Our Global Field

2000 m² for everyone!

Impressum

Publisher:
Foundation on Future Farming
Zukunftsstiftung Landwirtschaft

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December 2024

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Hello!

May we introduce those who feed you?

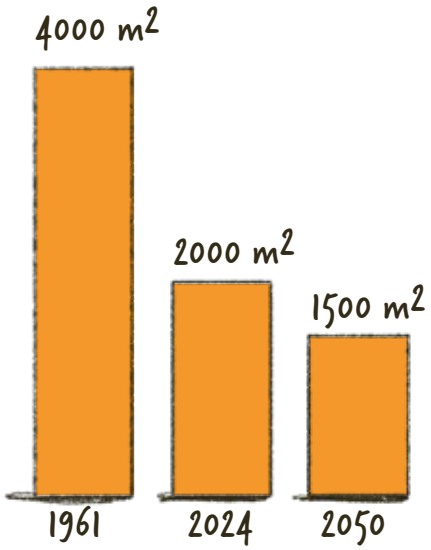
No matter what you have on your plate, someone somewhere has grown and harvested it for you. Do you always know where your food comes from and the story that each bite carries with it? We would like to take you on a little journey to the place that feeds you, a journey to your 2000 m^2 Global Field: your 'Weltacker'. *

We are currently around 8 billion people living on this planet. While that number continues to grow, the size of the Earth remains the same. This raises many questions for our future, including whether there will be enough food. Let's see what's available: globally there are about 1.6 billion hectares of arable land and 3.2 billion hectares of meadows and pastures.

This results in a manageable 2000 m^2 of arable land and 4000 m^2 of pasture per person. Everything you need must grow on 'your' 2000 square metres of arable land: wheat, rice, potatoes, vegetables, fruit, cooking oil, sugar, all the animal feed that does not come from the pastures, cotton for your clothes and tobacco if you smoke. Even biodiesel for your car or biogas for electricity and heat!

Have you ever thought about your part in the world's agriculture?

Arable land per person
past, present, future[1]



* 'Weltacker' is the original German term for the Global Field.

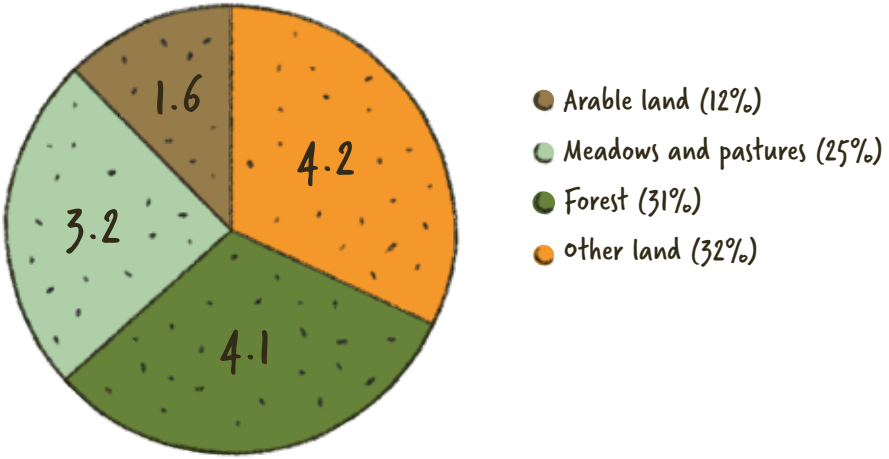
Size ratios

So how big is 2000 m² actually?

Try to visualise 40 by 50 metres, for example, or even 20 by 100. That's 175 parking spaces for cars, two 50-metre swimming pools with eight swimming lanes each, or a third of a soccer pitch[2], significantly more land than most allotment gardeners would like to cultivate in their free time.

On the other hand, most farming families in Asia and Africa have just 2000 m² at their disposal. More than 80 percent of the world's farmers cultivate just two hectares (20,000 m²) of land or less[3] and thus only farm around 12 percent of the world's agricultural land. Nevertheless, they produce over a third of the world's food.[4] On small farms such as these, most of the yield is used directly as food, while on larger farms, more of the production goes towards animal feed and processing.[5]

Global distribution of the Earth's surface area (in billions of hectares)



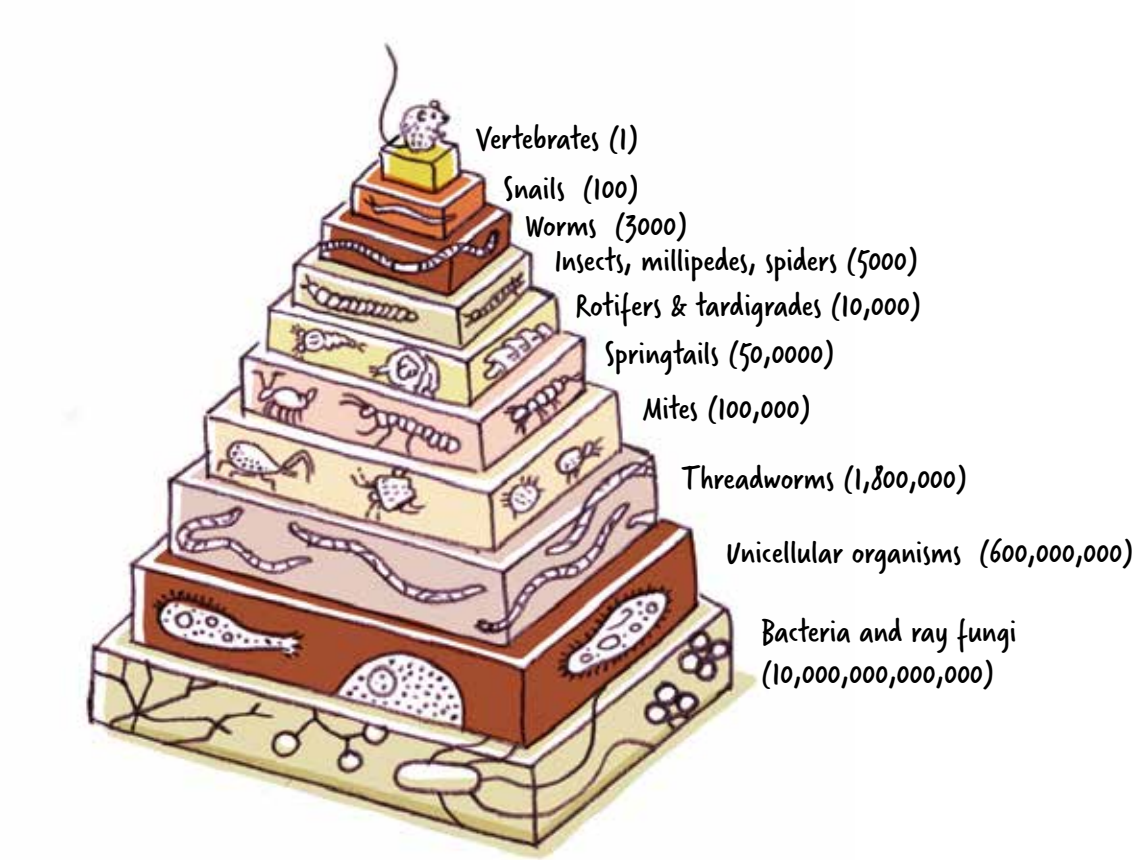
11% of the Earth's surface (excluding the oceans and Antarctica) is arable land. In addition, around 1% is made up of permanent crops such as vines and fruit. 25% is pasture (both barren and rich), 31% is forest and 32% is 'other land': mainly deserts, cities and roads, and inland waters.[6]

The big hustle and bustle

Who lives on your 2000 m^2?

When well cared-for, your 2000 m^2 are teeming with life: trillions of microorganisms, billions of fungi, algae, protozoa, millions of bristle worms, springtails and mites, thousands of millipedes and, of course, earthworms that work the soil.[7] Moles, mice and birds feed on your land, while bees, bumblebees and butterflies thrive on the flowers in your field.

In total, no fewer than 20 quadrillion creatures could be living on your 2000 m^2, weighing around two tonnes. We don't want to lose any of them. They are all important. The soil is only fertile and healthy when it's crawling and buzzing with life!



The smaller the better! Who would have thought that all these creatures can live on just one square metre of fertile soil?[8]

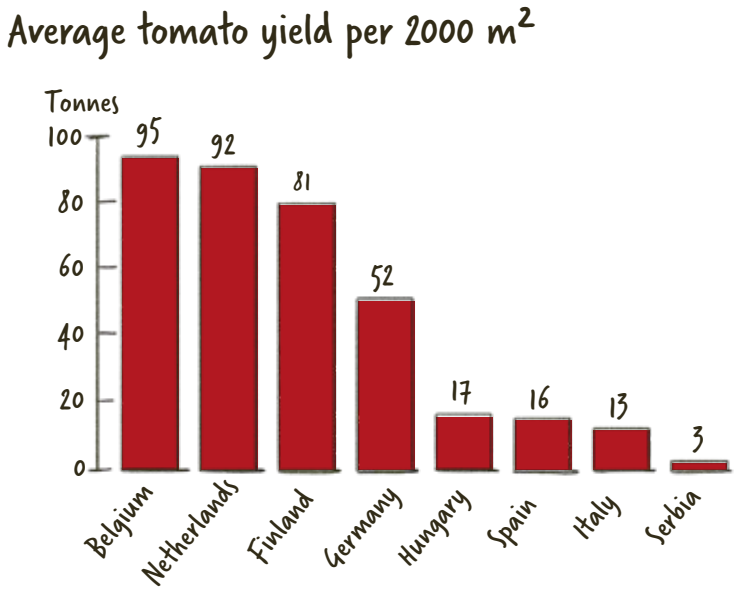
More than you can eat!

How much can be grown on 2000 m^2?

It's unbelievable just how much can be grown on 2000 m^2!

Tonnes of avocados, tomatoes, cabbage, wheat and potatoes. Definitely more than you could ever eat in a year. However, yields vary greatly depending on the location, the weather in a given year and the type of cultivation. For example, tomatoes have the highest yields in northern countries, where cultivation takes place in greenhouses and is therefore no longer so dependent on the season. However, most tomatoes in Europe come from Italy and Spain.

Very high yields per square metre are often the result of a particularly high use of energy, artificial fertilisers, pesticides and irrigation: growing as much as possible, in as little space as possible, is not necessarily good for the environment!



The huge difference in yield per hectare between countries (especially for vegetables) does not indicate that Belgium is more fertile than Italy.[9]

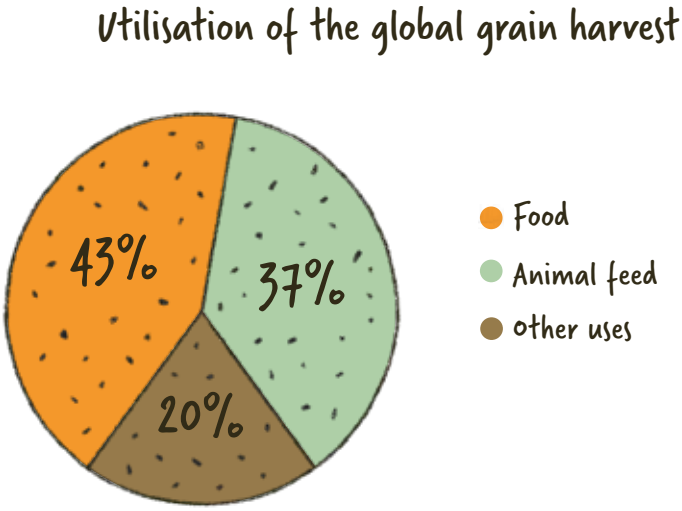

5200 kg
AUBERGINES
Greece
700 kg
CABBAGES
Czech Republic
400 kg
CAULIFLOWERS
Poland
15.000 kg
TOMATOES
Spain
9150 kg
CARROTS
China
6900 kg
ONIONS
Egypt
400 kg
OLIVES
Slovenia
2200 kg
AVOCADOS
Cyprus
2176 kg
Maize
USA
1100 kg
WHEAT
Sweden
590 kg
SOYA
Brazil
500 kg
GREEN BEANS
France
8500 kg
POTATOES
Germany
So that we don't get the wrong idea, only one of these piles grows on 2000 m2- not all piles together at once!

The ‘Weltacker’

The most important arable crops and their share

The world's 1.6 billion hectares of arable land is home to an incredible diverse range of crops, of which most of us know only a few. Our ‘Weltacker’ shows to scale how many hectares of arable land on earth are cultivated with which crops. Just under half of our Global Field is taken up with just four plant species: wheat, maize, rice and soybeans. Fruit and vegetables take up less than five percent each of our ‘Weltacker’.[10]

With the exception of rice, only a small proportion of the yield of the world's main monocultures crops is processed directly as food. The majority is fed to animals or converted into biofuels and industrial raw materials. For example, less than half of the grain harvest is used directly as food. Over one third is fed to animals.[11]



Over 2.8 billion tonnes of grains were harvested worldwide in 2023: a record! Less than half of this was used as food.[11]

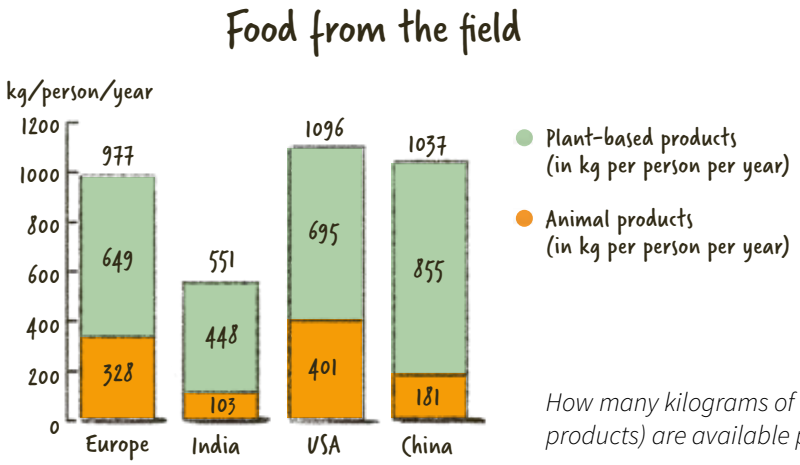
1) Wheat 13% 2) Maize 12% 3) Rice 10% 4) other grains 9% 5) oilseeds 11% 6) Soya 8%
7) Green fodder 9% 8) Luxury food 7% 9)Cotton 2% 10) Nuts 1% 11) Fruit 4%
12) Pulses 6% 13) Natural fibres 0.2% 14) Vegetables 4% 15) Tubers 4%

Kitchen inventory

How much do we need? How much do we have?

Kitchens, canteens, restaurants and supermarkets are the places where we cast our vote of what to grow on our 2000 m^2. With every purchase, we give farmers a mandate as to what they should produce and how good the quality should be. Every ingredient, every salad leaf, every loaf of bread, every sausage and every bag of potato chips has its own special place where it was grown and which it shapes as a result. In the case of 'ready meals', there are usually many places involved, often thousands of kilometres apart.

In Europe, most people, whether rich or poor, face the challenge of resisting the temptation to overeat and to eat the wrong things. Here, around 3500 calories are available per person (from infants to the elderly) every day.[12] Anyone who consumes 3500 calories a day and is not involved in competitive sport, hard physical labour, or is breastfeeding, will become overweight, which can be life-threatening at some point. In Afghanistan, an average of just 2200 calories are available, which is hardly enough for a healthy life.[13] In contrast, the 2500 in India and 3400 in China are more than enough. Nevertheless, in all three of these countries, millions of people go hungry because of unequal distribution. Malnutrition and overnutrition often live side by side. Worldwide, 3.1 billion people (42 percent of the world's population) cannot afford to eat a healthy diet; in Africa, the figure is as high as 78 percent of the population.[14]



How many kilograms of food from plant and animal origins (including dairy products) are available per person in different regions of the world? [12]

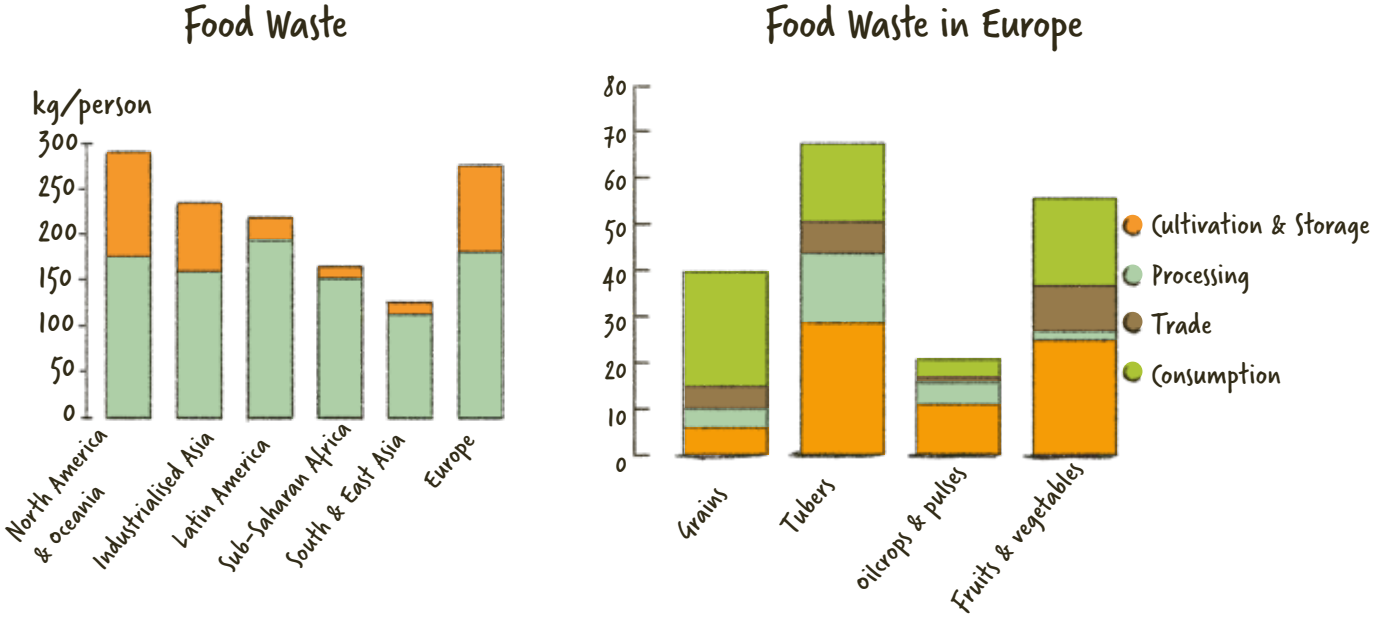

It's too crowded here. I'd rather go to an Italian restaurant!

Loss and waste

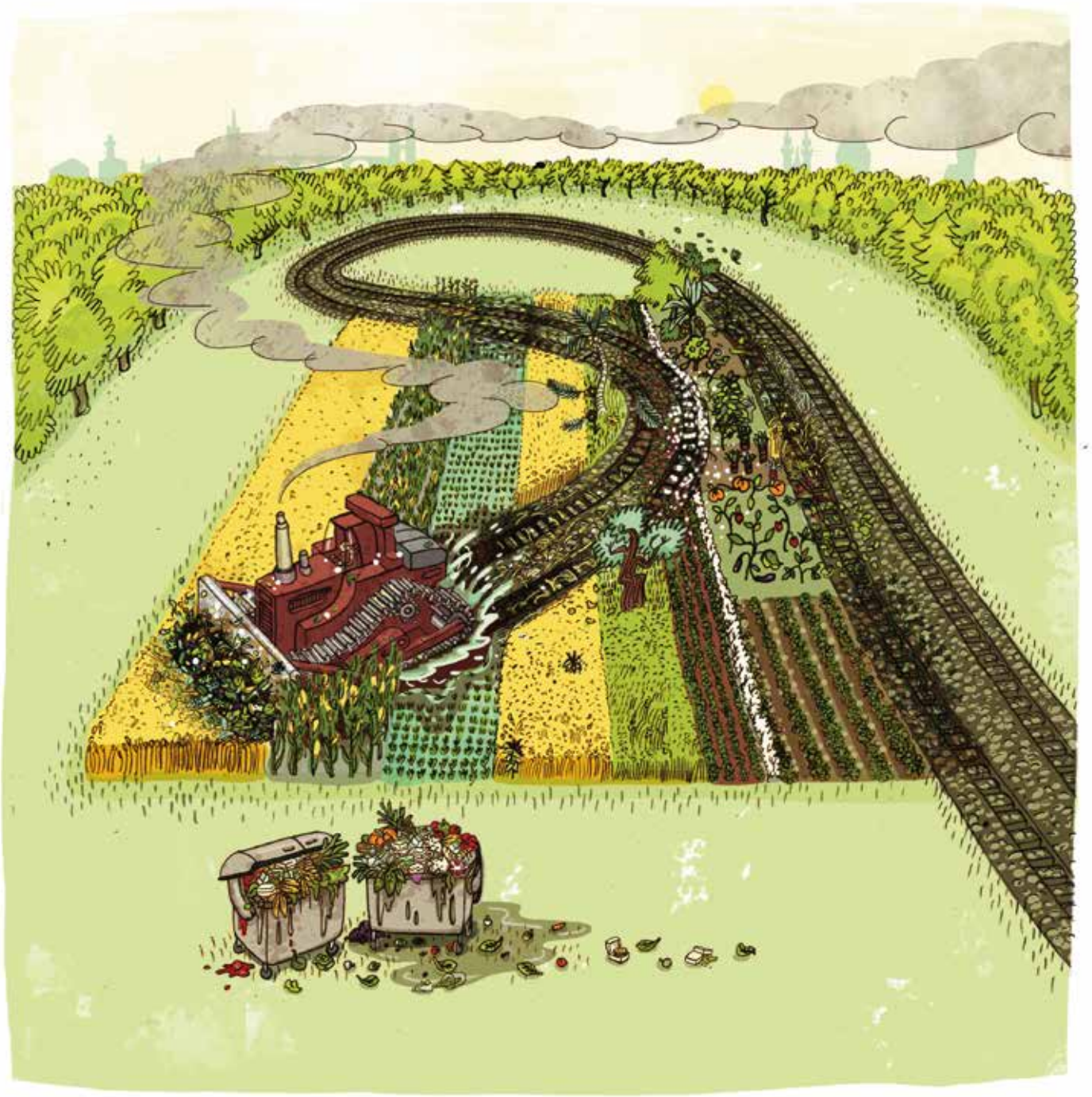
What's lost along the way?

To put 2000 calories on the plate, an average of 4600 calories have to be harvested from the fields worldwide.[15] The Food and Agricultural Organisation of the United Nations (FAO) estimates that 1.3 billion tonnes (or 32 percent of all food) is either lost or wasted: in the field, after harvesting, during processing and transportation[16], in supermarkets, bakeries, restaurants and in private households.

In industrialised countries, food is now so cheap that its real value is no longer appreciated. This is true in agriculture, trade, industry, restaurants and in many private households. Everything must be available fresh until closing time, best-before dates are misleading, the waste bin is filling up. As long as it has been sold beforehand, waste means good business! In the non-industrial regions of the world, losses after the harvest are often higher due to the climate and lack of technology. Consumers there, on the other hand, are much more careful with their food.



The more we have, the more we waste. In Europe, we waste a particularly large amount of grains (baked goods) and fruit and vegetables.[16]



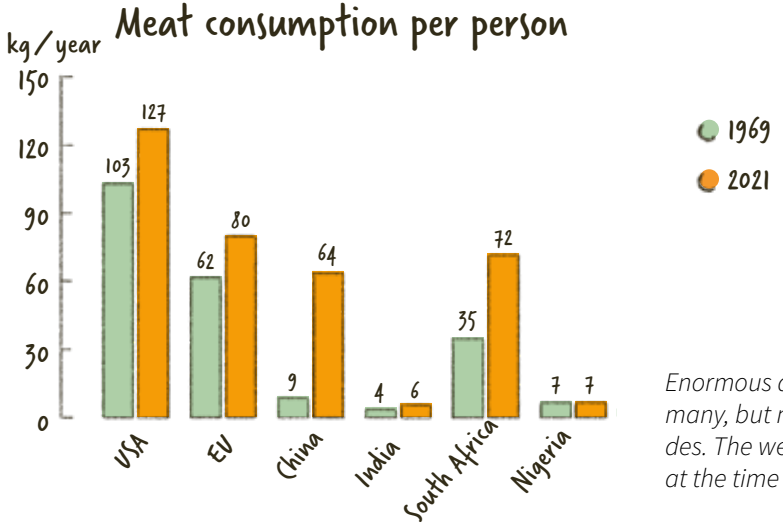
Pigging out

Two pigs would eat the entire harvest of your field!

We don't know the names of these two animals, but they are among the 52 million pigs in Germany, 240 million in the EU, and 1.5 billion worldwide[17] that are slaughtered every year. Around nine square metres of arable land are required to produce the concentrated feed (grain, maize, and soy) needed for each kilogram of pork.[18]

Our 2000 m^2 of land can provide just enough feed to fatten two pigs, if slaughtered at the usual weight of around 115 kilograms. However, this amount of pork is not even enough to meet the consumption of six EU citizens, who eat around 40 kg each per year.[19] This illustrates why many people struggle to sustain themselves on 2000 m^2 of land. During their short lives, our two pigs may be treated with antibiotics up to five times.[20] According to the EU Animal Welfare Directive[21], up to 2000 adult pigs could be kept on this same land: one pig per square metre.

Meat consumption continues to rise globally. Over the past 50 years, it has more than tripled, growing from 110 million tonnes to 350 million tonnes. However, per capita consumption varies significantly across regions. In India, for example, meat consumption has remained relatively unchanged over time.



Enormous differences: meat consumption has risen in many, but not all, regions of the world in recent decades. The weight in kilograms refers to the live weight at the time of slaughter.[22]


Go vegan!
Mixed feed

The global climate

What does our diet have to do with climate change?

The atmosphere, the gaseous envelope surrounding the earth, makes life on our planet possible. Its composition is significantly influenced by life itself and has changed dramatically throughout various geological eras. Water vapour and trace gases, such as carbon dioxide, methane, and nitrous oxide, trap part of the energy radiating onto the earth, causing the surface to absorb more heat than it releases. This natural greenhouse effect is what allows life as we know it to exist. Without it, the average global temperature would be -18°C instead of +15°C.[23]

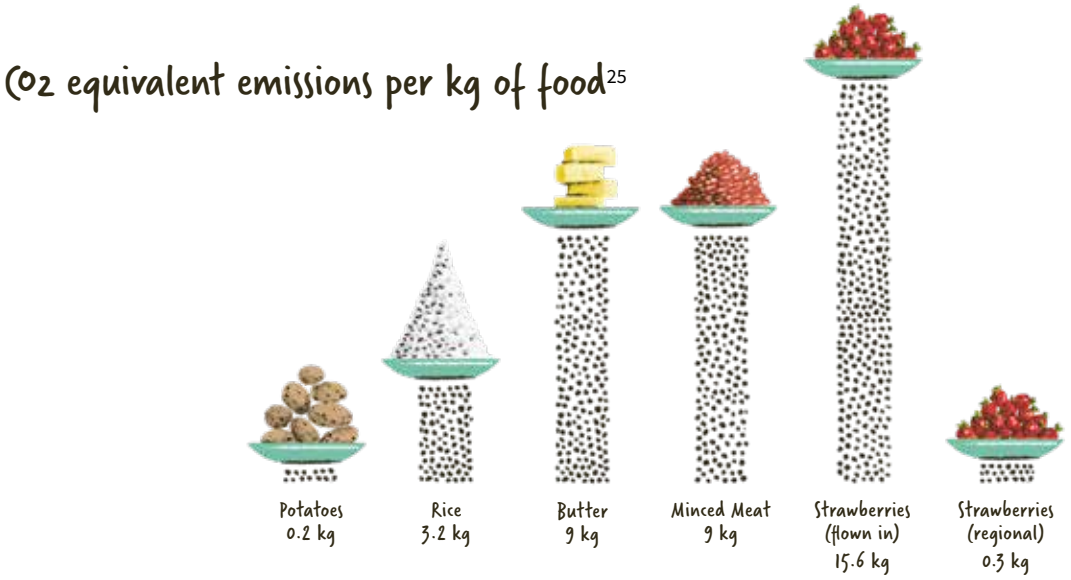
When humans cause the release of more greenhouse gases (particularly CO_2) into the atmosphere than natural processes can absorb, we increase the earth's temperature. But how do we manage to release this level of greenhouse gas emissions in the first place? To answer this, we must look at the carbon present in all living organisms, which combines with oxygen to form CO_2 in the atmosphere. During photosynthesis, plants absorb CO_2 using solar energy and release oxygen. The CO_2, combined with water, is converted into sugars that form leaves, stems, roots, and other organic matter. This photosynthesis nourishes animals, fungi, microorganisms, and humans.

Thus, plants remove carbon from the atmosphere. Some of it returns to the cycle when microorganisms break down plant matter into CO_2, or when wood burns. Another portion is permanently stored in soil and on the seabed.

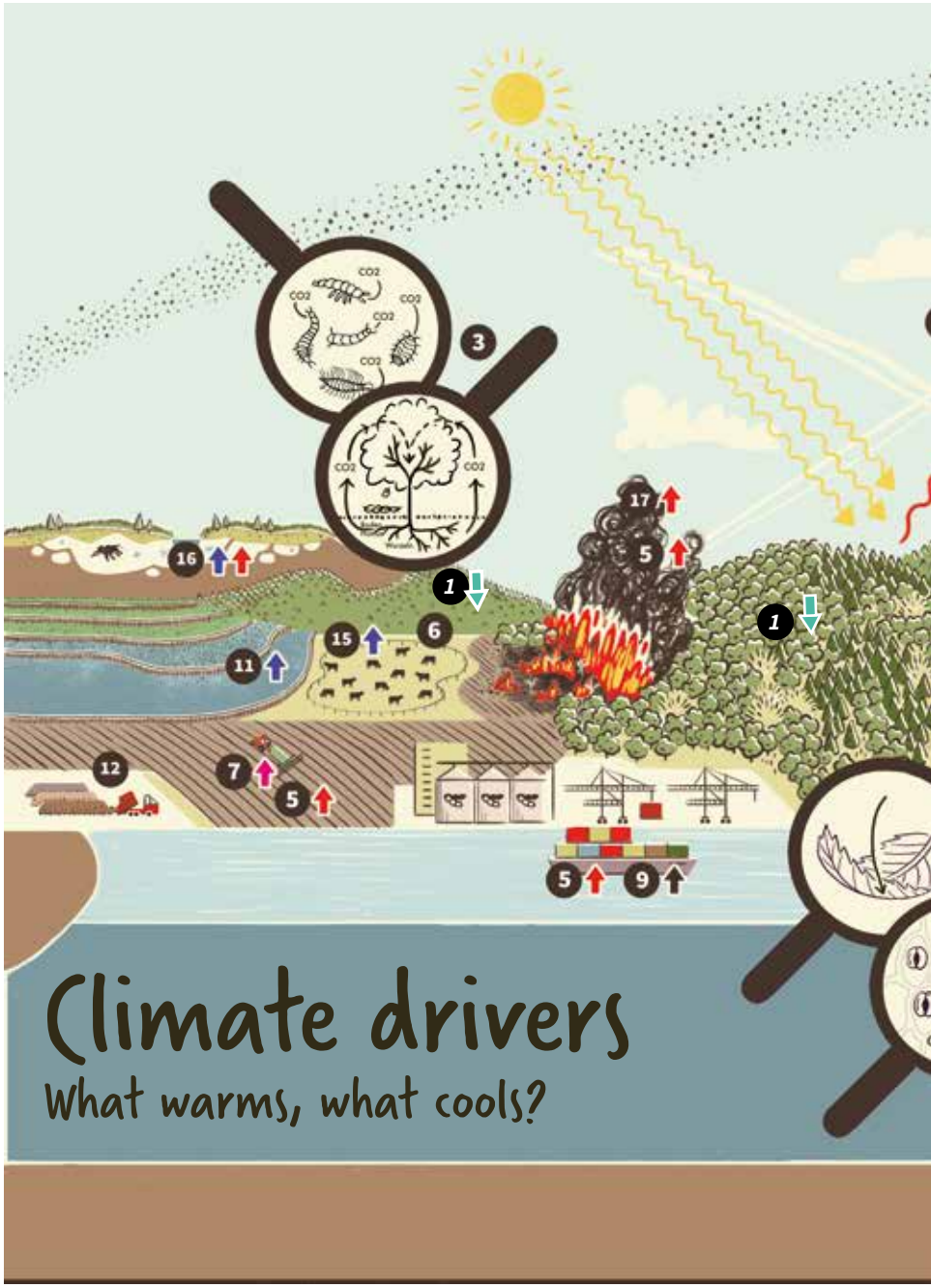
For thousands of years, the carbon cycle remained relatively stable, until about 200 years ago when humans began extracting and burning increasing amounts of fossil fuels, i.e. carbon stored in the earth as oil, coal, and natural gas. Simultaneously, we are reducing the carbon storage in soils by converting forests, wetlands, and meadows into farmland, settlements, and deserts.

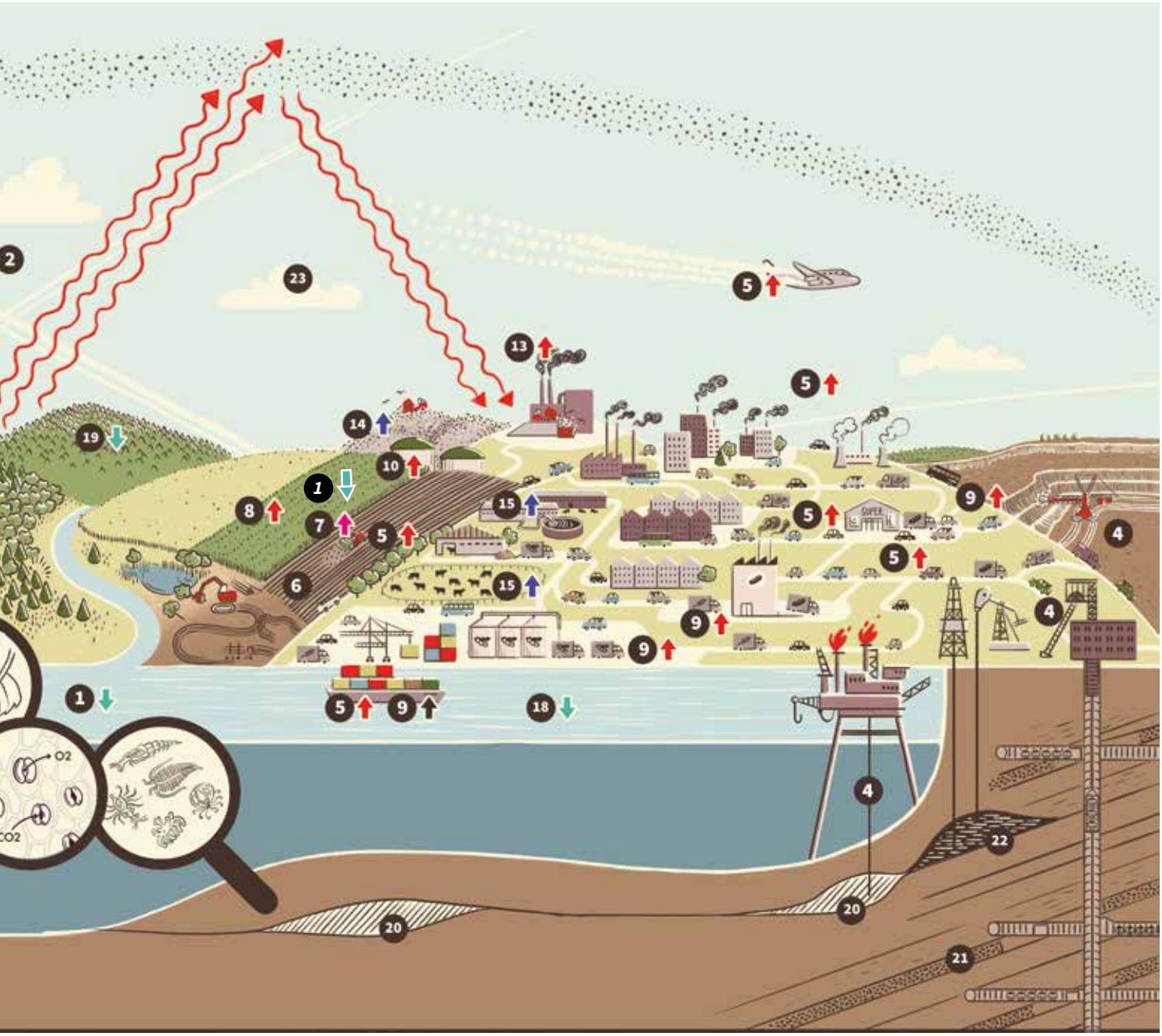
Nearly 40 percent of all additional greenhouse gases emitted by humans are directly or indirectly linked to food and agricultural production. These emissions come from deforestation, chemicals, mechanisation, cultivation, transportation, cooling, heating, packaging and food waste. Agriculture also significantly contributes to the emission of high-impact greenhouse gases like methane (from livestock fermentation and wet-rice fields) and nitrous oxide (from fertilisers). To achieve the Climate Convention's goal of limiting global warming to 1.5°C, we must reduce these emissions by almost 90 percent by 2050.[24]

From the field to the plate and ultimately to waste, different foods vary starkly in the level of emissions they are responsible for. Since one calorie of animal product requires significantly more plant calories to produce it, and methane is also emitted in the process, meat and dairy products have a particularly high greenhouse gas footprint. Meat and milk from cows grazing on local pastures are more climate-friendly than those from animals fed soy imported from Brazil. A strawberry flown halfway around the world is a far bigger contributor to climate change than a locally grown one- unless it comes from an oil-heated greenhouse. The energy used for freezing and heating during processing also plays a critical role in determining the extent of the detrimental impact on the climate.



1 Photosynthesis
2 Greenhouse effect
3 Soil respiration
4 Mining & oil production
5 Burning fossil fuels
6 Land use change
7 Fertilisers
8 Mostly conventional food & non-food production on the field
9 Transport
10 Biogas facilities & maize fields
11 Wet-rice cultivation
12 Composting
13 Waste incineration
14 Landfill
15 Animal husbandry stables/pastures
16 Permafrost soils
17 Deforestation
18 Storage in the ocean
19 Storage in forests
20 Gas
21 Coal
22 oil
23 Water vapour





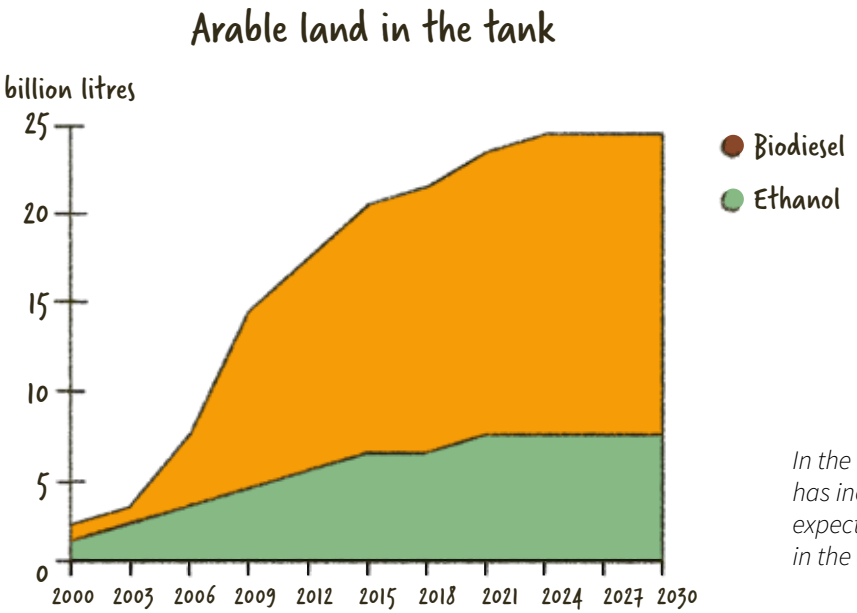
- Release of nitrous oxide
- Release of methane

Burning Out

How far can you travel with 2000 m^2?

Is producing fuel and energy from agricultural fields truly a sustainable solution to the climate crisis? Let's do the maths: the average rapeseed yield from 2000 m^2 of land in the European Union is about 650 kilograms, which can be converted into 272 litres of diesel. With a consumption rate of roughly 7 litres per 100 kilometres, this would allow a vehicle to travel around 3900 kilometres, just enough for a round trip from Brussels to Lisbon. However, this would use up the entire arable land for a year, leaving nothing to eat except for the remnants of the seed, a 'pressed rapeseed cake', which is typically used as animal feed. On average, a car in the EU covers 10,000 kilometres per year.

In Germany, nearly one-fifth of all arable land is dedicated to producing biofuel and energy through biogas facilities. If Germany's cars reduced fuel consumption by just one litres per 100 kilometres, the savings would exceed the total fuel and biogas output from these fields.[26]



In the European Union, the production of biofuels has increased enormously in recent years. It is expected to reach its maximum of 25 billion litres in the coming years.[27]


Mumbai - Delhi 1389 km
Rome - Paris 1459 km
Berlin - Bucharest 1729 km

Chemicals in the field

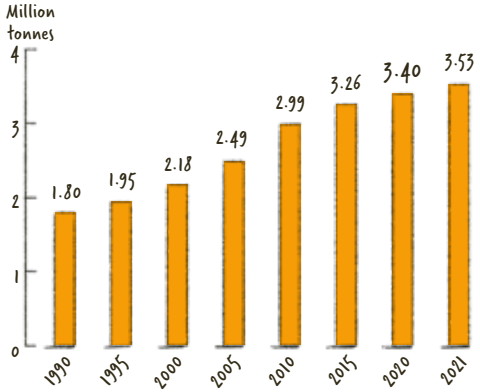
Will artificial fertilisers and pesticides save us from hunger?

Artificial fertilisers and synthetic pesticides were introduced after the First World War and have dominated industrial agriculture worldwide since the 1960's. They offer the promise of high yields with minimal labour, particularly in monoculture systems. However, the widespread use of these chemicals has severe consequences. Traces of pesticides can now be detected almost everywhere, posing threats to biodiversity and human health. This ongoing battle waged against nature, with the latest weapon in the arsenal being genetic engineering, has led to natural resistance arising in plants, insects, and fungi, making it an unwinnable fight in the long term.[28]

Artificial fertilisers are among the leading drivers of greenhouse gas emissions, mainly due to their high energy consumption and the release of nitrous oxide. Their use disrupts the natural nutrient balance in the soil, makes crops more susceptible to diseases, and increases nitrate content in groundwater. Excess fertilisers also suffocate lakes and rivers, causing eutrophication and creating dead zones along many of the world's coasts.

The alternative to chemicals is to use agro-ecological and organic cultivation methods that increase the soil fertility by building up humus. Approaches using mixed crops and crop-rotation instead of monocultures, as well as a variety of targeted individual measures, help to avoid pesticides. These methods are usually more labour-intensive and require more skill and care. However, they are worthwhile for the climate, biodiversity in the fields[29] and for the quality of the products[30].

Global trend in pesticide use



Pesticide use has been increasing year after year, with no signs of it slowing down in the future.[31]


Pesticides
Fertiliser

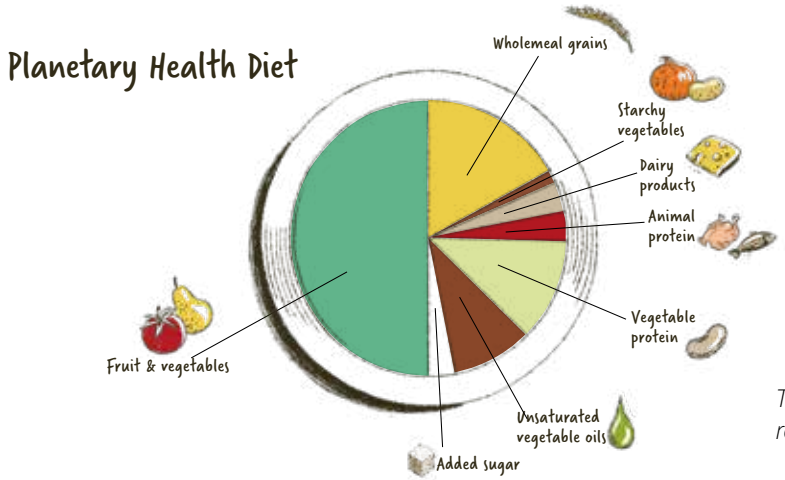
Healthy People, Healthy Planet

What could the diet of the future look like?

In 2050, almost 10 billion people will be living on this planet. How can we then feed ourselves so that everyone is healthy, and the ecosystems are not overloaded? A working group of international scientists (the EAT-Lancet Commission) has ventured a global answer to this question and presented a 'Planetary Health Diet'.[32] According to this report, we need to consume significantly fewer animal products, more plant-based protein and whole grains, much more fruits, vegetables and nuts. And ideally all of this should be less processed, locally produced, organically grown (or at least without artificial fertilisers and toxins) and with significantly less waste.

Of course, this 'magic formula' does not always look the same in different regions of the world or socioeconomic classes. However, the basic ground rules of healthy, sustainable and wholesome nutrition tend to be similar across the world. Eating 'healthy' and 'enough' can have a radically different meaning for different people: for many of us this means eating significantly less (and better quality) than we do currently, while for millions of people, this means eating much more than they do now to meet their needs.

These findings are not entirely new to most of us. We just need to do what we have known for a long time and not allow ourselves and our children to be seduced by a billion-dollar advertising industry into a constant excess of sugar, fat, meat and empty calories in artificial products. Things that are healthy for us usually leave the environment better off too.



This is what your plate could look like if you follow the recommendations of the EAT-Lancet Commission.[32]

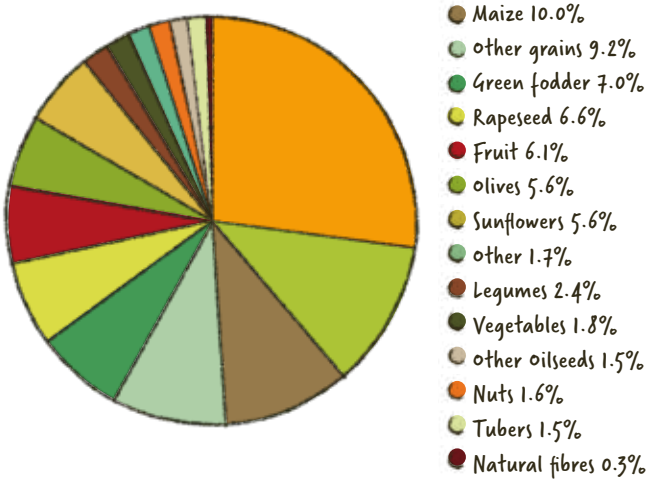
Land Grabbing

Why can't the rich EU feed itself?

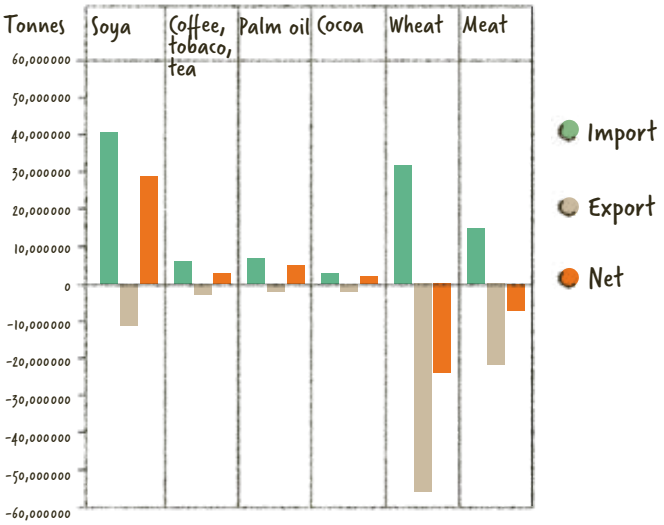
The European Union has more arable land per person than the global average, around 2500 m^2. In India it is 1200 m^2, in China 880 m^2 and in Switzerland only around 500 m^2. In the USA, on the other hand, there is 4760 m^2 and in Argentina almost 10,000 m^2 per person.[33] Wheat, barley, maize, other grains and oilseeds are the most important arable crops in Europe. Most of it is used as animal feed, and increasingly also for energy and fuel production.

If we compare the area of arable land used for crops imported into the EU (e.g. soy) with the area used for crops that we export (e.g. wheat), this results in a net import of around 21 million extra hectares of food brought in from other countries around the world. That makes an additional 500 m^2 of arable land per person, bringing the consumption up to a total of 3000 m^2 per person[34]. Yet Europe has excellent soils and climatic conditions, and the underlying technical and financial conditions are (theoretically) optimal. So why can't the EU feed itself? Because we can afford to import, and agricultural products are too cheap on the world market? A large proportion of our imported goods from arable land is not intended for our food.

What grows on the EU's fields[35]



EU Export/Import[36]




2000 m2
Wheat
Barley
other grains
Maize
Kape-seed
Nuts
Pulses
Fibres
Vegetables
Fruit
other oilcrops
potatoes
1000 m2
SOYA
Brazil
Argentinia
USA
COCOA
Ivory Cost
Ghana
Cameroon
RICE
Pakistan
Myanmar
Thailand
COFFEE
Brazil
Uganda
Vietnam
PULSES
Argentinia
USA
Russia
COTTON
India
Pakistan
Benin
SUN-FLOWERS
Ukraine
Russia
Argentinia
PALM OIL
Indonesia
Malaysia
Papua New Guinea
FLAX
Kazakh-stan
Russia
Canada
KAPE-SEEDS
Australia
Ukraine
Canada
RUBBER
Indonesia
Thailand
Ivory Cost
Nuts
Phillipines
Argentinia
Indonesia
FRUITS, VEGETABLES, SUGAR CANE, TOBACO, TEA

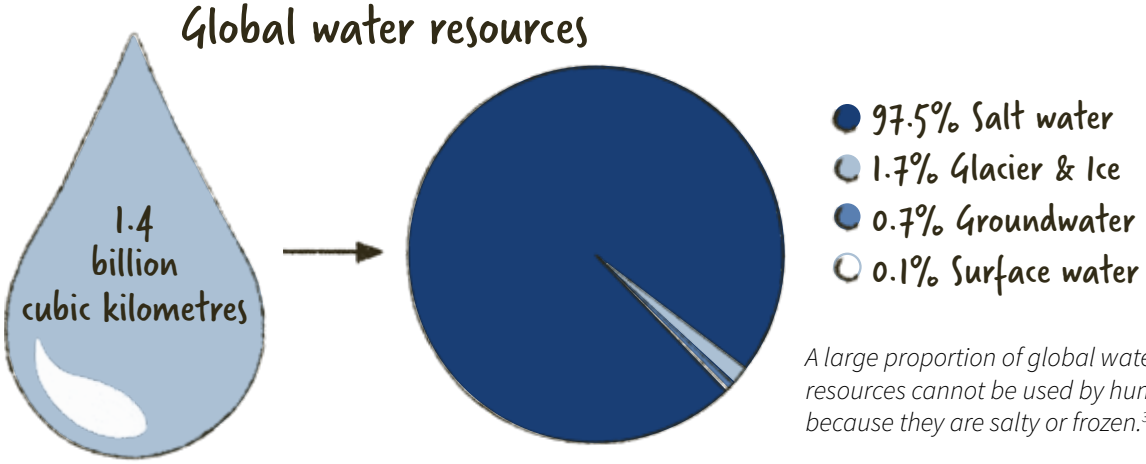
Elixir of life

Are we running out of water?

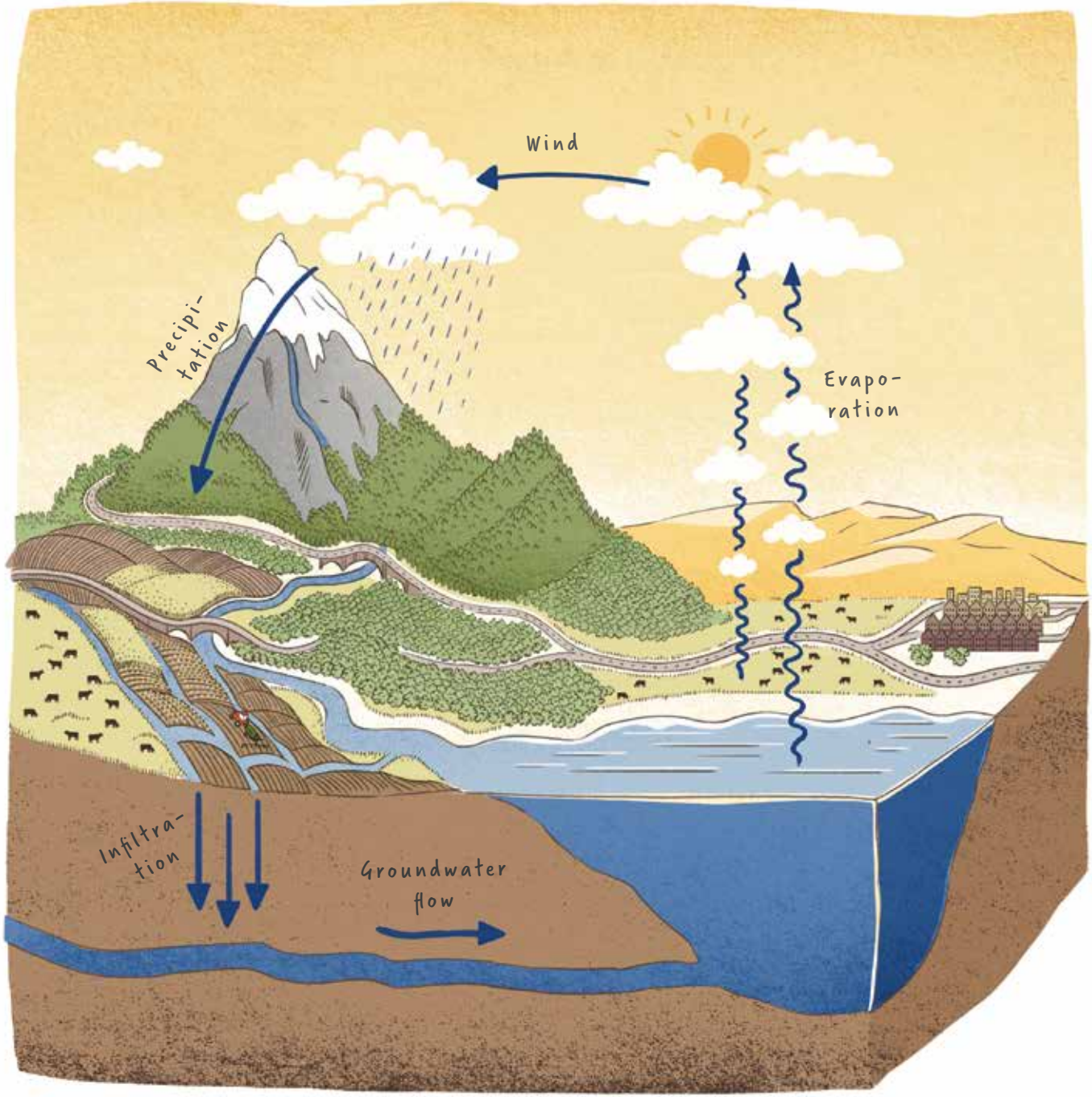
The water on our blue planet is in a constant natural cycle, in oceans, clouds, ice, water bodies, trees and all other organisms, in the soil and in the air: we don't lose a drop! However, we must adapt its use to the respective regional and local conditions and their changes in order to use and store the available quantities of water effectively, carefully and fairly and to make it available to as many organisms as possible in local cycles. The extraction of groundwater and surface water has increased rapidly in recent decades. Agriculture accounts for 70 percent of freshwater use.[37] In many regions, important groundwater reservoirs are being depleted and lakes and rivers are drying up.

The use of fertilisers, pesticides, chemicals and medicines, as well as untreated wastewater from industry and households, is making more and more surface and groundwater unusable or even toxic. Over a quarter of the world's population has no safe access to drinking water![38]

To counter these problems, water use should be adapted to be in line with natural cycles and water should be used effectively, carefully, fairly and in amounts corresponding to the local availability. The most important lever for sustainable use is to use and store rainwater more effectively.



A large proportion of global water resources cannot be used by humans because they are salty or frozen.[39]


Wind
Precipi-
tation
Evapo-
ration
Infiltra-
tion
Groundwater
flow

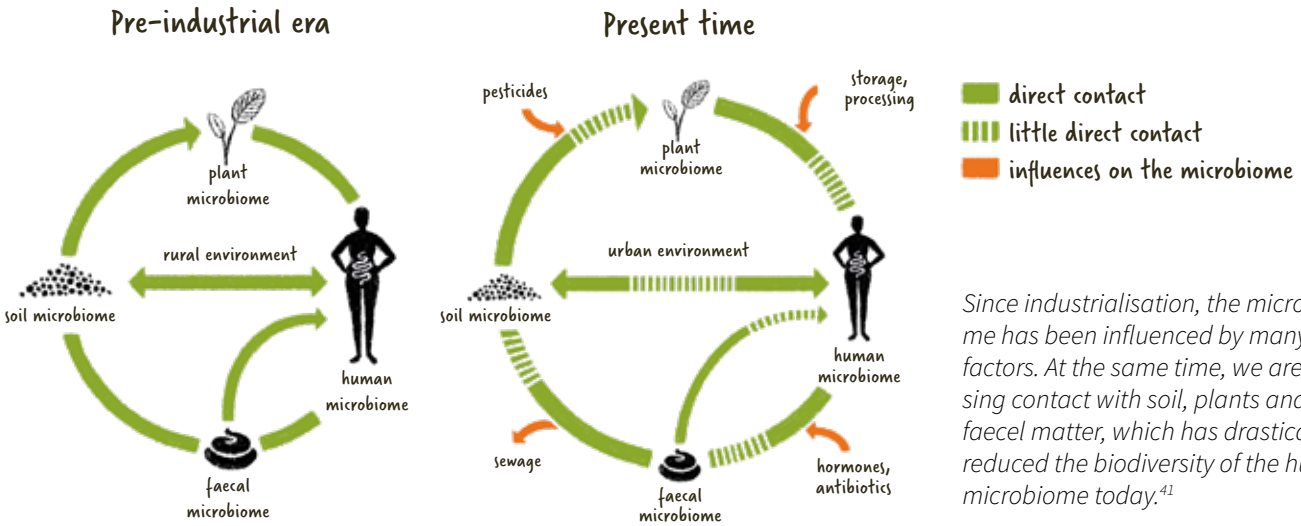
Microbiome

The more diverse, the better for us and nature

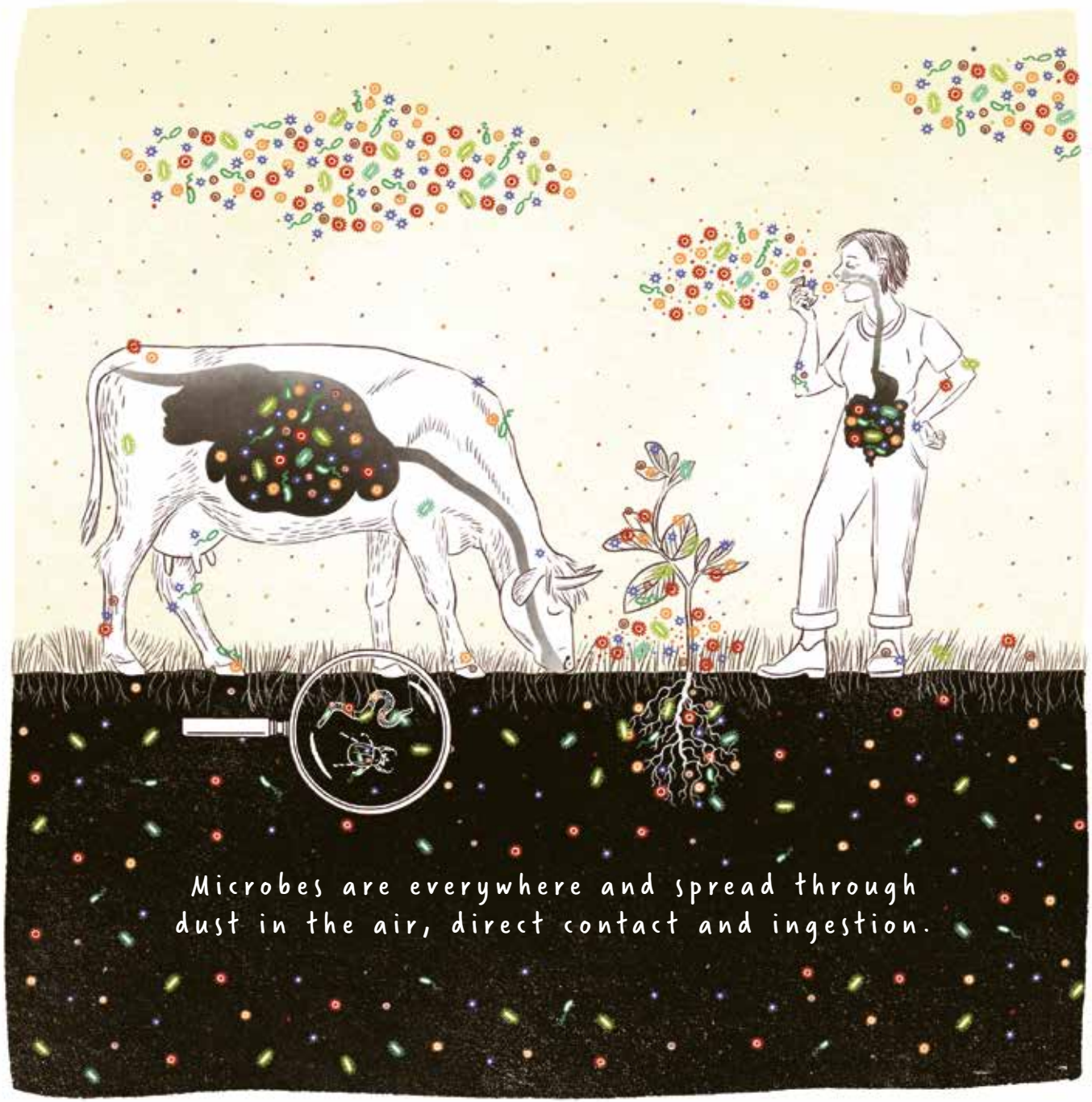
Over 30 trillion microorganisms, about as many as our body has cells of its own, colonise each and every one of us. Without them, we (including all animals and plants) would not be able to survive. The term ‘microbiome’ refers to the entire, highly active and interactive community of bacteria, fungi, algae and other microorganisms and viruses found in animals, plants, soil and in many other places.[40]

These primordial, exceptionally diverse communities, organise the exchange of nutrients and biological information both within an individual organism and between organisms. Microbiomes build and break down, digest and process and have thus formed the basis of all life for billions of years. Their ‘home’ is the soil, in which everything that lives and dies on land ends up together.

Humans have been making intentional use of these organisms since the beginning, for example in medicine, food production or to promote soil fertility. However, research into them is still in its infancy. So far, one thing seems certain: the diversity of the microbiome is key to its healthy balance and function.



Since industrialisation, the microbiome has been influenced by many new factors. At the same time, we are losing contact with soil, plants and even faecel matter, which has drastically reduced the biodiversity of the human microbiome today.[41]



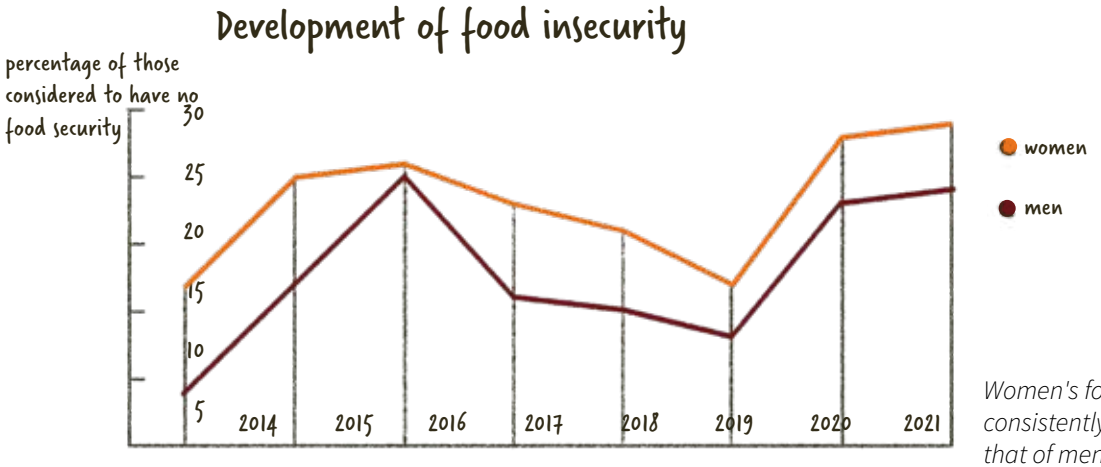
Microbes are everywhere and spread through dust in the air, direct contact and ingestion.

Agriculture and gender

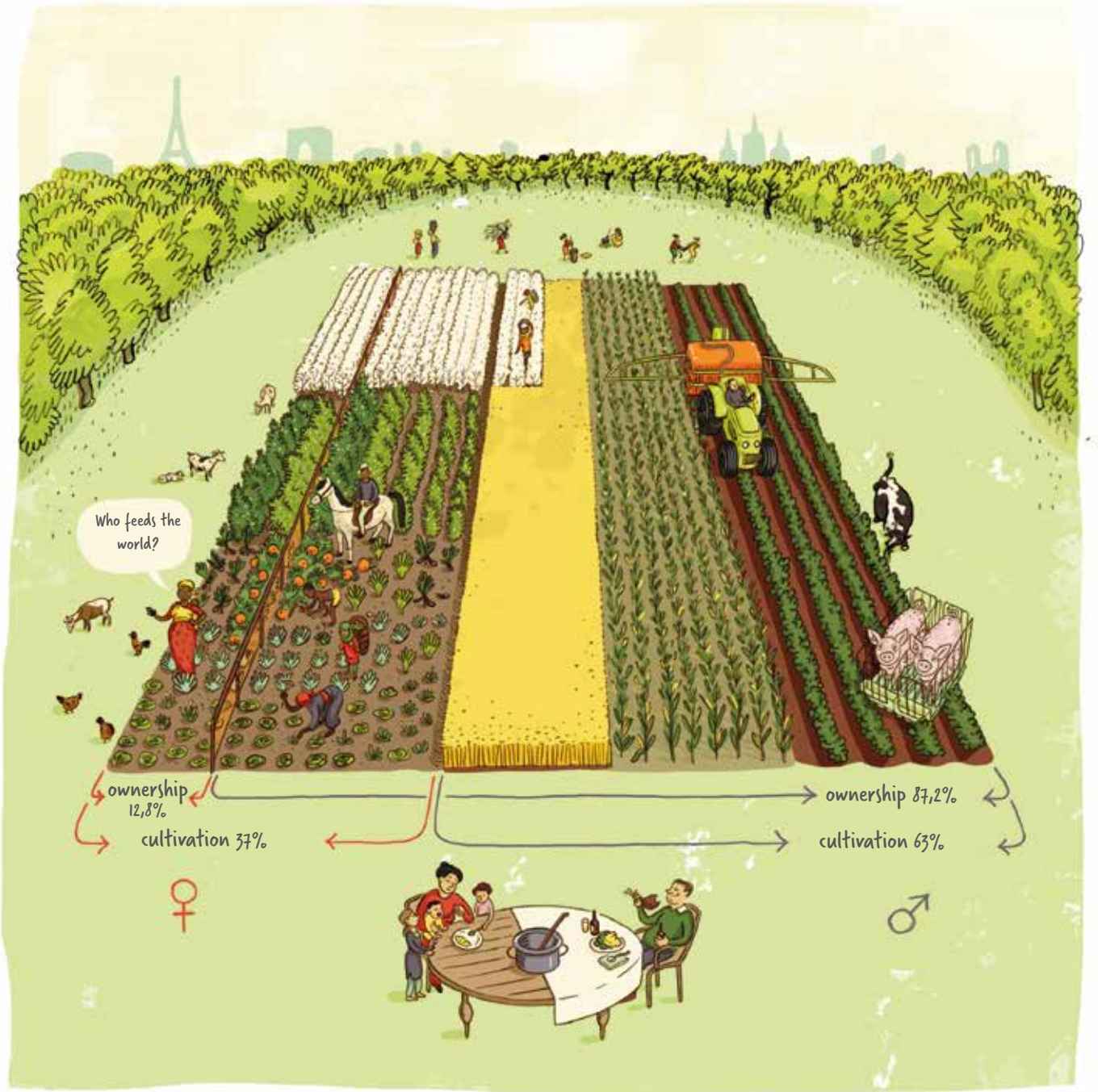
How women and men eat and work

Half of heaven belongs to women, as the saying goes. Only an eighth of the fertile earth belongs to them, and in Germany only a twelfth.[42] When it comes to tilling the fields, on the other hand, women are in the lead, especially when it concerns work done by hand.[43] The United Nations puts women's share of agricultural work at 38 percent worldwide.[44] That is the tip of the iceberg. Relief, social work and subsistence farming work are added to this. On top of that, everything that is considered 'housework': hauling water and wood, processing, preserving and cooking food. In fact, women do well over half of the work that feeds the world's population, while also investing much more reliably than men in the household (food, health, education) and the future of our children.

Men lead in other areas: in Germany, men eat twice as much meat as women and drink three times as much alcohol.[45] In many poorer regions of the world, the man often eats first, then the children, then the woman, especially in times of crisis. This is why significantly more women than men suffer from hunger and malnutrition.[44] If women, especially in rural areas, had the same rights and opportunities as men and were better protected from violence, there would be significantly less hunger and malnutrition in the world.



Women's food insecurity worldwide is consistently found to be higher than that of men.[46]

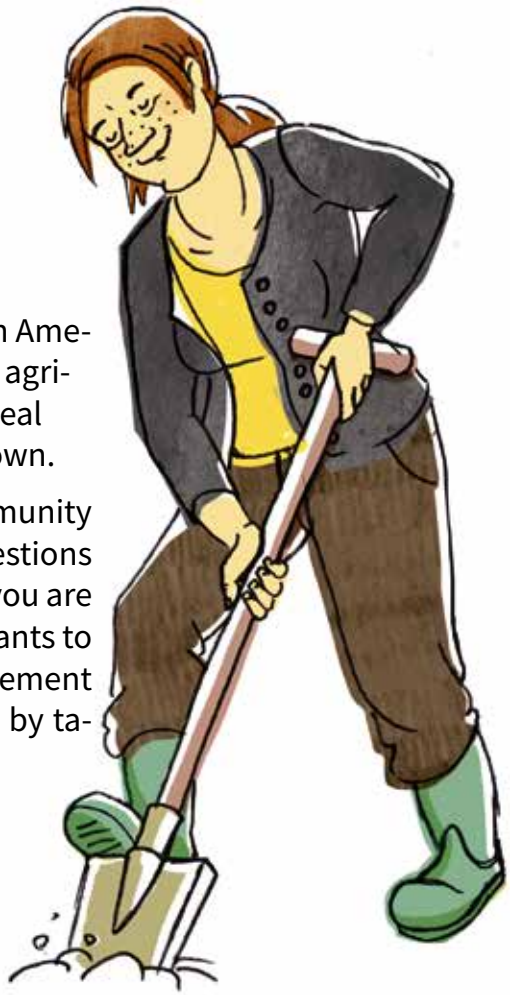

Who feeds the world?
ownership 12,8%
cultivation 37%
ownership 87,2%
cultivation 63%

Join the 2000 m² community!

Now we know our ‘Weltacker’ a little better. Think about it the next time you go shopping in the supermarket or when you order another piece of your 2000 m² in a bakery, kitchen, snack bar or restaurant. Where did the bread or spaghetti ‘grow’? What kind of life did the pig in the sausage have? Which farm did your fries come from? Were the tomatoes grown under foil? Who harvested them and how high are their wages? How was the cotton for your t-shirt picked?

If you would like to know how many square metres are needed for dinner today, we recommend our Global Field ‘buffet beds’, which can be found in many locations. Here we grow all the ingredients of a particular dish: we show you how many acres a schnitzel with fried potatoes takes up and how much space a pizza needs. You can also find out how many square metres your meal takes up in our space calculator ‘Mym²’ on our website.

There are many ways to make your 2000 m² a better and more liveable place for all of the organism, that call your share of the global farmland a home, and also for the people who work the land. You can eat better, less, only pasture-raised meat and animal products or even no animal products at all. You can buy organic products and pay attention to where your 2000 m² is mainly located: on farms you know, in the region, in Germany, Europe or overseas? You can avoid flying fruit and vegetables, buying cocoa and cotton from slave labour and, of course, avoid waste. Finally, you can campaign for public funds to be used to support approaches prioritising health, justice and more ecological sustainability. In contrast, according to current EU policy, funding amounts are determined simply by the number of hectares of



In more and more places in Europe, Africa, Asia or South America, you can visit real ‘Weltacker’ projects where global agriculture, its diversity and its challenges are exhibited in real life and the world's most important arable crops are grown.

Would you like to participate in the ‘Weltacker’ community with your own gardens or projects? Do you have questions and answers or does the ‘Weltacker’ relate with a topic you are working on? We are happy to welcome everyone who wants to get involved with ‘Weltacker: 2000 m^2 for everyone’ movement and join its community. You can find more information by taking a look at our website.

See you soon!

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www.2000m2.eu

Or simply get in touch with the ‘Weltacker’ in your area.

Sources

1 FAOSTAT, the statistics of the Food and Agriculture Organisation of the United Nations (FAO), is our most important data source. The FAO compiles its global data from national statistics and its own calculations and estimates. Direct links to the individual data sets are not possible, only to the respective areas in which the data can be selected. Here is the general main link to the FAO data: https://www.fao.org/faostat/en/#data

In this case they come from the "land" category: https://www.fao.org/faostat/en/#data/RL and "population": https://www.fao.org/faostat/en/#data/OA

2 The size of soccer pitches is not the same everywhere, but can vary greatly. Today, the usual size of a German national league pitch is 105 x 68 metres (FIFA and UEFA standard): https://ewige-tabelle-bundesliga.de/stadien/

3 Lowder, S.K., Skoet, J. and Singh, S. (2014). What do we really know about the number and distribution of farms and family farms worldwide? Background paper for The State of Food and Agriculture 2014. ESA Working Paper No. 14-02. Rome, FAO: http://www.fao.org/docrep/019/i3729e/i3729e.pdf

4 Sarah K. Lowder, Marco V. Sánchez, Raffaele Bertini (2021). Which farms feed the world and has farmland become more concentrated?, World Development, Volume 142, 2021, 105455, ISSN 0305-750X: https://doi.org/10.1016/j.worlddev.2021.105455

5 Vincent Ricciardi, Navin Ramankutty, Zia Mehrabi, Larissa Jarvis, Brenton Chookolingo (2018). How much of the world's food do smallholders produce?, Global Food Security, Volume 17, 2018, Pages 64-72, ISSN 2211-9124: https://doi.org/10.1016/j.gfs.2018.05.002

6 FAOSTAT, land, 2019-2021: https://www.fao.org/faostat/en/#data/RL

7 Bayrisches Staatsministerium für Umwelt und Verbraucherschutz (2006). Handreichung „Lernort Boden". Modul B. Sachinformation: Produzenten und Konsumenten, Zersetzer und Aasfresser, Räuber und Parasiten – Der Boden als Lebensraum: http://www.stmuv.bayern.de/themen/boden/lernort_boden/

8 James B. Nardi (2007). Life in the Soil: A Guide for Naturalists and Gardeners, The University of Chicago Press. Abrufbar: https://www.degruyter.com/document/doi/10.7208/9780226568539/html

9 FAOSTAT, crops, average tomato yields 2019-2021: https://www.fao.org/faostat/en/#data/QCL

10 FAOSTAT, crops, area harvested, 2018-2020: https://www.fao.org/faostat/en/#data/QCL

11 FAO (2023). Food Outlook, biannual report on global food markets: https://www.fao.org/giews/reports/food-outlook/en/ Der Food Outlook der FAO erschient zwei mal jährlich.

12 FAOSTAT, "Food balance sheets", 2019-2021: https://www.fao.org/faostat/en/#data/FBS

13 The Planetary Health Diet assumes that the average adult needs 2500 kcal per day. This amount varies according to age, gender, activity level and health profile, but overconsumption is a waste of food that has both health and environmental costs.

14 FAO (2023) The State of Food Security and Nutrition in the World 2023: https://www.fao.org/3/cc3017en/cc3017en.pdf

15 UNEP (2009). The Environmental Food Crisis, The Environment's Role in Averting Future Food Crises, S. 30, figure 12: https://www.grida.no/publications/154

16 FAO (2011). Global food losses and food waste – Extent, causes and prevention. Rome: https://www.fao.org/sustainable-food-value-chains/library/details/en/c/266053/

17 FAOSTAT, livestock primary, 2022: https://www.fao.org/faostat/en/#data/QCL

18 Meier, T., O. Christen (2013). Environmental Impacts of Dietary Recommendations and Dietary Styles: Germany as an Example. In: Environ. Sci. Technol 47 (2): S. 877–888, Supporting material:. Unter: https://shorturl.at/agCV6

19 FAOSTAT, food balance sheets, 2022: https://www.fao.org/faostat/en/#data/FBS

20 Niedersächsisches Landesamt für Verbraucherschutz und Lebensmittelsicherheit (2011). Bericht über den Antibiotikaeinsatz in der landwirtschaftlichen Nutztierhaltung in Niedersachsen: www.ml.niedersachsen.de/download/62481

21 Richtlinie 2008/120/EG des Rates vom 18. Dezember 2008 über Mindestanforderungen für den Schutz von Schweinen, Amtsblatt der Europäischen Union L 47/5, 18.2.2009: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:047:0005:0013:DE:PDF

22 FAOSTAT, food balance sheets, 1969 & 2021: https://www.fao.org/faostat/en/#data/FBS

23 Umwelt Bundesamt (2021). Klima und Treibhauseffekt: https://www.umweltbundesamt.de/themen/klima-energie/klimawandel/klima-treibhauseffekt#grundlagen

24 IPCC (2023). Climate Change 2023. Synthesis report. Unter: https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_FullVolume.pdf

25 Calculations from Institut für Energie- und Umweltforschung Heidelberg (ifeu). Website: https://www.ifeu.de/

26 Own calculation based on the basic data by Fachagentur für Nachwachsende Rohstoffe, FNR https://mediathek.fnr.de/grafiken/bioenergie/biokraftstoffe.html and the statistics „Verkehr in Kilometren" by Kraftfahrtbundesamt http://www.kba.de/DE/Statistik/Kraftverkehr/VerkehrKilometre/verkehr_in_kilometren_node.html

27 OECD Data Explorer, OECD-FAO Agricultural Outlook 2023-2032: https://shorturl.at/dmnV8

28 Heinrich Böll Stiftung. Pestizidatlas Österreich 2022: https://www.global2000.at/sites/global/files/Pestizidatlas-2022.pdf

29 Hole, D.G., Perkins, A.J., Wilson, J.D., Alexander, I.H., Grice, P.V., Evans, A.D. (2005). Does organic farming benefit biodiversity? Biological Conservation 122: 113-130: http://www.ask-force.org/web/Organic/Hole-Organic-biodiversity-2004.pdf

30 Bengtsson, J., Ahnström, J., Weibull, A.C. (2005). The effects of organic agriculture on biodiversity and abundance: a meta-analysis. Journal of Applied Ecology 42: 261-269: http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2664.2005.01005.x/pdf

31 FAOSTAT, Pesticides Use: https://www.fao.org/faostat/en/#data/RP

32 EAT. The Planetary Health Diet: https://eatforum.org/eat-lancet-commission/the-planetary-health-diet-and-you/ (2024)

33 FAOSTAT, 2021, "land": https://www.fao.org/faostat/en/#data/RL and "population": https://www.fao.org/faostat/en/#data/OA

34 European Union (2022). JRC technical report. Valeria De Laurentis, Arianna Galli, Serenella Sala. Modelling the land footprint of EU consumption: https://publications.jrc.ec.europa.eu/repository/bitstream/JRC128072/JRC128072_01.pdf

35 FAOSTAT, crops, area harvested: https://www.fao.org/faostat/en/#data/QCL

36 FAOSTAT, "trade", 2022: https://www.fao.org/faostat/en/#data/TCL. Cocoa products are also listed under "Cocoa" and soy products under "Soy"

37 Mukherjee, A., Scanlon, B. R., Aureli, A., Langan, S., Guo, H., & McKenzie, A. (2021). Global groundwater: from scarcity to security through sustainability and solutions. In Global groundwater (pp. 3-20). Elsevier: https://shorturl.at/oyRVX

38 Worldbank. Global Water Security and Sanitation Partnership: Annual Report 2023: https://shorturl.at/lotuB

39 Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz. Umwelt im Unterricht. Das Wasser der Welt - eine geteilte Ressource: https://www.umwelt-im-unterricht.de/hintergrund/das-wasser-der-welt-eine-geteilte-ressource

40 EUFIC (2021). Was ist das Mikrobiom und warum ist es wichtig?: https://www.eufic.org/de/lebensmittelproduktion/artikel/was-ist-das-mikrobiom-und-warum-ist-es-wichtig/

41 Blum, W.E.H.; Zechmeister-Boltenstern, S.; Keiblinger, K.M (2019). Does Soil Contribute to the Human Gut Microbiome? Microorganisms 23, 7 (9): https://www.mdpi.com/2076-2607/7/9/287

42 Farming First & FAO. The Female Face of Farming: https://shorturl.at/acvHN (2024)

43 UN Women (2015). Progress of the World's Women 2015-2016, Transforming Economies, Realizing Rights, S.90. Unter: http://progress.unwomen.org/en/2015/pdf/UNW_progressreport.pdf

44 FAO, Valentina Costa, Natalia Piedrahita, Erdgin Mane, Benjamin Davis, Vanya Slavchevska and Yonca Gurbuze (2023). Women's employment in agrifood systems, Background paper for The status of women in agrifood systems: https://openknowledge.fao.org/items/b8f8fd1d-0390-49b4-bf4e-60d6d1852763

45 Deutsche Gesellschaft für Ernährung e. V. (DGE), 12. Ernährungsbericht zur Ernährungssituation in Deutschland, laut Presseinformation der dge vom 7.1.2014: https://www.dge.de/wissenschaft/ernaehrungsberichte/12-dge-ernaehrungsbericht-2012/

46 FAO (2022). Gender-related impacts of the Ukraine Conflict. Rome. https://www.fao.org/3/cb9419en/cb9419en.pdf

How will we eat in the future?

Eight billion people share around 1.6 billion hectares of arable land on this planet. That's 2000 m^2 per capita. A lot has to grow on it: wheat for our daily bread, rice, potatoes, tomatoes, cabbage, carrots and other vegetables and fruit, grain and soy as concentrated feed for the animals whose meat, milk and eggs we consume, sugar, tea, coffee, cotton for t-shirts, sunflowers for cooking oil, rapeseed for fuel, corn for electricity, some rubber and tobacco. Everything we eat has a place where it comes from!

As we take a closer look at our 2000 m^2, many questions arise: how much space do I actually use? How far can a car drive with fuel from 2000 m^2? Where are my 2000 m^2 located? Which other creatures live on this field? Who cultivates my 2000 m^2? How many square metres do we have for lunch today? How many do we throw away?

Is the global arable land sufficient? Yes, absolutely, even in 2050 when we are over nine billion people. There will be enough for everyone if we treat the soil and all its life with care and do not consume more than is good for us.

www.2000m2.eu