
- ❖ The '*free rider problem*' indicates that a person who cannot be excluded from benefits that others provide has little motivation to contribute to collective efforts that create them but rather to 'free-ride' on the efforts of others.
- ❖ The '*prisoner's dilemma*' is a model of game theory. It shows the paradox that - in cases where there is a lack of communication - individually rational choices lead to collectively irrational outcomes.

In other words, all of these problems demonstrate that the benefit of  $all_d$  does not equal the benefit of  $all_c$ .

## 4.2 How to govern global commons: analytic framework

In her prize-winning book "Governing the commons", Elinor Ostrom (1990) criticised the metaphorical use of these models and its implications for policy making. She rejected the idea that individuals were "inevitably caught in a trap from which they cannot escape" and argued instead that "the capacity of individuals to extricate themselves from various types of dilemma situations varies from situation to situation" (Ostrom 1990:14). Based on empirical studies of successful and unsuccessful regimes of common-pool resources, Ostrom identified eight design principles for the governance of commons. Susan Buck has extended these principles to create a framework for analysis of Global Commons. The framework presented in Figure 8 not only integrates different levels of institutional choice but also considers multiple-use commons (Buck 1998:35).

Viewing multiple uses is especially important when putting 'land' at the centre of analysis. Different stakeholders have different perspectives on land and different interests in using it. These multiple uses relate to different kinds of ecosystem services; while some are interested in provisioning services and others in cultural services, the commons approach emphasises regulating and supporting services. Hence, governance institutions do not only need to balance short-term use interests against long-term ones; they also need to cope with different use interests, balancing them against each other - in the short term as well as in the long term.

### Box 2.1 Analytic Framework for the Global Commons

- I. Levels of Institutional Choice
    1. *Operational choice*: appropriation, provision, monitoring, and enforcement
    2. *Collective choice*: policy making, management, and adjudication
    3. *Constitutional choice*: formulation, governance, adjudication, and modification
  - II. Design Principles for Sustainable Regimes (principles especially important for global commons are indicated in bold)
    1. **Clearly defined boundaries**
    2. **Operational rules congruent with local conditions**
    3. Collective choice arrangements
    4. **Monitoring**
    5. **Graduated sanctions**
    6. Conflict resolution mechanisms
    7. Rights to organize regimes
    8. **Nested enterprises**
- In addition, for multiple-use commons
1. **Resource domain must be able to support all uses**
  2. **All users must be represented**
  3. **Knowledge of operational rules must be shared**

Sources: Edwards and Steins, "Developing an Analytical Framework"; McGinnis and Ostrom, "Institutional Analysis"; Ostrom, *Governing the Commons*

Fig. 8: Buck's analytic framework for the Global Commons

## 4.3 Biodiversity and Soil in the Rio-process: CBD, UNCCD and UNFCCC

The first Earth Summit in Rio de Janeiro, Brazil, set the global agenda for the 21<sup>st</sup> century; the integration of environmental and developmental concerns in the concept of Sustainable Development was its major achievement. Together with climate, biodiversity and soil constitute the three major concerns and preconditions for future human well-being, which is reflected in three Conventions that were opened for signature in Rio in 1992:

- ❖ the United Nations Framework Convention on Climate Change - UNFCCC
- ❖ the United Nations Convention on Biological Diversity -UNCBD
- ❖ the United Nations Convention to Combat Desertification - UNCCD

Climate change, loss of biodiversity, and soil degradation are distinct but inseparable phenomena; they are strongly interrelated, oftentimes mutually reinforcing each other. Figure 9 shows linkages and feedback loops among desertification, climate change and biodiversity loss as illustrated in the desertification synthesis of the *Millennium Ecosystem Assessment* (MA 2005:17).

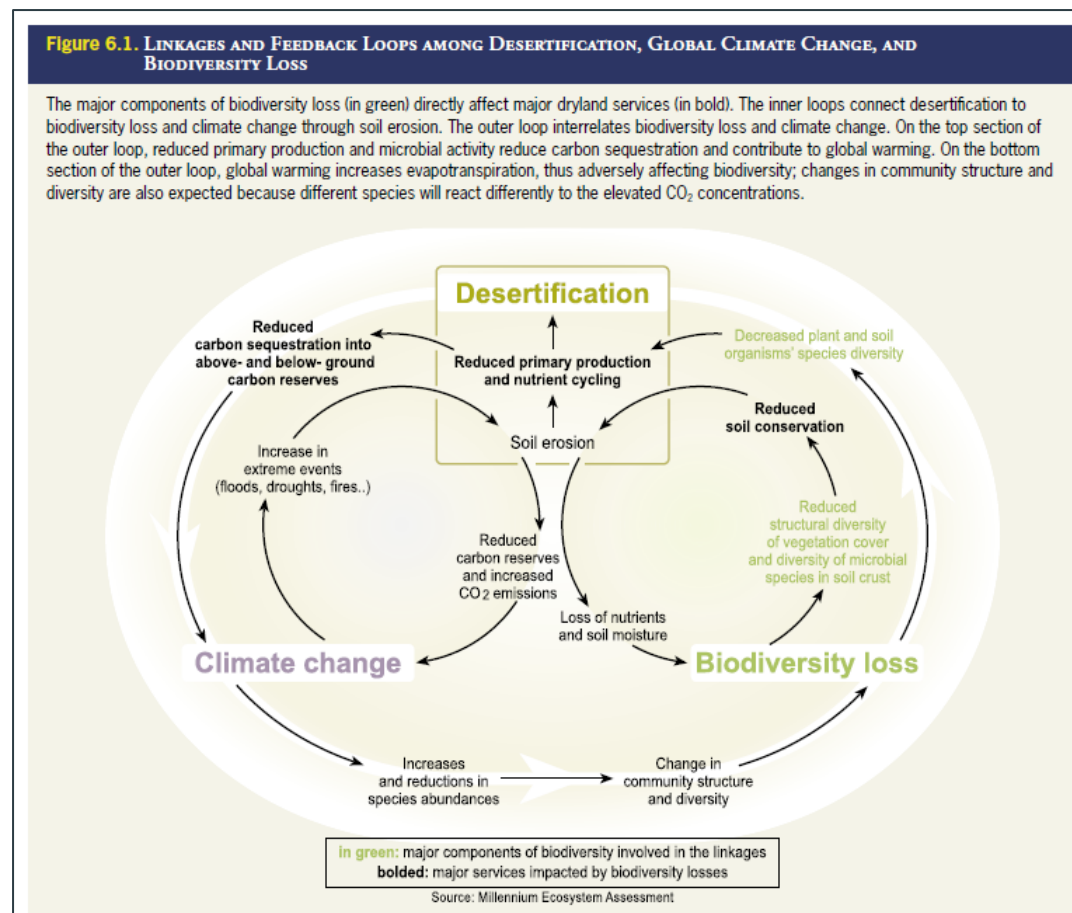


Fig. 9: Linkages and feedback loops among desertification, climate, and biodiversity according to MA

These **empirical interlinkages** are hardly reflected in the wording of the conventions, however. The UNFCCC does not mention the terms ‘soil’ and ‘biodiversity’, and the CBD does not explicitly address ‘climate’ or ‘soil’. Despite the literal absence of the term ‘soil’ in the CBD, references to the benefits of biodiversity for human well-being are all-pervasive, namely under the heading ‘sustainable use’, which is mentioned 37 times. The preamble explicitly acknowledges that “conservation and sustainable use of biological diversity is of critical importance for meeting the food, health and other needs of the growing world population” (UN 1992b). Although the CBD’s third objective, fair and equitable sharing of benefits, explicitly only refers to the utilisation of genetic resources, the reference to ‘food’ indicates that agriculture, land use and soil are also implicit components of the CBD’s agenda. The UNCCD is the only convention that explicitly refers to the two other topics, naming ‘biological diversity’ 10 times and ‘climate’ 7 times. Figure 10 presents an illustration of the Global Land Outlook that draws a clear relation among the three phenomena. The picture demonstrates that **poor management of land resources is at the heart of all three Conventions** (UNCCD 2017:15).



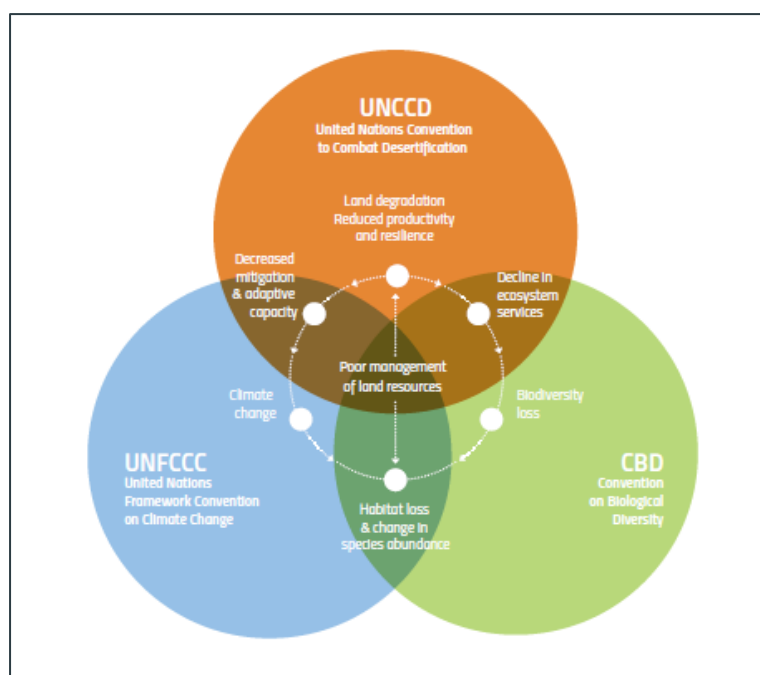


Fig. 10: Intertwined threats and the objectives of the Rio Conventions as presented in the Global Land Outlook

The **global follow-up process** regarding the implementation of the Rio outcomes features a continuous increase in the integration of concerns about biodiversity and soil. Table 2 lists institutions and processes concerned with global biodiversity and soil governance since the Earth summit in Rio in 1992 (→ Annex). It sketches their governance structures as well as major outcomes and conceptual developments. These demonstrate that biodiversity issues were increasingly addressed in the context of soil, while soil issues like erosion and carbon storage were progressively incorporated into biodiversity reporting. The 2018 *IPBES Assessment on Land Degradation* is proof of the latter, whereas the *Global Land Outlook* provides ample evidence of the former. In practice, the *Bonn challenge*, the *Global Soil Biodiversity Initiative* and the *4 per mille initiative* address soil, biodiversity, and climate at the same time. Likewise, the *Revised Soil Charter*, published by the FAO in 2015, addresses all three issues similarly:

“1. Soils are fundamental to life on Earth but human pressures on soil resources are reaching critical limits. Careful soil management is one essential element of sustainable agriculture and also provides a valuable lever for climate regulation and a pathway for safeguarding ecosystem services and biodiversity.” (FAO 2015:2)

With regard to the **design principles for sustainable regimes** mentioned above, the conventions lack two decisive features: graduated sanctions and nested enterprises. While ‘adoption of operational rules to the local level’ is partly safeguarded by national strategies and action plans and ‘monitoring’ is provided by member states and the Secretariats of the Conventions, failure to reach the agreed targets remains largely inconsequential due to the lack of sanctioning mechanisms. Likewise, the global governance of biodiversity and soil has not really been successful in establishing multiple layers of nested enterprises. On the lower levels, targets of the higher levels are often perceived as top-down-directives. Decision-making is still guided by competing interests on the same level rather than by cooperation to achieve the goals of the higher level. This is true for nations, when policy makers subordinate global goals to national interests, as well as for communities, where competition between municipalities counteracts cooperation on the federal level.

#### 4.4 Biodiversity and soil in the SDGs

The increasing integration of biodiversity and soil issues finally culminated in the outcome document of the *UN Sustainable Development Summit* in 2015: The *Agenda 2030* explicitly put the interrelatedness of all sustainability issues at centre stage. The 17 *Sustainable Development Goals*



are presented and treated as interrelated and interacting goals that can only be reached conjointly (UN 2015).

In the catalogue of the Sustainable Development Goals, the common concern for biodiversity and soil is addressed in SDG 15 'Life on land'. The goal is to "[p]rotect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss". Soil is explicitly addressed in target 15.3, which aims at a land degradation-neutral world:

15.3: By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world



Halting the loss of biodiversity is established as a global aim in target 15.5

15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species

However, due to the interlinkages between the phenomena (and between the goals), biodiversity and soil are relevant for many other goals and vice versa. The summary for policy makers of the *IPBES Assessment on Land Degradation* clearly states that “[a]voiding, reducing and reversing land degradation is essential for meeting the Sustainable Development Goals contained in Agenda 2030” (IPBES 2018:10). It features a figure that represents the relevance of land degradation to targets of each sustainable development goal (IPBES 2018:12). According to its depiction shown in figure 11, actions to address land degradation are generally synergistic with all other SDGs.

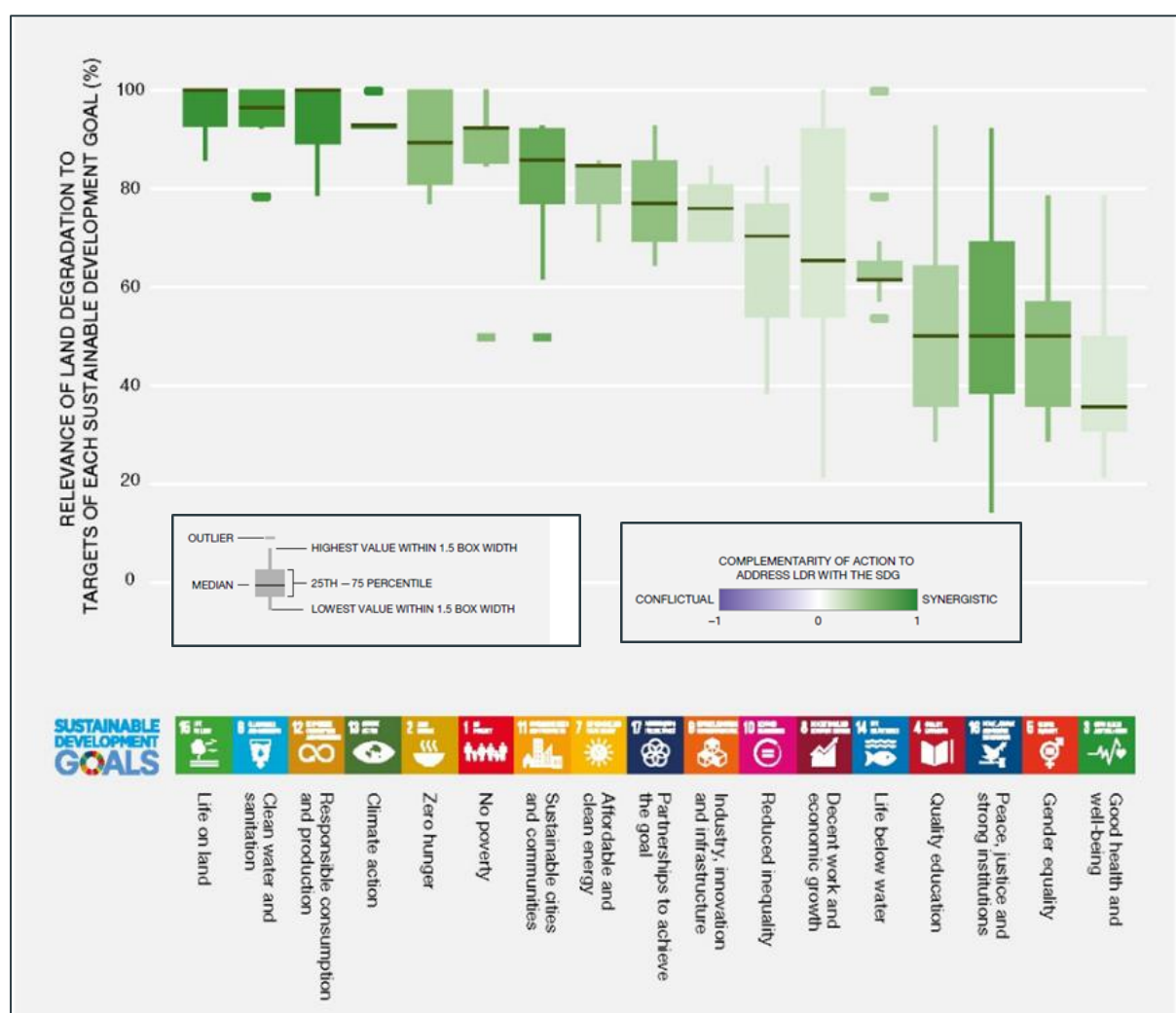


Fig. 11: Relevance of land degradation to targets of each SDG (%) according to IPBES 2018



The figure shows the following correlations (based on median values):

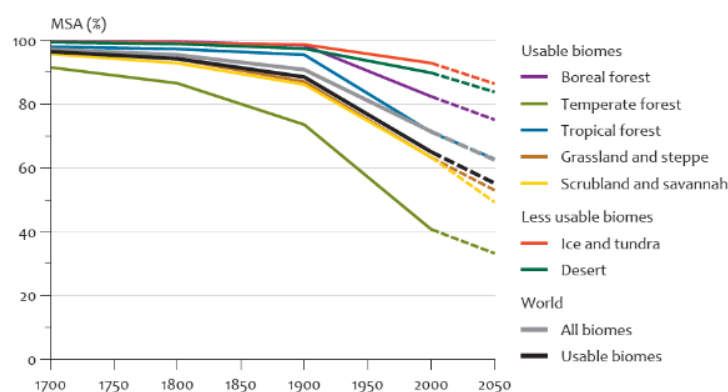
- ❖ *Highly to completely synergistic (90-100%):* SDGs 15 (land), 6 (water), 12 (responsible production and consumption), and 13 (climate action)
- ❖ *Moderately to highly synergistic (70-90%):* SDGs 2 (zero hunger), 1 (no poverty), 11 (sustainable cities), 7 (affordable and clean energy), 17 (partnerships), 9 (industry and infrastructure), and 10 (reduced inequality)
- ❖ *Barely to moderately synergistic (50-70%):* SDGs 8 (decent work), 14 (life below water), 4 (quality education), 16 (peace and justice), 5 (gender equality) and 3 (health and well-being).

“In none of the cases”, the text claims, “was the relationship between efforts to address land degradation and meeting the Sustainable Development Goals judged to be more conflictual than synergistic.” (IPBES 2018:12)

As confident as this claim may sound, some scepticism with regard to the validity of this optimistic assertion appears appropriate. Detailed discussion on the notoriously environmentally sensitive goals ‘economic growth’ (SDG 8) and ‘industry and infrastructure’ (SDG 9) is not provided in the assessment. Hitherto, growth of gross domestic product as a conventional indicator of economic prosperity has been correlated with an increasing loss of biodiversity. Nevertheless, it is still a target for the least developed countries (target 8.1). Although the decoupling of economic growth from environmental degradation is explicitly mentioned in target 8.4, the focus on resource efficiency neglects rebound effects. As Vivanoc et al. (2016) have argued, rebound effects need to be appropriately addressed in policy design in order to avoid undesired outcomes and environmental trade-offs.

A similar concern has to be raised with regard to health and well-being (SDG3): The *Human Development Report* recently demonstrated that the number of people in low human development decreased from 60 % of the global population to 12 % between 1990 and 2017 (UNDP 2018) - although biodiversity has been declining all the while. A study by the Netherlands Environmental Assessment Agency has demonstrated that global biodiversity in terms of mean species abundance (MSA) is expected to decrease by 10 percent points (pp) from about 70% in 2000, to about 60% in 2050 if the current trends in growth in population and income, changes in the structure of GDP, and technological improvements in production are extrapolated to the future (Brink 2010). Figure 12 shows the baseline scenarios for different biomes (12a) and different regions (12 b) (from Brink

MSA per biome in baseline scenario



2010:42-43).

Fig. 12a: Historic and projected mean species abundance for different biomes

## MSA of usable biomes per region in baseline scenario

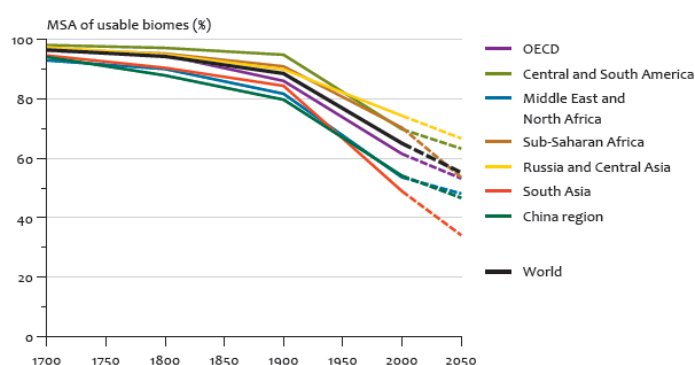


Fig. 12b: Historic and projected mean species abundance for different regions

Equally, the relation between “zero hunger” (SDG 1) and “life on land” (SDG15) cannot per se be regarded as positive. Under current conditions, the production of crops for food, fuel and fibre has to be considered a major driver of global MSA decline. Figure 13 shows the increasing pressure of crop production on biodiversity in the baseline scenario (Brink 2010:45).

## Pressures driving global biodiversity loss in baseline scenario

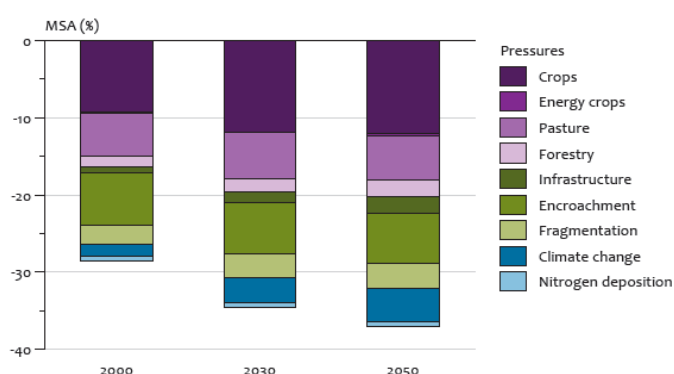


Fig. 13: Pressures driving biodiversity loss in baseline scenario according to Brink (2010)

These scenarios clearly demonstrate that in order to achieve the aspired synergistic effects, the conventional understanding of “economic prosperity”, “sufficient food”, “affordable energy”, and “quality infrastructure” that prevails in developed countries today will have to change dramatically in the future. First and foremost, the affluent societies with their huge ecological footprints will have to develop concepts of prosperity and well-being that are less resource- and energy-intensive than the currently existing ones. The following chapter will ask what role Germany can and does play in this transformation process.

## 5. The role of Germany

### 5.1 Biodiversity and soil in Germany: governance and outcome

Since Germany ratified the CBD in 1993, the Federal Ministry for the Environment (BMU) has been responsible for its implementation. In the context of the *German Sustainability Strategy* (Bundesregierung 2002), the BMU launched an initiative for a *National Biodiversity Strategy* that was finally adopted by the Federal Cabinet in November 2007 (BMU 2007). The strategy formulates visions, targets and 430 concrete measures. A chapter on visions for the sustainable use of biological diversity features sections on effects of German activities on biological diversity worldwide (B.2.3), agriculture (B.2.4) and soil use (B.2.5). For the latter the targets are:

- “To continuously *reduce soil erosion by 2020*
- To continuously *reduce discharges of pollutants* and materials so as to preclude long-term impairments to soil functions
- To review and, where applicable, concretise and efficiently implement good working practices in accordance with § 17 of the Federal Soil Conservation Act (BBodSchG) and § 5 of the Federal Nature Conservation Act (BNatSchG) in order to ensure *site-adapted soil use*. In order to minimise harmful soil changes associated with erosion, agricultural land is classified according to its erosion risk within the context of agricultural legislation (cross-compliance), and erosion-minimising measures are prescribed.
- To continue to prohibit all discharges of transgenic microorganisms which could pose a threat to the *diversity of soil organisms*
- To minimise further soil use by means of effective land recycling and by promoting *desealing measures*, both internally and externally” (BMU 2007: 49).

The *National Biodiversity Strategy* builds on existing national and European regulation, namely the *Federal Nature Conservation Act*, the *Federal Soil Conservation Act*, and the EU *Birds Directive* and *Habitats Directive*. However, it was clear from the outset that the strategy’s ambitious aim “to halt the decline in the current diversity of wild species by 2010” (BMU 2007:26) was unlikely to be achieved. To date, the index of species diversity monitored in the *German Sustainability Strategy* does not demonstrate any signs of a reversal of the downward trend in biodiversity. Although the state of preservation for single species has improved in some cases, the overall index is still far from the aspired aim.

The *German Sustainability Strategy* was meanwhile re-organised according to the Sustainable Development Goals (Bundesregierung 2016). In the revised 2016 edition, the numbers of the chapters and the respective indicators refer to the corresponding SDGs. Indicators related to biodiversity and soil are to be found in several chapters:

- ❖ 2.1a Nitrogen surplus in agricultural land
- ❖ 2.1b Organic farming
- ❖ 6.1b Nitrogen in groundwater
- ❖ 11.1a Land consumption (land used for settlements and transport infrastructure)
- ❖ 14.1a Nutrient inputs into North and Baltic Sea
- ❖ 15.1 Species diversity and landscape quality
- ❖ 15.2 Eutrophication of land ecosystems
- ❖ 15.3 Payments for reforestation within the REDD+ Framework

Currently, a new indicator for the implementation of SDG target 15.3, land degradation neutrality, is under construction. The Federal Agency for the Environment has commissioned a study with the aim of developing an indicator based on land use changes and soil values (Wunder et al. 2018).

The current status of these indicators is listed in table 3 (→ Annex). With regard to soil-related indicators, a slight improvement of increases in land consumption (11.1) and of nitrogen pressures on agricultural land (2.1) can be acknowledged. However, in June 2018 the European Court of Justice ruled that the German government has not taken sufficient action to curb high nitrate levels in groundwater (6.1b). Likewise, nitrate inputs into the oceans are still beyond the aspired levels (14.1a). Eutrophication of natural ecosystems has decreased, but more than 50% of vulnerable ecosystems still show elevated nitrogen loads (15.2).

## 5.2 Germany's international engagement for biodiversity and soil

Internationally, Germany enjoys a strong reputation of being environmentally concerned. Empirical surveys conducted by the *Federal Agency for Nature Conservation (BfN)* and the *German Environment Agency (UBA)* generally determine high levels of environmental awareness in the German population (BMUB u. UBA 2015, BMUB u. BfN 2016). Moreover, the German research community is known for its engagement in creating science policy interfaces for better protection of biodiversity and soil. For example, *NeFo*, the German science-policy interface for biodiversity research, was established in 2009 with financial support of the *Federal Ministry of Education and Research (BMBF)*.

The *International Academy for Nature Conservation* on the island of Vilm, INA, is a landmark institution of international biodiversity governance. Since 1999, this branch of the Federal Agency for Nature Conservation has been organising the *European Expert Meetings in Preparation of SBSTTA*, also known as the Vilm process, that have significant impact on the *Conference of the Parties (COP)*. Horst Korn, head of INA's biodiversity unit, is the German National Focal Point for the CBD's Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA). INA is also well-known for its international efforts in capacity building and the organisation of stakeholder-workshops with regard to Access and Benefit Sharing (ABS).

During the German Presidency of the G8, biodiversity was put on the G8 agenda for the first time. The *Potsdam Initiative - Biological Diversity 2010* - gave rise to the international TEEB studies. As a national follow-up, the Ministry for the Environment financed the study *Natural Capital Germany*, that provided several reports tailored to the needs of different decision makers (TEEB DE undated).

The *Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES)* has also been and still is strongly supported by German activities. The IPBES secretariat is located in Bonn, and a German coordination unit provides organizational and, if necessary, financial support to scientists willing to contribute to IPBES. Accordingly, Germany contributes a disproportionate number of lead authors and coordinating lead authors to the assessments.

In cooperation with IUCN, Germany hosted the high-level political event that launched the *Bonn Challenge* in 2011. This re-forestation initiative contributes to biodiversity, soil, and climate simultaneously. To date, 170.43 million hectares have been pledged, the global goal for 2030 being 350 hectares.

Under the *Convention on the Protection of the Alps*, an Alpine Working Group on Soil Protection will be established at the next Convention Conference (F. Glante). Germany will lead this group (BMU), and will provide technical support (information bases, monitoring, awareness rising).

Germany is also actively involved in the Global Soil Partnership, the European Soil Partnership and the European Environment Agency.

In contrast to this laudable international engagement, some actions taken by Germany in Brussels contradict aspirations for the effective conservation of biodiversity and soil. Among soil conservationists, Germany is infamous for having effectively blocked the establishment of an *EU framework for the protection of soil* in December 2007. Sigmar Gabriel, representing Germany at that point in time, argued that such a law would not respect the principle of subsidiarity and interfere with domestic soil policy (Council of the European Union 2007, Euractiv 2007.) From the perspective of biodiversity and soil as global commons, this nation-centred argumentation seems counter-productive.

Germany's role in the EU Common Agricultural Policy is similarly ambivalent. While members of the Ministry for the Environment and subordinated authorities support the claim 'public money for common goods', representatives of Germany effectively undermined efforts to green the CAP. According to Lorenzen (2018:37), it was primarily due to the influence of the German government that the original Rumanian proposal to link direct payments to agro-ecological practices was watered down to near ineffectiveness.

### 5.3 Germany's global ecological footprint

While many of the indicators discussed in the first section display a clearly dissatisfactory status, indicated by a cloud or a lightning symbol, there is one soil-related indicator that is marked with full sunshine: The *increase in land consumption* (11.1.) is slowing down and it is to be expected that the target value of less than 30 ha/day will be reached by 2030 if this trend continues. However, there is a downside to this demonstrated success that relates to the global effects of ongoing changes in land use in Germany. As the text explains, most of the land converted to settlement or infrastructure areas was formerly agricultural land:

“With 184.607 km<sup>2</sup>, agriculture covers the largest area of Germany's land (51.7 %) followed by forests with 109.306 km<sup>2</sup> (30.6 %). Between 1992 and 2014 the area of forests expanded by 4.770 km<sup>2</sup>, while agricultural land declined by 10.505 km<sup>2</sup>. That means that the increase in the amount of land used for human settlements and transportation infrastructure basically occurred at the expense of agricultural land.” (Bundesregierung 2016:159, my translation)

The conversion of German agricultural land has to be regarded as a driver for deforestation and soil degradation elsewhere, as a policy report of the *European Academies Science Advisory Council* recently pointed out:

“[L]oss of good agricultural soil in Europe increases demand for imports which may come from poorer soils elsewhere in the world (e.g. rain forest and semi-arid dryland soils) and intensify pressure for further clearance for agricultural purposes” (EASAC 2018: 9).

The study refers to a calculation made by Gardi et al (2014) demonstrating that the loss of European agricultural land from 1990 to 2006 which resulted from sealing had the productive equivalent of 6 million tonnes of wheat per year (EASAC 2018: 28). The study concludes:

“The loss of EU productive capacity, by increasing demands for imports, merely adds to the pressures in supplier countries to clear remaining areas of forest to meet demand. This ‘embodied deforestation’ is estimated at over 9 million hectares deforested between 1990 and 2008 to meet the EU's imports of crops and livestock. In view of soil sealing being one of the drivers of increased EU demand for imports, the EU analysis of community action required to reduce global deforestation should recognise soil sealing (whether for housing, infrastructure, mining or, more recently, solar farms) as a potential driver.” (EASAC 2018:28-29)

This example illustrates possible conflicts between urban and infrastructural development (SDG 9 and 11) and the location of high-quality agricultural land (SDG 2) that were mentioned above. Moreover, it is paradigmatic for a phenomenon that poses a serious challenge to the governance of global commons, so-called telecoupling. The telecoupling framework emphasises externalities of social or ecological change in a given country and its unintended distal effects in other countries (Liu et al. 2013). In the development process for a new soil indicator, these distal connections were also a major concern:

“The main limitation of the indicator though is that it cannot inform about changes in soil quality outside Germany that have been caused due to German consumption and trade patterns. For this reason many experts who were interviewed within the project mentioned the need to formulate a separate indicator on ‘extra-territorial effects’ or an indicator on ‘ecological footprints’. They argue that the consumption of imported goods puts pressure on land resources in other countries, and that this ‘virtual net import of land’ should be considered in the efforts to implement LDN [land degradation neutrality]”. (Wunder et al. 2018:51)

The *Ecological Footprint* can be used to illustrate indirect effects of a country's activities on the global commons. It is a comprehensive sustainability metric developed by Mathis Wackernagel and William Rees. Since its publication in the 1990s (Wackernagel/Rees 1996), it has been further developed for national accounting (Kitzes et al. 2009). The Global Footprint Network successfully applies it as an environmental communication tool. Methodologically speaking, the concept translates all human activities into one parameter: the amount of land used for this activity. This parameter is measured in global hectare per person [gha/p].

“The Ecological Footprint is derived by tracking how much biologically productive area it takes to provide for all the competing demands of its inhabitants. These demands include space for food growing, fiber production, timber regeneration, absorption of carbon dioxide emissions from fossil fuel burning, and accommodating built infrastructure. A country's consumption is calculated by adding imports to and subtracting exports from its national production” (GFN undated).



The calculated value is compared with the country's biocapacity, which denotes the capacity of a system to regenerate what people demand from it.

"Biocapacity is [...] the ecosystem's capacity to produce biological materials used by people and to absorb waste material generated by humans, under current management schemes and extraction technologies (GFN undated).

The resulting difference is the country's ecological reserve or deficit. An ecological deficit is thus an indirect measure for how much the country lives at the expense of other countries or future generations. Although this metric should not be taken too literally, it is a helpful approximate to assess the impact of a given country's production and consumption patterns on land (and hence: biodiversity and soil) in regions beyond its borders.

Currently, Germany's ecological footprint is calculated to be 5.1 gha/p while its biocapacity is 1.8 gha/p. That means: Germany's current ecological deficit is 3.3 gha/p (data from 2014, the graph in figure 14 is from the open data platform provided by GFN).

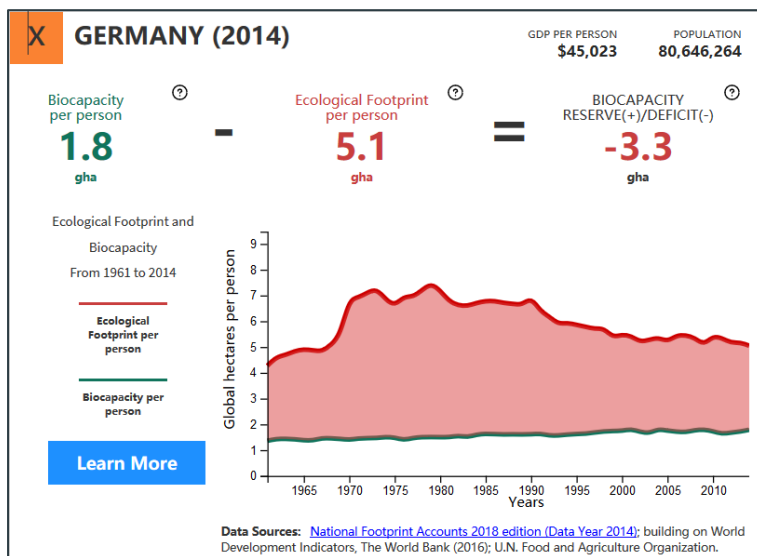


Fig. 14: Development of Germany's Global Footprint 1960-2015

This deficit demonstrates the *gap between the aspired sustainability and Germany's ongoing contribution to pressures on global commons* through unsustainable patterns of production and consumption. This is the case within Germany and (even more so) for measures taken by Germany; policies that aim for economical or societal progress inadvertently undermine environmental goals of biodiversity conservation and soil protection. As the failure to achieve an effective greening of the CAP demonstrates, more often than not environmental concerns are subordinated to short-term economic interests of particular groups or powerful actors. The benefit of all<sub>c</sub> is sacrificed for individual benefits of all<sub>d</sub>.

"Enhancing *policy coherence for sustainable development*" is target 17.14 of the Agenda 2030. The integration of economic, social, environmental, and governance aspects at all stages of domestic and international policy-making still is a huge desideratum in Germany. Enhancing policy coherence with regard to global commons requires acknowledging responsibility for unintended long-term distant effects of domestic policies. With regard to telecoupling, this acknowledgement may sometimes require accepting cutbacks in national economic progress in favour of international sustainability progress. Such tensions between national and global as well as between public and private interests may block effective governance of global commons. The following chapter scrutinizes the Agenda 2030 for transformations that are crucial for addressing these tensions for the advancement of global biodiversity and soil governance.

## 6. Transformations needed

Summarising what has been said in the previous chapters, three findings need to be clearly stated:

- ❖ Biodiversity and soil are indispensable for the well-being of humans, individually and collectively, that is: they are to be considered as global commons.
- ❖ Biodiversity and soil are under serious threat from various anthropogenic drivers, mediated by competing interests in the use of land and ecosystem services.
- ❖ The measures taken so far in, with and by Germany have not proven effective in reversing the global trend.

This sobering result provokes the question as to what kinds of transformations are needed to achieve more sustainable governance of biodiversity and soil as global commons. In interviews and discussions carried out in the context of this study, three fields of action were proposed that were expected to contribute to more effective protection of biodiversity and soil:

1. a shift towards more sustainable *production and consumption* patterns
2. better *participation* of all relevant stakeholders in policy-making and
3. improved *education* for sustainable development

For the sake of conciseness, I will limit the concluding chapter of this report to these three topics: first of all, because the named proposals correspond to my long-standing experience that environmental actors often identify these three as important levers and secondly, because these three topics find their equivalents in the Agenda 2030; sustainable production and consumption are addressed in SDG 12, stakeholder participation is a strong element of SDG 17 and education is the core of SDG 4.

### 6.1 Sustainable production and consumption

The original wording of SDG 12 as stated in the Agenda 2030 is “*Ensure sustainable consumption and production patterns*”. It has to be noted that the people who created the marketing campaign for the SDGs have changed this wording into “responsible consumption and production” in the respective icon. This re-wording indicates a shift in the perception of competencies. While ensuring sustainable consumption and production patterns is a task for policy makers, responsible consumption and production are a matter of individual choice. The responsibility, thus, has been delegated from governing authorities to individual actors, be they private or commercial.



From a commons perspective this shift is highly problematic, because, in the absence of regulation, individually rational choices can lead to collectively irrational outcomes (as was shown in chapter 4). It is rational for the individual to avoid costs as long as these costs do not achieve the desired benefit. Individuals who spend more money in order to protect the environment better have to pay the cost without being able to achieve the desired outcome, because this outcome requires collective action that cannot be enforced by the individual. As a result, the free-riders are better off than the responsible producers or consumers. This distribution of costs and benefits not only is unfair, it also is demotivating. As long as externalisation of costs provides competitive advantages on the market, the cooperation of all<sub>d</sub> required for effective protection of biodiversity and soil will remain unlikely. As Elinor Ostrom has put it

“When individuals who have high discount rates and little mutual trust act independently, without the capacity to communicate, to enter into binding agreements, and to arrange for monitoring and enforcing mechanisms, they are not likely to choose jointly beneficial strategies unless such strategies happen to be their dominant strategies” (Ostrom 1990:183)

Business actors often seek to deter policy makers from implementing regulation because they shy away from the related costs. Likewise, many individual consumers reject regulation, dreading constraints on their freedom of choice. However, individual costs that have to be paid by all<sub>d</sub> can be

justified by the collective benefit of all<sub>c</sub>. To preserve biodiversity and soil as global commons, both the creation of binding agreements for sustainable production and consumption and the arrangement of monitoring and enforcing mechanisms are indispensable. Individual responsibility and voluntary commitment alone won't do the job.

## 6.2 Participation

Since the Rio conference in 1992, participation has been an important element of sustainable development. The initial idea was that sustainability does not work as a top-down-approach imposed by a central authority but has to be amended by bottom-up processes. Participation was sought to involve those communities that are particularly affected by contested decisions, for example local and indigenous communities. This principle parallels Ostrom's 2<sup>nd</sup> design principle, according to which operational rules need to be congruent with local conditions.



Between 1992 and 2015 the idea of participation underwent a significant change. A new actor emerged that was hardly mentioned in the Agenda 21 but is omnipresent in the Agenda 2030: the stakeholder. In order to mobilise resources for the agenda's implementation, the preamble aspires to ensure the "participation of all countries, all stakeholders and all people". Accordingly, stakeholder participation is specified within SDG 17 as follows.

"17.16: Enhance the global partnership for sustainable development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the sustainable development goals in all countries, in particular developing countries"

Unlike the original concept 'global partnership', that meant international solidarity between developed and developing nations, 'multi-stakeholder partnership' refers to cooperation between public and private actors. The SDG knowledge platform emphasises the crucial role of this new institution:

"In our new development era with 17 intertwined Sustainable Development Goals and 169 associated targets as a blue-print for achieving the sustainable Future We Want, cross sectorial and innovative multi-stakeholder partnerships will play a crucial role for getting us to where we need by the year 2030." (UN undated)

From a commons perspective, this new policy paradigm has to be regarded as a double-edged sword. On the one hand it provides a possibility to create what Ostrom has called *nested enterprises* that are essential for the governance of global pool resources. On the other hand, increasing "*stakeholderisation*", as critics have named it, once again results in a delegation of responsibility from governing authorities to non-governmental actors.

For common-pool resources that are parts of larger systems, like biodiversity and soil, Ostrom has emphasized the importance of *nested enterprises*. In empirical studies she has observed one design principle shared by all successful commons:

"Appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises". (Ostrom 1990:90)

This means there is a nested hierarchy of rules. Like in a Russian puppet, rules on a lower lever are embedded in a set of rules on a higher level. With regard to institutional change this means that what can be done on a higher level depends on the rules of the lower level. If cooperation on a higher level is to be achieved, cooperation on a lower level is required. Currently, interaction on the lower levels is characterized by competition rather than by cooperation, however. Individuals, enterprises and communities compete for access to resources of all kinds. One reason for the difficulty to achieve the 30 ha target of the German Sustainability Strategy, for example, is the competition between communities for commercial premises or rather commercial taxes. To change the rules of the game, cooperation has to be exercised and developed on the local level. In the governance of multi-use commons, "all users must be represented" (Buck 1998:35). Multi-stakeholder partnerships may be regarded as one tool for enabling such representation and cooperation.

In spite of this optimistic reading, the term ‘multi-stakeholder partnerships’ presupposes that actors with different interests and concerns share a common goal that makes them partners. Yet in practice, the holders of different “stakes” don’t necessarily share the same values and principles. While corporate actors are legally bound to increase shareholder value, participants of multi-stakeholder partnerships need to act as stewards of the common good. Representatives of stock-listed companies are therefore prone to conflicts of interests. The remarkable difference between long-term common concerns and short-term partial interests is blurred by the unifying economic concept of “stake”. Meanwhile, this had prompted some indigenous groups to insist that they are not stakeholders but holders of rights - and that this is an important difference. With regard to the health sector, Judith Richter has cautioned that multi-stakeholder partnerships have turned into a means of inserting powerful economic actors into public fora (Richter 2017). To adequately address conflicting public and private interests, members of the German Institute for International and Security Affairs have recently called for *improved accountability and transparency of multi-stakeholder partnerships* in a paper for the United Nations Economic and Social Council, ECOSOC (Beisheim/Simon 2016).

With regard to the failed greening of the European CAP, Greenpeace (2018) has demonstrated that 25 out of the 46 members of the European Parliament’s agriculture committee (AGRI) had strong ties to the agriculture industry. With this safe majority those members of parliament with links to agriculture and the agriculture industry could exercise a strong influence on policy making. Such experiences support concerns that increasing inclusion of private actors into public decision making could harm the cause of the global commons.

To save biodiversity and soil as global commons, a clear commitment of all participants to the long-term, collective good of all is indispensable. Representatives of organisations with powerful economic interests and representatives of marginal groups or civil society cannot negotiate on equal footing. Nor are their respective “stakes” equally important for the global commons. Without an obligation to the common good, multi-stakeholder partnerships won’t do the job.

### 6.3 Education

Finally, we need to address an issue on which environmentally concerned actors tend to pin high hopes: education. According to a widespread opinion, all pupils and students - from elementary school to the university level - should learn about the importance of and threats to biodiversity and soil, farmers should receive better training, and politicians need to be better informed about the gravity of the problems we are facing. After a decade of Education for Sustainable Development (ESD, 2005-14), the UNESCO launched a Global Action Program (GAP) on Education for Sustainable Development (UNESCO undated). The Agenda 2030 also features a target on ESD in SDG 4:



By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development

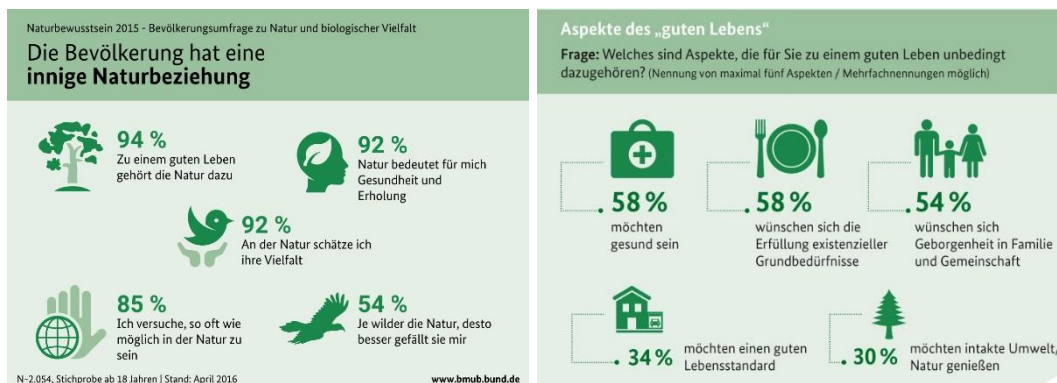
Without a doubt, education is an important aspiration. Article 26 of the *Human Rights Declaration* clearly and unequivocally states:

“Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages. Elementary education shall be compulsory. Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit” (UN 1948).

Ensuring access to quality education for all humans surely is a valuable goal, first of all because education is intrinsically valuable, and secondly, due to its potential contribution to sustainability. However, one must acknowledge that members of the highly educated elites are the ones with the largest ecological footprint. Education per se does not reduce the stress a person puts on the natural system through his or her personal lifestyle. An overly idealistic focus on knowledge and enlightenment tends to underestimate two relevant influences that are driving the current erosion

of biodiversity and soil: competing preferences on the one hand and institutional constraints on the other.

To illustrate competing preferences, I quote from the studies on nature awareness and on environmental awareness provided by the Federal Agency for Nature Conservation (BfN) and the Federal Environment Agency (UBA). The 2015 study on nature awareness yielded high approval rates for the statement “Nature is a constituent of a good life”. 94 % of the respondents agreed to this claim. The 2014 study on environmental awareness yielded a remarkably different result. Asked for discrete constituents of a good life, only 30 % of the respondents named nature. ‘Health’, ‘satisfaction of basic needs’, ‘security in family and society’, and ‘a good standard of living’ all ranked higher than ‘enjoyment of an intact environment/nature’. Figure 15 contrasts the infographics on the study on nature awareness and the study on environmental awareness as provided by the



Ministry for the Environment (image on the left: BMU 2016, image on the right: BMUB 2015).

Fig. 15: Findings of the study on nature awareness and on environmental awareness

The crux of the matter is that by satisfying the first four elements of a good life, people inadvertently contribute to the degradation of the fifth. More effective protection of biodiversity and soil will most probably impact some of the things that are considered ‘basis needs’ or part of ‘a good living standard’ today in Germany. A consistent and coherent policy that integrates environmental and developmental concerns in all policy areas will affect people’s personal lives in many different aspects: how and where we live, where we work and what kind of work we do, what and how we eat and where and how we spent our vacations – to name just a few. This ‘inconvenient truth’ has to be regarded as a major obstacle to sustainable governance of the commons: Achieving long-term benefits for all<sub>c</sub> requires curtailing (some of) the short-term benefits of all<sub>d</sub>.

With regard to the strong and firm political action required to achieve protection of biodiversity and soil, the expected frustration of individual needs or desires is a major constraint. Politicians cannot risk the support of the electorate. As sociologist Niklas Luhmann (1986) has demonstrated, the logic of the political system is different from the logic of the science system. The distinction that defines the political system is not “Is it (scientifically) true?” nor “Is it (morally) right?” but “Is it (politically) feasible?” For measures that result in a (perceived) worsening of the personal life situation of many citizens, political feasibility is generally low. Moreover, due to the distributive effects of environmental policies, pro-environmental measures (like eco-taxes) can increase existing inequalities within society. This increase imperils feasibility even more, as has been impressively demonstrated by the “yellow vests” in France quite recently.

In order to give policy makers the latitude necessary for making decisions in favour of the global commons, citizens need to understand the collective nature of the problems at hand. They need to recognise that binding rules restrict individual freedom of choice in order to ensure the long-term well-being of all humans. Vice versa, in order to make it possible for citizens to accept changes in their personal life situations, politicians need to understand the distributive effects of environmental policies. They have to ensure a fair distribution of the costs that improvement of the environment incurs. If policies reinforce existing inequalities (within nations as well as between

nations) and if the costs of environmental betterment are to be paid by the poorest, failure has to be expected.

To save biodiversity and soil as global commons, all actors need to acknowledge that the benefit of all<sub>c</sub> may require individual sacrifices of all<sub>d</sub>. Enabling students to gain this insight is an important task of education. Thus, education for sustainable development needs to refrain from any win-win rhetoric and instead place questions of justice and the good life at centre stage. Without serious acknowledgement of its ethical dimension, education for sustainable development won't do the job.



## 7. Recommendations

How can the transformations outlined in the previous chapter be broken down to the level of concrete measures at the national level? That is the central question of this concluding chapter. The following sections take up suggestions from external experts and discuss them in the light of the commons approach.

### 7.1 Measures in Germany

Land consumption must currently be regarded as a major driver of the loss of biodiversity and soil in Germany (H. Ginsky, UBA). Therefore, measures that can slow down the ongoing conversion of (mainly agricultural) land into settlement and traffic areas are a priority. From the perspective of the Global Commons, the measures named below make all the more sense as they would have indirect effects outside Germany, too, through tele-coupling effects.

- ❖ **§ 13 b BauGB:** The KBU considers the withdrawal or expiry of § 13 b BauGB to be the most important option (KBU 2017). Environmental impact assessment must effectively safeguard soil protection and slow down land consumption in Germany.
- ❖ **Downscaling of national goals to the communal level:** In order to design and operationalise the 30-ha-target of the German sustainability strategy (indicator 11.1.a), UBA conducted a pilot project on trading in land certificates. In this pilot, a population-based key was developed with which the target can be translated to the municipal level. A corresponding area calculator, with which the municipalities can display the quotas to which they are entitled, will soon appear on the UBA website. A further development is planned by the end of 2019, with which quotas for districts and federal states can also be specified (D. Grimski, UBA).
- ❖ **Land Saving Action Plan:** As part of the "Land Saving Action Plan" (Aktionsplan Flächensparen), UBA commissioned a research project to evaluate instruments for reducing land use and develop new ones (D. Grimski, UBA). The final report identifies three priority areas for action: introducing quotas, strengthening inner development of cities and reducing false incentives (Adrian et al. 2018). A serious obstacle to the local implementation of the 30 ha objective are conflicts with other objectives of municipal action (increase in population, establishment of businesses, low-cost housing). Intercommunal solutions often fail due to conflicts of interest between the different municipalities. With regard to the 'nested enterprises' design principle, the federal government should provide stronger incentives for inter-municipal cooperation.
- ❖ **MantelV:** If the Ordinance on the Handling of Mineral Waste and Soil Material (Mantelverordnung - MantelV) is passed by the Federal Council in the current year, the changes in the domain of physical soil protection ("Bodenkundliche Baubegleitung" - BBB) and the addition of wind erosion can be regarded as positive (K. Marx, UBA).
- ❖ **Federal Commission on Land:** Biodiversity and soil are cross-cutting issues affecting a wide range of sectors of society (agriculture, energy, urban development, industry, infrastructure and transport). In view of the multitude of competing interests, measures to effectively counter the loss of biodiversity and soils, e.g. financial instruments to internalise external costs, must expect resistance. The establishment of a commission to discuss important land use issues and develop viable policy options for their reduction could help to alleviate these conflicts (B. Scholten). As biodiversity and soil are multi-purpose commons, all users need be represented in decision making. In this respect, the central condition for such a Commission would be the participation of all relevant ministries (Ministry for Economic Affairs and Energy, Ministry for the Environment, Nature Conservation and Nuclear Safety, Ministry for Food and Agriculture, Ministry of Transport and Digital Infrastructure), representatives of all relevant users groups (farmers, industries, municipalities, consumer, environment and social associations), and of all relevant scientific communities



(Departmental research, large-scale research institutes and university research as well as relevant scientific associations).

## 7.2 Measures to increase contributions of science

For an improved impact of science on the governance of biodiversity and soil as global commons, the consulted experts had two proposals

- ❖ **Establishment of a Centre for Integrative Soil Research:** Interdisciplinary and practice-oriented research approaches, as developed in BoNaRes, should be institutionalised in the form of a Centre for Integrative Soil Research. Such a centre is not a matter of integrating soil research into existing structures (and thus jeopardising the urgently needed visibility), but of establishing a new institution that prominently bears the term soil in its title (B. Scholten).
- ❖ **Funding of long-term research and development projects** that enable the transfer of modern technologies (irrigation and drainage, wastewater treatment, waste treatment, etc.) to developing countries and their local adaptation and further development (P. Grathwohl).

## 7.3. German Activities in the EU

As one of the political heavyweights in the EU, Germany should be committed to improving protection of biodiversity and soils at EU level. The creation of a common legal basis for soil protection is to be seen as a priority here, as is a re-design of the CAP which adequately recognises the commons function of biodiversity and soils.

- ❖ **Commons orientation of the CAP:** As far as the integration of soil issues into the CAP is concerned, there is at least scepticism due to the smaller-scale decision left to the states (conditionality) (K. Marx, UBA). In 2018, the Federal/States Working Group on Soil Protection (LABO) prepared an opinion paper on the European Commission's Communication "Food and Agriculture of the Future" and the related legislative proposal. With regard to the objectives 5 (Foster sustainable development and efficient management of natural resources such as water, soil and air) and 6 (Contribute to the protection of biodiversity, enhance ecosystem services and preserve habitats and landscapes), the CAP 2021-27 allows member states to design conditionality and eco-schemes as they see fit. The working group suggests that Germany should take on a pioneering role through ambitious design. Furthermore, it proposes that the CAP should be designed in such a way that farms that operate in a way that preserves the soil are adequately rewarded for their increased contribution to the common good (LABO 2018).
- ❖ **Soil protection legislation at the EU level:** With regard to Germany's debatable role for the establishment of an EU framework for the protection of soil, a working group of UBA members prepared a position paper on the need for soil protection legislation at EU level (Ginzky et al 2018). The authors argue that Germany should promote soil protection legislation at the EU level to establish harmonized standards within the EU.

## 7.4. Measures on the global scale

As an influential political force, the Federal Government should commit itself globally to the further development of Agenda 2030. From the perspective of the Global Commons, greater consideration should be given to possible conflicts between public and private interests. The term 'stakeholder' blurs differences between economic interests, basic needs and human rights that are indispensable for appropriate policymaking. Specifically, this means:

- ❖ **Recognise and seriously address the distributional effects of environmental policy:** Policies that exacerbate existing inequalities prevent the broad social acceptance that is indispensable for long-term success. As long as the gap between the rich and the poor

continues to widen within countries and between countries, an effective policy to protect soils and biodiversity will not be possible.

- ❖ **Address conflicting interests in multi-stakeholder partnerships:** Improve accountability and transparency by an intergovernmental norm-setting process that reviews and identifies principles and guidelines (Beisheim/Simon 2016). Discriminate between rights of all humans and interests of some powerful groups. In case of conflicts between public and private concerns: Give priority to the common good.

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## Annex

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**Table 1:**

Evidence for the global commons function of biodiversity and soil provided at science-policy-interfaces

**Table 2:**

Institutions and processes of global biodiversity and soil governance following on the Earth Summit in Rio in 1992

**Table 3**

Status of indicators related to biodiversity and soil in 2016 edition of the German sustainability strategy

**Table 4**

List of consulted soil experts and institutions

Table 1: Evidence for the global commons function of biodiversity and soil provided at science-policy-interfaces

Title	Description	Outcomes
<b>National Forum on BioDiversity, Washington DC, 21.-24.09.1986</b>	The conference marks the beginning of concerned biologists' political engagement	Conference Proceedings: Wilson 1988
<b>Global Biodiversity Outlook (GBO)</b>	<p>"The second meeting of the Conference of the Parties called for the preparation of a periodic report on biological diversity: the Global Biodiversity Outlook (GBO). It suggested that the GBO should provide a summary of the status of biological diversity and an analysis of the steps being taken by the global community to ensure that biodiversity is conserved and used sustainably, and that benefits arising from the use of genetic resources are shared equitably."</p> <p><a href="https://www.cbd.int/gbo/">https://www.cbd.int/gbo/</a></p>	<p>Global Biodiversity Outlook</p> <ul style="list-style-type: none"> <li>• First edition 2001</li> <li>• Second edition 2006</li> <li>• Third edition 2010</li> <li>• Fourth edition 2014: A mid-term assessment of progress towards the implementation of the Strategic Plan for Biodiversity 2011-2020</li> </ul>
<b>Millennium Ecosystem Assessment (MA)</b>  <b>2001-2005</b>	<p>The MA synthesized information from the scientific literature and relevant peer-reviewed datasets and models. It incorporated knowledge held by the private sector, practitioners, local communities, and indigenous peoples. The MA did not aim to generate new primary knowledge, but instead sought to add value to existing information by collating, evaluating, summarizing, interpreting, and communicating it in a useful form.</p> <p>URL: <a href="https://www.millenniumassessment.org">https://www.millenniumassessment.org</a></p>	<p>Breakthrough of Ecosystem Services as conceptual framework</p> <ul style="list-style-type: none"> <li>• Ecosystems and Human Well-being: A framework for Assessment</li> </ul> <p>6 synthesis reports "Ecosystems and Human Well-being"</p> <ul style="list-style-type: none"> <li>• Overarching Synthesis</li> <li>• Biodiversity synthesis</li> <li>• Desertification synthesis</li> <li>• Opportunities &amp; Challenges for Business &amp; Industries</li> <li>• Wetlands and Water</li> <li>• Health synthesis</li> </ul> <p>5 global and multiscale assessment reports</p> <ul style="list-style-type: none"> <li>• Current State &amp; Trends assessment</li> <li>• Scenarios Assessment</li> <li>• Policy Responses (ch. 5: biodiversity)</li> <li>• Multiscale Assessment</li> <li>• Summary for Policy Makers</li> </ul>
<b>International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD)</b>  <b>2005-2007</b>	<p>The IAASTD was initiated by the World Bank and the Food and Agriculture Organization of the United Nations (FAO). Its objective was to assess the impacts of past, present and future agricultural knowledge, science and technology on the</p> <ul style="list-style-type: none"> <li>• reduction of hunger and poverty,</li> <li>• improvement of rural livelihoods and human health, and</li> <li>• equitable, socially, environmentally and economically sustainable development.</li> </ul>	<p>One Global Assessment Report, Five sub-global assessments, a synthesis report and a summary for policy makers</p> <ul style="list-style-type: none"> <li>• Agriculture at a Crossroads</li> </ul> <p>Available at: <a href="https://www.globalagriculture.org/">https://www.globalagriculture.org/</a> (NGO-website)</p>

Table 1: Evidence for the global commons function of biodiversity and soil provided at science-policy-interfaces

<p><b>The economics of Ecosystems &amp; Biodiversity (TEEB)</b></p> <p><b>2008-2010</b></p>	<p>TEEB is "a global initiative focused on 'making nature's values visible'. Its principal objective is to mainstream the values of biodiversity and ecosystem services into decision-making at all levels. It aims to achieve this goal by following a structured approach to valuation that helps decision-makers recognize the wide range of benefits provided by ecosystems and biodiversity, demonstrate their values in economic terms and, where appropriate, suggest how to capture those values in decision-making."</p> <p>URL: <a href="http://www.teebweb.org">www.teebweb.org</a></p>	<p>2008: Interim Report</p> <p>2010: Five TEEB study reports tailored to different audiences:</p> <ul style="list-style-type: none"> <li>• Ecological and economic foundations</li> <li>• National and International Policy Making</li> <li>• Local and Regional policy makers</li> <li>• Business and Enterprise</li> <li>• Synthesis Report</li> </ul>
<p><b>Global Soil Biodiversity Initiative (GSBI)</b></p> <p><b>Since 2011</b></p>	<p>The Global Soil Biodiversity Initiative was launched in September 2011. It was founded by</p> <ul style="list-style-type: none"> <li>• School of global environmental Sustainability, University of Colorado</li> <li>• Netherlands Institute of ecology</li> <li>• The university of Manchester</li> <li>• ETH Zürich</li> <li>• European Commission, Joint Research Centre</li> </ul> <p><a href="https://www.globalsoilbiodiversity.org/">https://www.globalsoilbiodiversity.org/</a></p>	<p>European Union (2016): Global Soil Biodiversity Atlas</p> <p><a href="https://publications.europa.eu/en/publication-detail/-/publication/c54ece8e-1e4d-11e6-ba9a-01aa75ed71a1">https://publications.europa.eu/en/publication-detail/-/publication/c54ece8e-1e4d-11e6-ba9a-01aa75ed71a1</a></p>
<p><b>Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)</b></p> <p><b>Since 2014</b></p>	<p>"The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) is the intergovernmental body which assesses the state of biodiversity and of the ecosystem services it provides to society, in response to requests from decision makers."</p> <p><a href="http://www.ipbes.net">www.ipbes.net</a></p>	<p>Global and four regional Assessments (Africa, the Americas, Asia Pacific, Europe and Central Asia)</p> <p>Six thematic and methodological assessments</p> <ul style="list-style-type: none"> <li>• pollinators, pollination and food production (2016)</li> <li>• Policy support tools and methodologies for scenario analysis and modelling (2017)</li> <li>• land degradation and restoration (2018) in preparation</li> <li>• invasive alien species and their control</li> <li>• sustainable use and conservation of biodiversity and strengthening capacities and tools</li> <li>• Policy support tools and methodologies regarding the diverse conceptualization of values of biodiversity</li> </ul>
<p><b>Global Land Outlook (GLO)</b></p> <p><b>First edition 2017</b></p>	<p>The Global Land Outlook (GLO) is a strategic communications platform of the UNCCD.</p>	<p>Publication: Global Land Outlook, First edition, 2017: full report, summary for policy makers and key messages</p> <p>The report demonstrates the central importance of land quality to human well-being, assesses current trends in land conversion, degradation and loss, identifies the driving factors and analyzes the impacts, provides scenarios for future challenges and opportunities, and presents a new and transformative vision for land management policy, planning and practice at global and national scales</p>

Table 2: Institutions and processes of global biodiversity and soil governance following on the Earth Summit in Rio in 1992

Title	Relevance for biodiversity and soil	Outcomes /Procedures
<b>United Nations Conference on Environment and Development UNCED, 3.-14.6.1992 Rio de Janeiro, Brazil</b>	<p>Building on the UN Conference on the Human Environment in Stockholm (1972), the Rio conference was the first UN conference that explicitly aimed at the integration of environmental and developmental concerns and included governmental as well as non-governmental entities.</p> <p>The Rio conference endorsed the concept of sustainable development and set the global agenda for the 21<sup>st</sup> century.</p> <p><a href="https://sustainabledevelopment.un.org/milestones/unced">https://sustainabledevelopment.un.org/milestones/unced</a></p>	<p><b>Documents</b></p> <ul style="list-style-type: none"> <li>• The Agenda 21</li> <li>• the Rio Declaration on Environment and Development</li> <li>• the Statement of Forest Principles</li> <li>• the United Nations Framework Convention on Climate Change (UNFCCC)</li> <li>• the United Nations Convention on Biological Diversity (UNCBD)</li> <li>• the United Nations Convention to Combat Desertification (UNCCD)</li> </ul>
<b>UNCBD</b>	<p>The Convention on Biological Diversity (CBD) entered into force on 29 December 1993. It has three main objectives:</p> <ol style="list-style-type: none"> <li>1. The conservation of biological diversity</li> <li>2. The sustainable use of the components of biological diversity</li> <li>3. The fair and equitable sharing of the benefits arising out of the utilization of genetic resources</li> </ol> <p><a href="https://www.cbd.int/">https://www.cbd.int/</a></p>	<p><b>Bodies</b></p> <ul style="list-style-type: none"> <li>• Secretariat (Montreal, Canada)</li> <li>• Conference of the Parties (COP)</li> <li>• Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA)</li> <li>• Subsidiary Body on Implementation (SBI)</li> <li>• Working Group on Article 8(j) (Indigenous and local communities)</li> </ul> <p><b>Protocols</b></p> <ul style="list-style-type: none"> <li>• Cartagena Protocol on biosafety</li> <li>• Nagoya Protocol on Access and Benefit Sharing (ABS)</li> </ul> <p><b>Mechanisms for implementation</b></p> <ul style="list-style-type: none"> <li>• National Biodiversity Strategies and Action Plans (NBSAPs)</li> <li>• Reporting: National Reports and Global Biodiversity Outlooks</li> <li>• Financial Resources and Mechanism</li> <li>• Clearing House Mechanism</li> <li>• Capacity Building</li> <li>• Technical and scientific cooperation</li> <li>• Strategic Plan 2012-2020 (→ 20 Aichi Targets, UN Decade of biodiversity)</li> <li>• Currently, a Post-2020 Biodiversity Framework is under construction</li> </ul>
<b>UNCCD</b>	<p>The United Nations Convention to Combat Desertification (UNCCD) is the sole legally binding international agreement linking environment and development to sustainable land management. Its objectives are:</p> <ul style="list-style-type: none"> <li>• to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification</li> <li>• to use long-term integrated strategies that focus simultaneously on improved productivity of land, and the rehabilitation, conservation and sustainable management of land and water resources, leading to improved living conditions</li> </ul> <p><a href="https://www.unccd.int">https://www.unccd.int</a></p>	<p><b>Bodies</b></p> <ul style="list-style-type: none"> <li>• Secretariat (Bonn)</li> <li>• Conference of the Parties (COP)</li> <li>• Global Mechanisms</li> <li>• Committee for the Review of the Implementation of the Convention (CRIC)</li> <li>• The Committee on Science and Technology (CST)</li> <li>• Working Group on Article 8(j) (Indigenous and local communities)</li> </ul> <p><b>Mechanisms for Implementation</b></p> <ul style="list-style-type: none"> <li>• Annexes for the five world regions</li> <li>• Regional, sub-regional and national Action Programs</li> <li>• Most action takes place on national level</li> <li>• Strategic Framework 2018-2030</li> <li>• Performance review and assessment of implementation system (PRAIS)</li> </ul>
<b>UN Millennium Summit,</b>	The summit's ambitious aim was to "end poverty by 2015"	United Nations Millennium Declaration

Table 2: Institutions and processes of global biodiversity and soil governance following on the Earth Summit in Rio in 1992

<b>6.-8.9.2000, New York</b>	The Declaration included a chapter on "our common environment" and reaffirmed the United Nations' commitment to "fight against the degradation and destruction of our common home"	8 Millennium Development Goals (MDGs)  <a href="http://www.un.org/millenniumgoals/">http://www.un.org/millenniumgoals/</a>
<b>World Summit on Sustainable Development (Rio+10), 2002, Johannesburg</b>	The follow-up conference to Rio 1992	<b>Major Concepts</b> <ul style="list-style-type: none"> <li>• Education for sustainable development (ESD)</li> <li>• Partners</li> </ul> Integration of the Millennium Goals into the Action Plan Decade on Education for Sustainable Development (DESD) 2005-2014
<b>Bonn Challenge</b>	The Bonn Challenge is a global effort to bring deforested and degraded land into restoration. It was launched in 2011 by Germany, IUCN and the Global Partnership on Forest Landscape Restoration (GPFLR)  <a href="http://www.bonnchallenge.org">www.bonnchallenge.org</a>	The challenge's goal was to bring 150 million hectares into restoration by 2020 and 350 million hectares by 2030. To date, 57 countries have committed pledges amounting to 170.43 million hectares.
<b>Global Soil Partnership (GSP), 7.-9.9.2011, Rome</b>	The GSP was launched to the meeting in Rome, co-organized by the FAO and the Joint Research Centre (JRC) of the European Commission (EC). It was established in December 2012. GSP's vision is to improve global governance of the limited soil resources of the planet in order to guarantee healthy and productive soils for a food secure world. GSP is a voluntary initiative and does not create any legally binding rights or obligations for its partners.  <a href="http://www.fao.org/global-soil-partnership/about/why-the-partnership/en/">http://www.fao.org/global-soil-partnership/about/why-the-partnership/en/</a>	<b>Bodies</b> <ul style="list-style-type: none"> <li>• GSP-Secretariat</li> <li>• Intergovernmental Technical Panel on Soils (ITPS)</li> <li>• Regional Soil Partnerships (RSPs)</li> <li>• Plenary Assembly</li> <li>• Links with the Rio Conventions</li> </ul> <b>Pillars of Action</b> <ul style="list-style-type: none"> <li>• Promote sustainable management of soil resources</li> <li>• Encourage investment and technical cooperation in soils</li> <li>• Promote targeted soil research</li> <li>• Enhance the quantity and quality of soil data</li> <li>• Harmonization of methods, measurements and indicators</li> </ul> <b>Outcomes</b> <ul style="list-style-type: none"> <li>• Report 2015: Status of the world's soil resources</li> <li>• Voluntary Guidelines for sustainable soil management</li> <li>• Revised World Soil Charter (2015)</li> </ul>
<b>United Nations Conference on Sustainable Development (Rio+20)</b>	The second follow-up conference on the Earth Summit in Rio 1992.	<b>Outcome document "The future we want"</b> <b>Conceptual Innovations:</b> <ul style="list-style-type: none"> <li>• Green economy</li> <li>• From Global Partnership to Global Partnerships</li> <li>• Engaging major groups and other stakeholders (MGOS) / Multi-Stakeholder-Dialogue</li> </ul>
<b>4permille initiative, 2015</b>	The international initiative "4 per 1000" was launched by the French Ministry of Agriculture and Food at the COP 21 in Paris, in 2015. It aims at the improvement of soil carbon storage by appropriate agricultural practices in order to combat climate change and improve food security at the same time - <a href="https://www.4p1000.org/">https://www.4p1000.org/</a>	<b>Bodies</b> <ul style="list-style-type: none"> <li>• The Partners Forum (consultant)</li> <li>• Consortium (decision making body)</li> <li>• The Scientific and Technical Committee,</li> <li>• The Executive secretariat (hosted by CGIAR, is the world's largest global agricultural innovation network).</li> </ul> The initiative currently involves 149 organizations of the public and private sectors (national governments, local

Table 2: Institutions and processes of global biodiversity and soil governance following on the Earth Summit in Rio in 1992

		and regional governments, companies, trade organisations, NGOs, research facilities).
<b>International Year of Soils (IYS) 2015</b>	The 68th UN General Assembly declared 2015 the International Year of Soils (IYS) (A/RES/68/232).	The FAO implemented the IYS 2015, within the framework of the GSP and in collaboration with Governments and the secretariat of the UNCCD International Decade of Soils 2015-24
<b>United Nations Sustainable Development Summit 25.-27.9.2015, New York</b>	The 193-Member United Nations General Assembly formally adopted the 2030 Agenda for Sustainable Development on 25 September 2015, along with a set of 17 Sustainable Development Goals, which Secretary-General Ban Ki-moon hailed as a universal, integrated and transformative vision for a better world.	<b>Outcome:</b> Agenda 2030 → 17 Sustainable Development Goals (SDGs) SDG 15 'Life on Land' explicitly addresses issues of biodiversity and soil



Table 3: Status of relevant indicators in the 2016 edition of the German sustainability strategy

<p><b>Stickstoffüberschuss auf landwirtschaftlich genutzten Flächen</b> in Kilogramm je Hektar</p> <p>Quelle: Institut für Pflanzenbau und Bodenkunde, Julius Kühn Institut (JKI) und Institut für Landschaftsökologie und Ressourcenmanagement, Universität Gießen</p>	<p><b>Landwirtschaftliche Fläche unter ökologischer Bewirtschaftung</b> Anteil an der gesamten landwirtschaftlich bewirtschafteten Fläche in %</p> <p>Quelle: Statistisches Bundesamt, Bundesministerium für Ernährung und Landwirtschaft (BMEL)</p>
<p>2.1 a Nitrogen surplus</p>	<p>2.1 b Organic farming</p>
<p><b>Nitrat im Grundwasser</b> Anteil der Messstellen, an denen der Schwellenwert<sup>1</sup> eingehalten wird, in %</p> <p>Quelle: Umweltbundesamt und Länderinitiative Kennindikatoren auf Basis von Daten der Bund-Länder-Arbeitsgemeinschaft Wasser</p>	<p><b>Anstieg der Siedlungs- und Verkehrsfläche</b> in Hektar pro Tag</p> <p>Quelle: Statistisches Bundesamt</p>
<p>6.1.b Nitrogen in groundwater</p>	<p>11.1a Land consumption</p>
<p><b>Gesamtstickstoffeintrag in Ost- Nordsee über ausgewählte deutsche Zuflüsse</b> Konzentration in mg/l (gleitender Durchschnitt der vergangenen 5-Jahre)</p> <p>Quelle: Statistisches Bundesamt, Umweltbundesamt nach Angaben der Länder bzw. Russgebietsgemeinschaften</p>	<p><b>Artenvielfalt und Landschaftsqualität</b> Index 2030 = 100</p> <p>Quelle: Bundesamt für Naturschutz, April 2016</p>
<p>14.1 Nitrogen inputs into North and Baltic sea</p>	<p>15.1 Species diversity</p>
<p><b>Ökosysteme mit Überschreitung der Belastungsgrenzen für Eutrophierung durch Stickstoffeinträge</b> Anteil der bewerteten Fläche empfindlicher Ökosysteme in %</p> <p>Quelle: Europäische Umweltagentur</p>	<p><b>Zahlungen an Entwicklungs- und Schwellenländer für den nachgewiesenen Erhalt bzw. Wiederaufbau von Wäldern unter dem REDD+-Regelwerk</b> in Millionen Euro</p> <p>Quelle: Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung</p>
<p>15.2 Eutrophication</p>	<p>15.3 REDD+-Payments</p>

Table 4: List of consulted soil experts

## List of consulted soil experts and institutions

Name	Institution	Date(s)	Contribution
Prof. Dr. Peter Grathwohl	Center for Applied Geoscience Workgroup Hydrogeochemistry University of Tuebingen	30.10.2018 09.02.2019	Interview Personal Communication (Knowledge Transfer, Education)
Prof. Dr. Thomas Scholten	Chair of Soil Science and Geomorphology  Soil Science and Geoecology Lab, Department of Geoscience, Faculty of Science University of Tuebingen	05.11.2018 14.02.2019	Interview Personal Communication (Centre for integrative soil research, Commission for sustainable land use)
	KBU: Soil Protection Commission at the German Environment Agency (UBA)	20.11.2018	Feedback to the Interim Report (Downscaling of 30 ha-goal to the communal level, better integration of policies)
	<i>Der Boden und das Kapital. Boden im Karl-Marx Jahr 2018.</i> Fachtagung der Kommission Bodenschutz beim UBA (KUB) zum Weltbodentag 2018	04.12.2018	Working Group 'Multifunctionality of Soils: How to raise public awareness for and effectively communicate ecosystem services of soil'
Dr. Frank Glante  Kirstin Marx, Harald Ginzky, Detlef Grimski	Head of the KBU's office  Members of UBA's Division II (Waterbody and soil protection)	15.10.18- 15.02.19  15.2.2019	Repeated Personal Communication  Opinion statement via Frank Glante (§13b BauGB, MantelV, Land Saving Action Plan, European soil legislation)

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Dr. Falk Schmidt | Leiter der Geschäftsstelle  
Institute for Advanced Sustainability Studies e.V. (IASS)

Berliner Straße 130  
14467 Potsdam

Tel: +49 (0) 331-28822-456

Fax: +49 (0) 331-28822-310

Email: [falk.schmidt@iass-potsdam.de](mailto:falk.schmidt@iass-potsdam.de)

### visdP

■ Prof. Dr. Dirk Messner, Co-Vorsitzender

Prof. Dr. Patrizia Nanz, Co-Vorsitzende

Prof. Dr. Martin Visbeck, Co-Vorsitzender

# wissenschaftsplattform\_ nachhaltigkeit 2030

## Über die wpn2030

### Die Plattform

**Die Wissenschaftsplattform Nachhaltigkeit 2030 ist ein zentraler Ort der Wissenschaft, an dem sie drängende Fragen der Nachhaltigkeitspolitik reflektiert und diskutiert** – im Austausch mit Politik, Wirtschaft und Gesellschaft. Wissen für Nachhaltigkeit wird dort zusammengetragen und weitergetragen, insbesondere im Hinblick auf die Umsetzung der Deutschen Nachhaltigkeitsstrategie. Die Plattform arbeitet unabhängig und ist systematisch eingebunden in den offiziellen politischen Steuerungs-, Dialog und Umsetzungsprozess der Agenda 2030. Träger der Plattform sind SDSN Germany, DKN Future Earth und das IASS Potsdam

### Mitglieder des Lenkungskreises

Günther Bachmann, Marianne Beisheim, Jetta Frost, Jörg Hacker, Reiner Hengstmann, Thomas Holtmann, Adolf Klope-Lesch (ex officio), Stephan Lessenich, Kai Lindemann, Karsten Löffler, Ursula Mathar, Dirk Messner (Co-Vorsitzender), Klaus Milke, Alexander Müller, Patrizia Nanz (Co-Vorsitzende), Jürgen Renn, Ulrike Schell, Ina Schieferdecker, Falk Schmidt (ex officio), Dennis Snower, Olaf Tschimpke, Martin Visbeck (Co-Vorsitzender), Markus Vogt, Joachim von Braun, Hilmar von Lojewski, Ulrich Walter, Marion Weissenberger-Eibl

### Vorsitzende des Lenkungskreises

Prof. Dr. Dirk Messner  
Prof. Dr. Patrizia Nanz  
Prof. Dr. Martin Visbeck

### Kontakt

#### **Geschäftsstelle Wissenschaftsplattform Nachhaltigkeit 2030**

c/o Institute for Advanced Sustainability Studies e.V. (IASS)  
Berliner Str. 130, 14467 Potsdam  
Tel.: +49-331-28822-456  
[www.wpn2030.de](http://www.wpn2030.de), [info@wpn2030.de](mailto:info@wpn2030.de)

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