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Federal Agency for
Nature Conservation

Sufficiency for biodiversity: Governing consumption within ecological limits



POLICY BRIEF #02/2025

Key messages

- **Current consumption patterns are a key driver of biodiversity loss, ecosystem degradation, and global injustice.** Excessive resource use in high-income regions and groups transgresses planetary boundaries and causes harm far beyond Europe's borders.
- **Sufficiency must become a core pillar of policy and economic decision-making.** Dominant sustainability strategies such as efficiency and consistency fall short in addressing overconsumption and excessive resource use. Sufficiency offers an essential pathway to align human well-being with ecological limits and ensure global equity.
- **Policymakers have a key role to play:**
 - **Fostering cultural change** by promoting sufficiency as a positive societal vision and regulating advertising to shift social norms.
 - **Setting clear targets** by introducing binding material footprint limits, sectoral reduction pathways, and broadening well-being indicators beyond gross domestic product (GDP).
 - **Leveraging demand-side instruments** by reforming fiscal policy, aligning public procurement with sufficiency, and applying true cost accounting.
 - **Promoting supply-side instruments** by investing in sufficiency-enabling infrastructure and adapting regulatory frameworks to support sufficiency-oriented business models.
 - **Assuming global responsibility** by promoting just, biodiversity-friendly international partnerships.

Keywords: Sufficiency, biodiversity, sustainable consumption, sustainable food systems, transformative change

1 Why sufficiency is essential to protect biodiversity

1.1 Current consumption patterns drive the transgression of planetary boundaries

Biodiversity and ecosystem services are essential for human well-being and quality of life. Nonetheless, despite increasing conservation efforts, biodiversity loss has reached alarming levels, threatening ecological resilience, weakening natural buffers against climate impacts, and undermining vital resources such as clean water and food (IPBES, 2019).

The **planetary boundaries** framework identifies nine key Earth system processes that are essential for maintaining the planet's stability and resilience (Richardson et al., 2023), defining safe limits for human activities. Six of these key thresholds **have already been transgressed**, including biosphere integrity, land-system change, and biogeochemical flows and freshwater systems (ibid.).

The consumption patterns of high-income countries and groups remain the strongest driver of environmental impacts worldwide (Wiedmann et al., 2020). In 2022, the European Union's (EU) material footprint amounted to 14.9 tonnes per capita, far exceeding the global average (EUROSTAT, 2025). At the same time, material demand is steadily increasing in emerging economies,

particularly in regions such as Asia and Africa (UNEP & IRP, 2024).

High consumption and economic growth are closely linked to biodiversity loss through several interrelated pathways. Agricultural areas, urban development, and infrastructure are expanding, leading to the overexploitation and pollution of terrestrial and marine ecosystems. Besides directly contributing to biodiversity loss, these pressures accelerate climate change. In turn, climate change drives further biodiversity loss, as rising temperatures and extreme weather events exceed the ability of many species to adapt. Furthermore, the intensification of global trade facilitates the spread of invasive alien species, which can disrupt native ecosystems and contribute to further biodiversity decline (Kliem et al., 2019; Otero et al., 2020).

This global interconnection – what Liu et al. (2019) call 'telecoupling' – links consumption in high-income regions such as the EU with biodiversity loss and severe environmental degradation worldwide.

Addressing overconsumption is thus not only essential for biodiversity protection but also a matter of global justice, as low-income countries disproportionately bear environmental burdens.



Fig. 1: Overconsumption: one of the root causes of resource exploitation and global biodiversity loss (Credit: Peter Bond/unsplash)

It is necessary to fundamentally reconsider the current growth paradigm to halt biodiversity loss and avoid (further) transgressing planetary boundaries. Ensuring a good life for all needs to be decoupled from ever-increasing resource use (Berger et al., 2024). Given the scale and urgency of biodiversity loss, as well as the pressing need for transformative change, dominant sustainability strategies are not adequate on their own. Ambitious approaches such as sufficiency need to be pursued to address the root causes of biodiversity loss and effectively reduce pressures on ecosystems.

1.2 Sustainability strategies and their limitations

Sustainability strategies are often framed around the three approaches of efficiency, consistency, and sufficiency (Metzner-Szigeth, 2021; Rudolf & Schmidt, 2025). However, the former two approaches face limitations regarding biodiversity protection. While efficiency aims to reduce resource use per unit through technological improvements, consistency seeks to align production with ecological cycles; for example, through renewable energy or agroecological practices (Brinken et al., 2022).

Efficiency gains through agricultural intensification often aggravate ecological degradation (Otero et al., 2020). Moreover, rebound effects can occur when cost savings or efficiency gains in one domain lead to increased consumption in another (Metzner-Szigeth, 2021), thereby preserving high-impact modes of consumption such as industrial meat, aviation, or fast fashion, while aggregate impacts continue to rise.

Consistency strategies, like many so-called green technologies – such as electric cars or solar panels – require vast amounts of raw materials, including lithium, cobalt and rare earths, fuelling extractive industries that damage biodiversity-rich ecosystems and provoke social conflicts, particularly in the Global South (Hund et al., 2020). Moreover, such strategies are frequently constrained by technological feasibility and economic barriers (Meijaard et al., 2024; Sogari et al., 2023).

While both strategies aim to decouple economic growth from resource use, evidence suggests that absolute decoupling is extremely rare and **insufficient to halt the exploitation of natural resources** (Parrique et al., 2019). Acknowledging the existence of planetary boundaries, it is necessary to address the limits of consumption to avoid leaving the underlying drivers of biodiversity loss unchallenged.

1.3 Sufficiency as key strategy to protect biodiversity

This makes **sufficiency** – a strategy aimed at reducing absolute resource use by aligning consumption with ecological limits – **a critical approach to biodiversity protection** (Hachtmann, 2024; Rudolf & Schmidt, 2025).

It offers a perspective that aligns human well-being with ecological limits, placing equal emphasis on meeting human needs and safeguarding non-human life (Casal, 2024). As a no-regret strategy, it supports multiple sustainability goals, including reducing resource extraction and biodiversity loss, as well as cutting emissions.

Despite its transformative potential, sufficiency remains largely absent from current sustainability policies. Moreover, if discussed, it is often framed narrowly as a climate change mitigation strategy, while its relevance for biodiversity remains overlooked (Hachtmann, 2024). However, this framing risks narrowing down sufficiency policies to a single indicator – greenhouse gas emissions – thereby overlooking other crucial aspects such as ecosystem integrity, which require a different analytical lens.

The measures proposed in this policy brief aim to close this gap. They contribute to broader sustainability goals but adopt a distinct perspective. Rather than solely addressing emissions, they focus on tackling overconsumption and excessive resource use as the key drivers of biodiversity loss in the context of consumption.

This policy brief aims to **bring biodiversity, consumption, and sufficiency more deliberately together** in policy development and offer perspectives on how policymakers can begin to think in these **integrated terms**.

1.4 Approaches to sufficiency

Two distinct yet complementary understandings of sufficiency can be differentiated (Lage, 2022).

A narrower, quantitative perspective – referred to here as **instrumental sufficiency** – **defines sufficiency as the intentional reduction of consumption and production to minimise resource use and environmental harm**. It emphasises setting clear upper and lower boundaries for sustainable lifestyles. This approach primarily calls for incremental change, offering concrete and actionable policy levers. From a biodiversity perspective, this approach helps reduce direct pressures on ecosystems – such as deforestation, land-use change, and pollution – by reducing overall material throughput.

A broader, systemic perspective – referred to here as **systemic sufficiency** – **understands sufficiency as a fundamental challenge to the current growth paradigm**. It calls for redefining prosperity beyond GDP and restructuring how societies organise economic activity, allocate resources, and measure well-being. While this approach offers fewer ready-made policy instruments, it nonetheless allows for political actions. In terms of biodiversity, this perspective enables tackling underlying drivers by addressing unsustainable economic logics, extractive patterns, and global injustices that underpin biodiversity loss.

The following policy recommendations are guided by both sufficiency perspectives, some enabling change within current frameworks, and others pointing to more fundamental shifts. While not always clearly assignable to one model, they offer different entry points for sufficiency-oriented policy for nature-friendly consumption.

Why policy action to foster sufficiency is necessary and just

While sufficiency is often associated with individual consumption and lifestyle choices, sustainability scholars increasingly emphasise that consumption practices are deeply embedded in structural conditions such as infrastructures, regulations, and social norms (Michaelis et al., 2024; Spangenberg & Lorek, 2019), thus underscoring the crucial role of public policy. Rather than placing the burden on individuals, governments must actively establish enabling conditions that make sufficiency-oriented lifestyles accessible, attractive, and feasible for everyone. Coherent regulations for businesses, targeted incentives, and investments in supportive infrastructures are key to facilitating the shift to resource-light and sufficiency-oriented lifestyles.

Furthermore, sufficiency offers a response to the urgent ethical imperative to address unsustainable consumption patterns that currently contribute to global inequalities, harm vulnerable populations – particularly in the Global South – and compromise the well-being of future generations and the integrity of ecosystems and biodiversity (Lage, 2022; Michaelis et al., 2024).

2 Implementing ambitious sufficiency policies for nature-friendly consumption and production

Existing efforts to link sufficiency politics and biodiversity protection are typically organised around key sectors such as food, housing, mobility, and material consumption (Andert et al., 2025; Galli & Coscieme, forthcoming). While sectoral approaches offer valuable entry points, this policy brief adopts a broader perspective by presenting a cross-sectoral model to help policy-makers identify patterns, design integrated strategies, and systematically embed sufficiency into biodiversity policy. For this purpose, it defines five key intervention areas, capturing core mechanisms through which sufficiency can support biodiversity across contexts (see Figure 2).

2.1 Foster cultural change for resource-light lifestyles

Sufficiency requires a profound cultural change. Policy interventions aimed at reducing resource consumption can only be effective and politically feasible if they are supported by broader changes in social values, norms, and everyday practices. Cultural change is therefore a cornerstone rather than an add-on of both instrumental and transformative sufficiency strategies. Policymakers can consider defining new societal visions for sustainable living that promote sufficiency as a positive route to well-being, social equity, and biodiversity protection. Without a desirable and positive vision for the future and societal buy-in, even well-designed policies might face resistance or fall short of their full potential (Michaelis et al., 2024).

Key recommendations:

- **Promote sufficiency as a strategy for social equity and ecological balance:** Governments should actively promote sufficiency as a dual strategy to stay within planetary boundaries and ensure fair access to resources for all. In cooperation with the private sector and civil society actors – including NGOs, community groups, and social movements – governments should launch public information,

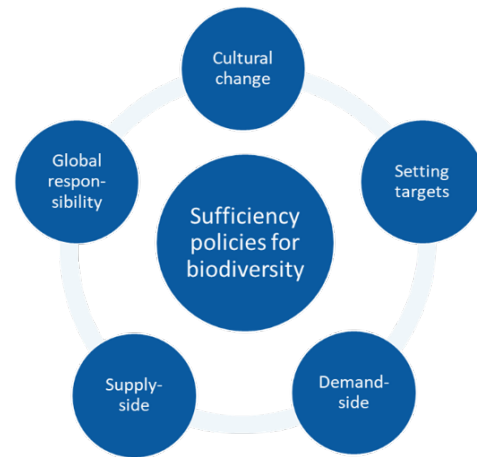


Fig. 2: Key areas for sufficiency policies for biodiversity (own illustration)

education, and awareness campaigns that communicate new societal visions for sustainable living and the environmental, social, and well-being benefits of sufficiency-oriented lifestyles. Campaigns should challenge status-driven consumption and promote attractive, inclusive, accessible alternatives to foster broad cultural change.

- **Regulate advertising to shift aspirations towards sustainable lifestyles:** Policymakers should implement regulations to limit advertising that promotes unsustainable, high-impact products and lifestyles, particularly in sectors such as fast fashion, fossil fuel-based mobility, and resource-intensive food production. Instead, policies should actively promote responsible marketing and foster campaigns that portray sustainable, sufficiency-oriented lifestyles as attractive, desirable, and socially rewarding. By reshaping cultural narratives through advertising and media, these measures can help shift social norms and aspirations towards nature-positive consumption patterns (Galli & Coscieme, forthcoming).
- **Support civil society actors that enable sufficiency-oriented social innovation:** Policymakers could strengthen civil society as a key driver of transformative

change toward sufficiency. Many practices aligned with sufficiency principles – such as collaborative consumption, prosuming, sharing, or communing – emerge from citizen-led initiatives and local engagement. These social innovations create new social relations, routines, and infrastructures that challenge established patterns of consumption and production (Jaeger-Erben et al., 2015). Public policy should provide long-term support by offering funding opportunities, ensuring access to public spaces and (digital) infrastructure, and embedding such initiatives into urban and regional development strategies.

2.2 Establish sufficiency-oriented targets

To advance sufficiency as a strategy for biodiversity protection, policymakers must consider how progress towards nature-friendly lifestyles could be measured and what meaningful targets could entail. This includes identifying suitable indicators to monitor consumption volumes and material use over time. The following suggestions illustrate possible approaches to defining such targets and metrics.

Key recommendations:

- **Set material footprint caps:** Just as climate policy relies on binding targets for GHG emission reductions, biodiversity policies also require concrete reduction targets to address overconsumption and associated resource use (Meysner & Gore, 2022). One option is to use the material footprint as a guiding indicator, as already applied under SDG 8.4. These targets could define a sustainable average material footprint per capita at the national level (e.g., 5.5 to 8 tonnes per capita, as suggested by the International Resource Panel (UNEP, 2020)) ensuring that resource use remains within planetary boundaries.
- **Introduce resource reduction targets in high-impact sectors:** Policymakers can complement overarching, national

material footprint caps with sector-specific reduction pathways in resource-intensive sectors and industries such as construction, manufacturing, food, mobility, housing, textiles, and electronics. These pathways should define reduction targets for material use, land footprint, and resource consumption. Additional, sector-specific indicators include living space per capita (housing), avoided passenger- or tonne-kilometres (mobility), food waste or per capita meat consumption (food) (Andert et al., 2025; Galli & Coscieme, forthcoming).

- **Broaden measurement frameworks beyond GDP:** Policymakers should move beyond the current growth-centred perspective, which obscures many facets of well-being. For instance, reconstruction after disasters inflates GDP, while essential services such as caregiving or public healthcare remain invisible (Stiglitz et al., 2018). They should adopt complementary indicators, such as the Human Development Index (HDI), the Gini coefficient (a measure of income inequality), or the OECD Better Life Index (a multidimensional measure of well-being), to provide a more accurate basis for decision-making. In addition, policymakers should integrate indicators that specifically capture biodiversity, such as the Living Planet Index or the Biodiversity Intactness Index, which are increasingly recognised alongside social and economic well-being metrics. These measures help to ensure that biodiversity protection becomes a visible and accountable dimension of policy decisions.
- **Support research and the development of new indicators:** Policymakers should promote research and funding programmes that advance the measurement of prosperity beyond economic and social aspects to explicitly include ecological boundaries and environmental impacts, to help align well-being metrics with sustainability goals.

2.3 Leverage demand-side policy

Current EU policies often prioritise supply-side measures such as regulatory standards, eco-design requirements, and innovation funding programmes aimed at promoting technological efficiency and circularity. However, these approaches alone are unlikely to reduce overall resource throughput and address the root causes of biodiversity loss. Demand-side instruments, including choice editing, (Galli & Coscieme, forthcoming), might serve as an additional lever to directly limit the absolute scale of resource extraction, land use, and material flows that drive biodiversity decline (IPBES, 2019, p. 956). Policymakers could consider developing clear regulatory frameworks and stronger economic signals to foster sufficiency-oriented systems.

Key recommendations:

- **Align public procurement with resource reduction goals:** Public institutions should lead by example in demonstrating low-resource consumption and setting best practices. Policymakers should therefore strengthen and expand green public procurement (GPP) criteria to mandate absolute resource reduction, durability, reparability, low material intensity, and a minimised land footprint. In particular, they should make circularity a binding requirement and shift the focus from products to service-based solutions (e.g., establishing leasing and renting models) (Jones et al., 2017). These steps are especially relevant in high-impact sectors such as construction, transport fleets, and public food services. As public procurement accounts for around 14% of EU GDP at approximately €2 trillion annually (European Commission, n.d.), these measures offer strong leverage for market transformation.
- **Implement fiscal instruments that reflect the full environmental and biodiversity costs of resource extraction and consumption:** Policymakers can introduce differentiated VAT rates that favour low-impact products, as well as levies on harmful products and practices such as

pesticides, luxury goods, or excessive land and water use (IPBES, 2019, p. 957).

These instruments should internalise environmental and health externalities into product prices, thereby incentivising both producers and consumers to adopt more sustainable practices (Fülling et al., forthcoming; Köppen et al., 2024). The resulting public revenues should be reinvested in biodiversity conservation, ecological restoration, and measures to promote social equity. To prevent burdens on lower-income households, such instruments must be paired with compensation measures such as income-based rebates or targeted transfers to ensure affordable and sustainable alternatives.

- **Embed true cost accounting (TCA) in economic and regulatory decision-making:** Policymakers should promote the development and use of TCA frameworks that integrate biodiversity, ecosystem services, and social externalities into economic decisions to complement fiscal instruments and support sufficiency-oriented economic structures. While TCA has mainly been applied in the food sector to date (Hamm et al., 2022), it is equally relevant for other resource-intensive areas. Embedding TCA in regulatory impact assessments and corporate reporting can guide public and private actors toward sufficiency-compatible business models.

2.4 Strengthen supply-side measures

Many current infrastructures – including physical and social environments – and dominant business models reinforce unsustainable consumption patterns and ecological degradation. Resource-intensive lifestyles are often structurally embedded and difficult to change without viable alternatives. To reduce biodiversity pressures and make sufficiency-oriented lifestyles feasible for all, one option for policymakers is to invest in infrastructure that enables sufficiency-oriented lifestyles and to develop supportive economic

frameworks that encourage alternative ways of producing and organising economic activity.

Key recommendations:

- **Prioritise public investments in sufficiency-enabling infrastructures:** Governments should direct public investment toward infrastructures that facilitate sufficiency-oriented lifestyles, making them easy, affordable, and attractive. This includes creating food environments that support sustainable diets (Agora Agriculture & IDDRI, 2025), expanding affordable and reliable public transport and establishing local repair and reuse centres to extend product lifespans and reduce waste (Andert et al., 2025; Galli & Coscime, forthcoming). Such structural measures reduce reliance on high-impact consumption and mobility patterns helping to relieve pressure on ecosystems by lowering overall resource demand and land use.



Fig. 3: Suitable food environments support nature-friendly diets (Credit: iStock/vaaseenaa)

- **Establish regulatory frameworks that strengthen corporate contributions to sufficiency goals:** EU instruments such as the Corporate Sustainability Due Diligence Directive (CSDDD) and the EU Deforestation Regulation (EUDR) set important standards, but should be further developed. Policymakers can require companies to assess whether their business models – including product-service

design, durability, resource intensity, and consumption inducement – align with sufficiency principles. These assessments should inform concrete targets and adjustments to reduce resource intensity over time.

Existing policies such as the ban on single-use plastics, the Ecodesign for Sustainable Products Regulation, and the Right to Repair Directive offer useful starting points but should be further aligned with sufficiency objectives – for example by expanding product coverage, ensuring access to spare parts, and closing loopholes (Ganapini, 2024). To address microplastic pollution more effectively, it is important to support innovation and the market uptake of durable, sustainable, and plastic-free alternatives (Daskalakis et al., 2022).

- **Promote business models that align with sufficiency principles:** In line with a systemic understanding of sufficiency, policymakers should support new business models that meet people's needs in a more sustainable manner. This could be through supporting co-innovation, research programmes, or businesses that prioritise social and ecological well-being over profit. This includes existing models of cooperatives, employee-owned firms, and social businesses with participatory governance and sustainable goals. These models foster equitable value creation. Governments should provide targeted financial tools (e.g., low-interest loans, preferential access to public contracts), remove administrative barriers, and establish legal frameworks that recognise entrepreneurial contributions to the common good.

2.5 Address global responsibility and prevent green colonialism

The ongoing green transition – including renewable energy and e-mobility – is increasing demand for critical raw materials, intensifying ecological pressures, and reinforcing global

inequalities, while unequal global trade and power relations reinforce extractive dynamics, shifting environmental burdens to the Global South (Lang et al., 2024). Policymakers should integrate sufficiency as a principle of global responsibility into trade, investment, and corporate governance frameworks to counter these developments.

Key recommendations:

- **Integrate strong social safeguards into supply chain regulations:** Regulations such as the EUDR should avoid unintended harm to smallholders and Indigenous communities by complementing environmental standards with robust safeguards for social rights and livelihoods (Aty-Biyo, 2024). This includes protecting land tenure, ensuring fair benefit sharing, and supporting producer countries in strengthening their institutional capacities for compliance. These measures are crucial in preventing green colonialism and ensuring that supply chain regulations contribute to more equitable and just trade relations (Pentzien & Fülling, 2025).
- **Support global partnerships for fair and sustainable resource governance:** The EU should promote cooperation with resource-exporting countries through

partnerships and trade agreements that explicitly support the advancement of land rights, fair benefit-sharing, and biodiversity-friendly production (Fülling et al., forthcoming). Such partnerships should foster broad participation and prioritise social justice to counteract extractive dependencies, ensuring that sustainability efforts contribute to equitable development pathways.

How to foster global collaboration and exchange? The One Planet network

The One Planet network is a **global community of practitioners, policymakers and experts** that work towards achieving Sustainable Development Goal 12: “Ensuring sustainable patterns of consumption and production”.

Within the One Planet network’s Programme on Consumer Information, the **Working Group “Biodiversity & Consumption”** strives to help reduce the negative impacts of consumption on nature, by activating stakeholders, strengthening collaboration and providing many ready-to-use information materials.

Find out more: www.oneplanetnetwork.org/programmes/consumer-information-scp/biodiversity

3. Conclusions

Sufficiency is a vital strategy for protecting biodiversity and safeguarding our natural life-support system. It addresses one of the root causes of ecological degradation and helps overcome key shortcomings of current sustainability policies that primarily focus on efficiency and consistency. At the same time, sufficiency offers a forward-looking vision: ensuring a good life for all within planetary boundaries. While it has played a minor role in policymaking to date, this brief has highlighted numerous practical ways to effect change. Governments should foster societal acceptance and cultural change, making sufficiency a shared and positive vision of well-being. Additionally, they should establish sufficiency-oriented targets and monitoring frameworks. They should strengthen demand-side instruments – including fiscal tools and public procurement – to reduce the material intensity of consumption and production. To enable low-impact lifestyles, public investments need to be directed towards supporting infrastructure and regulations that guide business towards sufficiency. Finally, sufficiency should be anchored in international frameworks to avoid shifting environmental burdens and to uphold rights in the Global South. Taken together, these actions can reduce pressure on ecosystems, strengthen social equity, and build economic resilience.

Literature

- Agora Agriculture & IDDRI. (2025). Towards national food policies that support healthy and sustainable consumption. Country case studies and the role of EU food policy. https://www.agora-agriculture.org/fileadmin/Projects/2024/2024-03_national_food_strategies_SWu/A-AGR_364_Towards_food_policies_that_support_sustainable_and_healthy_consumption_WEB.pdf
- Andert, M., Kling, A., Lage, J., Thema, J., Wiese, F., & Zell-Ziegler, C. (2025). Krisenfest, sozial und umweltgerecht: Impulse zur Entwicklung einer Suffizienzstrategie für Deutschland (Die Rolle von Energiesuffizienz in Energiewende und Gesellschaft, p. 972 KB, 50 pages) [Application/pdf]. BMBF-Nachwuchsforschungsgruppe EnSu. <https://doi.org/10.48506/OPUS-8766>
- Aty-Biyo, G. (2024, October 22). How the EU Can Avoid Green Colonialism. Transformative Private Law Blog. <https://transformativeprivatelaw.com/how-the-eu-can-avoid-green-colonialism/>
- Berger, L., Wulf, S., & Schuster, B. (2024). Nature Conservation and Transformative Change. Bundesamt für Naturschutz. <https://doi.org/10.19217/pos241en>
- Brinken, J., Trojahn, S., & Behrendt, F. (2022). Sufficiency, Consistency, and Efficiency as a Base for Systemizing Sustainability Measures in Food Supply Chains. *Sustainability*, 14(11), 6742. <https://doi.org/10.3390/su14116742>
- Casal, P. (2024). Sufficiency, Nature and the Future. *Political Philosophy*, 1(1). <https://doi.org/10.16995/pp.15252>
- Daskalakis, M., Kaser, S., Hentschel, A., & Breitbarth, M. (2022). EU Single-Use Plastics Directive Contents, deficits and development requirements. Fact sheet 19 of the BMBF Research Focus Plastic in the Environment. https://bmbf-plastik.de/sites/default/files/2022-07/FactSheet_InRePlast_19-EN.pdf
- European Commission. (n.d.). Public procurement. Internal Market, Industry, Entrepreneurship and SMEs. https://single-market-economy.ec.europa.eu/single-market/public-procurement_en
- EUROSTAT. (2025). SDG 12—Responsible consumption and production. Statistics Explained. https://ec.europa.eu/eurostat/statistics-explained/index.php?oldid=566993&title=SDG_12_-_Responsible_consumption_and_production
- Fülling, J., Pentzien, J., Lutz, K., Köppen, S., Bolte, V., & Giest, F. (2025). Towards nature-friendly consumption. Biodiversity impacts and policy options for shrimp, soy, and palm oil. Federal Agency for Nature Conservation (BfN). <https://doi.org/10.19217/brs255en>
- Galli, A., & Coscieme, L. (forthcoming). Nature-Positive Lifestyles: Unlocking Opportunities for People and Planet.
- Ganapini, C. (2024). The Current State of Right to Repair in the EU. Right to Repair; IFIXIT. https://repair.eu/wp-content/uploads/2024/10/Current-State-of-EU-Right-to-Repair_v3_2.pdf
- Hachtmann, M. (2024). Linking sufficiency and the protection of biodiversity: An issue of political implications, framing, descriptiveness and interdisciplinarity? *Nature Conservation*, 55, 83–102. <https://doi.org/10.3897/natureconservation.55.118243>
- Hamm, M. W., Mueller, A., Riemer, O., & Merrigan, K. (2022, January). True Cost Accounting and Dietary Patterns: A Strategy for Transformative Food Systems. TMG Research GmbH. https://assets.ctfassets.net/rrirl83ijfda/1eELrfyuNxweD9dFb96lOV/73ae53d86f4f6941340d4f1d4a6fbb11/TCA_Dietary-Patterns_web.pdf
- Hund, K., LaPorta, D., Fabregas, T. P., Laing, T., & Drexhage, J. (2020). Minerals for Climate Action. The Mineral Intensity of the Clean Energy Transition. International Bank for Reconstruction and Development/ The World Bank. <https://library.sprep.org/sites/default/files/2021-11/minerals-climate-action.pdf>
- IPBES. (2019). Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. <https://zenodo.org/doi/10.5281/zenodo.3831673>
- Jaeger-Erben, M., Rückert-John, J., & Schäfer, M. (2015). Sustainable consumption through social innovation: A typology of innovations for sustainable consumption practices. *Journal of Cleaner Production*, 108, 784–798. <https://doi.org/10.1016/j.jclepro.2015.07.042>
- Jones, M., Kinch Sohn, I., & Lysemose Bendsen, A.-M. (2017). Circular Procurement Best Practice Report. ICLEI - Local Governments for Sustainability, European Secretariat. https://circulars.iclei.org/wp-content/uploads/2021/01/Circular_Procurement_Best_Practice_Report.pdf

- Kliem, L., Pentzien, J., Baldauf, M., Bidjanbeg, A., Fehrenbach, H., Auberger, A., & Köppen, S. (2019). Sustainable Consumption for Biodiversity and Ecosystem Services. The cases of cotton, soy and lithium. BfN. https://www.bfn.de/sites/default/files/2021-11/Sustainable_Consumption_Biodiversity_bf.pdf
- Köppen, S., Brasil, B., Cosse Braslavsky, C., Carcamo, R., Clark, G., & Wulf, S. (2024). Implementing GBF Target 16: Addressing biodiversity impacts of food consumption. Bundesamt für Naturschutz. <https://doi.org/10.19217/pol244en>
- Lage, J. (2022). Sufficiency and transformation—A semi-systematic literature review of notions of social change in different concepts of sufficiency. *Frontiers in Sustainability*, 3, 954660. <https://doi.org/10.3389/frsus.2022.954660>
- Lang, M., Bringel, B., & Manahan, M. A. (2024). Lucrative Transitions, Green Colonialism and Pathways to Transformative Eco-social Justice: An Introduction. In M. Lang, B. Bringel, & M. A. Manahan (Eds.), *The Geopolitics of Green Colonialism* (1st ed., pp. 1–24). Pluto Press; JSTOR. <https://doi.org/10.2307/jj.12865310.5>
- Liu, J., Herzberger, A., Kapsar, K., Carlson, A. K., & Connor, T. (2019). What Is Telecoupling? In C. Friis & J. Ø. Nielsen (Eds.), *Telecoupling* (pp. 19–48). Springer International Publishing. https://doi.org/10.1007/978-3-030-11105-2_2
- Meijaard, E., Virah-Sawmy, M., Newing, H. S., Ingram, V., Holle, M. J. M., Pasmans, T., Omar, S., Van Den Hombergh, H., Unus, N., Fosch, A., Ferraz De Arruda, H., Allen, J., Tsagarakis, K., Ogwu, M. C., Diaz-Ismael, A., Hance, J., Moreno, Y., O’Keeffe, S., Slavin, J., ... Sheil, D. (2024). Exploring the future of vegetable oils. Oil crop implications - fats, forests, forecasts, and futures (1st ed.). IUCN, International Union for Conservation of Nature. <https://doi.org/10.2305/KFJA1910>
- Metzner-Szigeth, A. (2021). Strategies for Eco-Social Transformation: Comparing Efficiency, Sufficiency and Consistency. 18315649 Bytes. <https://doi.org/10.6084/M9.FIGSHARE.14610483.V1>
- Meysner, A., & Gore, T. (2022). Towards resource consumption within planetary boundaries. The case for binding EU material footprint reduction targets. Institute for European Environmental Policy (IEEP). https://ieep.eu/wp-content/uploads/2022/11/Towards-resource-consumption-within-planetary-boundaries-IEEP-2022.pdf?utm_source=chatgpt.com
- Michaelis, J., Vogel, B., Strunz, S., Lucht, W., Dahms, H., Dornack, C., Geissler, A., Hertin, J., Hoffart, F., Kemfert, C., Klein, M., Köck, W., Lage, J., Marquard, E., Schmalz, S., Settele, J., Sommer, B., Weiss, S., & Wiegand, S. (2024). Sufficiency as a “Strategy of the Enough”: Curbing ecological crises and injustices. A summary of the German Advisory Council on the Environment’s discussion paper. *GAIA - Ecological Perspectives for Science and Society*, 33(3), 275–281. <https://doi.org/10.14512/gaia.33.3.3>
- Otero, I., Farrell, K. N., Pueyo, S., Kallis, G., Kehoe, L., Haberl, H., Plutzar, C., Hobson, P., García Márquez, J., Rodríguez Labajos, B., Martin, J., Erb, K., Schindler, S., Nielsen, J., Skorin, T., Settele, J., Essl, F., Gómez Baggethun, E., Brotons, L., ... Pe’er, G. (2020). Biodiversity policy beyond economic growth. *Conservation Letters*, 13(4). <https://doi.org/10.1111/conl.12713>
- Parrique, T., Barth, J., Briens, F., Kerschner, C., Kraus-Polk, A., Kuokkanen, A., & Spangenberg, J. H. (2019). Decoupling Debunked. Evidence and arguments against green growth as a sole strategy for sustainability. European Environmental Bureau. <https://eeb.org/wp-content/uploads/2019/07/Decoupling-Debunked.pdf>
- Pentzien, J., & Fülling, J. (2025). EU Deforestation Regulation in Action: Towards Just and Effective ImplementationA (#01/2025.; Policy Brief). Federal Agency for Nature Conservation (BfN). <https://doi.org/10.19217/pol251en>
- Richardson, K., Steffen, W., Lucht, W., Bendtsen, J., Cornell, S. E., Donges, J. F., Drüke, M., Fetzer, I., Bala, G., Von Bloh, W., Feulner, G., Fiedler, S., Gerten, D., Gleeson, T., Hofmann, M., Huiskamp, W., Kummu, M., Mohan, C., Nogués-Bravo, D., ... Rockström, J. (2023). Earth beyond six of nine planetary boundaries. *Science Advances*, 9(37), eadh2458. <https://doi.org/10.1126/sciadv.adh2458>
- Rudolf, M., & Schmidt, M. (2025). Efficiency, sufficiency and consistency in sustainable development: Reassessing strategies for reaching overarching goals. *Ecological Economics*, 227, 108426. <https://doi.org/10.1016/j.ecolecon.2024.108426>
- Sogari, G., Bellezza Oddon, S., Gasco, L., Van Huis, A., Spranghers, T., & Mancini, S. (2023). Review: Recent advances in insect-based feeds: from animal farming to the acceptance of consumers and stakeholders. *Animal*, 17, 100904. <https://doi.org/10.1016/j.animal.2023.100904>

- Spangenberg, J. H., & Lorek, S. (2019). Sufficiency and consumer behaviour: From theory to policy. *Energy Policy*, 129, 1070–1079. <https://doi.org/10.1016/j.enpol.2019.03.013>
- Stiglitz, J. E., Fitoussi, J.-P., & Durand, M. (2018). Beyond GDP: Measuring What Counts for Economic and Social Performance. OECD. <https://doi.org/10.1787/9789264307292-en>
- United Nations Environment Programme (UNEP). (2020). Global Resources Outlook 2019: Natural Resources for the Future We Want. United Nations. <https://doi.org/10.18356/689a1a17-en>
- United Nations Environment Programme (UNEP) & International Resource Panel (IRP). (2024). Global Resources Outlook 2024: Bend the Trend – Pathways to a liveable planet as resource use spikes. International Resource Panel. <https://wedocs.unep.org/handle/20.500.11822/44902>
- Wiedmann, T., Lenzen, M., Keyßer, L. T., & Steinberger, J. K. (2020). Scientists' warning on affluence. *Nature Communications*, 11(1), 3107. <https://doi.org/10.1038/s41467-020-16941-y>

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