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SUSTAINABLE CONSUMPTION FOR BIODIVERSITY AND ECOSYSTEM SERVICES

Current state and future requirements in information,
communication and international cooperation

IMPRINT

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Federal Agency for Nature Conservation (BfN)
Division I 2.3 International Nature Conservation
Konstantinstr. 110
53179 Bonn, Germany
info@bfn.de | www.bfn.de/en

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)
Stresemannstraße 128 - 130
10117 Berlin, Germany
service@bmu.bund.de | www.bmu.de/en

Scientific Supervision

BfN, Division I 2.3: Simone Wulf, Dr. Bettina Hedden-Dunkhorst,
BMU, Division G II 2: Dr. Ulf Jaeckel, GIZ for BMU:
Geneviève Doublet

Authors

Chapter 1, 2, 4 and 5
Jenny Teufel, Viviana Lopez
Öko-Institut e.V. – Institute for Applied Ecology
Contact details:
j.teufel@oeko.de
Phone +49 761 45295-252
www.oeko.de

Chapter 3 and 5
Jan Christian Polanía Giese, Ulrike Knörzer
adelphi research gGmbH
Contact details:
polania@adelphi.de,
Phone +49 (30) 8900068-484
www.adelphi.de

Design/Layout: Tobias Binnig, www.gestalter.de

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LIST OF ABBREVIATIONS

10YFP	10-year framework for programmes on sustainable consumption and production
BfN	Federal Agency for Nature Conservation
BMEL	German Federal Ministry of Food and Agriculture
BMU	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
CBD	Convention on Biological Diversity
CI-SCP	Consumer Information Programme for Sustainable Consumption and Production
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CSI	Cement Sustainability Initiative
EBBC	European Business and Biodiversity Campaign
EU	European Union
FAO	Food and Agriculture Organization
FICEM	Inter-American Cement Federation
FSC	Forest Stewardship Council
GCCA	Global Cement & Concrete Association
GDN	Global Deal for Nature
GDP	gross domestic product
GRI	Global Reporting Initiative
GSTC	Global Sustainable Tourism Council
ICT	including information and communication technology
IPBES	Intergovernmental Platform on Biodiversity and Ecosystem Services
IUCN	International Union for Conservation of Nature
kbA	“kontrolliert biologischer Anbau”
PEFC	Programme for the Endorsement of Forest Certification Schemes
RTRS	Round Table on Responsible Soy
SBC	Sustainable Buildings and Construction Programme
TEEB	The Economics of Ecosystems and Biodiversity
UEPG	European Aggregates Association
UNEP-WCMC	UNEP World Conservation Monitoring Centre
UNEP	United Nations Environmental Programme
WBCSD	World Business Council for Sustainable Development
WRAP	Waste and Resources Action Programme
WRI	World Resources Institute
WWF	World Wide Fund For Nature

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KEY MESSAGES

Prevailing consumption patterns are coupled to a rapid destruction of natural and near-natural ecosystems and the loss of biodiversity and ecosystem services. Currently, a comprehensive overview of existing policy recommendations and implementation measures to counteract the impacts of consumption on nature is not available. Likewise, an overview of effective formats (e.g. fact-based information, storytelling, using of social media, etc.) for the communication of the link between consumption and biodiversity are missing. Yet, communication between producers, consumers and decision-makers seems to be crucial in this regard. This paper aims at filling this gap. It summarises the state of knowledge on the impacts of current consumption patterns on biodiversity and ecosystem services and gives an overview of recommendations for policy action and proposed measures. Good and best practice examples of communication on sustainable consumption including aspects of biodiversity and ecosystem services are given. To foster a change towards nature-friendly consumption, cooperation of key actors will be essential. Hence, this document also includes an overview of international networks, cooperations and initiatives of relevant stakeholders. It is based on a status quo analysis of the current state of findings, communication and cooperation related to consumption and its impacts on biodiversity and ecosystem services. The following central statements can be made on the base of the results of the analysis:

- The main causes for loss of biodiversity and ecosystem services are direct destruction of habitats, land use change, overuse and degradation of ecosystems, climate change and invasive species. The prevailing production patterns and the growing demand for consumer goods and services are directly related to the above-mentioned causes.
 - In relation to the entire life cycle of consumer products, the extraction of abiotic and biotic resources and the cultivation of biotic resources is generally associated with major losses on biodiversity and ecosystem services.
 - Due to the globalisation of many value chains, the consumption patterns of industrialised countries are largely based on raw materials extracted or cultivated in countries of the Global South. As a result, these countries are experiencing serious losses of biodiversity and ecosystem services. This development is particularly alarming in view of the fact that the countries of the Global South
- are generally richer in biodiversity hot spots than other countries.
 - Sufficiency¹-oriented lifestyles play a central role in a transition to more sustainable consumption patterns and in achieving ambitious goals in the protection of biodiversity, ecosystem services and climate. Therefore, special efforts should be made to successfully promote sustainable consumption through sufficiency-oriented lifestyles explicitly in the developed countries. These need to be embedded into a broader debate on greening the economy.
 - Several studies state that food consumption is one of the major causes of biodiversity loss at global level. Therefore, in terms of biodiversity conservation and the preservation of ecosystem services, the need for action in the area of food consumption has to be tackled with imperative action.
 - It should be noted too, that in other consumption areas such as mobility or information and communication technology there is a lack of knowledge about the links between consumption patterns and specific goods regarding the impact on biodiversity and ecosystem services.
 - People's awareness on the value of biodiversity is rising, but most consumers are still not aware on how their individual consumption behaviour is connected to the causes contributing to the loss of biodiversity and ecosystem services worldwide.
 - In general, biodiversity conservation is not at the forefront of communicating sustainable consumption. The main focus of sustainable consumption communication still lies on arguments related to climate change impacts. Other topics that are communicated relatively prominently in this context are the consumption of organic food and fair trade.
 - Most of the analysed media documents did not use the concept of ecosystem services. However, the value of nature and the dependence of human well-being on healthy and living ecosystems was emphasised more clearly in the last two years than in previous years. Especially in times of the COVID-19 pandemic, stakeholders have increased their efforts to highlight the links between consumption, biodiversity and human health.

1 The concept of sufficiency is explained in Infobox 2 (Page 22).

RIOT



INTRODUCTION

From a sustainability point of view, it is a matter of great urgency to achieve a change towards more sustainable production and consumption patterns. This transition is particularly important for the protection and sustainable use of biological diversity and ecosystem services. The growing demand for consumer goods and services globally leads to economic activities with severe impacts on the natural environment in the countries where raw materials are produced or extracted. Such impacts include the destruction of biodiverse ecosystems to expand production or mining sites, including large-scale deforestation, but also intensification of agriculture, overfishing, construction of new infrastructure, loss of scarce freshwater resources, soil erosion and pollution of water and soils. Due to the multiple links between the loss of biodiversity and ecosystem services and other environmental impacts, sustainable consumption patterns that protect biodiversity and ecosystem services also contribute to the management of other environmental crises, such as climate change or pollution. They are also essential to minimise the risk of the outbreak of further pandemics, such as COVID-19.

Increasing efforts are being made at international and national level to make consumption more sustainable, inter alia in the context of Agenda 2030 (especially sustainability goal 12: “Ensure sustainable consumption and production patterns”) and the 10-year framework for programmes on sustainable consumption and production (10YFP). Yet to achieve a transition towards sustainable consumption that also takes into account the conservation of biodiversity and ecosystem services, it is crucial to raise awareness for the before-mentioned impacts, promote measures to address them and foster cooperative action. At present, however, a systematic overview of the links between our consumption behaviour and the loss of biodiversity and ecosystem services, as well as of recommendations for biodiversity-friendly consumption, is not available. Furthermore, there is a gap of knowledge on how these recommendations can best be communicated.

The information presented in this paper is a result of a review of the most relevant and recently available scientific and technical literature on the impacts of consumption on biodiversity and ecosystem services in selected sectors. In addition, an analysis of relevant communication campaigns, activities and actors working on the topic of biodi-

versity, ecosystem services and consumption in selected consumption fields was carried out.

Considering this background, the present document provides the following information:

- A review of the **current state of research** on the impacts of consumption on biodiversity and ecosystem services
- An overview of the **recommendations and main action lines** for reducing impacts on biodiversity in selected consumption fields as a result of the literature review
- A **media analysis of recent communication measures** regarding the effects of consumption on biodiversity and ecosystem services and a selection of **good practice examples** for communicating recommendations for action and cooperation
- An overview of **international networks, cooperation and initiatives** of various social stakeholders engaging in biodiversity and sustainable consumption and making efforts to communicate these issues.

The information summarised in this paper shall serve as background material to inform the newly established international working group on Biodiversity Communication founded in the context of the UN One Planet network Consumer Information Programme for Sustainable Consumption and Production (CI-SCP).



INFORMATION - WHAT DO WE KNOW?

2.1

OVERVIEW ON IMPACTS OF CONSUMPTION ON BIODIVERSITY AND ECOSYSTEM SERVICES

The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), in its 2019 global assessment report, estimates that 23% of global land area is degraded. Over 85% of wetlands (surface area) have disappeared since 1970 and 32 million hectares of primary forest or recovering forest in the tropics were lost between 2010 and 2015 [40]. The same report indicates that as of today, about 1 million species in the animal and plant groups studied (25% of non-insect species) are threatened with extinction if no action is taken. In order of importance, the identified causes of biodiversity loss are land use changes (as main cause for terrestrial and freshwater systems), overexploitation of resources (as main cause for marine systems), climate change, emission of pollutants and introduction of invasive species.

The magnitude of environmental impacts caused by human activities is closely related to the overall popula-

tion and economic growth as well as to the consumption patterns of the so-called affluent societies. With increasing prosperity, environmental impacts at global level increase dramatically, for example, a doubling of economic prosperity leads to up to 80% higher greenhouse gas emissions [37]. A study has shown that between the years 2000 and 2011, despite gains in efficiency (i.e. reduction of land use impacts per unit gross domestic product (GDP)), overall population and economic growth led to increasing overall impacts on biodiversity worldwide [57]. Recent work also shows that current consumption patterns, or the global environmental changes associated with them, are also the cause of the emergence of pandemics such as COVID-19 [19, 70]. This means that all efforts to make our consumption patterns more sustainable not only include the protection of biodiversity and ecosystem services, but also contribute greatly to minimising the risk of further pandemics.

By looking at the resource consumption and environmental impacts along the entire life cycle of a product, the links between prevailing consumption patterns and the loss of biodiversity and ecosystem services become evident. Not only the extraction of abiotic resources and the cultivation of biotic raw materials, but also the construction of the infrastructure and material inputs necessary for production and transport contribute directly to the loss of biodiversity and ecosystem services. The overuse of natural resources (e.g. through overfishing or overgrazing) also leads to the degradation or even destruction of natural ecosystems and the loss of their ecosystem services.

Further environmental impacts occur along the product life cycle of consumer goods. Energy and fossil fuels consumption for production and transport, the use of chemicals in production or storage (e.g. pesticides and refrigeration agents), emissions into the air (e.g. air pollutants, greenhouse gases, etc.) in all life cycle stages, but also the pollution caused by improper disposal are all factors associated with environmental impacts on climate, soil, air as well as ground and surface water, and thus indirectly also on the balance of natural ecosystems and biodiversity.

While people's awareness on the value of biological biodiversity is rising [12] and the decline in biodiversity is perceived as a threat by a significant proportion of the population in a country like Germany, a much smaller proportion of the population feels personally responsible for the conservation of biodiversity [13]. Neither are most consumers aware about how their individual consumption behaviour is directly or indirectly connected to the causes contributing to biodiversity loss and ecosystem services worldwide.

Yet, the high level of consumption in industrialised countries and its associated demand for resources, which is highly dependent on international trade, leads to enormous losses of biodiversity and ecosystem services

in developing countries [17, 41, 47, 52, 84]. The hotspots where rapid and most dramatic biodiversity losses have been observed concentrate in Central and South America, Africa and Asia.

While recent studies identify livestock farming as the main cause of biodiversity loss in many of these regions, the impact of oilseed production on biodiversity has increased the most [57]. The increasing use of palm oil in the cosmetics and food industries, as well as for the production of detergents or biofuels is, for example, associated with the destruction of primary tropical forests along with peatland or wetlands. The destruction or degradation of these ecosystems entails a dramatic loss of biological diversity besides being associated with the emission of large quantities of greenhouse gases in many regions of the Global South such as Southeast Asia, and spreading most recently to Latin America, Central and West Africa.

Sustainable consumption choices, in combination with sufficiency-oriented lifestyles (see Infobox 2), can have a significant impact on the state of biodiversity in other regions of the world. Such choices include for example the everyday use of recycled toilet paper, the selection of coffee or cocoa products from sustainable agroforestry systems that do not involve rainforest clearance, the purchase of timeless and higher quality clothes instead of short-lived fashion trends, the purchase of a long-lasting washing machine, notebook or smartphone which does not have to be replaced for many years or the choice to forego the purchase of a new item by borrowing tools, reusing materials or buying second-hand instead. These consumption choices can contribute to the conservation of biodiversity and protection of ecosystem services. Therefore, a transition to more sustainable consumption patterns must focus on promoting better consumer information and sufficiency-oriented lifestyles, if ambitious goals in the protection of biodiversity, ecosystem services and the climate are to be achieved [37].

2.2

STATE OF KNOWLEDGE BY CONSUMPTION AREA

Consumer behaviour in industrialised countries and emerging markets can be differentiated into the six consumption areas Food and Nutrition, Construction and Housing, Mobility, Working and Office (including information and communication technology, ICT), Leisure and tourism and Textiles and Clothing [14].

The three consumption areas food and nutrition, construction and housing as well as mobility are priority areas for climate and resource protection [2, 61]. These areas are regarded as priorities for environmental action given that they account for 70 to 80% of all quantifiable environmental impacts caused by human consumption [2, 22, 37, 44,

65, 77]. Until now, they have therefore been at the heart of policy development and implementation of measures to reduce environmental impacts.

Specifically, in terms of biodiversity conservation and the protection of ecosystem services, the area of food and nutrition must be given top priority [15, 57, 86]. Looking at the whole life cycle of products, food consumption is the most important cause of biodiversity loss, accounting for 40% of quantified losses in most countries and regions². This is primarily linked to land use changes and greenhouse gas emissions caused by agricultural production worldwide [85]. Therefore, structural changes in agricultural production and consumption are indispensable to reduce the loss of biodiversity while ensuring global food security [9].

There exists a plethora of scientific knowledge on the impacts of the food and nutrition sector on biodiversity (see e.g. [15, 16, 23, 24, 34, 35, 82, 85, 91]). Food production and its links to biodiversity loss, the loss of ecosystem services and climate change have been intensively researched in the past, and the sector is still considered a research priority owing to food security. Therefore, information resulting from many different scientific disciplines contribute to an abundant body of knowledge about the impacts of food production and widely accepted up-to-date recommendations for action to adapt food production and consumption towards sustainability.

In the context of the consumption of tourism products and services, a subcategory in the field of leisure and tourism, there are a variety of segments which rely directly on biodiversity and ecosystem services, such as nature-based tourism, ecotourism, wildlife tourism and geotourism [88]. Furthermore, it has to be stated, that “there are many destinations where the conservation of marine and terrestrial ecosystems, protected areas and species largely depends on tourism revenue and operators” [60]. In turn, different aspects of the tourism experience, such as mobility, infrastructure, gastronomy and certain outdoor activities (like e.g. skiing, climbing etc.) can be directly linked to concrete impacts on biodiversity and ecosystem services [34, 35]. Many of these impacts are studied as part of other consumption areas (e.g. mobility) given the cross-cutting nature of tourism’s value chain and therefore, the information available for the general impacts of tourism is constantly developing.

However, most of the information available on the tourism sector is economic data (e.g. visitor spending, accommodation) collected at the destinations, with information on the environmental and social impacts of tourism being

generally limited and still needing to be captured (see e.g. [59, 82])

Information about other consumption areas in direct reference to biodiversity loss is scarce. With regard to the textile sector, recommendations for sustainable consumption have been developed using cotton as an example in a case study commissioned by the German Federal Agency for Nature Conservation [47]. The links between other consumption areas and biodiversity loss are in general difficult to capture along complex value chains. While in many cases information about impacts on biodiversity may in fact be available³, this information frequently only refers to a certain value chain or to the exploitation of specific resources (e.g. the mining of specific minerals such as the aluminium ore bauxite) instead of describing these impacts as indirect consequences of the consumption of final products and services (such as using a private car). This is the case for consumption areas such as construction and housing, information and communication technology (ICT) and mobility. The production of goods and the provision of services used in these consumption sectors is highly dependent on the use of a variety of different raw materials, among other e.g. a large number of different minerals. However, the impacts of mining activities on biodiversity and ecosystem services differ, sometimes drastically, both in type and magnitude. The extraction and processing of copper, for example, is associated with a high environmental hazard potential especially due to chemical pollution, which includes a high risk of negative impacts on biodiversity and ecosystem services [20, 21]. The aluminium ore bauxite, on the other hand, is relevant because it is almost exclusively mined in extensive open-cast mines which are often located in very sensitive (tropical) natural areas, causing the direct destruction of biodiverse habitats. In addition, the high energy demand in refining contributes to the high greenhouse gas potential of products made from primary aluminium. This mineral is used as input for vehicle production for the consumption area of mobility as well as in packaging for food and beverages.

The example of lithium suggests that in some cases there are also potential trade-offs between biodiversity and climate protection. Lithium is used in batteries and therefore important for e-mobility (i.e. electric vehicles), yet lithium extraction causes the degradation of rare salt lake ecosystems [47]. One should mention, however, that the extraction and the transport of crude oil for fuel production is

2 Average contribution to biodiversity loss based on a study including 45 countries and regions worldwide by Wilting et al. (2017).

3 See e.g. the IUCN report „Biodiversity risks and opportunities in the apparel sector“ [1].

also associated with major negative impacts or risks for biodiversity and ecosystem services (see for example the risks for leaks occurring in pipelines, tanker accidents, etc.).

Concrete recommendations for action can only be developed based on a more detailed analysis of each consumption area. Therefore, in order to provide a better overview, the impacts of and recommendations for three selected consumption areas are described in more detail below: Food & Nutrition, Construction & Housing and Tourism & Leisure.

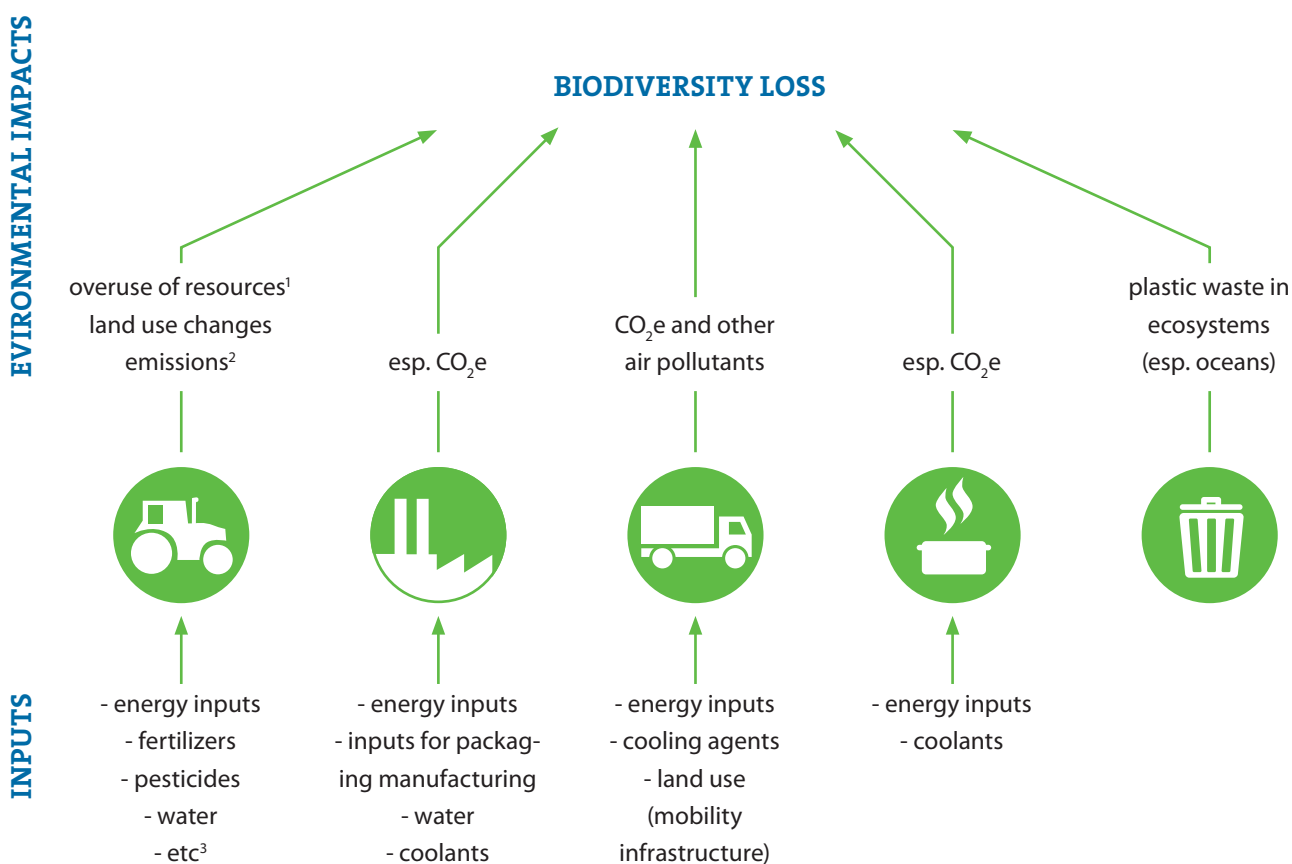
2.2.1 FOOD AND NUTRITION

The largest proportion of the environmental impacts in the food sector occurs at the level of agricultural production. Meanwhile, the contributions of energy consumption and emissions in food processing as well as fuel consumption and transport emissions along the value chain make up for a comparatively small share of environmental impacts [59].

Numerous studies show that agriculture is the economic sector that has the greatest impact on the loss of biodiversity and ecosystem services. Changes in land use lead to the direct destruction of natural ecosystems or, through intensified management, to the loss of heterogeneously structured agricultural landscapes characterised by high biodiversity [51, 74, 76].

The intensification of agricultural production is often accompanied by an overuse of natural resources (e.g. lack of crop rotation or flood irrigation in areas with water stress). The consequences of this overuse, such as a decline in soil organic matter, soil erosion, compaction and salinisation of soils, are associated with negative impacts on biodiversity [5, 55, 63]. Finally, biodiversity loss also occurs in connection with emissions resulting from agricultural processes (e.g. nitrogen and phosphate emissions, emissions of pollutants from the use of plant protection and growth aids, greenhouse gas emissions from animal production and land-use changes) [6, 31, 43, 50, 67, 71, 78, 83].

FIGURE 2-1: Biodiversity loss caused by environmental impacts along the food value chain



Footnotes: 1) soil, water 2) carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), ammonia (NH₃), nitrate (NO₃-), phosphate (PO₄3-), chemical residues from pesticides, etc. 3) e.g. antibiotics, growth aids such as stem shortener

Source: Öko-Institut e.V.

Moving from the supply end to the demand end of the value chain, it should be noted that different consumption habits (e.g. diets) also have an influence on biodiversity to varying degrees. A high consumption of animal products is associated with significantly greater environmental impacts (and consequently with stronger negative impacts on biodiversity) than diets with a high content of plant-based products [58, 59]. The key issue is the higher land requirements to produce animal products such as meat [49]. Based on yield data from the USA, 31.2 square metres of land are needed to produce 1000 kilocalories of beef, whereas producing 1000 kilocalories of cereals requires only 1.1 square metres [64]. Moreover, intensive animal production systems are generally dependent on the import of animal feed, which is often associated with land use changes and consequently with the loss of biodiversity in the feed-producing countries. The largest producers for soy, for example, are Brazil and the US, with Brazil alone accounting for about 34,700 million hectares of soy cultivations in 2018 [47].

In addition, high livestock densities are associated with high nitrogen and phosphate emissions into water, soil and air, which result in serious negative impacts on biodiversity in regions where these are located [87]. In contrast, extensive grassland management based on grazing or mowing in accordance with nature conservation principles is often associated with a positive impact on biodiversity by maintaining open pastures and meadows [30].

Several general measures have already been identified to reduce the impacts on biodiversity and ecosystem

services associated with food consumption. With respect to reducing the impacts of agriculture, two opposing paths are often proposed. One defends further intensification of agriculture to increase yields, in combination with set-aside land for nature conservation. The other advocates for a system change towards an agriculture that is associated with a lower impact on biodiversity and ecosystem services. As more recent studies explicitly name intensive forms of land management as a major driver of biodiversity loss and ecosystem services, the idea that further intensification of agriculture in combination with set-aside land for nature conservation will contribute to reducing such degradation is not aligned with the state of knowledge in this field [24, 82].

Furthermore, it should be considered that besides negative environmental effects linked to intensive agricultural primary production systems, these are also significant drivers of unequal distribution of the global food supply with consequences for land concentration in agricultural production, also being closely connected to the issue of land grabbing [82]. Ultimately, structural changes at both production and consumption levels are needed in the area of food and nutrition. These are indispensable to reduce the loss of biodiversity while ensuring global food security.

A set of recommendations for the field of food and nutrition are guided by five main approaches to the protection of biodiversity and ecosystem services (see Table 2-1). These can be implemented both through public procurement and private consumption [75].



TABLE 2-1: Approaches for sustainable consumption to protect biodiversity and ecosystem services in the consumption area food & nutrition

Recommendation	Description and explanation of the recommendation
1. Purchase of food produced with a lower environmental impact	<p>Buying food certified according to standards of controlled organic farming or other sustainability standards in the food sector is a consumer choice that reduces the environmental impact of agricultural production.</p> <p>Organic farming can make an important contribution to solving the environmental problems associated with agriculture, including the protection of biodiversity, water and soil [68].</p>
2. Purchase of food that is produced without destroying ecosystems that are important for the conservation of biodiversity (e.g. subtropical or tropical primary forests, mangrove forests, marine ecosystems)	<p>Focus on primary agricultural products (palm oil, soy, coffee, cacao) and fish products whose production does not entail the destruction of biodiverse ecosystems. For these product groups, there are trustworthy sustainability labels which can guide consumers: e.g. Fair Trade, GEPA, MSC, ASC, RSPO, RTRS, Danube/EU Soya, Pro Terra⁴.</p>
3. Implementation of measures designed to reduce food waste and tackle the issue of overproduction	<p>Global food losses along the entire value chain amount to 1.3 billion tonnes per year, which corresponds to about one third of the food intended for human consumption [33]. The projections show that about half of the waste is “theoretically avoidable” [69].</p>
4. Implementation of measures aimed at reducing the use of animal products	<p>A change in the dietary habits of industrialised and emerging countries towards a diet made up mainly on plant products is one of the key solutions for the protection of biodiversity and ecosystem services [56] and will probably have a greater effect than the consumption of organic food [27]. In general, it is recommended that:</p> <ul style="list-style-type: none"> • Positive messages on reduced meat consumption should be developed (animal health, own health, ecological benefits). • To convey knowledge and rational arguments, but this alone is not enough to change eating behaviour. Emotions, cognitive dissociation (between knowledge and actual behaviour) and social norms have the greatest influence on meat reduction [72]. • Environmentally harmful subsidies should be abolished, and external costs internalised. Changes in supply must be initiated and encouraged. • Vegan and vegetarian alternatives must be made available.
5. Purchase of “old and rare varieties” to promote agrobiodiversity	<p>Although more than 6000 plant species are cultivated for food worldwide, only a little less than 200 species make a substantial contribution to the global food supply [29]. This development is worrying also in terms of food security, as the fewer varieties are grown, the greater the risk of crop losses due to pests or extreme weather events. Due to market availability considerations, this approach is probably not applicable for public procurement, but it can be implemented in private consumption.</p>

4 There exist other country-specific labels, e.g. in Germany the organic agricultural labels Naturland, Bioland and Demeter.

2.2.2 CONSTRUCTION AND HOUSING

The construction of the infrastructure necessary for housing and transport is linked to several direct and indirect environmental impacts, destroys habitats and leads to the loss of their biodiversity and ecosystem services:

- New buildings and outdoor facilities that are built on previously vacant surfaces cover areas that will not be available for years, decades or indefinitely in the form of plant or animal habitats. Thus, refurbishment of old properties for new purposes and remediation and reuse of brownfield play an important role in biodiversity conservation.
- The construction activity itself is associated with disturbances and interventions in nature on site (e.g. soil compaction).
- The extraction of abiotic resources needed as material input for the construction sector leads to the destruction of natural habitats in different regions through mining activities and to high energy requirements and environmental pollution in the processing of these materials.
- The mining of abiotic resources is often accompanied by other environmental impacts such as continuous emissions of pollutants during active mining operations into groundwater, air and surface water. Besides, the mining of abiotic resources is also associated with environmental risks in the form of catastrophic events with devastating consequences for biodiversity⁵.
- Some building materials (e.g. insulation materials) contain toxic and/or environmentally hazardous substances which may be released into the environment over time or during their disposal.

The most relevant topic for the protection of biodiversity and ecosystem services in this consumption area is, besides the loss of land, the extraction and production of building materials. This effect of building materials extraction on biodiversity loss builds a strong link between biodiversity loss prevention and circular economy. Thus, there is a strong urge to close material chains and replace cement etc. with side stream materials, increase the reuse and upcycling of building materials to prevent biodiversity loss⁶. The local solutions should be raised in value/be used as a prerequisite for new innovations as well, including earth

construction, mud, clay, straw, bamboo etc. This would promote the biodiversity targets to utilise local traditional knowledge in biodiversity preservation and as a source of new innovations and business. Considering that a large number of materials are used in the construction sector, it is difficult to provide a comprehensive picture of the impacts on biodiversity associated to all of them. However, several abiotic and biotic resources are used for the production of these materials. Such is the case, for instance, with concrete production which relies on the extraction of sand and gravel as well as wood which is utilised in various ways in the construction sector as well as for the production of furniture for private consumption in the housing field. The impacts and recommendations described in this section focus on these two resources.

Wood

The connection of timber consumption to the issue of deforestation and forest degradation plays an important role in the protection of climate, biodiversity and ecosystem services. According to the WWF's Living Forest Report 2015, unsustainable logging and pulp plantations are mentioned as secondary cause whereas large and small-scale agriculture and livestock are listed as the primary causes of forest loss. If no measures are taken against global deforestation trends, 170 million hectares of forest will be lost by 2030. A summary of main pressures on forests in different global deforestation fronts is given in the report. In addition to the causes of deforestation already mentioned above, it is important to note here that the use of firewood and charcoal production by the informal sector is a major cause of loss of biodiversity and ecosystem services in least developed countries. Furthermore, the operation of mines, the use of hydroelectric power, infrastructure projects and increased fire incidence and intensity are other pressures on global forest ecosystems. More than 80% of the forest loss predicted by 2030 will take place in so-called "deforestation fronts". The WWF has identified 11 such deforestation fronts worldwide which correspond to regions known as biodiversity hotspots. [91]

A study by Chaudhary et al, which quantified the impact of timber production on biodiversity with a global focus, supports the WWF findings described above. Tropical countries with low timber yields and a high proportion of endangered species are most affected. [18].

⁵ As demonstrated by the dam burst in Brumadinho and the resulting mudslide accident in the state of Minas Gerais (Brazil) on 25 January 2019.

⁶ In Germany, a so-called „Assessment System for Sustainable Building“ has been developed. This is an instrument for planning and evaluating sustainable and usually public construction projects. It complements the Guideline for Sustainable Building of the Federal Ministry of the Interior, Building and Community as a holistic assessment methodology for buildings and their surroundings. This instrument includes criteria that addresses „biodiversity friendly material extraction“. (for more information see <https://www.bnb-nachhaltigesbauen.de/en/assessment-system/>, last assessed on 2021/03/12)



The consumption of wood as building material or for the furniture industry is a driver for unsustainable forest use in Russia, North America, Scandinavia, as well as in Eastern European countries⁷. Here the causes of biodiversity loss are traced back to intensive forestry use in the form of monocultures and clear-cutting [16]. Nevertheless, about 32% of the species extinction caused by forestry is caused by export production for high-income nations. Worldwide, global trade in timber causes a loss of ecosystem services which can be estimated at 1.5 trillion US dollars per year, with the highest losses located in tropical and sub-tropical countries of the Global South [16].

On the consumer side, reliable information for sustainable consumption can already be provided regarding the area “Building & Construction”. Wood and wood-based materials for the construction of buildings as well as for interior design should come from sustainably managed forests that are demonstrably economically viable, environmentally sound and socially acceptable. The certifications of the Forest Stewardship Council (FSC) and the Programme

for the Endorsement of Forest Certification Schemes (PEFC) can support this. Moreover, as the influence of private consumption is limited, appropriate communication measures for sustainable consumption of wood in the building sector would have to be directed to other target groups (architects, housing associations, etc.). The Sustainable Buildings and Construction Programme (SBC) is a programme of the One Planet Network that aims at improving the knowledge of sustainable construction and to support and mainstream sustainable building solutions. The work involves sharing good practices, launching implementation projects, creating cooperation networks and committing actors around the world to sustainable construction⁸.

There are also a number of standards addressing interior design such as the “Blue Angel for low-emission furniture and slatted frames made of wood and wood-based materials” (DE-ZU 38, January 2013, version 6). As regards the problem of using tropical wood for garden and balcony furniture, there is an increasing number of products on the market that carry the FSC label.

⁷ The main reasons for the deforestation in Latin and South America, Asia and Africa are food and feed production, the establishment of forest monocultures for pulp production and mining activities [91].

⁸ <https://www.oneplanetnetwork.org/sustainable-buildings-and-construction>, last assessed on 2020/11/27

Sand and gravel

Sand and gravel are abiotic resources also called bulk raw materials because they are used in large quantities in the construction sector (including road construction) to produce concrete and mortar. It is estimated that around 47 to 59 billion tonnes of abiotic resources are mined worldwide each year, with 68 to 85% sand and gravel accounting for the largest share of them [43]. Other uses of sand & gravel are as input for silicon to produce computer chips and solar cells, and the production of glass and ceramics. Metal foundries need quartz sand for moulding and the consumer goods industry uses sand fillers to produce high quality products in paint, plaster and plastics.

The extraction of the two raw materials sand and gravel causes a high land consumption and therefore has a significant impact on biological diversity. In addition, due to dwindling deposits on land and rapidly growing demand (especially in the Asia-Pacific region and in Africa), raw materials are now also being extracted from rivers, river deltas and the sea. Mining in river basins and in the sea is associated with serious environmental problems. These include changes in groundwater levels, erosion of shore zones and seacoasts, changes in flow conditions and changes in light conditions due to the whirling up of fine sediments. These environmental impacts are accompanied by massive impairments, up to the complete destruction of river and marine ecosystems and the loss of the ecosystem services associated with them such as coastal and flood protection. The consequences are often ignored, especially in emerging and developing countries. In addition, sand and gravel are often mined illegally. There is also a lack of reliable data for assessing environmental impacts and their consequences. [45, 48, 81]

In absolute terms, the most important approach for biodiversity protection in relation to bulk raw materials is a reduction in absolute demand [10]. Some possible starting points are an increase in the use of secondary materials in the construction sector (for example recycled concrete replaces gravel) and an extension of the service life of buildings [10], as well as the development of political measures to promote the concept of sufficiency in the building and construction sector. Another recommendation coming from the cement and aggregates sector refers to the development of guidelines on "Good professional practice in the extraction of sand and gravel in marine areas" [45]. In addition to the need to sensitise the public to the issue on this matter, the pressure on national governments should be drastically increased to achieve development and promotion of appropriate policies including strict regulation on sand mining. Finally, developing instruments

of economic incentives and certification systems to promote sustainable mining systems can be taken as general recommendation for the reduction of biodiversity and ecosystem services loss associated with the buildings and construction consumption field.

2.2.3

LEISURE AND TOURISM

The tourism industry and the issue of biodiversity and ecosystem services are closely linked to each other. On the one hand, attractive landscapes, sparsely populated regions and untouched nature are popular destinations. This makes tourism dependent on the conservation of the naturalness of given regions, including the preservation of their biodiversity and ecosystem services. On the other hand, the tourism industry is a contributor to the loss of biodiversity and ecosystem services, e.g. through the construction of the required infrastructure (hotels in coastal regions, cable cars in mountainous areas, etc.), through the emissions associated with travel (greenhouse gas emissions and air pollutants) or direct pollution (trash etc.) and direct destruction of ecosystems by tourist activities (e.g. diving, climbing, hiking). In addition, invasive species can also be spread by tourism.

An overview of the positive and negative impacts of tourism is presented in Table 2-2 and reflects its ambivalence in terms of biodiversity and ecosystem services.



TABLE 2-2: Overview of the positive and negative impacts of tourism on biodiversity and ecosystem services

Positive impacts of tourism

- Tourism concessions have the potential to secure land and preserve it. They can form corridors in the buffer zones of national park. [69]
- Provides policy makers with an economic justification for the conservation of biodiversity and ecosystem services.
- Can involve local people to protect biodiversity and integrate their specific ecological knowledge.
- Has the potential to inform about biodiversity and ecosystem services and can be used as a platform for further education.
- Direct benefits can result from citizen science and participation of visitors in nature conservation projects.
- Can generate revenue for nature conservation efforts, including the protection of endangered species [90]. The COVID-19 pandemic has shown that many conservation efforts in the Global South depend on tourism revenue.

Negative impacts of tourism

- Increases demand for land in regions that are important for biodiversity protection (such as coasts and mountains)
- Leads to increased fragmentation of areas that are important for biodiversity conservation through the construction of the necessary infrastructure for travelling and lodging.
- Increases negative impacts on regional ecosystems (e.g. soil erosion due to footfall damage in mountains, increased inputs of nutrients, construction activities, rubbish on beaches, disturbance of sensitive species, etc.).
- Contributes to the spread of invasive species and diseases.
- Causes significant GHG emissions (through the mobility activities associated with traveling).
- Is associated with the risk of the extinction of species in areas where unsustainable hunting and fishing management is practised.

Potential conflicts between tourism and nature conservation, for example regarding land use or the behaviour of tourists, can often be resolved by good management. However, the development of integrated management plans for sustainable tourism is time and resource intensive and should definitely include public participation of local communities. The tourism industry has the potential to optimise the way it uses natural resources, while creating economic value for protected biodiversity and stimulate its further conservation. There is room nevertheless to further integrate the sustainable use of biodiversity as a key element in tourism destination marketing and promotion, especially to trigger a shift from strategies focusing on the volume of tourists towards higher quality experiences, often in connection with the level of local satisfaction with tourism. As tourists are relatively autonomous in the choice of tourism products they consume, greater awareness on these aspects could lead to changes in travel behaviour. [90]

Ecotourism is defined as responsible travel to areas close to nature, which contributes to the protection of the environment and is of benefit to the local population [20]. Since 1990, this has been mentioned as an alternative to tackle environmental issues in the tourism industry. Nevertheless, recent reviews of the implementation of this practice for the last 30 years point out its merits but also shortcomings regarding its impacts on regions considered biodiversity hotspots [8, 73]. These reviews have concluded that in order to truly support nature conservation, ecotourism must

1. develop and implement a specific approach for ecosystem protection,
2. define boundaries of the protected area,
3. directly benefit local population and
4. have a strong community-based monitoring system [8, 73].

Ultimately, however, these requirements should be imposed on all nature-based tourism offers.

Finally, the consumer could recognise environmentally friendly and sustainable tourism offers through credible certification. However, it is questionable whether the information available in the tourism sector reaches the consumer. The variety of existing certifications is counterproductive. As of today, there are more than 200 different green and sustainable tourism standards, which also represents a challenge for the proper implementation and improvement of the criteria. This is because the effectiveness of a label increases with the degree of its

distribution, or with the number of companies or destinations that can be certified. To tackle this issue, the Global Sustainable Tourism Council (GSTC) has developed two so-called global baseline standards for sustainability in travel and tourism: the GSCT Basic Standard for Business and the GSCT Basic Standard for Destinations. Both basic standards contain criteria addressing the conservation of biodiversity, ecosystems and landscapes, but these target the different operators in the tourism industry.

2.2.4

GENERAL RECOMMENDATIONS FOR ACTION ON SUSTAINABLE CONSUMPTION FOR BIODIVERSITY AND ECOSYSTEM SERVICES

Based on statistical data and trade flows, a recent study has examined the impacts of global raw material flows from outside the European Union (EU) to Germany, as an example for an industrialised country. By estimating the demand for land use and the impact of individual raw materials on biodiversity and ecosystem services, overall action approaches for sustainable consumption were derived from the findings [47]. The central measures for overarching sustainable consumption considered to be transferable to other industrialised nations are:

- the promotion of consumer information and communication,
- the use of public procurement as a lever to promote biodiversity-friendly consumption (see Infobox 1),
- the promotion of a lifestyle oriented towards sufficiency (see Infobox 2),
- increasing transparency along the supply chain and internalising environmental costs wherever possible,
- supporting international stakeholder initiatives on biodiversity and ecosystem services,
- the evaluation and consideration of existing alternative materials or raw materials and
- the closure of important material cycles [47].

All the above-mentioned approaches address decision-makers, like non-governmental organisations or public institutions promoting consumer information on sustainable consumption.

An individual consumer (private or public) can contribute to the reduction of biodiversity loss, deforestation as well as to the reduction of global greenhouse gas emissions by making appropriate purchase decisions or adopting changes in his or her dietary habits [7]. Therefore, approaches that address aspects like “consumer information”, “promoting lifestyles oriented towards sufficiency” or “increasing transparency” enable sustainable purchase decisions and also address the individual consumer.

Of central importance for a successful political strategy on sustainable consumption is the identification and implementation of measures that have a very high environmental relevance. In the literature on sustainable consumption, such measures can be listed under the term “big points” [3]. The term “big points” is generally used for measures that address the priority consumption areas and that have a very high environmental relevance primary with regard

to climate and resource protection (and subsequently also for the protection of biodiversity and ecosystem services). Among others these are:

- reducing the consumption of animal products in the area of nutrition
- reducing the size of living space, improving insulation standards in the area of construction and housing, and
- reducing the number of flights in the area of mobility.

In terms of the probability of implementation, the “big points” include measures that are widely rejected (e.g. forgoing air travel) and measures that are implemented by a growing number of people on a permanent basis (e.g. investments in renewable energy or car sharing). In scientific literature, these measures are also referred to as “key decisions” [46], “key points” [7] or “top ten measures” [32].

INFOBOX 1: Eco-labelling and sustainable public procurement

Eco-labelling is a relevant instrument for consumer information and communication and is also important for public procurement in the promotion of sustainable consumption. With the help of eco-labelling instruments, environmentally- and biodiversity-friendly products can be labelled and easily recognised by the consumer.

The aspect of biodiversity and ecosystem services is partly addressed by some eco-labels. However, in the vast majority of eco-labels, the protection of biodiversity and ecosystem services is not a central element.

For example, the Blue Angel applied in Germany for recycled paper advertises, among others, with the slogan “Protect the forests” for products that fulfil the criteria of their standard for recycled paper. In the area of food & nutrition, eco-labelling is used e.g. to identify products from controlled organic farming (“kontrolliert biologischer Anbau” – kbA). In addition to the standards of controlled organic farming, there is now a large number of other sustainability standards in the food sector

which have formulated specific criteria for cultivation, fishing, or aquaculture with the aim of environmental protection.

Private consumers and public procurement⁹ can already contribute to environmental protection with their consumption decisions. However, there is a need for further integration of the protection of biodiversity and ecosystem services into eco-labelling schemes by supplementing existing criteria with additional ones that specifically address the protection of biodiversity and ecosystem services (see Annex I Good practice 1). Given the abundance of existing eco-labels, it is not advisable to develop and establish new labels, but rather that existing recognised standards are supported and strengthened. In addition, consideration should also be given to how the protection of biodiversity and ecosystem services can be further integrated into already existing approaches of sustainable consumption policy and into concrete advisory instruments on sustainable consumption.

⁹ The public sector is a major economic actor that has a steering effect on the market and can stimulate the supply of sustainable products and services through demand. The estimate of total general government expenditures on works, goods, and services in the European Union was 2049.8 billion euros in 2017, 2% higher than in 2016 [25].

INFOBOX 2: Promotion of sufficient lifestyles

Sufficiency is defined as “modification of consumption patterns that help to respect the Earth’s ecological boundaries while aspects of consumer benefit change” [28]. Understanding consumption through “benefit aspects” instead of simply in terms of “benefits” means that goods and services hardly ever have only one single benefit. For example, both a car and a bicycle provide the benefit of mobility, whereas the speed, comfort, effort and health effects, as well as fuel and parking requirements are differentiating aspects between them.

Moving from a focus on product-related consumption (e.g. recycled sanitary paper versus sanitary paper made from virgin fibres) and towards a focus on lifestyles, it must be noted that certain lifestyles geared towards sufficiency (e.g. using public transport, bicycles and car-sharing instead of owning a car) contribute to the protection of biodiversity and the conservation of ecosystem services. [47]. This is aligned with discussions in recent years about the safe space for humanity between the environmental ceiling and the social foundations [66]. Therefore, a sufficient lifestyle must not only respect ecological boundaries (as upper limit), but also satisfy basic needs (as lower limit).

As a communication strategy, sufficiency is a difficult topic to touch on, but it is worth considering given its high potential for promoting sustainable consumption and biodiversity protection. For this purpose, sufficiency communication should not necessarily focus on completely avoiding consumption, but rather on the consumption of resource-saving products and services. This action area contributes to the overarching objective of decoupling economic growth from resource consumption or biodiversity loss. This implies that regardless of the consumption field, communication strategies in line with extending the useful life of products, avoiding disposable products, reducing food waste or reducing animal products, can contribute to answering the question how we can ensure that rising prosperity does not lead to increased biodiversity loss (see Annex I Good practice 2 and Good practice 3).

Sufficiency can (and should) be stimulated by policy. While sufficiency is only one of three complementary paths to sustainability alongside with “efficiency” and “consistency”, sufficiency policies can influence the consumer behaviour of citizens through different instruments:

Information and persuasion instruments

Can show that given behaviours are necessary and useful and can lead to sufficiency-oriented consumption decisions. Some examples are:

- publicity campaigns on the ecological aspects of high meat consumption
- eco-labelling of sustainable products

Incentive instruments

Can make sufficiency-oriented behaviours economically attractive:

- Existing taxes and charges - e.g. on electricity, mineral oil and sewage - or
- subsidies, e.g. for local public transport
- taxes on specific resource consumption

Appropriate public planning and infrastructure provision

Can make it considerably easier to act sufficiency-oriented, and in some cases even make it possible in the first place. They include, for example:

- pedestrian- and bike-friendly urban planning,
- public “using instead of owning” schemes or
- vegetarian and vegan options in public canteens.

Regulatory instruments

Can also be used for an (in some cases indirect) promotion of sufficiency through:

- product standards (Eco-design specifications setting absolute energy consumption limits for products or longer warranty periods [4])
- setting limits (speed limit);
- bans (driving in inner-city areas)
- “Right to repair”¹⁰

¹⁰ For example, see that the European Parliament wants to grant European Union consumers a “right to repair” (see <https://www.europarl.europa.eu/news/en/press-room/20201120IPR92118/parliament-wants-to-grant-eu-consumers-a-right-to-repair>, last assessed on 2021/03/12).



3 COMMUNICATION – HOW TO SPREAD THE WORD?

Issues of biodiversity and ecosystem services should be further integrated into communication with consumers to allow for informed consumption decisions and promote sustainable consumption. This is also in line with the fundamental principle of relevance of the Guidelines for Providing Product Sustainability Information, especially in regards to products/services with a high impact on biodiversity [79] (see Infobox 3). Moreover, the urgency of the issue as well as recommended actions for a transition towards more sustainable and biodiversity-friendly consumption should be communicated to decision-makers in policy, business and civil society.

To allow for a stocktake of feasible communication formats, a media analysis has been conducted. The analysis observed how international organisations report on the consumption of different products and its impacts on biodiversity and ecosystem services. Documents were only considered eligible for the analysis if they made a clear link between these two topics. Documents about sustainable consumption itself or about biodiversity and ecosystem services alone do not lie within the scope of the study. The focus of the selection strategy of the documents lies on

presenting the versatility of communication formats and narratives and thus ensuring a broad overview of the types of communication used. The analysis included around 100 documents and contained different communication formats such as toolkits, reports, press statements, information brochures and campaign websites. The scope of the analysis comprises international and English language documents and the study period spans the years 2017 to 2020 with some minor exceptions depending on the yield of the results per focal topic. The analysis puts a focus on different consumption fields in order to gain a deeper understanding of the communication of the respective products in connection with biodiversity. The topics include:

- Meat consumption,
- Tourism
- Information and communication technology,
- Furniture made of wood,
- Sand and gravel.

Different key questions aim to measure the content and scope of the communication of the effects of consumption on biodiversity and ecosystem services. The main questions ask for the type of target groups and the kind of recommendations in the communication documents. Furthermore, several criteria that were answered according to the content and visual features of the documents help estimate the narrative of the respective document [62]:

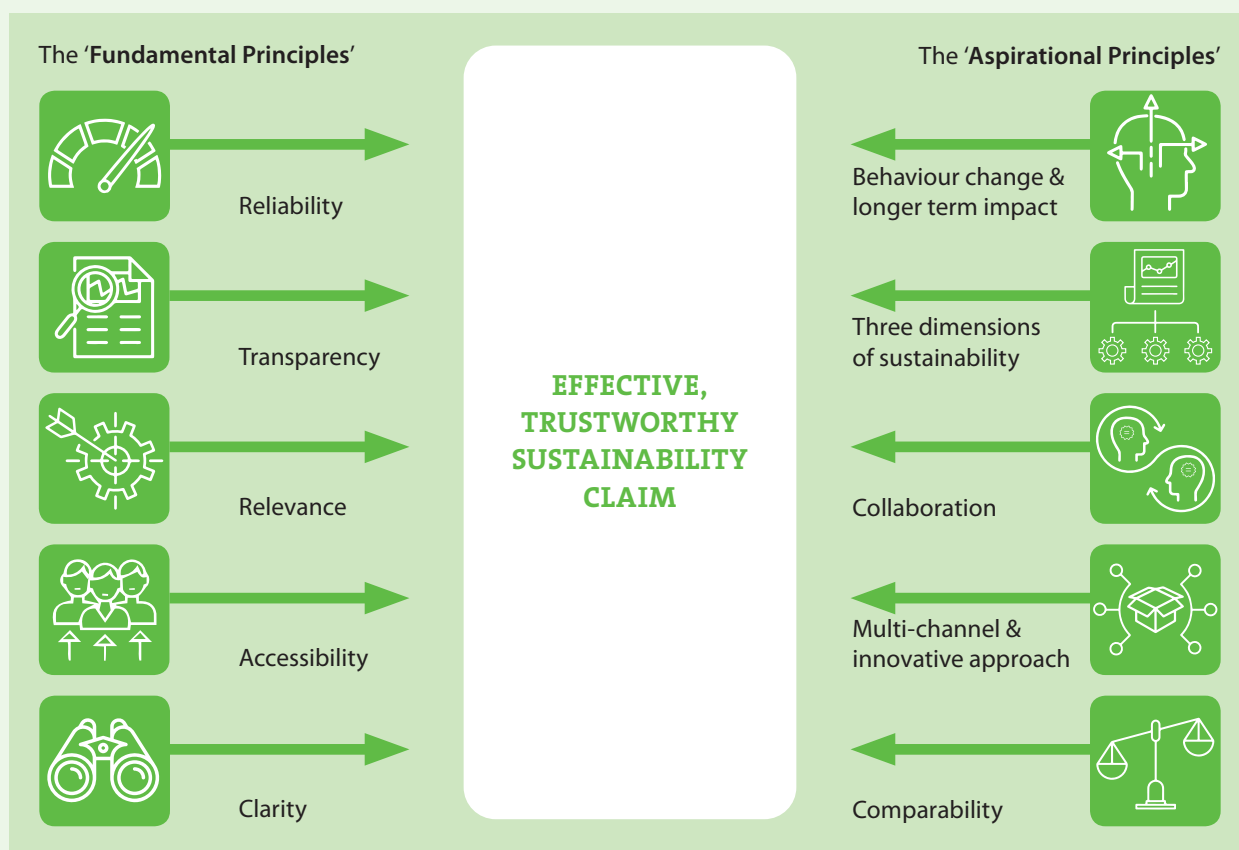
- Subject (“Does the human perspective prevail or is the focus on nature?”)
- Value (“Is the value of nature presented relative to human needs or does it have an intrinsic value in itself?”)
- Motivation (“Is the loss of biodiversity the focus or is it rather the attempt to safeguard biodiversity?”)
- Appeal (“Does the message appeal emotionally or logically?”)

INFOBOX 3: Guidelines for Providing Product Sustainability Information

In a process led by the UN Environment Programme and the International Trade Centre, the One Planet network Consumer Information Programme (CI-SCP) developed international ‘Guidelines for Providing Product Sustainability Information’ [79]. The Guidelines propose a set of five fundamental (‘must be met’) and five aspirational

(‘should be met’) principles to help information providers improve their product sustainability communication. The principles are valid for environmental, social and economic information, and thus can be used to identify or develop good practices of biodiversity communication.

FIGURE 3-1: Key principles of the Guidelines for Providing Product Sustainability Information



Source: UN Environment, International Trade Centre. 2017. Guidelines for Providing Product Sustainability Information, One Planet network Consumer Information Programme for Sustainable Consumption and Production (CI-SCP).

3.1 OVERVIEW ON KEY TOPICS

MEAT CONSUMPTION

Due to the strong negative impacts of the increasing consumption of animal products on biodiversity and ecosystem services, the sub-theme “Meat consumption” is an important topic in the analysis.

This topic is already well covered and there are numerous publications and campaigns by international organisations on the connection between meat consumption and biodiversity and ecosystem services. The assessed media documents frequently cover meat consumption and its effect on biodiversity and ecosystem services. Hereby, the extinction of species due to meat consumption is one prominent topic of several campaigns. The narrative style focuses on nature as a subject of communication, and pictures of animals serve as main graphic elements. Media convey communication messages through an emotional appeal that cites the impending loss of biodiversity as motivation to act (Figure 3-1). By this, communication about

meat consumption and biodiversity stands out from the other topics analysed within the study.

Many of the documents primarily address consumers, and as a recommendation for action, the top priority is to reduce one’s own meat consumption (see also Good practice for communication 1 in Annex II). Consumers are thus the main target group of the analysed communication activities. Communication formats cover a wide range of different media, such as explanatory videos, infographics, pledges, cookbooks, regular social media posts. Examples for campaigns that highlight the effect of meat consumption on biodiversity loss include the “Take Extinction Off Your Plate” campaign by the Center for Biological Diversity (see Good practice for communication 1 in Annex II), the “Meat-Free Monday” campaign or the Slow Food International initiative with its “Slow Meat” campaign.

FIGURE 3-2: Narratives: Using an emotional or logical appeal

Communication addressing the issue of meat consumption uses more emotional narratives than communication in the other assessed topics such as tourism, information and communication technology (ICT), furniture made of wood and sand and gravel.



Source: own elaboration

TOURISM

Biodiversity is an important basis for many aspects of tourism, and at the same time, tourism has an impact on biodiversity in tourist areas and beyond [34, 35].

In the media documents that were analysed concerning the consumption field of tourism, both nature and people serve as subject in the communication messages, in line with the logic that biodiversity and tourism are interdependent on each other. In these documents, communication appeals follow logical arguments, insofar as biodiversity is described as essential for tourism and therefore sustainable consumption patterns are seen as essential to prevent the degradation of ecosystems. Behind this is the utilitarian idea of assigning a value to biodiversity that needs to be preserved. Analysed media documents address a broad variety of stakeholders, and in the international context, studies or data sheets target primarily governments or tourism operators in terms of their technical expertise. Thus, training material and toolkits of

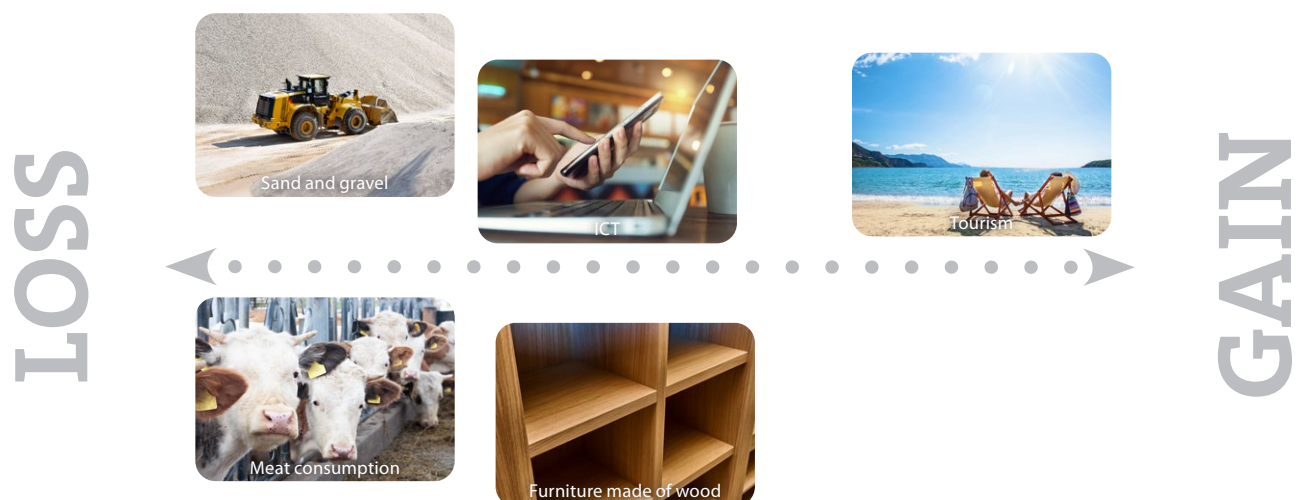
international organisations serve to empower tourism operators to sensitise local tourists to biodiversity and initiate conservation measures. In addition, there are documents and campaigns which address tourists directly and provide information on how to travel sustainably to protect local biodiversity (see also Good practice for communication 3 in Annex II).

As such, the documents in this consumption area predominantly use the narrative of gain as motivation, whereas media in other areas of consumption focus on the prevention of loss (Figure 3-2).

Recommendations for action within the documents that were analysed include addressing the value of conservation through tourism, incentivising such efforts, making nature part of the tourism product and investing in nature-based solutions for sustainable tourism.

FIGURE 3-3: Narratives: Using loss or gain as motivation for action

Communication addressing the consumption field tourism uses predominantly the narrative of gain as motivation for action (i.e. the attempt to safeguard biodiversity) than communication in the other assessed topics: meat consumption, tourism, information and communication technology, furniture made of wood and sand and gravel



Source: own elaboration

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

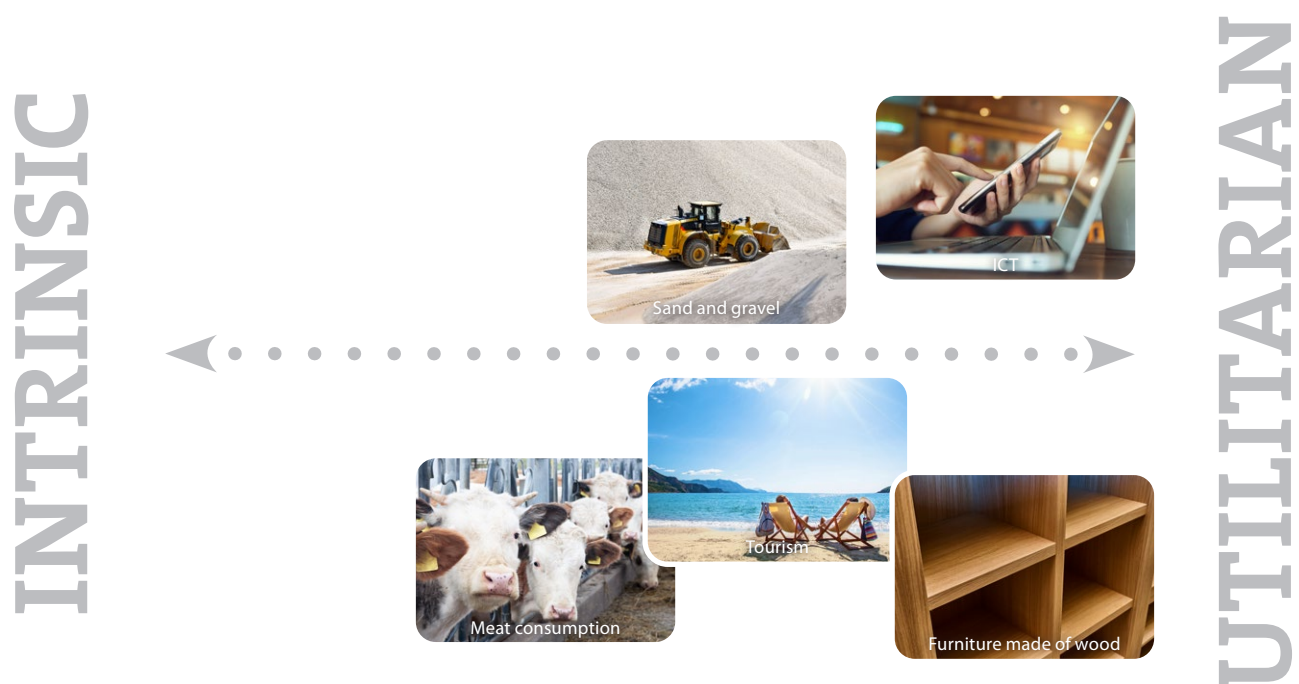
The extraction of mineral resources has increased significantly in recent decades and is increasingly causing environmental impacts that exceed planetary boundaries [42]. One of the drivers of this development is the ever-increasing demand for information and communication technology, which in their production processes causes the extraction of abiotic resources, for example the minerals cobalt, copper, gold or rare earth elements.

The analysed communication materials on the subject of information and communication technology focus primarily on the precarious working conditions, human rights violations and corruption in the supply chain. The topic of biodiversity and ecosystem services is rarely at

the centre of communication but tends to be treated as a marginal issue along with other environmental topics such as greenhouse gas emissions. Communication formats contain many text elements and use a logically appealing language. Most narratives portray utilitarian values, which is similar to the other consumption fields analysed but even more pronounced in the case of ICT (see Figure 3-3). Recommendations to limit the negative environmental impact primarily address companies and governments to enforce stricter regulations. Accordingly, recommendations for action for consumers that address the topic from the perspective of biodiversity and ecosystem services are less present, which creates an interesting field for the future development of new communication materials.

FIGURE 3-4: Narratives: Displaying intrinsic or utilitarian values

Communication addressing the different consumption fields predominantly employs utilitarian values as narrative, as such the value of nature is rather portrayed relative to human needs instead of having an intrinsic value in itself.



Source: own elaboration

FURNITURE MADE OF WOOD

Furniture which uses wood, a natural resource, as the main component, has so far only been a marginal topic in the debate on the influence of consumer activities on biodiversity. Yet, forests are home to the largest part of the earth's terrestrial biodiversity. Even if most deforestation is due to the development of new agricultural land, the purchase of furniture and the associated wood consumption has a direct impact on the ecological balance of forests [26].

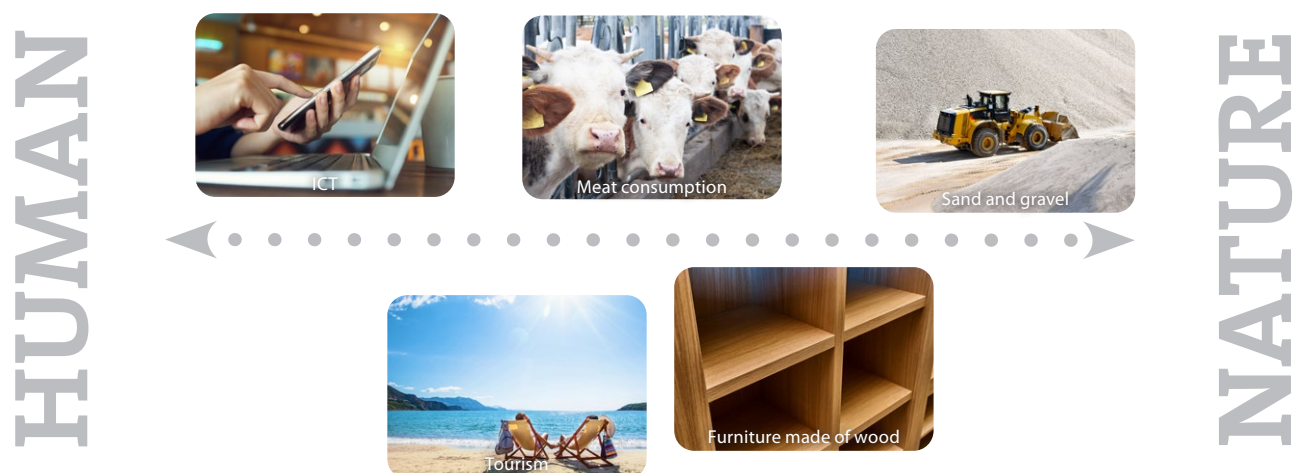
Overall, the media documents analysed mainly focus on the wider context of the ecological effects of excessive wood consumption on the environment and climate, and the insufficient legal regulations in this area. Documents mention impacts on biodiversity as partial aspects of the ecological consequences, but they are not analysed in detail. The main target groups are governments, which should improve their state regulations on responsible forest management, and companies, which should commit themselves voluntarily to sustainable forest management by purchasing certified timber and by better controlling their suppliers. The impact of individual consumption using wood as a raw material in furniture and other possible

impacts on biodiversity (for example, when processing textiles in furniture) are less emphasised, but do appear.

The communication formats consist almost exclusively of text elements on websites, e.g. on projects and especially labels, (sustainability) reports, some of which are scientific in nature, and on a few fact sheets with background information for interested consumers. As companies and governments are the main target groups, the communication messages follow a logical appeal and demonstrate the advantages of sustainable forest management. In addition to these documents, more information about the effects on biodiversity and ecosystem services could be made available to consumers. The narrative style focuses on human beings and nature as subjects in a relatively balanced way, often depicting the utilitarian dependence of humans on a healthy forest, and thus the need to preserve biodiversity (see Figure 3-4). This approach is similar to media on the topics of meat consumption and tourism, in which both human and nature are also equally employed as subject of the communication.

FIGURE 3-5: Narratives: Human or nature as subject of the communication

Within the different consumption fields communication measures vary in terms of perspectives. Some topics, such as ICT as well as tourism rather employ the human perspective, in other topics, e.g. sand and gravel the perspective of nature as subject of the communication prevails.



Source: own elaboration

SAND AND GRAVEL

After water, sand and gravel are the most important resources in terms of international mining and trade volume [48, 80]. Despite its great relevance, the topic of sand and gravel has received little attention at international level. It is only in recent years that the topic has increasingly moved onto the agenda. Two alarming reports were published in 2018 and 2019 that highlight the environmental and social scope of the problem of sand extraction [48, 80]. In 2014, the Indian Avaaz Foundation initiated one of the few campaigns on the environmental and social consequences of sand mining, called “Don’t bury the issue of sand mining”. The website “Sand stories” collects relevant documents, newspaper articles, and is a central knowledge hub for the topic of sand and gravel (see also Good practice for communication 2 in Annex II). Overall, the analysed documents focus on the effects of sand mining on ecological and social systems, the high crime rate in this sector

and the lack of political regulation. They mention the impacts on biodiversity as partial aspects of the ecological consequences, but do not analyse them in detail.

Due to the use of sand as a building material, media documents mainly address the target groups of companies, political decision-makers and civil society to create an awareness of the ecological and social problems of sand and gravel extraction. Sand in comparison to meat or furniture is not a typical consumer product, thus individual consumption behaviour is not a main topic in the assessed documents. Recommendations for action for sustainable consumption include the reduction of building development, using recycled and alternative materials to sand (e.g. wood instead of concrete) in the construction sector, reducing impacts by implementing existing standards and best practices.



3.2 WHAT CAN WE CONCLUDE?

The aim of this study was to gain an understanding on how organisations communicate about the effects of consumption on biodiversity and ecosystem services. Further research could take a next step and elaborate on the question of how consumption behaviour has changed as a result of the communication measures. From this, appropriate communication instruments could be derived.

The target groups addressed for communication vary depending on the topic analysed. For example, in the case of sand and gravel, the analysed documents address companies, governments and civil society more frequently. In the case of ICT, although some campaigns and documents about information and communication technology target consumers, these focus less on biodiversity than on the social problems associated with the production of ICT. Communication documents about meat consumption frequently address consumers and give recommendations for action, for example tips on how to reduce meat consumption to protect biodiversity. In the case of tourism, a range of stakeholders is addressed as target group, including consumers as well as tourism operators. Communication about furniture and the use of wood, on the other hand, often addresses consumers in connection with labels. Evidently, the presented findings on target groups depend on the research design and the focus on the concept of “consumption”, rather than production. As such this was a deliberate choice and does not invalidate the findings but is worth mentioning at this point.

Several findings in terms of narratives employed can be drawn from the documents that have been analysed. Communication addressing the different consumption fields predominantly employs utilitarian values as narrative, as such the value of nature is rather portrayed relative to human needs instead of having an intrinsic value in itself. Within the different consumption fields, communication measures vary in terms of perspectives. Some consumption fields, such as ICT as well as tourism rather employ the human perspective, in other consumption fields, e.g. sand and gravel, the perspective of nature as subject of the communication prevails. Emotional narratives are most frequently used when addressing meat consumption in comparison to the other assessed consumption fields.

Communication addressing the consumption field tourism predominantly uses the narrative of gain as motivation for action (i.e. the attempt to safeguard biodiversity) than communication in the other assessed consumption fields.

The intensive use of natural resources is one main driver of the decline of global biodiversity – the media documents assessed regularly cite this connection and adapt it according to the focal topics. Recent studies agree that the anthropogenic influence on the loss of biodiversity and ecosystem services is considerable and that consumption patterns directly influence this negative trend [40, 89, 92]. Recommendations for action therefore point to the need for transformative changes in the production and consumption of energy, food, feed, fibre and water, and for a reduction in global consumption levels as well as, for example, increased waste recycling. Interestingly, the dependence of human well-being on healthy and living ecosystems was emphasised more clearly in 2020 and 2019 than in previous years. Especially in the wake of the COVID-19 pandemic, stakeholders have increased their efforts to highlight the links between consumption, biodiversity and human health. Communication means mainly used rational logic and put the emphasis on the utilitarian value of nature and its provision of ecosystem services (see also Good practice for communication 4 in Annex II). Communication about the well-being of people in relation to the ecological balance reflects the attempt of numerous organisations to use a more integrative approach to the interaction between man and nature.



4 COOPERATION – WHO IS ACTIVE AND WHERE?

In order to achieve actual structural changes in terms of sustainable consumption which involves biodiversity, the available information should be translated into efforts to implement the different recommendations for action. Cooperation between different types of actors is conducive to achieve these goals. With this aim in view, an analysis and mapping of 20 relevant cooperation and networking activities, as well as of over 380 organisations active in the field of biodiversity, ecosystem services and consumption has been conducted. Through the existing connections between individual actors (e.g. governmental agencies, research institutions, NGOs, companies), international networks and initiatives, it can be shown which of them are actively engaged at the international level. Visualising these links also allows to identify potential mediators and multipliers in the context of sustainable consumption and biodiversity as well as to draw conclusions regarding the need for further cooperation.

This section presents an overview of selected international networks, cooperations and initiatives working on the topic of biodiversity and sustainable consumption from two perspectives: First in terms of the international

engagement to raise awareness and tackle the impacts on biodiversity and ecosystem services loss (**Acting**). Second, from the perspective of the actors and institutions who are currently visible in their efforts to communicate about the links between biodiversity and sustainable consumption in selected consumption fields (**Communicating**).

Among the selected cooperation examples from the first perspective, there is a clear trend in activities and work relating directly to biodiversity and ecosystems services protection. From the scientific sector, the activities mainly focus on conducting research and developing evaluation frameworks which contribute to making nature's value visible and exploring the links between the production and consumption systems. These types of cooperation are often aimed at mainstreaming their results into decision-making processes.

Similar activities are conducted by cooperations from the intergovernmental sector which also focus on available scientific information and emphasise the need for action in the topic of sustainable consumption for the sake of biodiversity (see Good practice for cooperation 1 in Annex III).

In some cases, these initiatives are engaged in implementing activities in selected regions which can later contribute to advancing the topic by presenting case studies and relevant information for interested stakeholders.

The business and sectoral initiatives and networks within this group address the issue of biodiversity rather from the production side, by initiating activities and efforts that serve to reduce environmental impacts along their value chains. Cooperations act as a platform for dialogue between different stakeholders, enabling them to discuss ways of integrating biodiversity considerations into current business activities. Most importantly, these business networks serve to showcase best practice solutions which can be translated into a change of business practices and enable the global economy to incorporate biodiversity

protection. Despite all of this, the topic of sustainable consumption is not directly communicated as part of business and biodiversity cooperations. Their work focuses mostly on activities and outreach within the business sector while none of their efforts are aimed at raising awareness of their consumers about these matters. Similarly, the work of the sectoral networks covering the selected consumer sectors of food & nutrition, tourism & leisure, construction & housing shows that the largest part of the visible commitment to combating biodiversity loss is still focused on the production part of the entire life cycle of products. The activities of this cooperation range from the development of industry guidelines to improve biodiversity performance to the promotion of certification and labels to connect producers and consumers (see Good practice for cooperation 3 in Annex III).

FIGURE 4-1: Examples of biodiversity cooperation in different sectors and consumption areas



Source: own elaboration

Although many of these business and sectoral networks are well connected with each other by sharing common members, there are consumption fields whose efforts on addressing the topic of biodiversity loss are still isolated from the general international cooperation landscape. This is the case for the network which has been identified as working on issues related to information and communication technologies. Despite focusing on the environmental impacts of abiotic resources, the latter seems to be disconnected from other current initiatives in addressing biodiversity loss as part of production and consumption activities.

The great variety of actors involved and actively participating in the networks and initiatives depicted in Figure 4-1 indicate the broad level in which these efforts are being conducted. This presumably is the result of the mainstreaming of the issue of biodiversity loss and the international awareness and sense of urgency for action which has been led by organisations such as the Secretariat of the Convention on Biological Diversity (CBD), Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), the United Nations Environmental Programme (UNEP) and the International Union for Conservation of Nature (IUCN) during the last decade.

Based on common connections to various of these exemplary cooperation initiatives, some actors and networks have been identified to be at the centre of several parallel efforts; these can be important connecting points, as well as suitable actors to be involved in further activities (e.g. as experts in specific contexts or because of their potential to reach other actors). The Business for Nature (see Good practice for cooperation 1 in Annex III) and the EU Business @Biodiversity initiatives, for example, include multiple members which also share connections with other members of the networks which have been selected with respect to business and sectoral engagement for biodiversity. By sharing most of their connections with other networks and actors, these two initiatives occupy a central position in this context.

While the general engagement of organisations such as the World Wide Fund For Nature (WWF) and the World Business Council for Sustainable Development (WBCSD) in this context is the most visible, there are other relevant actors who are visible in relation to specific consumption fields. This holds true for the Food and Agriculture Organization of the United Nations (FAO), the CBD secretariat and the Global Nature Fund when it comes to initiatives involving food & nutrition, or FAO and WWF in relation to wood and timber, as well as the International Union for

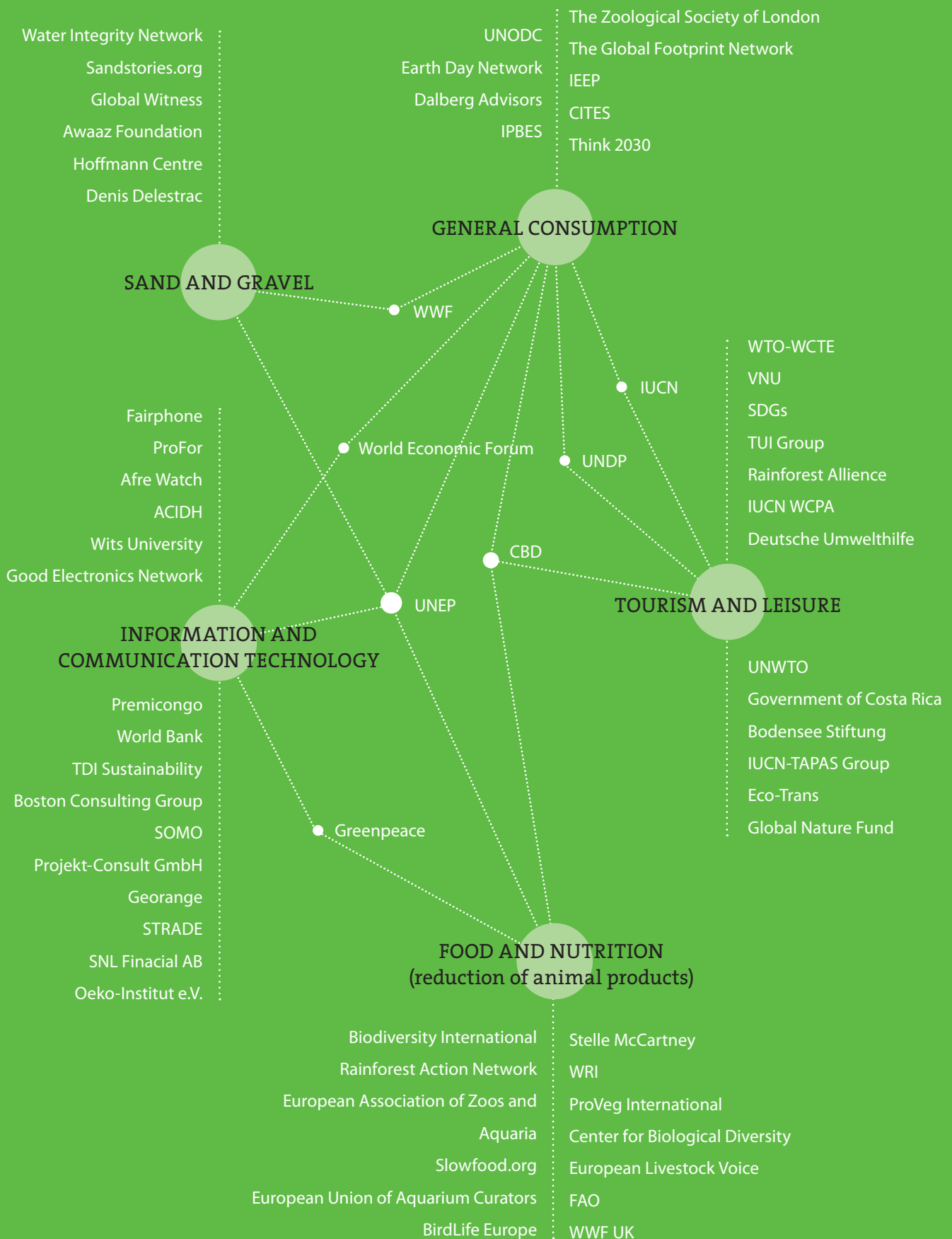
Conservation of Nature (IUCN) which connects the cement & aggregates sector with general business & biodiversity initiatives. Meanwhile, actors such as the German Ministry of Environment and Nuclear Safety (BMU), the World Resources Institute (WRI) and the UNEP World Conservation Monitoring Centre (UNEP-WCMC) have been identified as relevant due to their connections to both the scientific and technical sector initiatives (such as IPBES and TEEB, the Economics of Ecosystems and Biodiversity), and the general business and biodiversity engagement networks.

Based on the actors involved in communication campaigns which had been identified during the media analysis, results from the „communicating“ perspective are also presented (Figure 4-2). This network provides an overview of the actors which are currently communicating in relevant topics of the selected consumption areas (see chapter 2.2).

The analysis conducted through the application of Social Network Analysis (SNA) is a method for the visual representation of social relationships, as well as for locating and grouping actors. In a social network, all actors are indirectly connected to all others via relational paths and can therefore influence each other. The position of an actor can be used to define its role in terms of information dissemination within a particular thematic network. Individual actors with information dissemination roles are important for structuring the agenda setting process and positioning new topics in communication for desired sustainability transitions [53].

This network perspective reveals that, in terms of communicating the impacts of selected consumption areas on biodiversity and ecosystem services as well as formulating recommendations for the end consumer, mainly NGOs and intergovernmental actors are actively engaged. Organisations placed in the middle of the network are part of parallel communication on various relevant topics involving different consumption areas. Consequently, those key actors, in terms of their visibility regarding communication for sustainable consumption and biodiversity, are UNEP and the CBD Secretariat in the first place and secondly WWF, UNDP, IUCN, Greenpeace and the World Economic Forum at the international level. In advancing the topic of sustainable consumption for biodiversity and ecosystem services, the dissemination of further communication approaches should consider these key actors.

FIGURE 4-2: Network of visible actors in communication on biodiversity in relation to selected consumption areas



Source: own elaboration



OUTLOOK

Since the beginning of this millennium, the international social debate on sustainable consumption has been – and in part still is – strongly influenced by the topic of climate protection. This topic along with energy efficiency has so far played a dominant role in communicating consumer recommendations. Keeping in mind the current state of the planetary boundaries besides climate change, it is very important to also address other aspects of sustainable consumption such as the protection of biodiversity and the preservation of ecosystem services in communication and information efforts.

INFORMATION NEEDS

The current state of information, communication and cooperation on the topic of sustainable consumption for biodiversity and ecosystem services already provides a rich but extendible context. This document describes the status quo of research on the impacts of consumption on biodiversity and ecosystem services and recommended actions, with a focus on the consumption areas food & nutrition, construction & housing (with emphasis on the raw materials wood and sand & gravel) and tourism & leisure. Regarding other consumption areas, like mobility or ICT, scientific information on the topic of sustainable consump-

tion for biodiversity and ecosystem services is rare. Information is only available on the impacts of individual value chains and raw materials. Therefore, these consumption areas were not the focus of the status quo analysis. In further research for sustainable consumption for biodiversity and ecosystem services, the results of these investigations have to be linked to specific consumer goods and consumption patterns in these consumption areas.

Regarding the specific instrument of sustainability labelling as one instrument to promote sustainable consumption, it can be stated that the aspect of biodiversity and ecosystem services is partly addressed. However, its impacts should be assessed individually and according to different geographical regions. With the help of labels that implicitly or explicitly incorporate criteria for the protection of biodiversity and the conservation of ecosystem services, private consumers and public procurement can already make a contribution in this field when taking their consumption decisions. However, there is a need to further extend those attributes into sustainability labelling or to supplement existing criteria by supporting and strengthening existing recognised standards. Consideration should also be given to how biodiversity protection and the protection of ecosystem services can be integrated more

closely into existing advisory instruments for climate and resource protection.

In general, sufficiency-oriented lifestyles (e.g. the use of public transport, bicycles and car sharing instead of owning a car) contribute to the protection of biodiversity and the conservation of ecosystem services, as well as to reducing many other relevant environmental problems (climate change, pollution etc.). In this regard, a social transformation towards sustainable lifestyles and economies decoupled from growth will be essential to achieve ambitious goals for the protection of biodiversity and ecosystem services. However, communicating sufficiency and transformative environmental policy aimed at sufficiency are very difficult issues to address. Sustainability transformation involves a multi-faceted change in societal routines and structures, including the integration of social and technological aspects. There is a great need for research in this area in the development of sufficiency policies, which are based on different instruments that can influence the purchasing or usage behaviour of citizens.

COMMUNICATION NEEDS

A media analysis was carried out to identify typical ways and examples of good practice of how to communicate biodiversity and ecosystem services in relation to consumption. It was found that such communication in the topics of meat consumption and tourism is closely related to the end product or service and therefore is closely linked to the end consumer. This is rarely the case for the other topics that have been analysed. In the case of furniture made from wood, new communication approaches that link the end product more clearly to potential negative impacts on biodiversity and ecosystem services should be further explored and could help consumers in making more sustainable consumption choices. For ICT products, which have complex value chains, communication on biodiversity impacts mainly relates to particular resources at the bottom of the value chain and not to the end product itself. Additionally, the communication of biodiversity impacts of ICT products is often overlapped by communication on social problems (corruption, working conditions etc.). Since interested consumers have been sensitised to negative social impacts of resource extraction for ICT products, the additional loss of biodiversity and ecosystem services at the local level could be connected to the loss of local livelihoods and negative impacts on the communities close to the resource extraction sites. This narrative could also be used for the still underestimated issue of sand and gravel consumption.

In general, communication needs to focus more on ecosystem services instead of solely on biodiversity. Particularly when addressing businesses as the target group, this can help clarify that their business models are strongly dependent on functioning ecosystem services and that upcoming generations will regard sustainability as an imperative for their purchasing decisions. In recent years, there has been a shift in communication efforts through campaigns to safeguard pollinators or the documented relation between pandemics and impaired ecosystems. As a consequence, this could be an entry point to broaden the discussion on sustainable consumption.

COOPERATION NEEDS

Most of the identified business cooperation networks currently working on the topic of biodiversity approach the issue of biodiversity from the production end instead of the consumption end of their value chains. These networks promote biodiversity protection by sharing experiences and good practice examples of how individual companies or sectors try to reduce their impacts as well as include biodiversity considerations in the environmental impact assessment of their business activities.

Looking at these “inward” (i.e. in terms of raw materials, supply chain and production processes) approaches to protecting biodiversity, the question arises as to whether reducing biodiversity risks on the production side is enough to reduce threats to biodiversity and ecosystem services. As steering changes in sustainable consumption from the consumer end are also an important part of the solution, it is necessary that cooperation activities to protect biodiversity expand beyond the production level and also contribute to educate consumers about efficiency and sufficiency. For this purpose, further cooperation between stakeholders from NGOs, scientific and civil society sectors could contribute to complement current cooperation and communication activities by adding other perspectives for sustainable consumption.

ANNEX I.

GOOD PRACTICE EXAMPLES FOR INFORMATION

GOOD PRACTICE FOR INFORMATION 1:

Feasibility study on biodiversity criteria in Eco-labelling and public procurement

The project “Biodiversity criteria in procurement and in the construction industry” - feasibility study & action plans conducted on behalf of the Federal Agency for Nature Conservation (BfN) and completed at the beginning of 2018 with funding from the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) is a good example of identifying the needs to further integrate biodiversity criteria in eco-labelling and public procurement.

This project examined how biodiversity protection can be taken into account in federal procurement and in the construction industry. Based on the results of a hot spot analysis, the researchers systematically investigated the extent to which the protection of biodiversity is already addressed in existing sustainability standards for selected product groups and which gaps exist in eco-labelling. In addition, the cross-sectoral environmental management systems ISO 14001:2015 and EMAS, the reporting certifications GRI (Global Reporting Initiative) and the UN Global Compact Guideline, as well as the ISO standard 26000:2010 were examined according to their requirements for the protection of biodiversity. Gaps were identified and concrete action plans were drawn up for the product groups food/catering, paper

products, textiles, natural stones and gravel/sand to take account of biodiversity in the federal procurement and to further develop existing standards. Although the focus of the study was on Germany, the results can be transferred to other nations (Teufel et al. unpublished report; Teufel et al. unpublished final report).

In a follow-up project, concepts for the consideration of biodiversity in federal public tenders for paper products and printed matter as well as food and meals (in canteens and catering) have been developed on the basis of existing EU law. Recommendations have been developed for binding requirements to be complied with, e.g. on the use of organic food, the use of ingredients of animal origin, measures to reduce food waste or minimum requirements for printed products. The results of this follow-up project are also transferable [75].

Source: Teufel, J.; Hermann, A.; Müller, R. (2020): Biodiversity criteria in procurement II: Further development and practical implementation of biodiversity criteria in selected product groups of federal public procurement. BMU (ed.), 2020. Online available (only in German) at: https://www.bmu.de/fileadmin/Daten_BMU/Pool/Forschungsdatenbank/fkz_3518_81_1100_biodiversitaetskriterien_beschaffung_ii_bf.pdf.

GOOD PRACTICE FOR INFORMATION 2:

How the transformation towards meals and menus with fewer animal products in German community catering can succeed?

Lopez et al. [54] examined how the transformation towards meals and menus with fewer animal products in German community catering (institutional foodservices in schools, day-care centres, hospitals and government buildings) can succeed as part of the transformation to more sustainable food systems. Considering the potential of this sector to influence the food consumption through individual diets and the development of eating habits, this study determined which measures can be implemented to promote the reduction of animal products in community catering. By applying a governance model designed for assessing socio-ecological transformation processes, the researchers identified a bundle of intervention approaches suitable to the status quo of German community catering such as:

- Existing societal trends (such as health, animal welfare and regionalism) should be taken up by policy makers and used to set targets. Political measures aimed at the reduction of the consumption of animal products should be accompanied by social marketing campaigns that use storytelling approaches. Prominent authentic role models, for example athletes who have also changed their diet in terms of performance, should be involved in these campaigns.
- Relevant actors, so-called change agents, must be networked and the practical knowledge of best-practice actors must be made accessible. New alliances should be created for sharing resources and work towards common interests (health insurance companies, occupational health managers work councils or parent advisory boards and education state ministries). Of great relevance is the commitment of the federal

ministries to support the transformation and drive it forward with the market power of the public sector.

- Exnovation, i.e. the phasing out of established non-sustainable products, technologies and practices, should be shaped [38, 39]. This could also include a set of measures that lead to price increases for food of animal origin while ensuring the access of low-income households to sustainably produced animal products.
- As the necessary practical knowledge for the preparation of dishes low in animal products is not widely available in the catering sector, the training contents for catering professions in theory and practice should be revised and adjusted. This would contribute to this transformation by ensuring that catering services can offer tasty and creative meals and eventually develop menu lines for different target groups which consider the prevailing taste preferences.

Even though the results obtained are based on an analysis of the situation in Germany, the research approach can be applied globally and some of the results are transferable to other industrialised countries. Above all, this good practice example shows that a careful analysis of the targeted food system is needed in order to develop effective measures aimed at changing food consumption habits.

Source: Lopez, V.; Teufel, J.; Gensch, C.-O. (2020): How a Transformation towards Sustainable Community Catering Can Succeed. In: Sustainability 12 (1), p. 101. DOI: 10.3390/su12010101.

GOOD PRACTICE FOR INFORMATION 3: Information for food waste reduction

The **Waste and Resources Action Programme** (which operates as WRAP) is a registered UK Charity. WRAP has launched several effective campaigns against food waste in the UK, e.g. "Love Food Hate Waste" or "Guardians of Grub". WRAP is working with organisations in the food and drink industry to create economic and environmental value from reducing food waste and greenhouse gas emissions as well as tackling issues around water scarcity across the supply chain. They enable organisations to unlock the economic benefits of waste reduction and resource efficiency in the food and drink supply chain.

The German Federal Ministry of Food and Agriculture (BMEL) has launched the campaign "**Too good for the bin**" ("Zu gut für die Tonne") in 2012. Their website contains background information to raise awareness of the topic, as well as tips on shopping planning, food storage, preservation, whole-animal recycling and recipes for recycling of leftovers (including a Best Leftovers app and Brochure "[10 golden rules to prevent food waste](#)"). Every year, the federal prize "Too good for the bin!" is awarded for outstanding projects that help to avoid food waste.

Also in 2012, the non-profit organisation **United Against Waste e. V.** launched an initiative for the food service market to make cooking personnel and the industry aware that the fight against food waste is feasible and also saves money. The association now has more than 100 members and provides practical solutions for out-of-home catering that can also be transferred to other industrialised countries. The initiators have put together

a concrete service package in Germany. The information material helps cooks to make the topic of food waste in everyday kitchen life more tangible for all those involved. At the same time, active public relations work ensures that the challenge of food waste continues to move into the public focus. Another source of concrete measures for the avoidance of food waste in the food industry is [the internet platform on avoiding food waste](#). These approaches are theoretically transferable to other industrialised countries.

At the European level, the **Waste Framework Directive** has been revised. The revised EU waste legislation adopted on 30 May 2018 requires Member States to take measures to reduce food waste at each stage of the food supply chain, to monitor food waste and to report on progress made. Food waste is defined and recorded as such only after harvesting and after slaughter. [11].

In the meantime, the BMEL has published the "National Strategy for the Reduction of Food Waste" for Germany. In accordance with the UN's sustainability target, this strategy aims to halve food waste by 2030 [11]. The implementation process is documented on the website "[Active together against food waste](#)". It also provides an overview of international activities.

Other Resources:

["Too good for the bin"](#)

[United Against Waste e. V.](#)

[WRAP](#)

["Too Good to Go"](#)

The app is available in several countries.

ANNEX II.

GOOD PRACTICE EXAMPLES FOR COMMUNICATION

GOOD PRACTICE FOR COMMUNICATION 1:

Take Extinction Off Your Plate

Description: The campaign “Take Extinction Off Your Plate” aims at consumers to reduce their consumption of animal products. It highlights the impact of livestock production as one of the main threats to wildlife and the environment and thereby addresses the loss of nature and connects it with a simple solution: halve your meat and dairy consumption. Informing on the negative consequences of intensive animal husbandry and food loss ranges from emotional (horror movie trailer) to objective (scientific studies, news). The campaign also provides solutions on how to gear towards more plant-based diets by offering vegetarian/vegan recipes. It further implies a nudge by asking visitors of the campaign website to issue a pledge on reduced meat and dairy consumption and share the pledge with their peers.

Highlights: The campaign uses a multi-channel approach in terms of media (various formats and communication occasions) and sincerity (from humorous to serious). It is therefore suitable to a broad (US-based) audience. It contains several sub-campaigns that can be launched at certain occasions such as Halloween.

Organisation: Center for Biological Diversity

Source: <https://www.takeextinctionoffyourplate.com/>

Geographic Area: USA (mainly)

Date: 2014 (start)

Media Format(s):

Video, Guides & Recipes (with meat free alternatives), Knowledge base (scientific studies, news coverage, edited background information, illustrations/ graphics), Pledge for halving meat consumption

Picture Credit: © Center for Biological Diversity

FIGURE 5-1: Take Extinction Off Your Plate – campaign poster



FIGURE 5-2: Take Extinction Off Your Plate – video screenshot



GOOD PRACTICE FOR COMMUNICATION 2: SandStories

Description: The website SandStories serves as a central knowledge hub for the topic of sand and gravel extraction. As such, it collects relevant scientific literature, newspaper articles, blog posts, and interviews that inform the broad public. The website features a video, explaining the impact of sand extraction on the environment and on biodiversity, as well as on the livelihood of the local population. SandStories informs about the problem of sand extraction and hereby addresses a topic that tends to be forgotten in environmental communication. The portal offers best-practice examples and offers possible solutions to tackle the sand crisis.

Highlights: The website collects and displays all different kinds of stories about sand, from scientific literature to best-practice examples of projects. With its social media channels, SandStories also addresses a broad audience and tries to raise awareness about sand.

Organisation: Kiran Pereira (individual)

Source: <http://www.sandstories.org/>

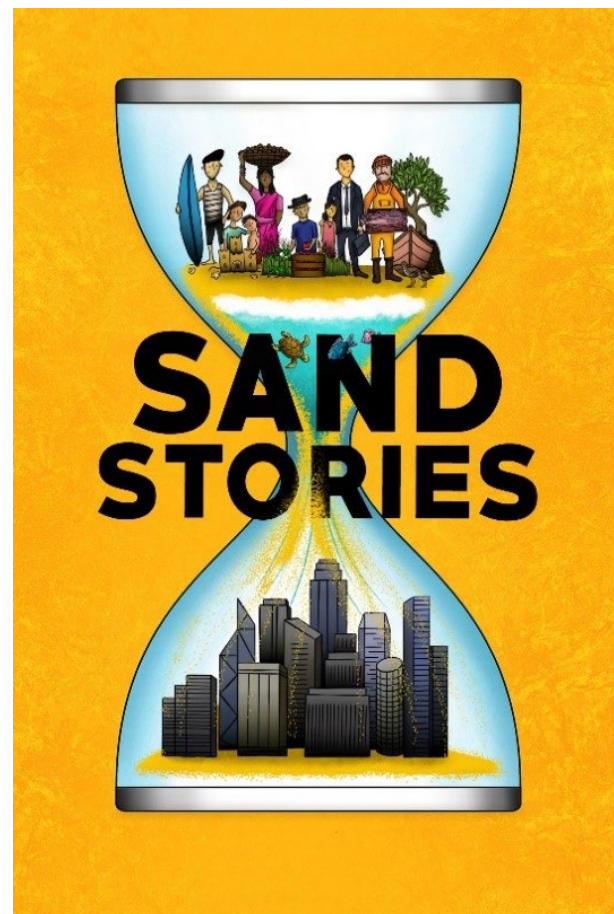
Geographic Area: Global

Date: 2016 (start)

Media Format(s):

Newsletter; Videos; Social media channels, e.g. twitter, Facebook, Instagram; Blog featuring stories, interviews and podcasts, best-practice examples of legislations and companies' initiatives

FIGURE 5-3: SandStories – book cover



Picture Credit: © Kiran Pereira

GOOD PRACTICE FOR COMMUNICATION 3: TUI Group Souvenir Guide

Description: The TUI Group Souvenir Guide supports travellers in their purchase decisions on souvenirs. On the one hand, the guidance appeals to legal issues and prevents travellers from violation of the Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and very negative experiences at the customs. On the other hand, it addresses moral issues connected to being responsible for causing loss of biological diversity in general and at the holiday destination in particular. Instead, biodiversity-friendlier alternatives are promoted that also support the local economy (such as local plant-based cosmetics or other artisan products).

Highlights: The guide provides concise and comprehensive information on why responsible souvenir shopping matters to preserving biodiversity. While the guide has a global scope, country specific guidance is available for selected destinations. For those countries, a solution-oriented approach is taken by recommending suitable alternatives to banned souvenirs.

Organisation: TUI Group; Partner: Global Nature Fund

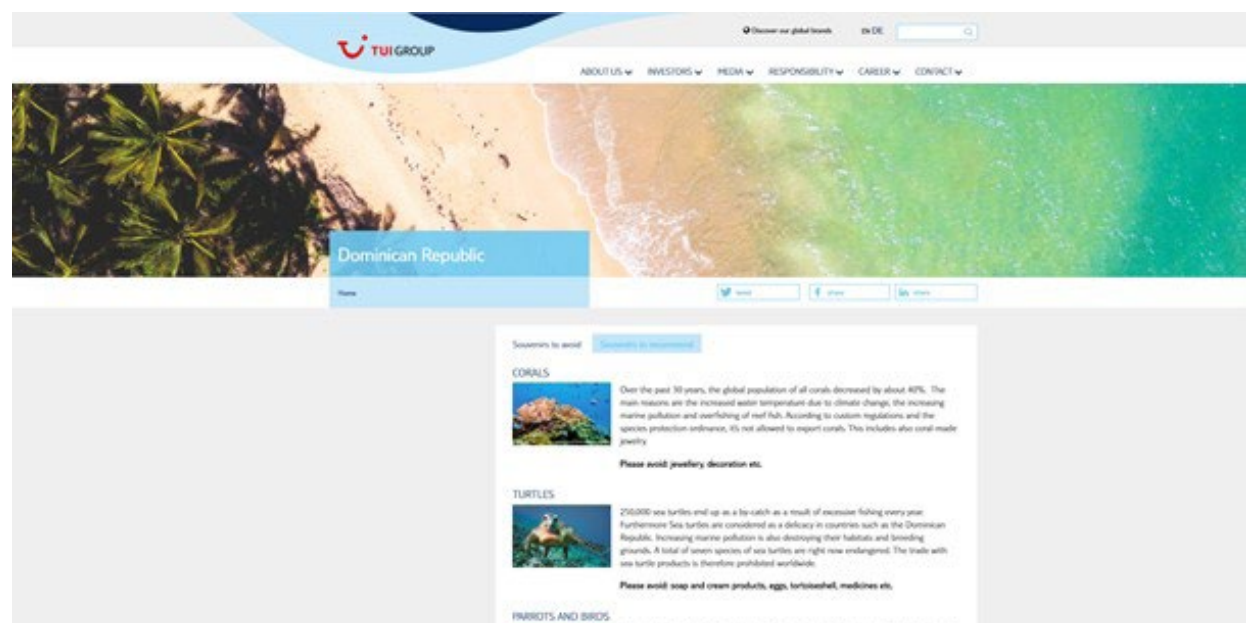
Source: <https://www.tuigroup.com/en-en/souvenir-guide/>

Geographic Area: global

Date: 2019 (start)

Media Format(s): Website

FIGURE 5-4: TUI Group Souvenir Guide – website



GOOD PRACTICE FOR COMMUNICATION 4:

Our Planet: Our Business

Description: The film “Our Planet: Our Business” builds on the highly successful Netflix series “Our Planet” and explicitly addresses business leaders. It highlights the importance of functioning ecosystem services to business, with the economic value of nature’s services more than doubling global GDP. While making clear that in the anthropocene mankind has become the driving force on global change, the film postulates that this also implies the ability to fix negative impacts that have been caused by unsustainable production and consumption patterns. It also argues that growing consumer segments expect businesses to become sustainable with a low impact on biodiversity and ecosystem services.

Highlights: The film provides a comprehensive overview on the inter-relation of functioning ecosystem services and successful businesses. It features high level personnel from various sectors, including Johan Rockström (PIK), Christiana Figueres (UNFCCC), Hindou Oumarou Ibrahim (Femmes Peuples Autochtones du Tchad/AFPAT), Anand Mahindra (Mahindra Group) and Sir David Attenborough. Business leaders, used to being briefed on the basis of reports, are approached in a visually appealing and entertaining way.

Organisation: WWF; Partner: Netflix, Silverback Films

Source: <https://www.ourplanet.com/en/video/our-planet-our-business/>

Geographic Area: global

Date: 2019

Media Format(s):

Film (approx. 40 minutes)

FIGURE 5-5: Our Planet: Our Business



Picture Credit: © Sophie Lanfear / Silverback / Netflix

GOOD PRACTICE FOR COMMUNICATION 5:

Zero Means Zero

Description: In October 2019, the Round Table on Responsible Soy (RTRS) launched a campaign which focuses on informing audiences about valuable ways to drive impact on the ground in the soy sector. This campaign focused on delivering the “Zero means Zero” messages which has been defined by RTRS. They chose a positive “call to action”; stressing that there is an issue but that tools are available as solutions to tackle it. “It is possible to meet the growing global demand for soy and at the same time preserving native vegetation and protecting human rights while improving the conditions for workers.”

Highlights: The campaign focuses on the solutions and on positive messages, with the main objective of giving straightforward and clear guidance on the existing possibilities and impacts when choosing RTRS certification. Thereby, they show that it is possible to change the way we grow and consume our food. Across the world,

across sectors and across the entire supply chain, the challenge is great, yet many tools exist to mitigate the negative impacts of soy production and benefit environment and people at the same time. RTRS offers not the silver bullet but a concrete tool ensuring the transparent implementation of this objective.

Organisation: Round Table on Responsible Soy Association (RTRS) Partner: Communication partner Creative Concern (UK)

Source: <https://responsiblesoy.org/beyond-deforestation?lang=en>

Geographic Area: Global

Date: October 2019 - February 2020

Media Format(s): Social media channels e.g. LinkedIn and Twitter; Website; Mailings

FIGURE 5-6: Zero Means Zero



Picture Credit: © RTRS

ANNEX III.

GOOD PRACTICE EXAMPLES FOR COOPERATION

GOOD PRACTICE FOR COOPERATION 1:

Biodiversity cooperation networks

Business for Nature is a global coalition which brings together influential organisations and forward-thinking businesses to demonstrate business action and call for governments to reverse loss of nature. Business for Nature's efforts aim at convening a united business voice to influence key political decisions on nature in 2020 and beyond, by calling for a global framework that will reverse nature loss through policies that protect and restore nature and incentivise its sustainable use. This coalition also focusses on demonstrating business ambition and action to protect and enhance nature by aggregating, amplifying and helping scale existing business commitment platforms. In addition, their work showcases business solutions and translates them into commitments for action and meaningful impact which can be used to drive business decisions.

Due to their efforts in communicating the business case for reversing nature and showcasing further business commitments to incorporate nature protection into their activities, Business for Nature is considered a good practice example.

Weblink: <https://www.businessfornature.org/>

The work of the **Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)** is also seen as a good practice example for information on the impacts of consumption on biodiversity and ecosystem services and the need for action in general. The information provided by IPBES is based on scientific findings backed up by quantitative and qualitative data. The platform is international and both interdisciplinary and transdisciplinary. Civil society actors from various fields participate in the activities of IPBES as observers. IPBES works on a variety of relevant questions on the topic of sustainable consumption and continuously develops both scientific principles and methods for recording and evaluating biodiversity and ecosystem services, as well as concrete recommendations for policy makers.

Two of the current work programmes of this platform

are relevant in the context of business and sustainable consumption: Business and biodiversity assessment which focusses on the impact and dependence of business on biodiversity and nature's contributions to people; and Transformative change assessment which identifies factors in human society (behavioural, social, cultural, economic, institutional, technical and technological dimensions), that may be leveraged to bring about transformative change for the conservation, restoration and wise use of biodiversity. Moreover, IPBES also works on activities related to communication and engagement and is therefore considered an exemplary cooperation.

Weblink: <https://ipbes.net/business-impact>

Global Deal For Nature is a not-for-profit organisation incorporated as Sustainable Markets Foundation in New York, United States.

In 2017, 49 scientists authored a landmark paper, "An Ecoregion-Based Approach to Protecting Half the Terrestrial Realm" that called for a Global Deal for Nature (GDN) — a companion to the Paris Climate Agreement — to promote increased habitat protection and restoration, national and regional conservation strategies, and the empowerment of indigenous peoples to protect their sovereign lands. The goal of such a deal would be to protect half the terrestrial realm to halt the extinction crisis while sustaining human livelihoods. A key concept in the paper is that each of the world's 846 terrestrial ecoregions needs its own plan shared by the countries whose boundaries overlap its geophysical extent.

In April 2019, many of these scientists published a new paper called "A Global Deal for Nature: Guiding Principles, Milestones, and Targets" that explains why protecting half the Earth is needed, and presents a science-driven plan to save the diversity and abundance of life on Earth. It builds upon many scientific proposals for protecting key biodiversity areas and the latest climate science, calling for a milestone of at least 30% of lands protected by 2030 with an additional 20% in cli-

mate stabilisation areas. It is also the first to include land, freshwater, and marine ecoregions in one global plan.

On the website these scientists promote a petition, calling on world leaders to support a Global Deal for Nature

that protects and restores half of the Earth's lands and oceans <https://www.globaldealfornature.org/>

Weblink: <https://www.globaldealfornature.org/about/>

GOOD PRACTICE FOR COOPERATION 2:

Cooperation networks in the Food & Nutrition consumption area

LIFE Food & Biodiversity is the key project of the European Business and Biodiversity Campaign (EBBC) funded by the EU LIFE programme, aiming to improve the biodiversity performance of standards and labels within the food industry. EBBC is a partner consortium which supports companies from all industries in integrating biodiversity into their corporate management.

The results from this project have provided concrete extensive and detailed recommendations for action to improve the protection of biodiversity in sustainability standards of the food industry. The recommendations address the degradation and destruction of ecosystems, the overexploitation of natural resources and the aspect of "invasive species". The recommendations differenti-

ate between strategic recommendations for standard organisations and companies, recommendations on the management of biodiversity, recommendations for "very good practice" in the conservation of biodiversity and recommendations for companies and retail [36].

This catalogue of recommendations represents a kind of toolkit that can be used for the further development of existing standards to address the protection of biodiversity and ecosystem services and is therefore considered a good practice example.

Weblinks: www.food-biodiversity.eu
<https://www.biodiversity-performance.eu/>

GOOD PRACTICE FOR COOPERATION 3:

Biodiversity cooperation work in the Cement & Aggregates sector

Different cooperation activities in the cements and aggregates sector have resulted in the development of guidelines and tools aimed at further improving the biodiversity performance of the sector and represent a good practice example of sectoral collaborative efforts.

The **Global Cement & Concrete Association (GCCA)** is the trusted, authoritative platform and voice of the cement and concrete sector across the world. GCCA's membership consists of cement producers from right across the globe. In 2020, GCCA's activities resulted in the development of guidelines aimed at improving the overall performance in biodiversity management and the rehabilitation of quarries of the sector.

From 2007 until 2014, IUCN and Holcim worked together to strengthen biodiversity management within Holcim's operations, and to contribute to sector-wide improvements in the cement sector and related sectors. The ultimate goal of the relationship was to go beyond company boundaries to contribute to sector-

wide improvements in the cement industry and related industries. E.g.: Creating biodiversity management tools for industry-wide application. In 2014, during Phase I of the IUCN-Holcim relationship, and together with the Cement Sustainability Initiative (CSI), the European Cement Association, the Inter-American Cement Federation (FICEM) and the European Aggregates Association (UEPG), a guide for Integrated Biodiversity Management System in the cement and aggregates sector was published. Additionally, a methodology for the Net Impact Assessment of Biodiversity in the Cement Sector was also developed by CSI.

The work carried out by the Cement Sustainability Initiative (CSI) was officially transferred from the World Business Council for Sustainable Development (WBCSD) to the Global Cement & Concrete Association (GCCA) as of 1 January 2019.

Weblink: <https://gccassociation.org/>



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