

Lecture 12, from here to there: Which path into sustainability? A summary from the last “100 days”

- “Development Towards Sustainability”:
Our ethical and moral obligations and a quantifiable definition.
(a definition motivated by physics and natural science principles)
- Possible fatal disasters for our global “comfort zones”.
- Remaining natural capital and the growing destructive “human impact”.
- Terminating our destructive impact and natural capital restoration?
- It seems we know what we should do locally (Moral-Ethics-Earth Care) and why we will probably fail to use what we know.
- Personal thoughts and ideas for an uncertain future and ending “day 100” with a “relaxing” Aperol.

Development Towards Sustainability:

Our ethical and moral obligations and a quantifiable definition (1)

From the Suisse constitution (in german sorry)

<http://www.admin.ch/ch/d/sr/101/a2.html>

Präambel: ..

Das Schweizervolk und die Kantone,

in der Verantwortung gegenüber der Schöpfung, im Bestreben, den Bund zu erneuern, um Freiheit und Demokratie, Unabhängigkeit und Frieden in Solidarität und Offenheit gegenüber der Welt zu stärken, im Willen, in gegenseitiger Rücksichtnahme und Achtung ihre Vielfalt in der Einheit zu leben, im Bewusstsein der gemeinsamen Errungenschaften und **der Verantwortung gegenüber den künftigen Generationen**, gewiss, **dass frei nur ist, wer seine Freiheit gebraucht, und dass die Stärke des Volkes sich misst am Wohl der Schwachen**, geben sich folgende Verfassung:

Art. 2 Zweck:

1. Die Schweizerische Eidgenossenschaft schützt die Freiheit und die Rechte des Volkes und wahrt die Unabhängigkeit und die Sicherheit des Landes.
2. Sie fördert die gemeinsame Wohlfahrt, **die nachhaltige Entwicklung**, den inneren Zusammenhalt und die kulturelle Vielfalt des Landes.
3. Sie sorgt für eine möglichst grosse Chancengleichheit unter den Bürgerinnen und Bürgern.
4. Sie setzt sich ein für die **dauerhafte Erhaltung der natürlichen Lebensgrundlagen** und für eine friedliche und gerechte internationale Ordnung.

Development Towards Sustainability:

Our ethical and moral obligations and a quantifiable definition (2)

- **Bundesrat Doris Leuthard**

(Leichter leben - Die 2000-Watt-Gesellschaft Studie 2010):

http://www.novatlantis.ch/fileadmin/downloads/2000watt/LeichterLeben2010_d.pdf

*"If the global energy and resource demand continues as before, then we need about 2.3 times more resources than today. **These reserves do not exist!**"*

- **ETH Rat 2009:**

<http://www.novatlantis.ch/2000-watt-gesellschaft/eth-bereich.html>

"The climate and energy problem is too complex, it can not be solved with slogans. We need more differentiated views"

- **ETH Energieleitbild Dezember 2012:** https://www.ethz.ch/content/dam/ethz/associates/intranet/Service/sicherheit-gesundheit-umwelt/SGU/files/energie/de/eth_energieleitbild.pdf

Quote: *'Switzerland, as a leading country in innovation and technology, plays a guiding role for a sustainable design of our energy future'*

7 topics for direct action and measures:

- 1) **Research:**

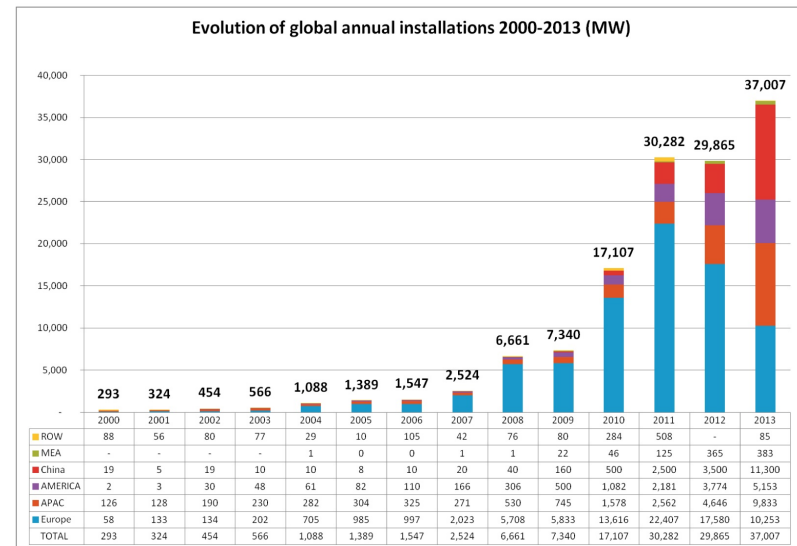
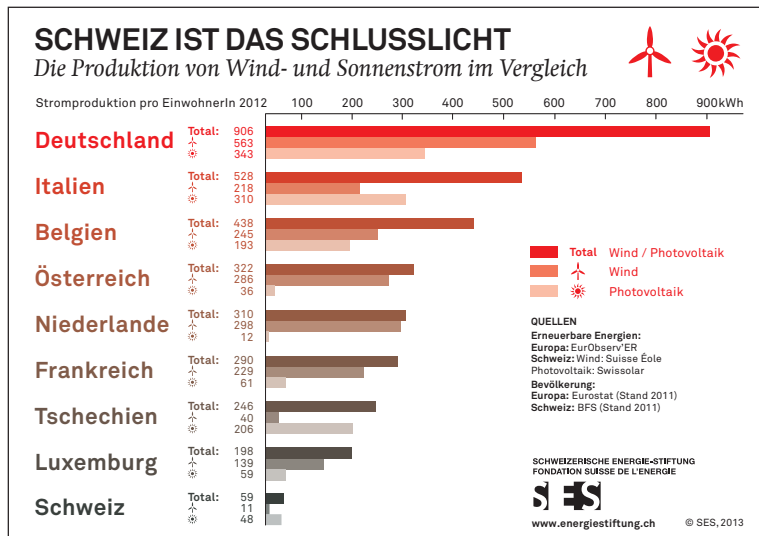
Support for basic research and interdisciplinary research and the development of competence in understanding the energy system.

- 2) **Teaching: Support for thesis works related to energy questions, increase the interdisciplinary teaching and create a critical discussion atmosphere about energy relevant topics.**

“Switzerland, as a leading country in innovation and technology, plays a guiding role for a sustainable design of our energy future”

If one believes in “solar energy” one gets the feeling that the “data” do not support this claim!

(hm.. Suisse hydropower provides almost 4000 kWh/capita/year!)



Source: EPIA

Source Schweizer Energie Stiftung <http://www.energiestiftung.ch/> and data from European Photovoltaic Industry Association <http://tinyurl.com/ptov6cv>.

EPIA Europe data: new PV in 2014 = 7GW (2013 = 11GW) installed

Development Towards Sustainability:

Our ethical and moral obligations and a quantifiable definition (3)

remember "secret hypothetical letter" 19.02.2015

Sehr geehrte Studenten (Energie und Umwelt (II) FS 2015),
sehr geehrter Herr Dittmar,

Es ist offensichtlich: unsere heutige Lebensweise weltweit und in der Schweiz ist nicht nachhaltig.

*Die unvermeidbaren Veränderungen zu einer nachhaltigen Lebensweise können also entweder
(1) von der Natur erzwungen werden oder
(2) durch unser gemeinsames Handeln unter Berücksichtigung der Naturgesetze erreicht werden.*

Als eine führende Bergsteigernation verstehen wir, dass es bei einem nahenden Gewitter im Hochgebirge das Beste ist, den Abstieg ohne Panik zu beginnen. Sie, als Naturwissenschaftler, wissen, dass die Zeitachse nur in eine Richtung zeigt und der Weg zurück versperrt ist. Wir bitten Sie, in nächsten 100 Tagen, nach dem noch unbekanntem Weg zur Nachhaltigkeit zu suchen.

In der Hoffnung auf Erfolg und mit besten Grüßen,
D.L.-Bundesamt für Energie und Umwelt, BERN

**What we tried during the last 100 days (following the STOP principle):
Stop-Think-Observe-(since "15.5.2015" develop a (our) theoretical) Plan!**

20 years of “sustainable development” made our (global) life even less sustainable!

UN meetings Stockholm (1972), Rio (1992) and Rio+20 (2012)

“World Remains on Unsustainable Track Despite Hundreds of Internationally Agreed Goals and Objectives”

Guardian (June 12, 2012), about “Global Environmental Outlook” (UNEP June 6, 2012) at http://www.unep.org/geo/pdfs/geo5/GE05_report_full_en.pdf and daily cognitive dissonance stress data here <http://www.desdemonadespair.net> **some selected stress data:**

- Population increased from 3.9 billion (1972) to 5.5 billion (1992) to 7 billion 2012; and (without “collapse”) 8-8.5 billion people want to live (like we in the rich countries!) in 2032!
- Non renewable energy resource consumption almost doubled from 1972 to 2012.
- CO2 levels in the atmosphere: 330 ppm (1972) to 359 ppm (1992) today (2015) 404 ppm.
- The world failed to reach the Millennium Development Goal (MDG) target of a significant reduction in the rate of biodiversity loss by 2010.
- Economic growth has come at the expense of natural resources and ecosystems.
- Since 2000 alone, forests equivalent in size to the landmass(area?) of Germany have been lost;
- 80% of the world’s fish stocks are (close to collapse) fully or overexploited or have collapsed already.
- The Gobi desert is growing by roughly 10,000 square kilometres every year. Each year an additional 20 million hectares of agricultural land become too degraded for crop production, or are lost to urban sprawl (from a total of 1500 million hectares).

Development Towards Sustainability:

Our ethical and moral obligations and a quantifiable definition (4)

Sustainability and sustainable development are difficult to define.

Lets try a well known scientific method:

Definition through negation:

“Though it seems a contradiction of terms, it is actually possible to give meaning to a term, not only by describing what it is, but also by describing what it is not. This exercise may work better with terms that are abstract or somewhat complicated.”

<http://english.tjc.edu/jbru/1301/negation.htm> und <http://en.wikipedia.org/wiki/Negation>

Ansatz (we only have two possibilities:

We live **sustainable** or **unsustainable!**

**We need to identify unsustainable aspects in our
way of life!**

Development Towards Sustainability:

Our ethical and moral obligations and a quantifiable definition (5)

Ansatz: unsustainable aspects in our way of life?

Unsustainable aspects of our society (culture/way of life):

- The growing human impact ($I=PAT$), carrying capacity and overshoot (27.2.2015).
- The usage of “non renewable” energy resources (oil, gas, coal and uranium); the usage of non renewable mineral resources (as long as recycling is based on cheap non renewable energy sources (6.3.2015).
- Non compostable and dangerous waste with a long lifetime (Asbestos, plastics, toxic chemical and radioactive waste, CO_2) reduce/destroy the remaining natural capital (13.3.2015).
- The destruction of biodiversity (our life support system) (20.3.2015).
- Industrial agriculture destroys the soil, pollutes our water and is based on cheap fossil energy resources (27.3.2015).

Development Towards Sustainability:

Our ethical and moral obligations and a quantifiable definition (6)

The meaning of: “Development towards sustainability”

- if parts of the system are unsustainable, the entire system is unsustainable.
- if parts of the system (our way of life) become less unsustainable within a time interval, one can begin to talk about a “development towards sustainability”!

Result: a new and quantifiable definition! and a publication in February 2014 (out of the 2013 lecture)

<http://ihp-lx2.ethz.ch/energy21/sustainabilitypublished.pdf>

Development towards sustainability means:

We need to live less and less “**unsustainable**”!

What is still missing: problems for the scientists within all of us:

- (1) Understand the remaining resources of the natural capital (e.g. oil).
- (2) Define the “Carrying capacity” as a function of the natural capital.
- (3) Identify **uncontrollable “Tipping Points” of the “Titanic”?**

How distant are those icebergs? (e.g. What is the CO₂ concentration which results into the “Runaway” global warming?)

- (4) Is it possible to help (speed up) the regeneration of natural capital?

Possible fatal disasters for today's "comfort zones"

Which chain element is the weakest?

"Ein einziges Glied, das in einer grossen Kette bricht, vernichtet das Ganze."

Johann Wolfgang von Goethe (Wilhelm Meisters Wanderjahre III, 12)

Our growing "dependence" on imports of almost everything increase the risk of "heart attacks".
(even small disturbance of the global system can be fatal)

What is valid today ("we are rich enough to buy what we need") might be wrong tomorrow!

Some local and global risks for the next few years:

(just thinking about them creates "cognitive dissonances" and mental stress)

- Practically nothing works today without a stable supply of oil and electric energy!
Supply disruptions (reductions) of finite (energy) resources and an unstable electric grid destroy our still functioning economic system.
- Printing more and more "Dollars, Euros etc" will not solve our debt problems forever.
How will Switzerland's (Germany's) economy survive the next dollar/euro crisis?
- Even if we in Switzerland and the EU manage to stay out of wars, global resource crisis and resource wars between (USA-Russia-China-etc) will have terrible consequences for us!
- Dangerous waste (asbestos, plastics, chemical and radioactive waste, the CO₂ problem) reduce and destroy the remaining natural capital and our life support system.
- Industrial agriculture destroys the soil, poisons the water (and us!) and is based on cheap fossil energy resources. Nobody has an idea how this system can function and feed the people in the "Cities and Mega-Cities" without cheap oil based transport.
- We are destroying the biodiversity .. (for how long can we live without bees?)

The remaining natural capital and the growing destructive “Human Impact”

the I=PAT equation: http://en.wikipedia.org/wiki/I_%3D_PAT

P.R. Ehrlich, J.P. Holdren, Impact of population growth, Science, 1971

Without the relation to the local/global **Carrying Capacity (CC)** (or the local natural capital) the I=PAT equation gives at best only “qualitative” guidance!

a new (M.D. 2013?) modified quantifiable equation:

$$CC(\text{time}) = CC(t=0) - \text{Impact}(t) + \text{Restoration}(t)$$

$$\text{Impact}(t) = \text{nat. Reductions (like volcanic eruptions)} + I(=PAT)$$

$$\text{Restoration}(t) = \text{natural Restoration}(t) + \text{human Restoration}(t)$$

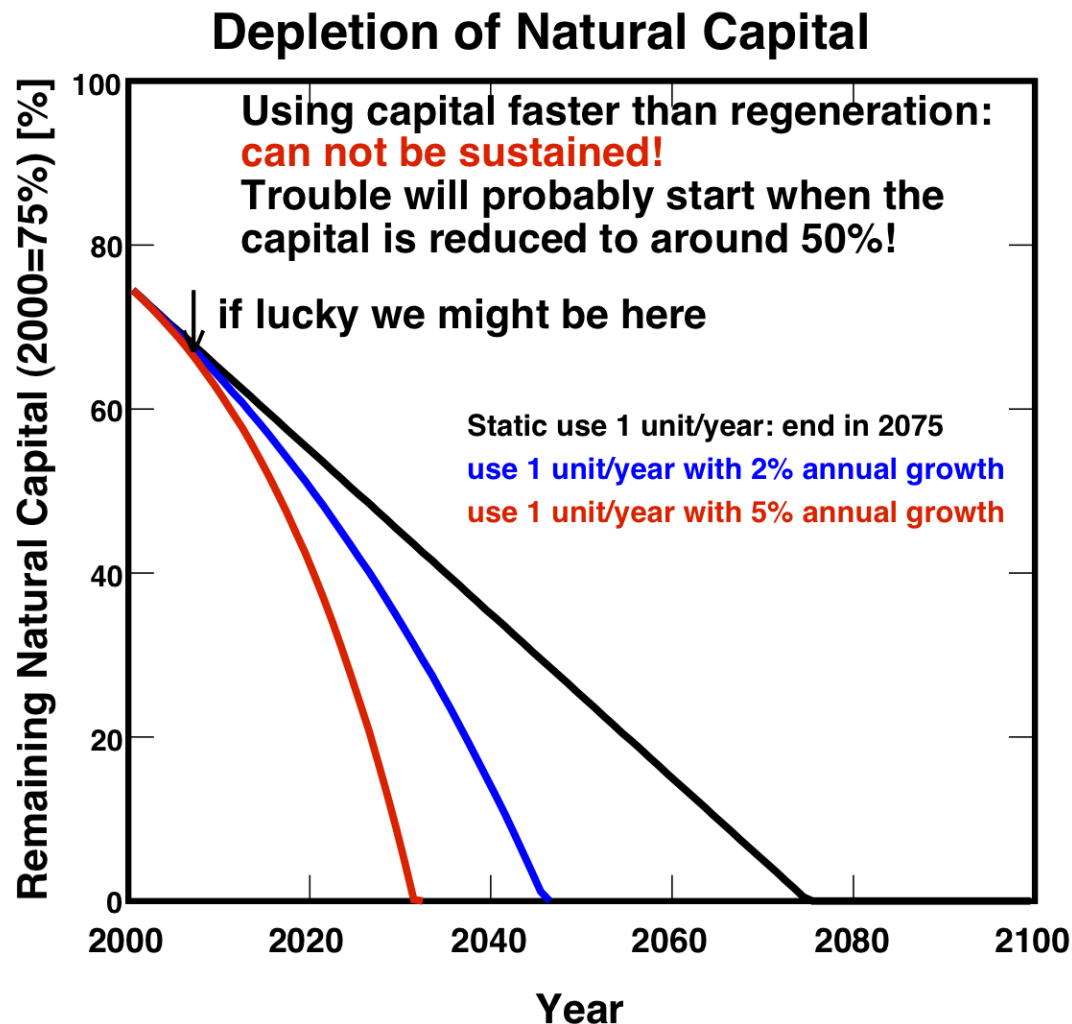
The local and global sustainability principle is violated as long as the natural capital is destroyed faster than its restoration.

Attention: **the actual “Ghost carrying capacity” is very large!**
(“thanks” to the use of non renewable (energy) resources)

Ending the destruction of the natural capital (1)

"Ein einziges Glied, das in einer grossen Kette bricht, vernichtet das Ganze."
Johann Wolfgang von Goethe (Wilhelm Meisters Wanderjahre III, 12)

the destructive "human" Impact ($I=PAT$) is still growing:
How large is the remaining natural capital (locally and globally?)
Oil, perhaps the weakest chain element (many elements are damaged already!)



Ending the destruction of the natural capital (2)

"Ein einziges Glied, das in einer grossen Kette bricht, vernichtet das Ganze."

Johann Wolfgang von Goethe (Wilhelm Meisters Wanderjahre III, 12)

the biggest risks for Switzerland, Western Europe and the globalised world and how we do (not yet) react locally?

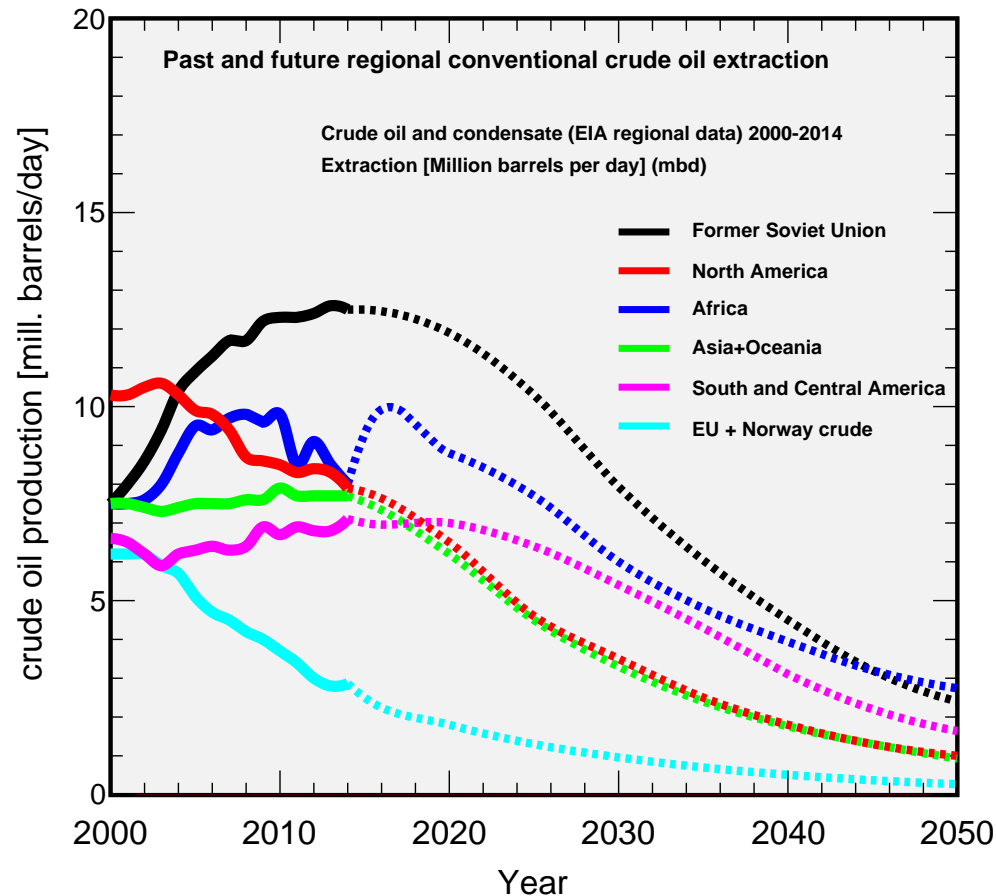
perhaps the most important problem: Peak Oil (plateau and decline):

- crude oil is our most important energy carrier and it seems we have reached the global extraction plateau.
(\approx 80 million barrel per day + about 12 mbd of "other liquids").
- industrial food supply chain (1 Cal. food = 10 Cal. from oil/gas) and the global trade (economy) is based on this cheap oil.
- Conflicts about the access to the remaining oil reserves in the Middle East (2/3 of the remaining good oil!)?

We should/must learn "now" to live with less oil every year (-5%/year?)!
In addition: oil "supply" interruptions can happen all the time!

Regional oil production model to 2050

My new resource/production based regional oil extraction model:
Oil rich Middle East countries remain at today's level 24 mbd



- 1) My estimate (preliminary) is based on past years conventional crude oil extraction and claimed remaining reserves.
- 2) Shale oil, oil sands and other (unconventional) liquids will perhaps continue at about 10 mbd (about 10-15% of today's global consumption).

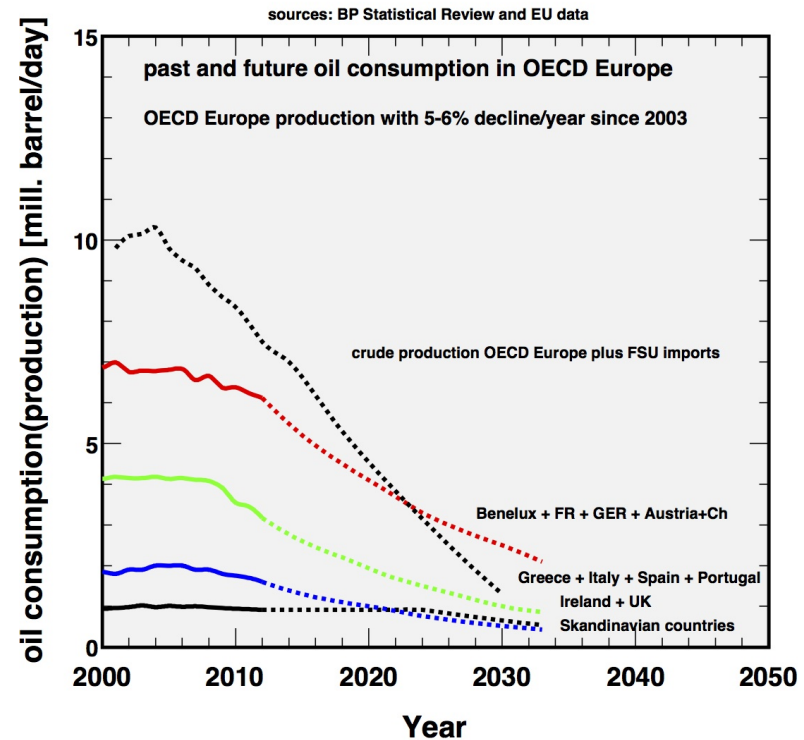
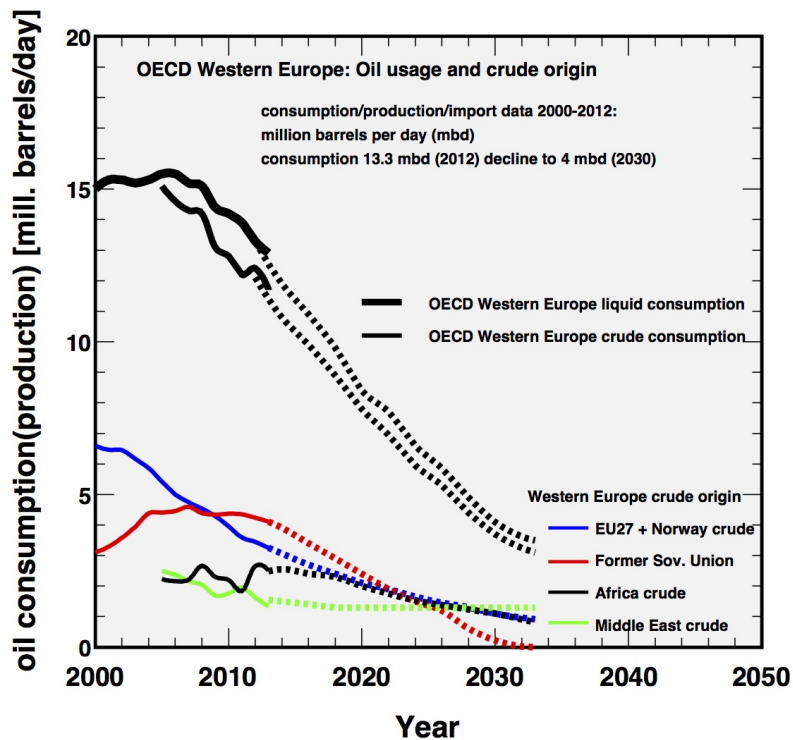
Ending the destruction of the natural capital (3)

"Ein einziges Glied, das in einer grossen Kette bricht, vernichtet das Ganze."
Johann Wolfgang von Goethe (Wilhelm Meisters Wanderjahre III, 12)

Oil consumption ..the weakest element?

The oil supply from Russia can become critical every "moment" .

How will the EU transit countries distribute the oil?



Decline of oil imports by 5-6% per year (starting essentially now)
curves perhaps with ± 2 years uncertainty.

(my 2014 estimate for Western Europe)

more details at the ETH Zukunftsblog <http://tinyurl.com/lhhespw>

Unsustainable living and how to minimise cognitive dissonances? (1)

Our destructive impacts create cognitive dissonance stress!

<http://psychology.about.com/od/cognitivepsychology/f/dissonance.htm>

“According to Festinger’s theory of cognitive dissonance, people try to seek consistency in their thoughts, beliefs, and opinions. So when there are conflicts between cognitions, people will take steps to reduce the dissonance and feelings of discomfort. They can go about doing this a few different ways.”

“Automatic human key strategies” :

- Focus on more supportive beliefs that outweigh the dissonant belief or behaviour.
Like: “my behaviour can’t be so bad” and very selective (ignoring) collection of new information.
- Reduce the importance of the conflicting belief.
The behaviour will be constructed as being forced: “I did not have a choice”.
(drugs and alcohol might also “help” to reduce tensions.
- Change the conflicting belief so that it is consistent with other beliefs or behaviours.
Particularly in the case of deeply held values and beliefs, change can be exceedingly difficult.

Successful “Development towards sustainability” strategies must include ideas far beyond “automatic dissonance” reduction.

Unsustainable living and how to minimise cognitive dissonances? (2)

If *“Our problems can not be solved by the same methods that created them”* new ideas and strategies are needed!

If it is true that:

1. Some humans, like adventurers and “successful” scientists (**you!**) look for dissonances (“problems”) and enjoy to “solve” them!
2. More tolerant and more open people have less problems to accept new ideas and new informations.

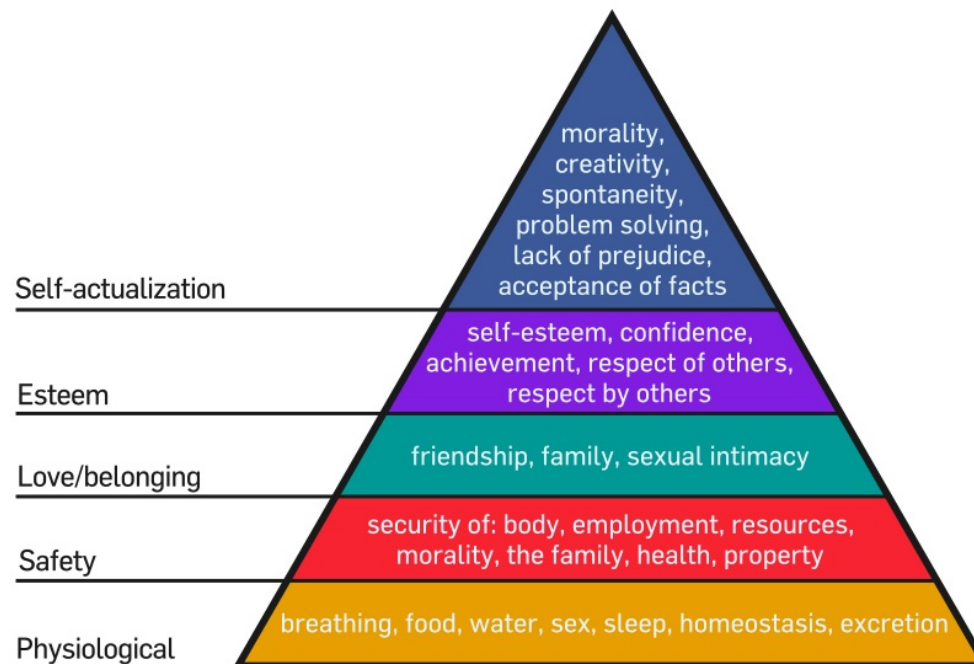
Need to accept scientific facts (the results of our destructive impact) and learn to enjoy:

- (1) learn and demonstrate how “natural repair processes” can be accelerated with a different “human impact”;**
- (2) learn about such examples, try to learn and adapt them locally and**
- (3) distribute the know how and the fun of achieving such “success”.**

It seems we know what we should do locally (Moral-Ethics-Earth Care) and why we will probably fail to use what we know(1)

Minimal conditions for a sustainable and “good” life?

Maslow’s hierarchy of needs http://en.wikipedia.org/wiki/Maslow's_hierarchy_of_needs



Most points could theoretically be reached easily in a functioning community and without oil and electric energy!

Why does this not even function in rich industrialised countries?

(See child poverty developed countries http://en.wikipedia.org/wiki/Child_poverty#Developed_countries)

*Poor man meets rich man. Looking at each other, the poor man to the rich:
“Wouldn't I be poor, you would not be rich!” B. Brecht*

It seems we know what we should do locally (Moral-Ethics-Earth Care) and why we will probably fail to use what we know(2) What is wrong with this model?

**In case we “want” a “development towards sustainable living”:
Theoretically Switzerland could feed itself sustainable:**

From unsustainable food production on 2000m²/person to a local 100 m²/person gardening space? Make this space available to all who want!

A 80% self-sufficient community and local sustainable gardening “food” model:
(requirements \approx 1 hour work/m²/year and moderate “permaculture” yields)

100 kg fruits (30-40 m²), 100 kg vegetables (30-40m²) and 50 kg potatoes (20m²) per person and year.

- Individual 100-150 m² vegetable/fruit garden space for each “family” .
- Fruits from local community “self service” food forests with large varieties of seasonal fruit bushes and trees.
- Some community farmed “potatoes” .
- Dairy and meat products from import free biological sustainable community farming.

“Ask for work, if they don't give you work, ask for gardening land, if they don't give you work or gardening land .. take the gardening land!”

Slightly modified Quote from Emma Goldman

Is private land ownership the reason that this “idealistic” model is not working (yet)?

It seems we know what we should do locally (Moral-Ethics-Earth Care) and why we will probably fail to use what we know(3)

potential theoretical solutions and “human nature within today's environment”

Real humans live (voluntary or not!) in “very large scale” groups and “Mega-Cities”. Behaviour depends on private property, power structures, cognitive prejudices and cognitive dissonances:

- Even in the best functioning “democratic” structures, the individual has little to no influence on decision making. **Is true democracy impossible for larger groups?**
- Top-Down “power/richness” structures (the upper 10 000) dominate our workspace, politics and the media.
- Thanks to our philosophical “progress” thinking most humans believe/accept this Top-Down system (with God like humans at the top) as the natural and just order.
- Most of “us” believe (want to) to be members of an undefined Middle Class. We usually want a much more egalitarian distribution of resources, at least within our clan/social group country (perhaps even on the entire planet)!
- Dangerous crazy people (monster) are a small minority. Only under unstable conditions those can achieve extraordinary power!

We can hope that Einstein was correct not only with the neutrino velocity:

“The world is a dangerous place to live; not because of the people who are evil, but because of the people who don't do anything about it.”

Personal thoughts and ideas for an uncertain future (1)

Experiences with huge groups of humans from the last few thousand years:

- From the beginning to the end, the existence of “empires” is based on the exploitation of natural and human resources and the need to expand.
- Collisions with other empires is unavoidable and the strongest “survive” .
- Today's globalised empires function thanks to cheap and sufficiently available energy resources.
- As long as empires can grow, many people within the “heart” of the empire seem to “profit” from this strength.
- Once the natural is “consumed” and expansion is no longer possible, the empire begins to decline and the “profiteers” have to accept the new realities!

Personal thoughts and ideas for an uncertain future (2)

**Huge human crowds and historical quantum jumps?
Revolutions and revolutionary movements: what did they achieve?**

- Stagnating empires were always confronted with “revolutionary” movements of the suppressed!
- Sometimes the elites (often for unclear reasons) can not continue “to rule as before” and mass movements can lead to sudden unexpected system changes.
- So far, all successful local uprisings have either resulted in new “Top-Down” structures or foreign powers terminated (through wars) new “experiments.

The end of cheap oil/energy can lead to local independence wars, but most successful independence movements do have little “know how” on how to create a sustainable way of life.

Personal thoughts and ideas for an uncertain future (3)

today's global situation:

“Our Titanic continues to move full speed forward”!

Viewpoints of “remaining” political movements in the richer countries?

- “Right wing parties” believe in the unsinkable Titanic and do not see Icebergs. Some exceptions observe “Houston we have a problem”, but believe in the “survival of the richest” (not the “survival of the fittest”)!
- Moderate centrum (“religious”) parties: “Keep on going” and hope for “wonders”.
- “Left” parties and movements (whatever this means) believe in “egalitarian distribution systems” and a just distribution of the fruits of the economic growth within the country. Ideas about global solidarity and justice have practically disappeared.
- “Green” political parties? Different ecological ideas are combined with hopes in an undefined “green” economy which sometime in the future will make us sustainable. Ignorance of natural laws and the hopes in technological wonders are widely distributed.
- Groups trying to think and work outside of the existing system (antigrowth, permaculture, anarchists of different colours etc..) seem to have many interesting ideas.. but are without any influence! **Their ideas do not appear to be attractive!**

Personal thoughts and ideas for an uncertain future (4)

a “Top-down military leadership” **We can do way, way better!**

Table 1. Follower types

<i>High</i>	Alienated Followers	Effective Followers
Critical Thinking		
<i>Low</i>	Sheep	Yes People
	<i>Passive</i>	<i>Active</i>

Adapted from Robert E. Kelley, "In Praise of Followers," in *Military Leadership: In Pursuit of Excellence*, 3rd ed., ed. Robert L. Taylor and William E. Rosenbach (Boulder, CO: Westview Press, 1998), 137.

See Chuang Tzu: “Flight from Benevolence” <http://terebeck.hu/zen/mesterek/MertonChuangTzu.pdf>

“there are three classes of people to be taken into account: “yes-men”, “blood-suckers” and “operators..”

Personal thoughts and ideas for an uncertain future (5)

Turning as asked? “We can do way, way better”



Figure 4.5 Authority can be taken too far.

What about this answer:

“Sir, I will show you a great place where you can even enjoy to jump!”

Final thoughts: Which path into sustainability? (1)

The point when the steep path down to the valley varies from region to region, but within the globalised world we are all dependent on each other.

Two dominant “way of life” options (if it comes to the system collapse)

A nomadic hunter gatherer culture appears to be unachievable in most regions of the planet (today's population density):

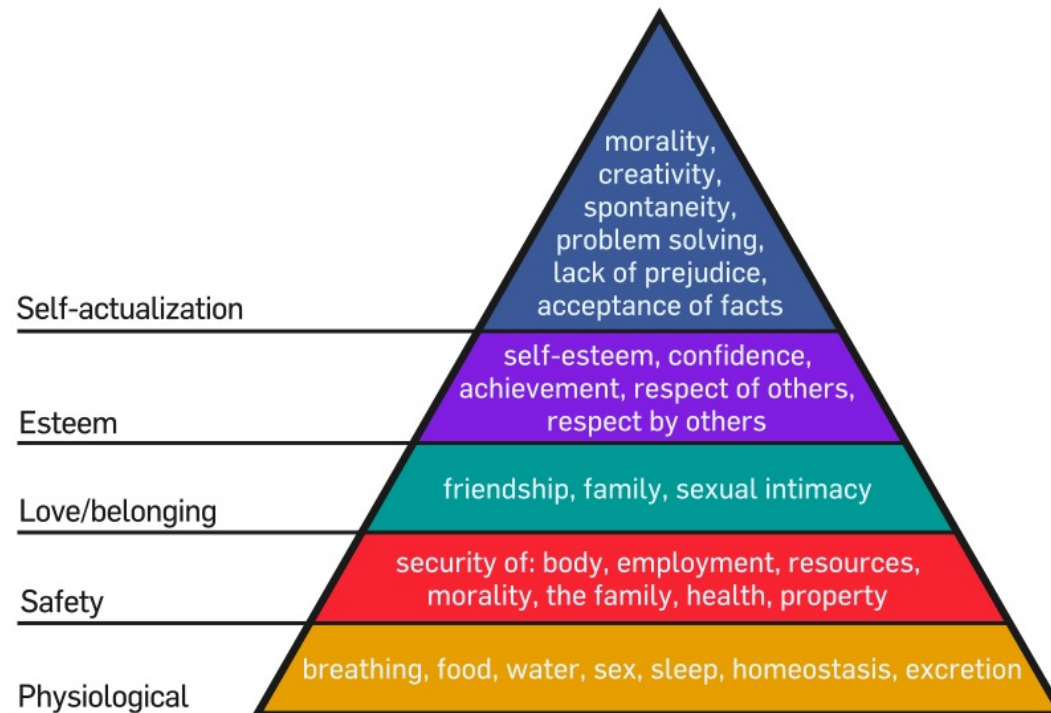
(Desert living, like the “Tuareg/Bushmen”: unachievable for most of us!)

1. **Chiefdom Feudal/Mafia-like larger scale cultures with unsustainable but pseudo stable conditions;**
2. **“Small scale” egalitarian cultures, surrounded by a growing biological and cultural diversity.** Perhaps one could imagine a modern versions of the [http://en.wikipedia.org/wiki/Cucuteni-Trypilian_culture](http://en.wikipedia.org/wiki/Cucuteni-Trypillian_culture).

Final thoughts: Which path into sustainability? (2)

Option 2: “Small scale” egalitarian cultures, surrounded by a growing biological and cultural diversity can theoretically achieve a sustainable and perhaps better way of life. (see Maslow’s hierarchy of needs)

Attention: Attacks from outside groups (Feudal/Mafia-like cultural groups (Option 1)) are probably the greatest theoretical danger.



Final thoughts: Which path into sustainability? (3)

If we really want an active “development towards sustainability”, then we need new thoughts, ideas and research to replace our comfort zones with their **“cognitive dissonances” with something new and better!**

1. Learn (and practice) how one can live better with living less and less unsustainable.
2. Conserve and restore the natural capital:
(Biodiversity, democratic principles and human rights!)
3. Create sustainable (“permaculture”?) island and make them beautiful with flowers. *“Those who love their environment (garden), will make it flourish!”*
<http://tinyurl.com/ozsa7zn>
4. A satisfying sustainable way of life and for future generations can not be achieved in isolation. → **Help the remaining sustainable “small scale” cultural groups and perhaps learn from them.**

We all have many talents and interests: Develop especially those talents within that can help you and your surrounding for the transition into sustainability.

Final thoughts: Which path into sustainability? (4)

Derrick Jensen (from the book endgame) Quote:

<http://miscellaneousmaterial.blogspot.ch/2011/07/derrick-jensen-engame-hope.html>.

“Another question people sometimes ask is, “If things are so bad, why don’t you just party?” Well, the first answer is that I don’t really like parties. The second is that I’m having great fun. I love my life. I love life. This is true for most activists I know. We are doing what we love, fighting for what and whom we love.”

Heinrich Heine Germany a Winter’s tale (Deutschland ein Wintermärchen).

<http://www.heinrich-heine.net/winter/winterengl.htm>

http://www.balladen.de/web/sites/balladen_gedichte/autoren.php?b05=15&b16=420
and youtube <https://www.youtube.com/watch?v=9R00vMpWMIQ> or <https://www.youtube.com/watch?v=gWQQtoW-uE8>

..A new song, a better song, My friends will be my aim! We should, right now on earth, A kingdom of heaven proclaim.

We wish to be happy, here on earth, The days of need have gone; The idle belly must not enjoy What toiling hands have won.

Enough bread grows here on earth, For all mankind’s nutrition, Roses too, myrtles, beauty and joy, And green peas, in addition.”