Options for food and water for future generations

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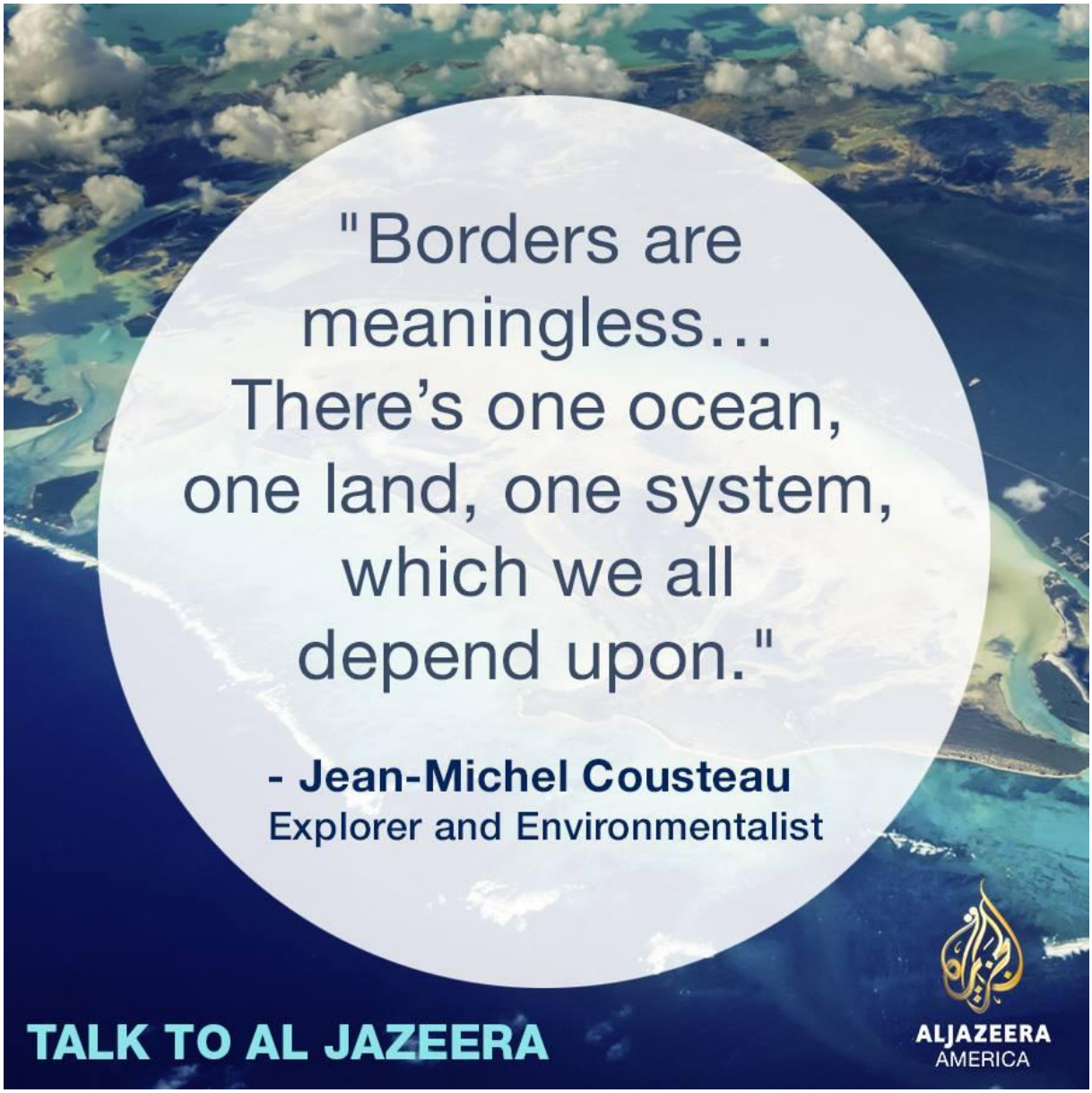
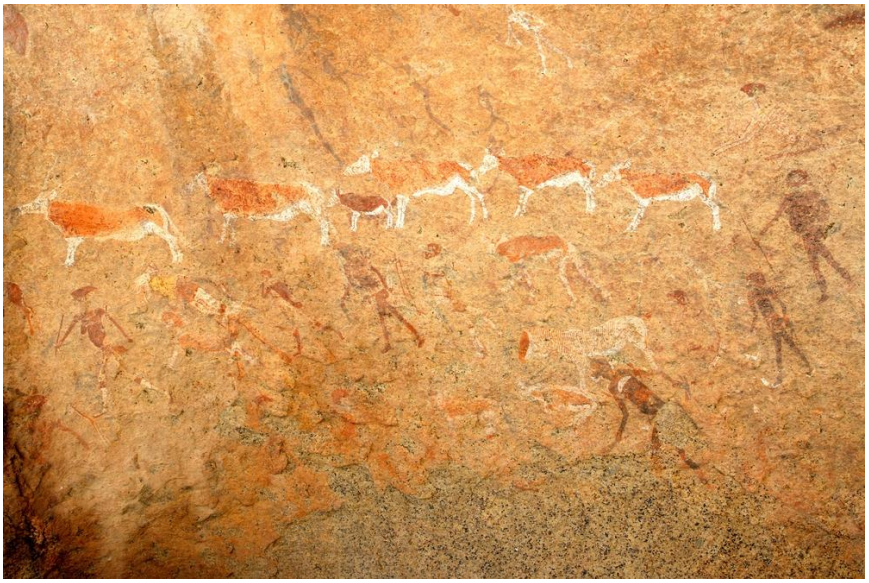
Sen Foundation



What world organizations strive for for future generations on earth is food democarcy for all world citizens. The definition of food democracy is, that it is the key to feeding everyone equitably, healthily, affordably and sustainably.[1]

In this paper the following topics will be elaborated upon: first the history of food, and how it became business, then agriculture, followed by the element food needs most: water. The two major cycles of water on earth are explained, and what the footprint means all people and all that is produced leave on this earth. Finally we return to food, by looking for ways the world population can be fed, even when their numbers rise.

History



source: http://hraf.yale.edu/resources/faculty/explaining-human-culture/hunter-gatherers-foragers-2/

Humans were hunters and gatherers in their early days. Till they discovered that when you did not eat all of the seeds of plants, but instead sow some of them and tend to them, in the end you could safe time because you knew where to find a lot of crop. At the same time some useful animals were domesticated. Some humans then stopped gathering and hunting and became farmers and stock keepers. The first group of course became attached to locations with fertile earth and water at hand, the latter were moving around to where pastures were greenest in a particular season. Foodsupplies grew and were exchaged with others, villages and then cities evolved, also for safety matters. Since there was now a surplus of food, some folks could spend their time governing other people, worship the gods, making furniture or earthenware, trade services and materials in exchange for food. From that moment on food was business, and we humans never looked back. Food is still major business, and when you look around the supermarket, you will notice most of the food is prepacked, canned, treated, prepared, dried or frozen.

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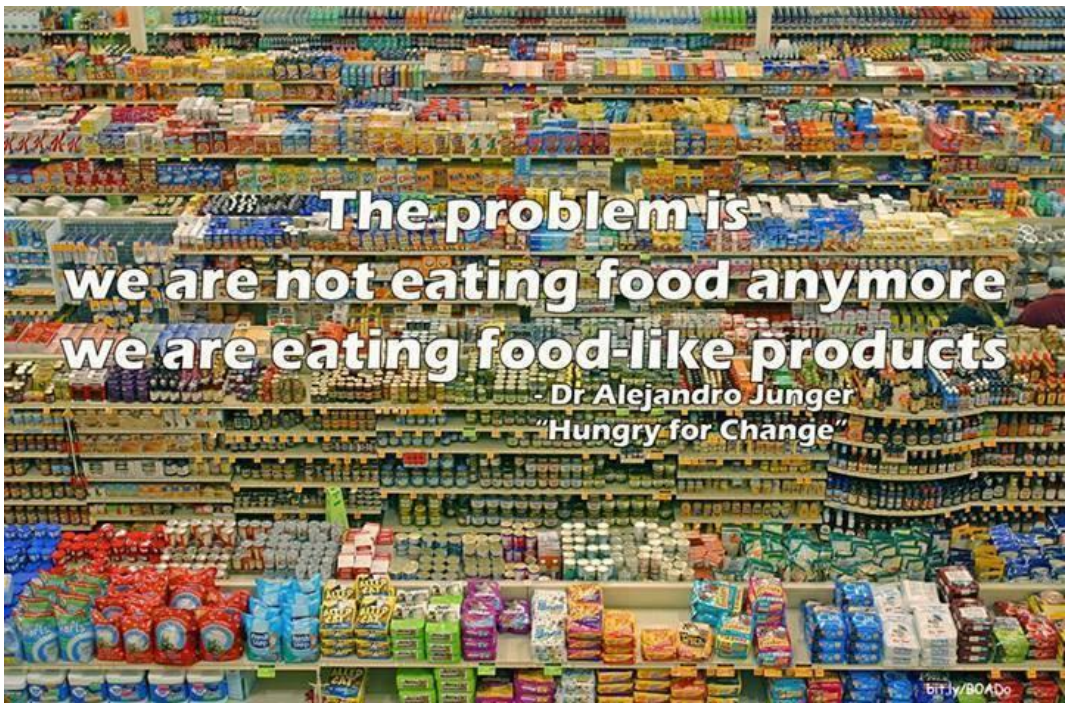
Food business and food regimes



The picture above shows us how most supermarkets are stocked: you have to pass all these packed shelves with "food-like products" as Junger calls them in order to get to the fresh foods like fruits and vegetables, dairy and meat. In fact, even our grandparents would not recognize some of the content in all those packs and cans and jars as food. And to protect food from decay many ingredients are added by today's food industry that we ourselves would not even recognize as food if we saw it in a shop. Food business has been industrialized. It had to, because we humans grew in numbers and industrialized. Farmers and stock keepers turned into factory workers, miners, artisans and shopkeepers. And to keep them working, food had to be supplied, plenty of it for a reasonable price, else the workers might revolt and the whole system would be in danger.

The decline in numbers of farmers implicated some aspects of the provision of food had to be redirected. Since Brittain was the place where industrializing evolved, and since that country had world wide colonies, the idea arose that food could be grown in the colonies, mainly in India, cattle could be raised in the US and sheep in Autralia. All this would be sent to the mother country. For the money thus earned, people in the colonies could buy the stuff made in the mother country by the factory workers. Everybody happy. It became the **first**

food regime in modern times, linking emerging industrialization to cheap food supply zones all over the world.[2] The **second food regime** came into being after World War II, when the United States used its huge agro - industry to create alliances and win markets with the help of food aid, mainly to keep receiving countries out of communism, this was in the time of the Cold War. At this moment we see a **third food rigime** in place, a neo - liberal project securing transnational circuits of money and commodities, including food. Smallholders are displaced and formed into a casual global labor force.[3]

The question is: is this a problem, and then of course, why is it a problem?

Over the past few years some interrelated crises - like the energy, food and financial crisis plus climate change - have brought the flaws in our current world food system to light,[4] what is wrong with worldwide food security, and why the international organizations should pay attention to these problems.

- This market is neither neutral nor efficient, but largely orchestrated by corporate, financial and political actors.
- The trade in food is increasingly dominated by a few large operators as seen below, where the ten largest companies are shown with all their brands. Local supermarkets have them all in stock - or the majority of them - no matter where you live on earth. Even ISIS trades in them, so we were informed lately - be they halal or not.

Bron: http://socialismoryourmoneyback.blogspot.nl/2012_04_01_archive.html

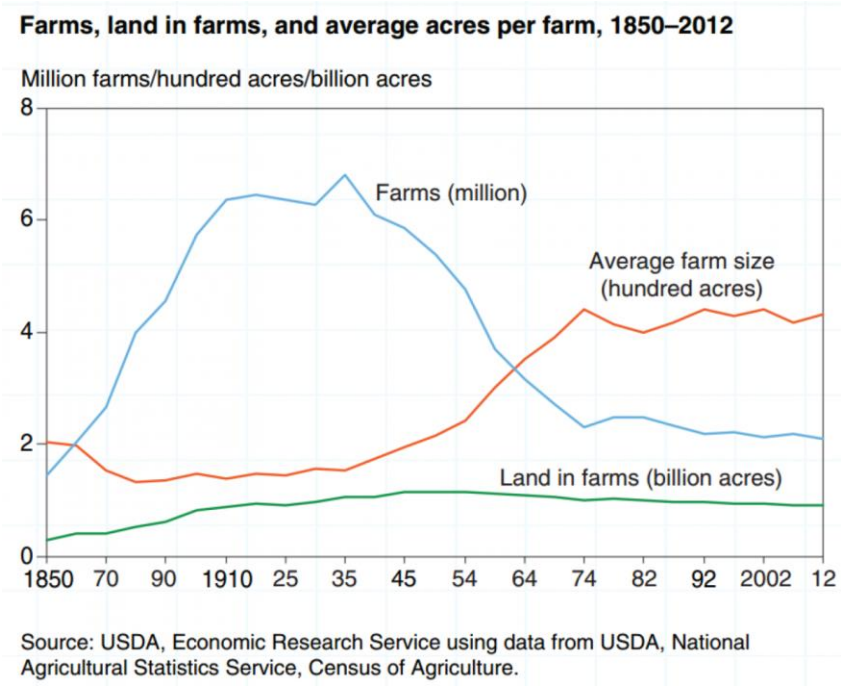
[2] Nora McKeon: Food security governance, Empowering communities, regulating corporations, Routlegde Critical Security Studies series,Routledge, London 2015 page

[3] Nora McKeon: Food security governance, Empowering communities, regulating corporations, Routlegde Critical Security Studies series,Routledge, London 2015 page 12

[4] Nora McKeon: Food security governance, Empowering communities, regulating corporations, Routlegde Critical Security Studies series,Routledge, London 2015 page 3.

- Multinationals have the power to influence the earnings of farmers and other suppliers, both food processors and supermarkets are becoming larger and larger and are keen on keeping their cost as low as possible, and that is no good news for farmers, stockkeepers and other suppliers. This is called the **social cost of the food chain**.[5]

Agriculture



Production of major program crops (like barley, corn, cotton, oats,peanuts, rice, sorghum, soybeans) has been shifting to larger (family) farms, as you can see from this graph: the number of farms - in this case in the US - is going down, the acres go up and the available land stays more or less the same of course - the greater stretches of land that can be tilled by machines most certainly are no longer available unless one cuts down forests.

The world needs to increase food production by at least 70% by 2050[6], to feed an increasing population. A greater part of this population will have better incomes than they have now, and this will subsequently change their diet, they

[5] http://www.trouw.nl/tr/nl/33444/De-week-in-voedsel/article/detail/4094767/2015/07/04/De-immense-sociale-kosten-van-de-voedselproductie.dhtml?utm_source=dailynewsletter&utm_medium=email&utm_campaign=20150705
[6] Brian Gardner: Global food Futures, feeding the world in 2050. Bloomsbury, London 2013. page 1

will consume more calories and want more animal products like meat and dairy prodcuts. That will put more strain on the food chain, because, as you can understand, it takes more and costs more to raise cattle than to grow fruits and vegetables: the latter are ready to eat, the first have to eat greens and transfer that into dairy and meat - at greater cost. Estimates vary, but it takes around 7 kilos of grain to make one kilo of beef. Pigs are about 4:1 and relatively thifty chickens are around 2:1. Then there's the vast water consumption and the CO2 emissions (27kg for a kilo of beef). If, however, humans were to eat the kilo of grain themselves, that would be that. A kilo of lentils creates only 0.9 kg of CO2. Along with not flying and driving, going vegetarian is one of the very best things you can do for the earth.[7]

The price of oil and gas is volatile, and this will put another strain the price of food, because energy is necessary for farm instruments, for cooling and heating, for transport to outlets etc. Gas is used to produce fertilizer.

Climate change will also have an increased negative influence on producing food, and so will be the deterorization of soil. Rising sealevels will effect the salination of the soil, as we in the lowlands of Netherlands experience already. There is also the threat of salination of supplies of fresh groundwater.[8] The world is running out of fertilizers like nitrogen, phosphorus and potassium.

Then, last but not least, there is the urgent matter of fresh water.

Water

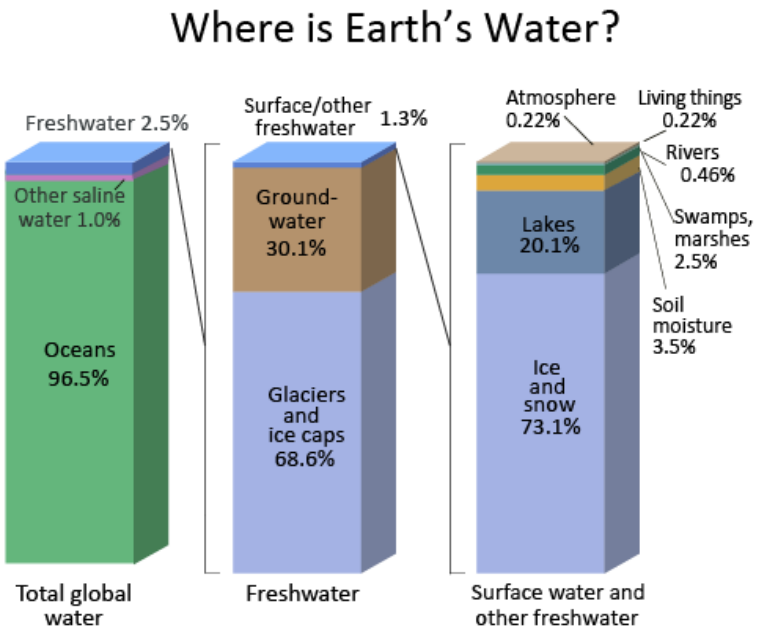
Have a look at our planet, as seen from the surface of the moon.

[7] a.o.: http://www1.agric.gov.ab.ca/%24department/deptdocs.nsf/all/faq7811

[8] Brian Gardner: Global food Futures, feeding the world in 2050. Bloomsbury, London 2013. page 22

www.natuur-wereld.be

Astronauts always marvel at her blueness. And yes, earth is very blue. In fact, 2/3 of her surface is covered with water. Unfortunately, 97% of that water is salt water: the seas and the oceans. Two percent of fresh water is locked in icesheets and snow. So only 1% is readily available for human use, for drinking, watering fields, for industries, for cooling.

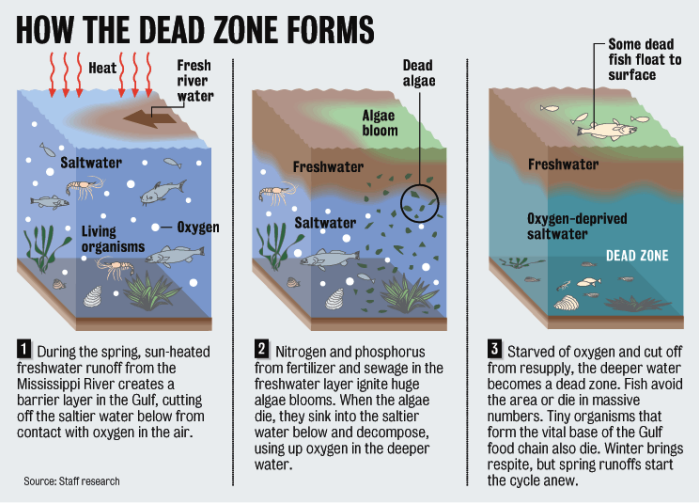


Source: Igor Shiklomanov's chapter "World fresh water resources" in Peter H. Gleick (editor), 1993, Water in Crisis: A Guide to the World's Fresh Water Resources. (Numbers are rounded).

Water in rivers and lakes is fresh water, but often it is:

- polluted by wates from industries and pesticides and fertilizers from fields, even ground water is polluted that same way

- thus **5 bilion people on earth have only polluted water available within 50 kilometers from their homes**.[9]
- most big rivers on earth contain dams for hydro-electricity
- when pumping up water, many cavities fill up with salt water from the seas, leading to salination of wells and soils and dying crops.[10]
- much pollution is carried to the seas by the rivers, this leads to so-called 'dead zones' at the deltas of over 200 rivers on earth, where agro-poisons, medicine residues, plastic beads etc. accumulate and kill off all plants, algae, fish and crustaceans.



Source: *http://realtruth.org/articles/130422-005.html*

The above shows you the ways water and food are interconnected. Is there no hope for water in the future? Yes, there is. But it will ask for harsh steps - by the full international community. How? Technology?

Banki Moon, the Secretary - General of the UN said: "We are nearing the point of no return where no amount of technical solutions or ingenuity will help". Banki Moon expects this to happen within two generations.[11] **The best hope is for the world community is to take responsibility for the commons**.

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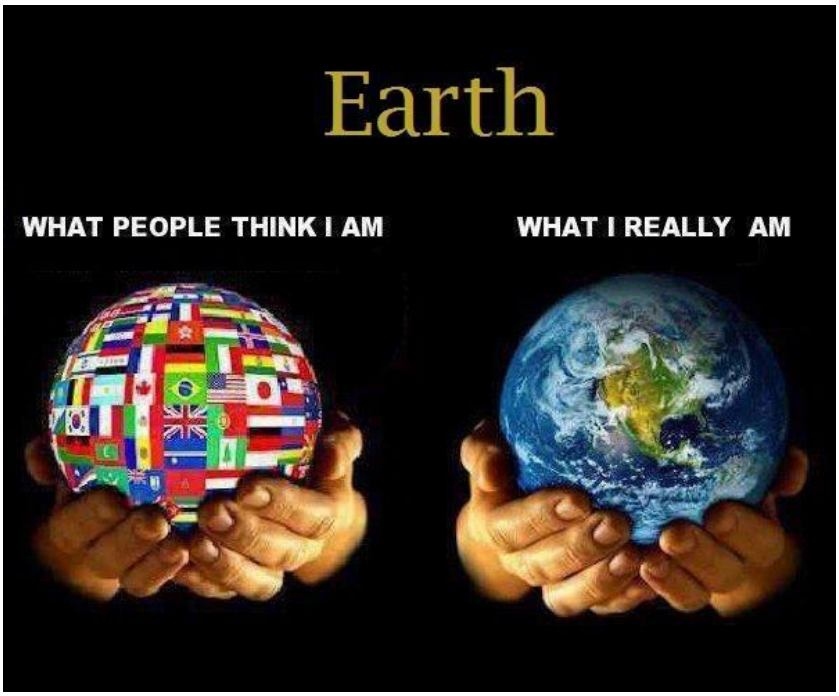
[9] WHO(2000) Global Water Supply and Sanitation Assessment. World Health Organization. Geneva

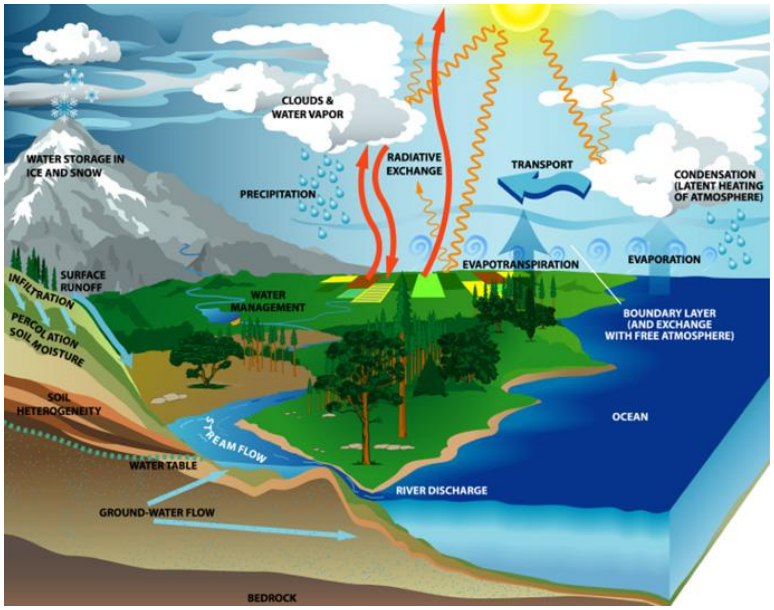
[10] Janos Bogardi, former director of the UN University's Institute for Environment and Human Security, speaking on International Day of Biological Diversity, May 22 2013

[11] Ban Ki-moon, Secretary General for the United Nations, speaking on International Day of Biological Diversity, May 22 2013



- We shall have to come to agreements on how to use fresh water, save water, keep water and how to save the seas. No easy matter, because no country will be readily willing to give up some amount of economic growth for sustainability as we can see now already.
- No country should give up its natural resources for an other country's benefit, at the costs of its own people.
- We have to look for the best methods to clean polluted water and desalinate salt water.
- Each country should manage its available water sustainably.
- To keep water in dams is no solution, because the lakes behind them cover too much soil, needed to feed the hungry. And dams will change both the ways the water runs and the speed of the flow, plus the amounts of water available downstreams. Water behind the dams covers land that is no more available for agriculture or habitats for humans and animals and plants.
- Better studies should take place in order to understand what is really going on in the **two great cycles of water on earth**: the hydrological cyclus of fresh waters,that you see here below.

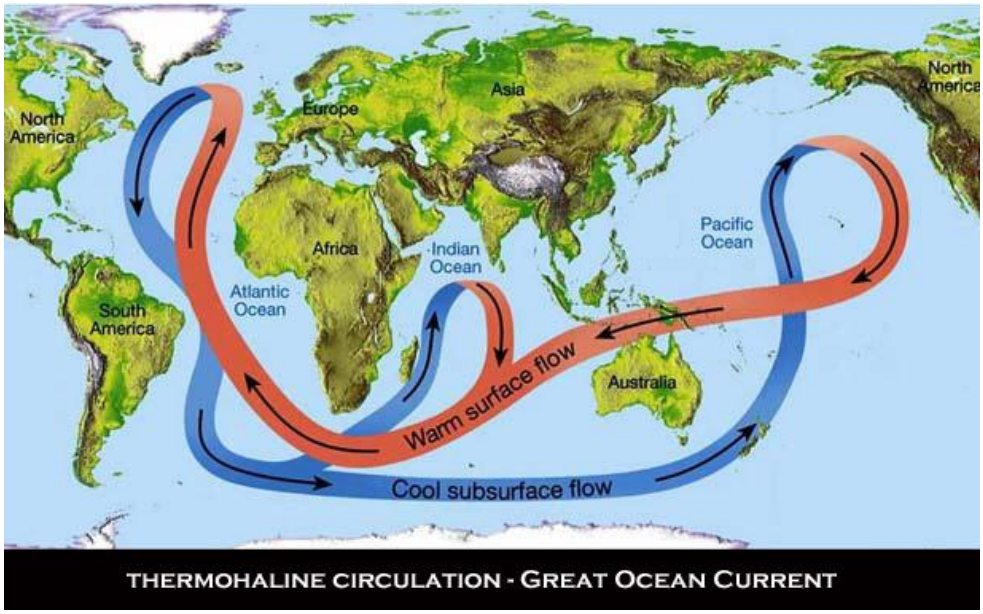
Watercycles on earth



http://mediterraneanforest.blogspot.nl/2011/01/biogeographical-cycles.html)

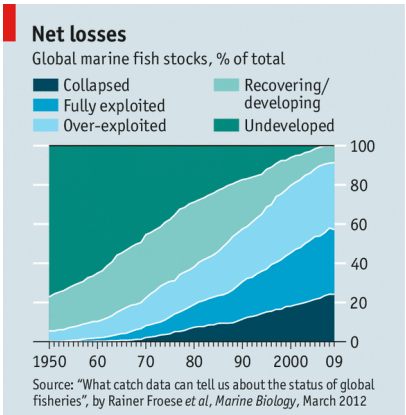
The **hydrological cycle** is familiar to most of us. Rain and snow come down on earth. Some of the water is absorbed into the soil drains into the groundwater, some of it is drained into rivers, that eventually bring all that fresh water to the seas where it turns into salt water. Some rain and snow, warmed by the sun, evaporates into clouds again, cools down, then produces rain again - though often it will rain some place else then where the water evaporated. This cycle takes place within the peel around the earth, the atmosphere, sealed from outer space, so we loose no water through the ozone layer.

The second major cycle is the **thermohaline circulation,** also known as the **gulf streams** or **currents** in our oceans and seas. It controls the winds, weather, rains, cyclones, temperatures, droughts etc. on earth:

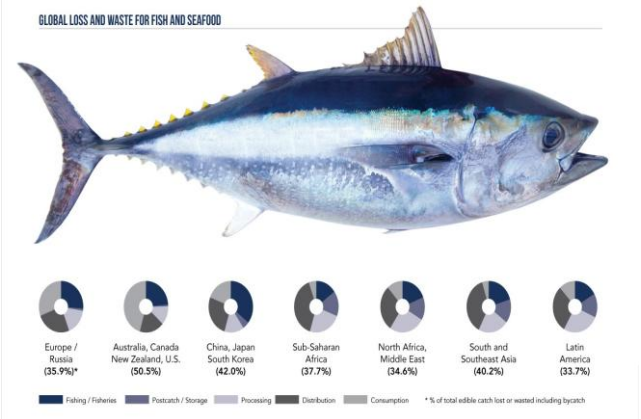


https://www.withfriendship.com/images/i/40266/Thermohaline-circulation-image.jpg

The warm stream, raised in the Pacific, flows with the turning of the earth passing Afrca, towards Europe, there it cools off around Greenland and the North Pole in the cold of the Atlantic and sinks deeper into the seas, in the opposite direction, via Antarctica, past Australia, warming up again, etc. This cycle is crucial for all life in the seas because the seas are also the home of fish and other animals and plants, among which our biggest hope for the future of foods, medicine and fuels: fast- growing, protein rich algae. Change the temperature of the waters and some species die for lack of food, since temperatures have an influence on the availabilty of food, e.g. plankton, the tiny creatures on which many species feed, from crustacians to whales. Yet we catch fish and waste it like there is no end to the supplies.



Source: "The Economist" 22 februari 2014.



Source: The Swedish Institute for Food and biotechnology

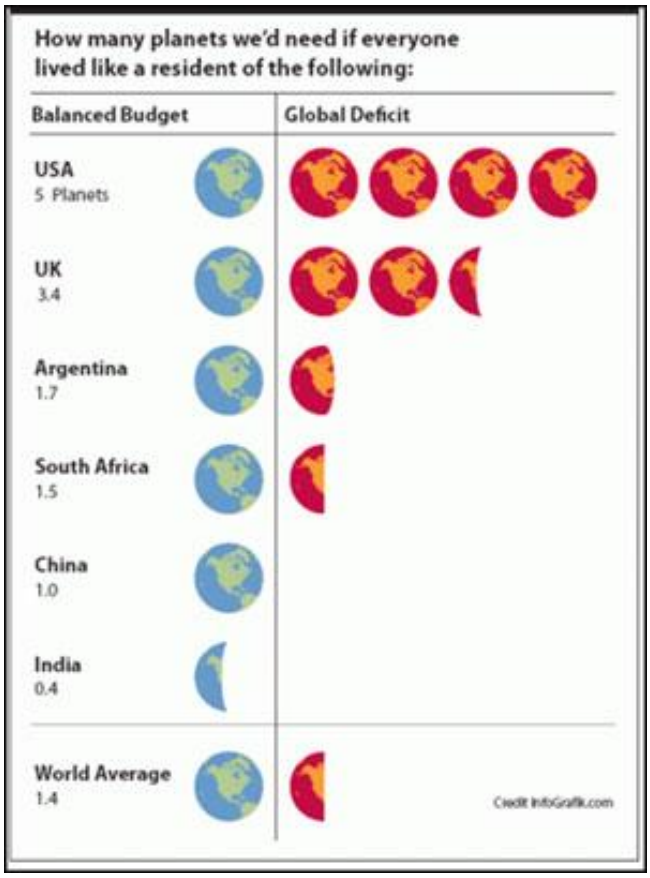
Then, it has recently been discovered, a even bigger percentage of carbon dioxide then we first thought is absorbed by the seas. That may sound promising, but it leads to the acidification of the seas, in which the corals, shells of moluscs and the shells of crustaceans dissolve. (Beside the water footprint there is also a cabon dioxide footprint, but we won't dwell on that in this paper.)

Footprints we leave on earth

A major way to safe water is to control the water footprints of anything and anyone that uses water: humans, crops, enterpirses, cattle. A water footprint is the true amount of water that is needed to grow a plant, raise an animal or make a product. But also the amount each of us use everyday. If you have a pool, or take a bath everyday, eat meat every day, you use more water than the vegetarian who takes a shower, and use a glass while brushing teeth instead of an running tap.

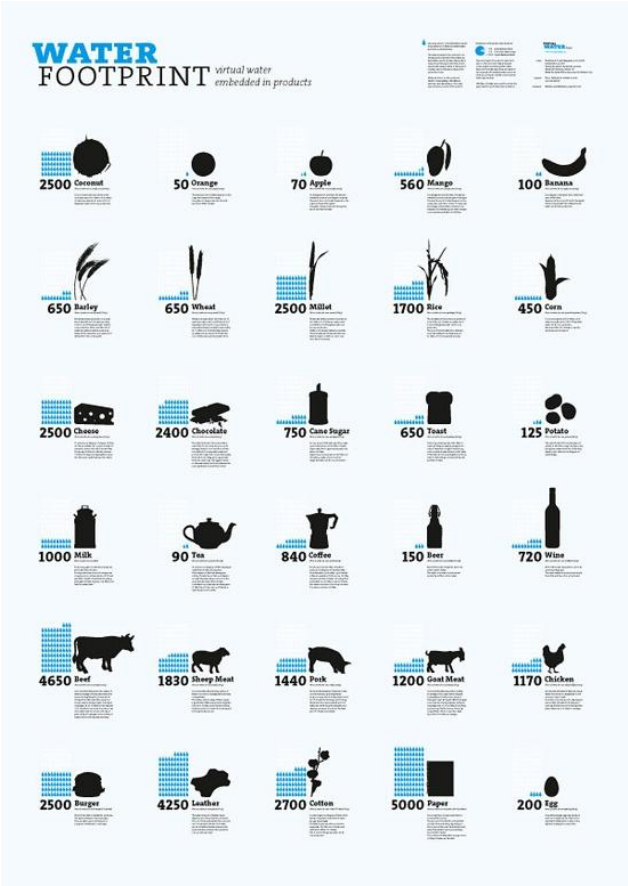
http://4.bp.blogspot.com/-ql5yH5Zmtk8/TcEd-7bpW9I/AAAAAAAAAG8/T5KwQv-wZ-0/s1600/Slogan%25402x.png

Something is forgotten here: please also add: what you waste. Also: Your behaviour adds to your country's footprint. If everyone on earth would live like an average US citizen, we would need 4 extra earths to supply us, China doesn't do to bad, though we all expect their prosperity is on the rise, so I'm sure they will need then also need some spare earths we do not yet have. On evarge, if we go on like we do, we need half a planet extra.



But:

Have a look at some water footprints:



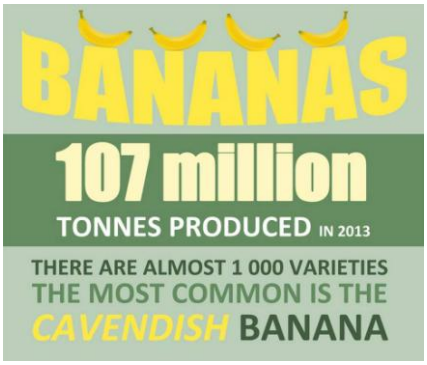
The above shows why dimishing consuming meat and dairy by the world population is a great ways to diminish water use. So is recycling, e.g. of clothes made of cotton, another thirsty crop. You can now see why food and water are so closely intermingled. To reduce water use, we also have to look at better ways to water fields. Sprinkle systems, watercanons etc, take up far more water and are less effective than drip-systems. There are many institutes that concentrate on hybrid plantspecies. They look for ways to improve e.g. the protein - content of rice and wheat, or adaptation of vegetables to more saline field conditions.

How to feed the world

There are over 300,000 species of edible plants in the world yet fewer than 20 species now provide 90% of our food. However, there are hundreds of less well known edible plants from all around the world which are both delicious and nutritious. [12] About half our plant-sourced protein and calories come from just three species: maize, rice and wheat. We coud learn more and share more among countries on food matters. Many ngo's concentrate on that subject as a way to aliviate hunger. Look for instance at these many tubers (sweet pototoes etc.) from Peru:

http://www.resilientcommunities.com

At the moment they are shared with farmers in mountenous areas in Africa with similar conditions as there are in Andes - mountains in Latin America.[13] This is contrary to monocultures, like bananas



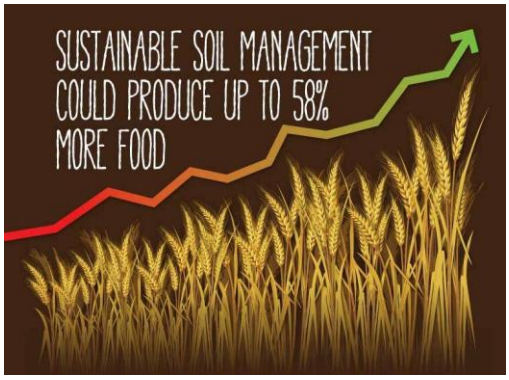
https://www.facebook.com/UNFAO/photos/pb.46370758585.-2207520000.1438191829./10153534767463586/?type=3&theater

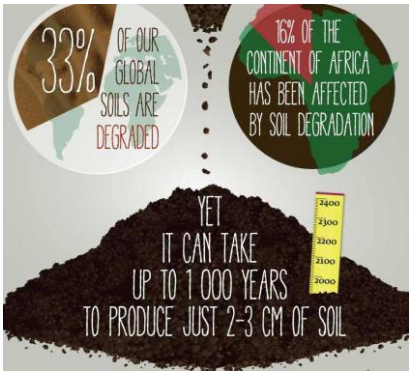
Plants need soil, water, air, warmth and nutrion, so another aspect on the road to food security is teaching farmers to take better care of the soil. Soil is a mix of minerals, air, water, and countless micro - organisms,

[12] https://www.newscientist.com/article/mg22730301-400-the-nature-of-crops-why-do-we-eat-so-few-of-the-edible-plants/ last seen July 28th

[13] *http://www.resilientcommunities.com*

the surface of the land, the very outer layer of the earth.[14] Plenty of methods are researched and carried out at the moment on how to keep soils healthy, because each kind of soil and climate condition asks for a different method of tilling. Thanks to organisms living in the earth, like e.g. worms that dig holes in the soil, plants get air, but these creatures can be killed when pesticides are used.





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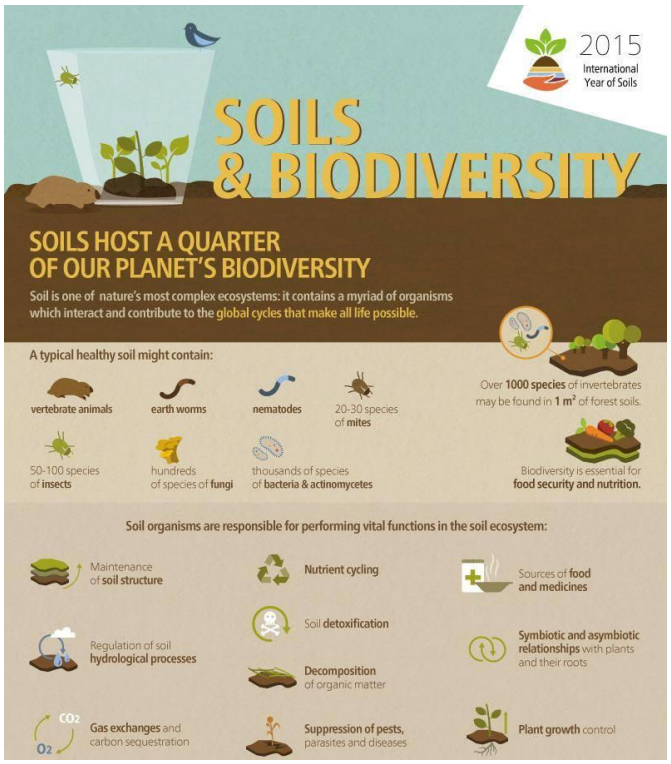


source:https://www.facebook.com/UNFAO/photos/pb.46370758585.-2207520000.1438191829./10153534263438586/?type=3&theater

[14] https://www.soils.org/discover-soils/soil-basics, last seen July 28th

This is not new science, however. Often it is age-old. Native Americans planted corn, beans and sqaush (the three sisters) to benefit from each other. The corn is meant as structure for the beans, the beans provide nitrogen for the soil and the other plants. Squash grows on the ground, prevents weeds and keeps the soil moist.[15]

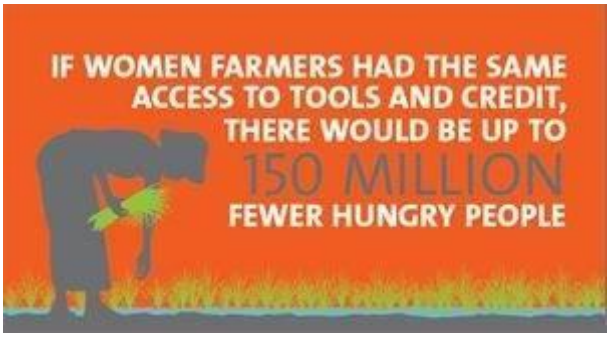
The UN puts much confidence in small farms as a way to battle hunger and to obtain foods, and so do many of the ngo's.[16] You see, when the soil you till is your own, and has been worked on by generations of your family, you are more likely to use it wisely then when you rent some piece of land and use it to exhaustion in order to obtain as much money as fast as possible out of it.

- Family and small-scale farming are linked to world food security
- Traditional food products are preserved, this contributes to balanced diets
- Safeguards agro-biodiversity, uses natural resources sustainably
- Boosts local economies and well-being of communities

Since women perform 66% of the work, it's good to empower them with means to better the yields of their lands.

[15] http://www.bing.com/images/search?q=did+you+know+that+native+americans+planted&view=detailv2&&id=97C3960B7745530FE4B6BAC268B8633E7F892252&selectedIndex=4&ccid=XY1iCxow&simid=607994712083793185&thid=OIP.M5d8d620b1a30795840120c4783452ec5o0&ajaxhist=0

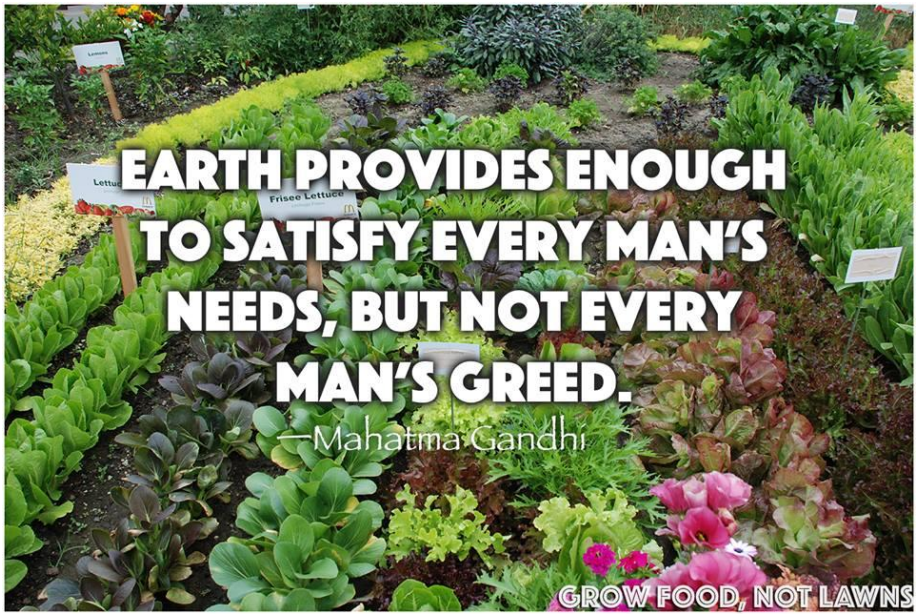
[16] http://www.fao.org/family-farming-2014/en/



http://www.unwomen.org/en/news/in-focus/rural-women-food-poverty

Finally, as a person, waste as little as possible, wether it is food or clothing or shoes or machines or instruments.

Now that you have seen how much is invested in your food, I hope you agree that waste is a shame, because: we waste so much as 60 kilo of food a person per year.



The small sized farms as a solution seems contrary to what others say: we should have massive farms with GMO crop. Why is there so much controversy over GMO? What is GMO?

Humans have since ages crossed two of the same type of plants or animals, looking for wanted qualities like bigger fruits, or disease resistance. This method takes lots of time. GMO means:

Those opposed to GMO have five objections against that method:

Inform yourself, and then carefully take your point of view. Live your life with respect for our planet earth and take your responsibility for it. And never ever loose hope!

Sources:

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- Brian Gardner: Global food Futures, feeding the world in 2050. Bloomsbury, London 2013.

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- www.thenutricionsource.com, expecially: http://www.hsph.harvard.edu/nutritionsource/sustainability/

- http://www.fao.org/family-farming-2014/en/

- http://www.huffingtonpost.com/joel-k-bourne-jr/farming-ourselves-out-of-food_b_7738744.html?ncid=fcbklnkushpmg0000006

- http://www.huffingtonpost.com/entry/palm-oil-impacts_55a4c391e4b0b8145f737dd5

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- http://www.realfarmacy.com/usda-to-allow-chickens-from-u-s-to-be-shipped-to-china-for-processing-and-back-to-u-s/

- http://www.rodalesorganiclife.com/food/congress-votes-keep-gmo-info-food-labels?cid=socFD_20150724_49711016&adbid=10153579597044642&adbpl=fb&adbpr=165599879641

- http://www.fao.org/in-action/good-agricultural-practices-help-raise-farmers-incomes-in-lao-pdr/en/?utm_source=facebook&utm_medium=social+media&utm_campaign=fao+facebook

Recommended reading:

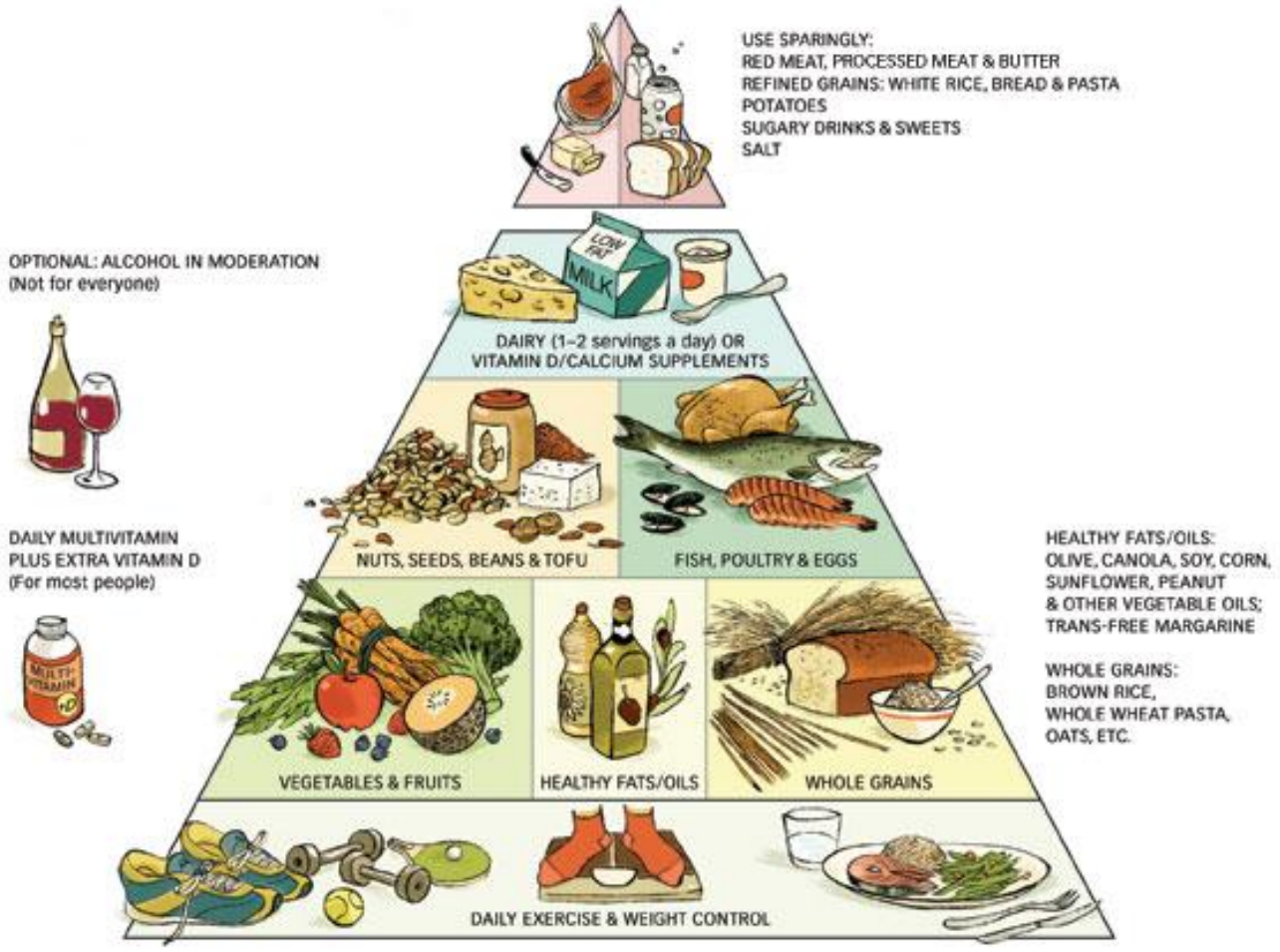
- Michael Moss: Salt Sugar Fat : How the Food Giants Hooked us. Random House, London 2013

- Raj Patel: Stuffed and Starved, from farm to fork, the hidden battle for the food system. Portobello Books, London 2012

Film (inDutch) Zembla http://www.npo.nl/zembla/04-03-2015/VARA_101372907

THE HEALTHY EATING PYRAMID

Department of Nutrition, Harvard School of Public Health



For more information about the Healthy Eating Pyramid:

WWW.THE NUTRITION SOURCE.ORG

Eat, Drink, and Be Healthy
by Walter C. Willett, M.D. and Patrick J. Skerrett (2005)
Free Press/Simon & Schuster Inc.