Der **ökologische Rucksack** ist die sinnbildliche Darstellung der Menge an Ressourcen, die bei der Herstellung, dem Gebrauch und der Entsorgung eines Produktes oder einer Dienstleistung verbraucht werden. Sie soll im Rahmen der Ökobilanz einen Vergleichsmaßstab bieten, mit dem verdeutlicht wird, welche ökologischen Folgen die Bereitstellung bestimmter Güter verursacht.

Das Modell geht zurück auf Friedrich Schmidt-Bleek, der es 1994 im Rahmen der Überlegungen zum Material-Input pro Serviceeinheit (MIPS) erstmals veröffentlichte.

Ähnliche Ansätze finden sich auch in den Ansätzen zum ökologischen Fußabdruck und dem virtuellen Wasser.

Inhaltsverzeichnis

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- 1 Beispiele und Daten zum Ökologischen Rucksack
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Beispiele und Daten zum Ökologischen Rucksack [Bearbeiten]

Typische Werte sind ein Faktor 5 für Kunststoffe, das heißt für ein Kilogramm Kunststoff werden 5 Kilogramm Ressourcen benötigt. Weitere Werte sind Faktor 15 für Papier, Faktor 85 für Aluminium, Faktor 500 für Kupfer und Faktor 550'000 für Gold.

Beispiel Baumwollkleidung: Herstellung

- Der Anbau von Baumwollpflanzen benötigt sehr viel Wasser
- 10 Prozent des weltweiten Pestizid- und Düngemittelverbrauchs gehen auf das Konto der Baumwolle
- Die Transportwege sind teilweise erheblich: Anbauort, Stoffproduktion, Weiterverarbeitung und Verkauf sind räumlich meist getrennt

Gebrauch

- Waschmittel
- Energie
- Wasser

Rechnet man den gesamten Ressourcen- und Energieaufwand zusammen, ergibt sich für eine 600 Gramm leichte Jeans ein ökologischer Rucksack von 32 Kilogramm. Diese entspricht einem ökologischen Rucksack mit Faktor 53.

Kritik [Bearbeiten]

Der ökologische Rucksack ist als grobe Zahl zu verstehen, welche Einblick gibt in einige der nötigen Prozesse und Aufwendungen, welche durch Konsumgüter verursacht werden. Viele wichtige Umweltbelastungen werden mit dem Ökologischen Rucksack aber nicht oder schlecht abgebildet. So wird in obengenannten Beispiel der Baumwollherstellung zwar der Energieaufwand für die *Herstellung* der Pestizide berücksichtigt, die ökologischen *Auswirkungen* des Pestizides in der Natur werden aber ignoriert.

Das genaue Verständnis des ökologischen Rucksackes wird dadurch erschwert, dass die Autoren bei der Berechnung gewisse Ressourceninputs nicht miteinbeziehen. So werden beispielsweise die notwendigen Inputmengen an Wasser oder Luft nicht berücksichtigt.[1] In den meisten Konsumgütern wäre der benötigte Wasserinput aber der bedeutendste Masseninput.

Literatur [Bearbeiten]

- Friedrich Schmidt-Bleek (Hrsg.): *Der ökologische Rucksack*. 2004, ISBN 3777612898
- Friedrich Schmidt-Bleek: Das MIPS-Konzept, Faktor 10. Verlag Knaur, ISBN 3-426-77475-5

Einzelnachweise [Bearbeiten]

1. ↑ http://www.nachhaltigkeit.de/_pdf/ws27.pdf - MIPS berechnen 2002

Weblinks [Bearbeiten]

- Klima-Aktiv: Ökologischer Rucksack auf Waren und Tätigkeiten
- Weltweite Daten zur Berechnung ökologischer Rucksäcke
- Türkl; Ritthoff; Geibler; Kuhndt, in: Jahrbuch Ökologie 2003: Virtuell = umweltfreundlich? Der ökologische Rucksack des Internet (PDF)

Die Idee der Rucksäcke beruht auf der Überlegung, wie man rechnerisch am besten vorgehen könne, um die Menge an Natur zu verdeutlichen, die in jedem Sachgut steckt. Das Problem ist, dass das Gewicht einer Mausefalle wenig darüber aussagt, wieviel Holz aus dem Wald geholt werden musste, um das Brettchen zu schneiden. Und das Gewicht der Stahlfeder gibt keine Auskunft über den Abraum, welcher aus seinem geologisch gewachsenen Platz bewegt werden musste, um das Erz verfügbar zu machen, wieviel Transport nötig war und wie viele natürliche Ressourcen für den Bau der Hochöfen für die Stahlgewinnung nötig war. Man kann aber alle Prozessschritte von der Mausefalle zurück zu dem Punkt verfolgen, an dem die natürlichen Rohmaterialien ursprünglich gewonnen wurden, also "bis zur Wiege" des Produkts. Man kann diesen Weg "materiell" zurückverfolgen, also die Prozessketten aufrollen. Man kann ihn zusätzlich auch "geographisch" nachvollziehen, also fragen, aus welchem Land oder aus welcher Gegend die einzelnen Materialien kommen. Der "ökologische Rucksack" ist definiert als die Summe aller natürlichen Rohmaterialien von der Wiege bis zum verfügbaren Werkstoff oder zum dienstleistungsfähigen Produkt in Tonnen Natur pro Tonne Produkt, abzüglich dem Eigengewicht des Werkstoffes oder Produktes selbst, gemessen in Tonnen, Kilogramm oder Gramm. Für die Praxis ist es sinnvoll, zwischen dem ökologischen Rucksack und dem Material Input, kurz MI, zu unterscheiden.

http://www.umweltdatenbank.de/lexikon/oekologischer_rucksack.htm

Unter dem **Ökologischen Fußabdruck** wird die Fläche auf der Erde verstanden, die notwendig ist, um den Lebensstil und Lebensstandard eines Menschen (unter Fortführung heutiger Produktionsbedingungen) dauerhaft zu ermöglichen. Das schließt Flächen ein, die zur Produktion seiner Kleidung und Nahrung oder zur Bereitstellung von Energie, aber z. B. auch zum Abbau des von ihm erzeugten Mülls oder zum Binden des durch seine Aktivitäten freigesetzten Kohlendioxids benötigt werden.

Das Konzept wurde 1994 von Mathis Wackernagel und William E. Rees entwickelt. 2003 wurde von Wackernagel das Global Footprint Network gegründet, das u. a. von der Nobelpreisträgerin Wangari Maathai, dem Gründer des Worldwatch Institute Lester R. Brown und Ernst Ulrich von Weizsäcker unterstützt wird.

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- 4 Weblinks
- 5 Einzelnachweise

Daten und Fakten [Bearbeiten]

Die weltweit verfügbare Fläche zur Erfüllung der menschlichen Bedürfnisse wird nach Daten des Global Footprint Network und der European Environment Agency insgesamt um 23 % überschritten.[1] Danach werden bei gegenwärtigem Verbrauch pro Person 2,2 ha (Hektar) beansprucht, es stehen allerdings lediglich 1,8 ha zur Verfügung. Dabei verteilt sich die Inanspruchnahme der Fläche sehr unterschiedlich auf die verschiedenen Regionen. Europa (EU25 und Schweiz) beispielsweise benötigt 4,7 ha pro Person, kann aber nur 2,3 ha selber zur Verfügung stellen. Dies bedeutet eine Überbeanspruchung der europäischen Biokapazität um über 100 %. Frankreich beansprucht demnach annähernd das Doppelte, Deutschland etwa das Zweieinhalbfache und Großbritannien das Dreifache der verfügbaren Biokapazität. Ähnliche Ungleichgewichte finden sich auch zwischen Stadt und Land.

Die USA brauchen etwa 9,7 ha, Großbritannien 5,6 ha, Brasilien 2,1 ha, die Volksrepublik China 1,6 ha und Indien 0,7 ha für eine Person (2002) [2]

Siehe auch [Bearbeiten]

- Ökologischer Rucksack
- Die Grenzen des Wachstums

- Umweltraum
- Happy Planet Index

Literatur [Bearbeiten]

- Meadows, Dennis L. et al.: *Limits to Growth: The 30-Year Update*. Chelsea Green Publishing Company 2004, ISBN 1-93-149858-X (englisch)
- Wuppertal Institut für Klima, Umwelt und Energie (Hrsg.): *Fair Future - Ein Report des Wuppertal Instituts. Begrenzte Ressourcen und globale Gerechtigkeit*. 2. Auflage. Verlag C.H. Beck, München 2005, ISBN 3406527884 (bietet eine klare Definition auf Seite 36)
- WWF (2008): *Living Planet Report 2008* (PDF, 5,1 MB)

Weblinks [Bearbeiten]

- Global Footprint Network
- Plattform Footprint - "Eine für alle" - das österreichischen Netzwerk von Umwelt-, Entwicklungs- und Sozialorganisationen zum Thema ökologischer Fußabdruck
- Unterrichtsmaterialien und Fachbeiträge zum Ökologischen Fußabdruck auf verbraucherbildung.de, dem Bildungsportal des Verbraucherzentrale Bundesverbandes e.V.
- Aktion der BUNDjugend zum Ökologischen Fußabdruck der online-Rechner befindet sich bei den / EcoNautix
- Lexikon der Nachhaltigkeit: Ökologischer Fußabdruck
- Österreichischer Online-Rechner des Bundesministerium für Land und Forstwirtschaft, Umwelt und Wasserwirtschaft
- WWF: Mit 10 Fragen den ökologischen Fußabdruck berechnen (Österreich)
- Ecological Debt Day - Ab heute leben wir auf Pump bei Telepolis (06.10.2007)

Einzelnachweise [Bearbeiten]

1. ↑ [1]
2. ↑ Zitiert nach "State of the Planet", Beihefter New Scientist, 6. Januar 2007. Siehe auch New Scientist

Ecological footprint

From Wikipedia, the free encyclopedia

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The **ecological footprint** is a measure of human demand on the Earth's ecosystems. It compares human demand with planet Earth's ecological capacity to regenerate. It represents the amount of biologically productive land and sea area needed to regenerate the resources a human population consumes and to absorb and render harmless the corresponding waste. Using this assessment, it is possible to estimate how much of the Earth (or how many planet Earths) it would take to support humanity if everybody lived a given lifestyle. Humanity's

total ecological footprint is estimated at 1.3 - in other words, humanity needs 1.3 Earths in order to sustain our collective lifestyle.[1] This is just one of many varying figures on the global ecological footprint.

While the term *ecological footprint* is widely used,[2] methods of measurement vary. However, calculation standards are now emerging to make results more comparable and consistent.[3]

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- 2 Methodology
- 3 Ecological footprint studies in the United Kingdom
- 4 Discussion
- 5 Ecological footprint by country
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- 8 Further reading
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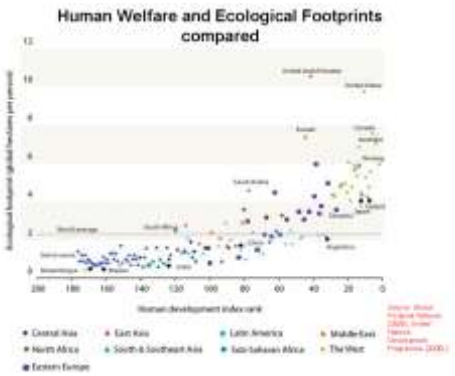
[edit] Ecological footprint analysis



Ecological footprint for different nations compared to their HDI. Recent evidence[*citation needed*] suggests that improvements in the Human Development Index in most cases generally results in an increase in its ecological footprint.

Personal Environmental Impact Accounting, similar in concept to the ecological footprint, was developed in the early 1990s by Don Lotter and released in 1992 as EnviroAccount software. The first academic publication about the ecological footprint was by William Rees in 1992.[4] The ecological footprint concept and calculation method was developed as the PhD dissertation of Mathis Wackernagel, under Rees at the University of British Columbia in Vancouver, Canada, from 1990-1994.[5] Originally, Wackernagel and Rees called the concept "appropriated carrying capacity".[6] To make the idea more accessible, Rees came up with the term "ecological footprint," inspired by a computer technician who praised his new

computer's "small footprint on the desk."[7] In early 1996, Wackernagel and Rees published the book *Our Ecological Footprint: Reducing Human Impact on the Earth*.[8]

Ecological footprint analysis compares human demand on nature with the biosphere's ability to regenerate resources and provide services. It does this by assessing the biologically productive land and marine area required to produce the resources a population consumes and absorb the corresponding waste, using prevailing technology. This approach can also be applied to an activity such as the manufacturing of a product or driving of a car. This resource accounting is similar to life cycle analysis wherein the consumption of energy, biomass (food, fiber), building material, water and other resources are converted into a normalized measure of land area called 'global hectares' (*gha*).

Per capita ecological footprint (EF) is a means of comparing consumption and lifestyles, and checking this against nature's ability to provide for this consumption. The tool can inform policy by examining to what extent a nation uses more (or less) than is available within its territory, or to what extent the nation's lifestyle would be replicable worldwide. The footprint can also be a useful tool to educate people about carrying capacity and over-consumption, with the aim of altering personal behavior. Ecological footprints may be used to argue that many current lifestyles are not sustainable. Such a global comparison also clearly shows the inequalities of resource use on this planet at the beginning of the twenty-first century.

In 2003, the average biologically productive area per person worldwide was approximately 1.8 global hectares (gha) per capita. The U.S. footprint per capita was 9.6 gha, and that of Switzerland was 5.1 gha per person, while China's was 1.6 gha per person.[9] [10] The WWF claims that the human footprint has exceeded the biocapacity (the available supply of natural resources) of the planet by 20%.[11] Wackernagel and Rees originally estimated that the available biological capacity for the 6 billion people on Earth at that time was about 1.3 hectares per person, which is smaller than the 1.8 global hectares because it did not include bioproductive marine areas.[8]

A number of NGO websites allow estimation of one's ecological footprint (*see* Footprint Calculator, below).

Ecological footprinting is now widely used around the globe as an indicator of environmental sustainability.[*citation needed*] It can be used to measure and manage the use of resources throughout the economy. It can be used to explore the sustainability of individual lifestyles, goods and services, organizations, industry sectors, neighborhoods, cities, regions and nations.[12] Since 2006, a first set of ecological footprint standards exist that detail both communication and calculation procedures. They are available at www.footprintstandards.org and were developed in a public process facilitated by Global Footprint Network and its partner organizations.

[edit] Methodology

The ecological footprint accounting method at the national level is described in the Living Planet Report or in more detail in Global Footprint Network's method paper. The national accounts committee of Global Footprint Network has also published a research agenda on how the method will be improved. [13]

There have been differences in the methodology used by various ecological footprint studies. Examples include how sea area should be counted, how to account for fossil fuels, how to

account for nuclear power (many studies simply consider it to have the same ecological footprint as fossil fuels), which data sources used, when average global numbers or local numbers should be used when looking at a specific area, how space for biodiversity should be included, and how imports/exports should be accounted for.[6].[7] However, with the new footprint standards, the methods are converging.[*citation needed*]

[edit] Ecological footprint studies in the United Kingdom

The UK's average ecological footprint is 5.45 global hectares per capita (gha) with variations between regions ranging from 4.80 gha (Wales) to 5.56 gha (East England).[10] Two recent studies have examined relatively low-impact small communities. BedZED, a 96-home mixed-income housing development in South London, was designed by Bill Dunster Architects and sustainability consultants BioRegional for the Peabody Trust. Despite being populated by relatively "mainstream" home-buyers, BedZED was found to have a footprint of 3.20 gha due to on-site renewable energy production, energy-efficient architecture, and an extensive green lifestyles program that included on-site London's first carsharing club. The report did not measure the added footprint of the 15,000 visitors who have toured BedZED since its completion in 2002. Findhorn Ecovillage, a rural intentional community in Moray, Scotland, had a total footprint of 2.56 gha, including both the many guests and visitors who travel to the community to undertake residential courses there and the nearby campus of Cluny Hill College. However, the residents alone have a footprint of 2.71 gha, a little over half the UK national average and one of the lowest ecological footprints of any community measured so far in the industrialised world [14][15] Keveral Farm, an organic farming community in Cornwall, was found to have a footprint of 2.4 gha, though with substantial differences in footprints among community members.[16]

[edit] Discussion

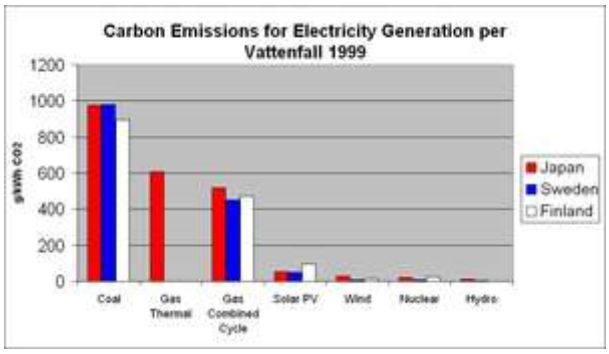
Early criticism was published by van den Bergh and Verbruggen in 1999;[17] another criticism was published in 2008.[18] A more complete review commissioned by the Directorate-General for the Environment (European Commission) and published in June 2008 provides the most updated independent assessment of the method.[19]

Grazi et al. (2007) have performed a systematic comparison of the ecological footprint method with spatial welfare analysis that includes environmental externalities, agglomeration effects and trade advantages. [20] They find that the two methods can lead to very distinct, and even opposite, rankings of different spatial patterns of economic activity. However, this should not be surprising, since the two methods address different research questions.

Calculating the ecological footprint for densely populated areas, such as a city or small country with a comparatively large population — e.g. New York and Singapore respectively — may lead to the perception of these populations as "parasitic". This is because these communities have little intrinsic biocapacity, and instead must rely upon large *hinterlands*. Critics argue that this is a dubious characterization since mechanized rural farmers in developed nations may easily consume more resources than urban inhabitants, due to transportation requirements and the unavailability of economies of scale. Furthermore, such moral conclusions seem to be an argument for autarky. Some even take this train of thought a step further, claiming that the Footprint denies the benefits of trade. Therefore, the critics argue that that the Footprint can only be applied globally.[21]

The method seems to reward the replacement of original ecosystems with high-productivity agricultural monocultures by assigning a higher biocapacity to such regions. For example, replacing ancient woodlands or tropical forests with monoculture forests or plantations may improve the ecological footprint. Similarly, if organic farming yields were lower than those of conventional methods, this could result in the former being "penalized" with a larger ecological footprint.[22] Of course, this insight, while valid, stems from the idea of using the footprint as one's only metric. If the use of ecological footprints are complemented with other indicators, such as one for biodiversity, the problem could maybe be solved. Indeed, WWF's Living Planet Report complements the biennial Footprint calculations with the Living Planet Index of biodiversity.[23] Manfred Lenzen and Shauna Murray have created a modified Ecological Footprint that takes biodiversity into account for use in Australia [24].

Although the ecological footprint model treats nuclear power the same as it treats coal power, [25] the actual real world effects of the two are radically different. A life cycle analysis centered around the Swedish Forsmark Nuclear Power Plant estimated carbon dioxide emissions at 3.10 g/kWh[26] and 5.05 g/kWh in 2002 for the Torness Nuclear Power Station.[27] This compares to 11 g/kWh for hydroelectric power, 950 g/kWh for installed coal, 900 g/kWh for oil and 600 g/kWh for natural gas generation in the United States in 1999.[28]



The Swedish utility Vattenfall did a study of full life cycle emissions of Nuclear, Hydro, Coal, Gas, Solar Cell, Peat and Wind which the utility uses to produce electricity. The net result of the study was that nuclear power produced 3.3 grams of carbon dioxide per KW-Hr of produced power. This compares to 400 for natural gas and 700 for coal (according to this study). The study also concluded that nuclear power produced the smallest amount of CO_2 of any of their electricity sources. [29]

Claims exist that the problems of nuclear waste do not come anywhere close to approaching the problems of fossil fuel waste.[30][31] A 2004 article from the BBC states: "The World Health Organization (WHO) says 3 million people are killed worldwide by outdoor air pollution annually from vehicles and industrial emissions, and 1.6 million indoors through using solid fuel."[32] In the U.S. alone, fossil fuel waste kills 20,000 people each year.[33] A coal power plant releases 100 times as much radiation as a nuclear power plant of the same wattage.[34] It is estimated that during 1982, US coal burning released 155 times as much radioactivity into the atmosphere as the Three Mile Island incident.[35] In addition, fossil fuel waste causes global warming, which leads to increased deaths from hurricanes, flooding, and other weather events. The World Nuclear Association provides a comparison of deaths due to accidents among different forms of energy production. In their comparison, deaths per TW-yr of electricity produced from 1970 to 1992 are quoted as 885 for hydropower, 342 for coal, 85 for natural gas, and 8 for nuclear.[36]

Although the ecological footprint model treats water as a very scarce resource[25], there are other sources that disagree. A January 17, 2008, article in the Wall Street Journal states, "World-wide, 13,080 desalination plants produce more than 12 billion U.S. gallons (45,000,000 m³) of water a day, according to the International Desalination Association." [37] A March 21, 2008 article in the Las Vegas Sun states that the cost of desalinizing 1,000 gallons of water is only US$3.06. [38] Even people who live far away from the ocean are benefitting from desalination. For example, after being desalinized at Jubail, Saudi Arabia, water is pumped 200 miles inland though a pipeline to the capital city of Riyadh. [39]

[edit] Ecological footprint by country

Main article: List of countries by ecological footprint

The total world ecological footprint is 2.7 global hectares per capita and the ecological reserve, or biocapacity - the amount of land availible for production, is in deficit at 0.6 global hectares per capita.[40]

[edit] See also

Environment portal

Sustainable development portal

- Carbon footprint
- Water footprint
- Dependency theory
- Ecological economics
- Ecosystem valuation
- Environmental impact assessment
- Greenhouse debt
- Life Cycle Assessment
- *Limits to Growth*
- Physical balance of trade
- Simon-Ehrlich wager
- *The Population Bomb*
- Natural capital
- List of environmental issues

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[edit] Further reading

- Rees, W. E. and M. Wackernagel (1994) Ecological footprints and appropriated carrying capacity: Measuring the natural capital requirements of the human economy, in Jansson, A.

et al. *Investing in Natural Capital: The Ecological Economics Approach to Sustainability*. Washington D.C.:Island Press. ISBN 1559633166

[edit] External links

- Global Footprint Network *Ecological Footprint : Overview*
- World Overshoot Day Day on which humanity starts consuming more than nature can regenerate in that year.
- *Footprintcalculator.org*: an interactive, flash-animated, Footprint calculator for individuals (United States, Australia Only)
- WWF "Living Planet Report", a biannual calculation of national and global footprints
- Answers to common Footprint questions
- Big Picture TV Free video clip of Mathis Wackernagel, co-creator of ecological footprint analysis
- Life Cycle Assessment, introduction
- Independent directory of service providers, databases, tools for LCA/Carbon footprint and related
- Best Foot Forward *Ecological Footprint experts*
- Ecological Footprint 2.0
- Ecological Footprint Cartogram
- UK charity specifically dedicated to sustainable development linked to ecological footprinting
- *2010 Biodiversity Indicators Partnership*

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Sustainability

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Resource use and conservation

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Sustainability disciplines, professions and activities

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International reports and agreements

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Lists and glossaries

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Topics in Industrial Ecology

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Topics on human population

acre : One U.S. acre is equal to 0.405 hectares. For U.S. audiences, Footprint results are often presented in global acres (ga) , rather than global hectares. See global hectare, hectare, local hectare.

area type : see land type

biodiversity buffer : The amount of biocapacity set aside to maintain representative ecosystem types and viable populations of species. How much needs to be set aside depends on biodiversity management practices and the desired outcome.

biological capacity or biocapacity : The capacity of ecosystems to produce useful biological materials and to absorb waste materials generated by humans, using current management schemes and extraction technologies. "Useful biological materials" are defined as those used by the human economy, hence what is considered "useful" can change from year to year (e.g. use of corn (maize) stover for cellulosic ethanol production would result in corn stover becoming a useful material, and so increase the biocapacity of maize cropland). The biocapacity of an area is calculated by multiplying the actual physical area by the yield factor and the appropriate equivalence factor. Biocapacity is usually expressed in units of global hectares.

biological capacity available per person (*or* per capita) : There were 13.4 billion hectares of biologically productive land and water on this planet in 2005. Dividing by the number of people alive in that year, 6.5 billion, gives 2.1 global hectares per person . This assumes that no land is set aside for other species that consume the same biological material as humans.

biologically productive land and water : The land and water (both marine and inland waters) area that supports significant photosynthetic activity and biomass accumulation used by humans. Non-productive areas as well as marginal areas with patchy vegetation are not included. Biomass that is not of use to humans is also not included. The total biologically productive area on land and water was approximately 13.4 billion hectares in 2005.

carbon Footprint : When used in Ecological Footprint studies, this term is synonymous with demand on CO2 area. NOTE: The phrase "Carbon Footprint" or "carbon footprint" has been picked up in the climate change debate. There are several calculators that use the phrase "Carbon Footprint", but many just calculate tonnes of carbon, or tonnes of carbon per euro, rather than demand on bioproductive area.

carbon uptake land: The demand on biocapacity required to sequester (through photosynthesis) the carbon dioxide (CO_2) emissions from fossil fuel combustion. Although fossil fuels are extracted from the Earth's crust and are not regenerated in human time scales, their use demands ecological services if the resultant CO_2 is not to accumulate in the atmosphere. The Ecological Footprint therefore includes the biocapacity, typically that of unharvested forests, needed to absorb that fraction of fossil CO_2 that is not absorbed by the ocean.

consumption : Use of goods or of services. The term consumption has two different meanings, depending on context. As commonly used in regard to the Footprint, it refers to the use of goods or services. A consumed good or service embodies all the resources, including energy, necessary to provide it to the consumer. In full life-cycle accounting, everything used along the production chain is taken into account, including any losses along the way. For example, consumed food includes not only the plant or animal matter people eat or waste in the household, but also that lost during processing or harvest, as well as all the energy used to grow, harvest, process and transport the food.

As used in Input Output analysis, consumption has a strict technical meaning. Two types of consumption are distinguished: intermediate and final. According to (economic) System of National Accounts terminology, intermediate consumption refers to the use of goods and services by a business in providing goods and services to other businesses. Final consumption refers to non-productive use of goods and services by households, the government, the capital sector, and foreign entities.

consumption components (also consumption categories) : Ecological Footprint analyses can allocate total Footprint among consumption components, typically food, shelter, mobility, goods, and services, often with further resolution into sub-components. Consistent categorization across studies allows for comparison of the Footprint of individual consumption components across regions, and the relative contribution of each category to the region's overall Footprint. To avoid double counting, it is important to make sure that consumables are allocated to only one component or sub-component. For example, a refrigerator might be included in either the food, goods, or shelter component, but not in all.

consumption Footprint : The most commonly reported type of Ecological Footprint. It is the area used to support a defined population's consumption. The consumption Footprint (in gha) includes the area needed to produce the materials consumed and the area needed to absorb the waste. The consumption Footprint of a nation is calculated in the National Footprint Accounts as a nation's primary production Footprint plus the Footprint of imports minus the Footprint of exports, and is thus, strictly speaking, a Footprint of apparent consumption. The national

average or per capita Consumption Footprint is equal to a country's Consumption Footprint divided by its population.

Consumption Land Use Matrix : Starting with data from the National Footprint Accounts, a Consumption Land Use Matrix allocates the six major Footprint land uses (shown in column headings, representing the five land types and carbon uptake land) to the five Footprint consumption components (row headings). Each consumption component can be disaggregated further to display additional information. These matrices are often used as a tool to develop sub-national (e.g. state, county, city) Footprint assessments. In this case, national data for each cell is scaled up or down depending on the unique consumption patterns in the state, county or city.

Consumption Land Use Matrix

	Built-up Land	Carbon uptake land	Cropland	Grazing Land	Forest	Fishing Ground	**Total**
Food							
Shelter							
Mobility							
Goods							
Services							
Total							

conversion factor : A generic term for factors which are used to translate a material flow expressed within one measurement system into another one. For example, a combination of two conversion factors—"yield factors" and "equivalence factors"— translates hectares into global hectares. The extraction rate conversion factor translates a secondary product into primary product equivalents.

Conversion Factor Library : See Footprint Intensity Table.

daughter product : The product resulting from the processing of a parent product. For example wood pulp, a secondary product, is a daughter product of roundwood. Similarly, paper is a daughter product of wood pulp.

double counting : In order not to exaggerate human demand on nature, Footprint Accounting avoids double counting, or counting the same Footprint area more than once. Double counting errors may arise in several ways. For example, when adding the Ecological Footprints in a production chain (e.g., wheat farm, flour mill, and bakery), the study must count the cropland for growing wheat only once to avoid double counting. Similar, but smaller, errors can arise in analyzing a production chain because the end product is used in produce the raw materials used to make the end product (e.g. steel is used in trucks and earthmoving equipment used to mine the iron or that is made into the steel). Finally, when land serves two purposes (e.g. a farmer harvests a crop of winter wheat and then plants corn to harvest in the fall), it is important not to count the land area twice. Instead, the yield factor is adjusted to reflect the higher bioproductivity of the double-cropped land.

Ecological debt : The sum of annual ecological deficits. Humanity's Footprint first exceeded global biocapacity in the mid-1980s, and has done so every year since. By 2005 this annual

overshoot had accrued into an ecological debt that exceeded 2.5 years of the Earth's total productivity.

ecological deficit / reserve : The difference between the biocapacity and Ecological Footprint of a region or country. An ecological deficit occurs when the Footprint of a population exceeds the biocapacity of the area available to that population. Conversely, an ecological reserve exists when the biocapacity of a region exceeds its population's Footprint. If there is a regional or national ecological deficit, it means that the region is importing biocapacity through trade or liquidating regional ecological assets. In contrast, the global ecological deficit cannot be compensated through trade, and is therefore equal to overshoot.

Ecological Footprint : A measure of how much biologically productive land and water an individual, population or activity requires to produce all the resources it consumes and to absorb the waste it generates using prevailing technology and resource management practices. The Ecological Footprint is usually measured in global hectares. Because trade is global, an individual or country's Footprint includes land or sea from all over the world. Ecological Footprint is often referred to in short form as Footprint (not footprint).

Ecological Footprint Standards : Specified criteria governing methods, data sources and reporting to be used in Footprint studies. Standards are established by the Global Footprint Network Standards Committee composed of scientists and Footprint practitioners from around the world. Standards serve to produce transparent, reliable and mutually comparable results in studies done throughout the Footprint Community. Where Standards are not appropriate, Footprint Guidelines should be consulted. For more information, consult www.footprintstandards.org.

ecological reserve : See ecological deficit / reserve.

embodied energy : Embodied energy is the energy used during a product's entire life cycle in order to manufacture, transport, use and dispose of the product. Footprint studies often use embodied energy when tracking trade of goods.

energy Footprint : The sum of all areas used to provide non-food and non-feed energy. It is the sum of carbon uptake land, hydropower land, forest for fuelwood, and crop land for fuel crops.

equivalence factor : A productivity based scaling factor that converts a specific land type (such as cropland or forest) into a universal unit of biologically productive area, a global hectare. For land types (e.g., cropland) with productivity higher than the average productivity of all biologically productive land and water area on Earth, the equivalence factor is greater than 1. Thus, to convert an average hectare of cropland to global hectares, it is multiplied by the cropland equivalence factor of 2.64. Pasture lands, which have lower productivity than cropland, have an equivalence factor of 0.5. See also yield factor.

extraction rate : A processing factor comparing the quantity of a parent product to the quantity of the resulting daughter product. When a parent product is processed its mass changes. For example, when wheat is processed into white flour, the bran and germ are stripped lessening its mass. Therefore, in order to calculate the number of hectares needed to produce a given mass of flour, an extraction rate is needed. This extraction rate in this example is the ratio of tonnes of flour divided by the tonnes of wheat processed to produce the flour.

Footprint Intensity : The number of global hectares required to produce a given quantity of resource or absorb a given quantity of waste, usually expressed as global hectares per tonne. The National Footprint Accounts calculate a primary Footprint Intensity Table for each country, which includes the global hectares of primary land use type needed to produce or absorb a tonne of product (i.e., global hectares of cropland per tonne of wheat, global hectares of forest per tonne carbon dioxide).

Footprint Intensity Table : A collection of the primary and secondary product Footprint intensities from the National Footprint Accounts. Footprint intensity is usually measured in gha per tonne of product or waste (CO2). The Footprint Intensity Table is maintained by Global Footprint Network, supported by the Network's National Accounts Committee.

Footprint neutral or negative : Human activities or services that result in no increase or a net reduction in humanity's Ecological Footprint . For example, the activity of insulating an existing house has a Footprint for production and installation of the insulation materials. This insulation in turn reduces the energy needed for cooling and heating this existing house. If the Footprint reduction from this energy cutback is equal to or greater than the original Footprint of insulating the house, the latter becomes a Footprint neutral or negative activity. On the other hand, making a new house highly energy efficient does not by itself make the house Footprint neutral, unless at the same time it causes reduction in other existing Footprints. This Footprint reduction has to be larger than the Footprint of building and occupying the new house.

global hectare (gha) : A productivity weighted area used to report both the biocapacity of the earth, and the demand on biocapacity (the Ecological Footprint). The global hectare is normalized to the area-weighted average productivity of biologically productive land and water in a given year. Because different land types have different productivity, a global hectare of, for example, cropland, would occupy a smaller physical area than the much less biologically productive pasture land, as more pasture would be needed to provide the same biocapacity as one hectare of cropland. Because world bioproductivity varies slightly from year to year, the value of a gha may change slightly from year to year.

Guidelines (for Footprint studies) : Suggested criteria governing methods, data sources and reporting for use when Footprint Standards are not appropriate or not yet developed.

hectare : 1/100th of a square kilometre, 10,000 square meters, or 2.471 acres. A hectare is approximately the size of a soccer field. See also global hectare and local hectare

IO (Input-Output) analysis : Input-Output (IO, also I-O) analysis is a mathematical tool widely used in economics to analyze the flows of goods and services between sectors in an economy, using data from IO tables**.** IO analysis assumes that everything produced by one industry is consumed either by other industries or by final consumers, and that these consumption flows can be tracked. If the relevant data are available, IO analyses can be used to track both physical and financial flows. Combined economic-environment models use IO analysis to trace the direct and indirect environmental impacts of industrial activities along production chains, or to assign these impacts to final demand categories. In Footprint studies, IO analysis can be used to apportion Footprints among production activities, or among categories of final demand, as well as in developing Consumption Land Use Matrices .

IO (Input-Output) tables : IO tables contain the data that are used in IO analysis. They provide a comprehensive picture of the flows of goods and services in an economy for a given

year. In its general form an economic IO table shows *uses*--the purchases made by each sector of the economy in order to produce their own output, including purchases of imported commodities; and *supplies*--goods and services produced for intermediate and final domestic consumption, and exports. IO tables often serve as the basis for the economic National Accounts produced by national statistical offices. They are also used to generate annual accounts of the Gross Domestic Product (GDP).

land type : The Earth's approximately 13.4 billion hectares of biologically productive land and water are categorized into five types of surface area: cropland, grazing land, forest, fishing ground, and built-up land. Also called ”area type.”

life cycle analysis (LCA) : A quantitative approach that assesses a product's impact on the environment throughout its life. LCA attempts to quantify what comes in and what goes out of a product from “cradle to grave,” including the energy and material associated with materials extraction, product manufacture and assembly, distribution, use and disposal and the environmental emissions that result. LCA applications are governed by the ISO 14040 series of standards (http://www.iso.org).

local hectare : A productivity weighted area used to report both the biocapacity of a local region, and the demand on biocapacity (the Ecological Footprint). The local hectare is normalized to the area-weighted average productivity of the specified region's biologically productive land and water. Hence, similar to currency conversions, Ecological Footprint calculations expressed in global hectares can be converted into local hectares in any given year (e.g., Danish hectares, Indonesian hectares) and vice versa. The amount of Danish hectares equals the amount of bioproductive hectares in Denmark – each Danish hectare would represent an equal share of Denmark's total biocapacity.

National Footprint Accounts : The central data set that calculates the Footprints and biocapacities of the world and roughly 150 nations from 1961 to the present (generally with a three year lag due to data availability). The ongoing development, maintenance and upgrades of the National Footprint Accounts are coordinated by Global Footprint Network and its 70 plus partners.

natural capital : Natural capital can be defined as all of the raw materials and natural cycles on Earth. Footprint analysis considers one key component, *life supporting* natural capital, or ecological capital for short. This capital is defined as the stock of living ecological assets that yield goods and services on a continuous basis. Main functions include resource production (such as fish, timber or cereals), waste assimilation (such as CO2 absorption or sewage decomposition) and life support services (such as UV protection, biodiversity, water cleansing or climate stability).

nuclear Footprint : Until the 2008 edition of the National Footprint Accounts, the Footprint of electricity generated by nuclear power was treated as equivalent, per kilowatt, to the world average Footprint of fossil-fuel derived electricity. As of the 2008 edition, this Footprint component is no longer included in the national calculations. This does not mean that the use of nuclear energy is free of risk or demands on the environment, only that these risks and demands are not easily expressed in terms of biocapacity. More specific concerns related to nuclear electricity include costs and undue subsidies, future waste storage, the risk of plant accidents, weapons proliferation and security risks.

overshoot : Global overshoot occurs when humanity's demand on nature exceeds the biosphere's supply, or regenerative capacity. Such overshoot leads to a depletion of Earth's life supporting natural capital and a build up of waste. At the global level, ecological deficit and overshoot are the same, since there is no net-import of resources to the planet. Local overshoot occurs when a local ecosystem is exploited more rapidly than it can renew itself.

parent product : The product processed to create a daughter product. For example wheat, a primary product, is a parent product of flour, a secondary product. Flour, in turn, is a parent product of bread.

Planet Equivalent(s) : Every individual and country's Ecological Footprint has a corresponding Planet Equivalent, or the number of Earths it would take to support humanity's Footprint if everyone lived like that individual or average citizen of a given country. It is the ratio of an individual's (or country's per capita) Footprint to the per capita biological capacity available on Earth (2.1 gha in 2005). In 2005, the world average Ecological Footprint of 2.7 gha equals 1.3 Planet Equivalents.

primary product : In Footprint Studies a primary product is the least processed form of a biological material that humans harvest for use. There is a difference between the raw product, which is all the biomass produced in a given area, and the primary product, which is the biological material humans will harvest and use. For example, a fallen tree is a raw product that, when stripped of its leaves and bark, results in the primary product of roundwood. Primary products are then processed to produce secondary products like wood pulp, paper, and so on. Other examples of primary products are potatoes, cereals, cotton, or forage. Examples of secondary products are kWh of electricity, bread, clothes, beef, or appliances.

primary production Footprint (also primary demand) : In contrast to the consumption Footprint, a nation's primary production Footprint is the sum of the Footprints for all of the resources harvested and all of the waste generated within the defined geographical region. This includes all the area within a country necessary for supporting the actual harvest of primary products (cropland, pasture land, forestland and fishing grounds), the country's built-up area (roads, factories, cities), and the area needed to absorb all fossil fuel carbon emissions generated within the country. In other words, the forest Footprint represents the area necessary to regenerate all the timber harvested (hence, depending on harvest rates, this area can be bigger or smaller than the forest area that exists within the country). Or, for example, if a country grows cotton for export, the ecological resources required are not included in that country's consumption Footprint; rather, they are included in the consumption Footprint of the country that imports the t-shirts. However, these ecological resources *are* included in the exporting country's primary production Footprint.

productivity : The amount of biological material useful to humans that is generated in a given area. In agriculture, productivity is called yield.

secondary product : All products derived from primary products or other secondary products through a processing sequence applied to a primary product.

tonnes : All figures in the National Footprint Accounts are reported in metric tonnes. One metric tonne equals 1000 kg, or 2205 lbs.

yield : The amount of regenerated primary product, usually reported in tonnes per year, that humans are able to extract per area unit of biologically productive land or water.

yield factor : A factor that accounts for differences between countries in productivity of a given land type. Each country and each year has yield factors for cropland, grazing land, forest, and fisheries. For example, in 2005, German cropland was 2.3 times more productive than world average cropland. The German cropland yield factor of 2.3, multiplied by the cropland equivalence factor of 2.6 converts German cropland hectares into global hectares: one hectare of cropland is equal to 6.0 gha.

Note that primary product and primary production Footprint are Footprint specific terms. They are not related to, and should not be confused with the ecological concepts of primary production, gross primary productivity (GPP) and net primary productivity (NPP)

http://www.footprintnetwork.org/en/index.php/GFN/page/glossary/