

**Lecture 5**  
**(Block I: What is unsustainable today (4))**  
**Sustainability and the destruction of the biodiversity:**  
**How much do we need for (a good) life?**

- **Introduction**

“Our species (homo sapiens) can not exist without nature, but nature can exist without humans!”

some video to watch:

<http://crisisoflife.net/>, <http://speciesalliance.org/index.php> and

<http://www.youtube.com/watch?v=0i2uZ4-AkrA&list=PLJEjgXhD0rY8Gs0M3wV7phJSxXphg1j2z>

- **biodiversity: concepts and definitions (for physicists)**

- **How much biodiversity do we need for a sustainable (good?) life?**

Dr. Christoph Küffer, Institute of Integrative Biology ETH Zurich

<http://geofms.ethz.ch:591/Geodyn/Koordinaten/FMPro?-db=koordinaten&ID=167&-format=datensatzdet.e.htm&-lay=www&-find=>

- B. Russell's “Message To Future Generations” a little modified

(<http://www.youtube.com/watch?v=ihaB8AF0hZo>)

**“Either we learn to live together with nature or we will die together!”**

## Introduction: many nice words, but the extinction rates still increase

“Executive Summary” from “**Global Biodiversity Outlook 3**” (fall 2012)

<http://www.cbd.int/gbo3/?pub=6667&section=6673>

The UN report starts with:

**“The target agreed by the world’s Governments in 2002, ”to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth”, has not been met.”**

and the related UN video:

World Wide Views on Biodiversity 2012-Teil 1

<http://www.cbd.int/gbo3/default.shtml> **“Not a single government claims that the target goals have been achieved at a national level”**

(min 1:10) and min 7:50 **”It is not too late ..but we need to act now.**

The result: **United Nations Decade on Biodiversity 2011-2020**

and “nobody” cares about it!

What about the update in “Outlook 4” (autumn 2014) we are in 2015..

(in case remember the 2020 goals <http://www.cbd.int/2011-2020>)

# Executive Summary: Global Biodiversity Outlook 4 (fall 2014)

<http://www.cbd.int/gbo4/> and  
<http://www.cbd.int/gbo/gbo4/gbo4-summary-en.pdf>

The UN report starts with:

**“There has been significant progress towards meeting some components... However, in most cases this progress will not be sufficient to achieve the targets set for 2020, and additional action is required to keep the Strategic Plan for Biodiversity 2011- 2020 on course.”**

and “Achievement of the 2050 vision for biodiversity” (page 15)

the 2050 Vision of the Strategic Plan for Biodiversity 2011 - 2020:

“By 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people” .

What to expected from the Global Biodiversity Outlook 22 (fall 2050)?

## 2015.. what is new? a new Suisse and a new EU report

Environment Switzerland 2015

[http://www.bafu.admin.ch/publikationen/publikation/01794/index.html?lang=en&show\\_kat=/publikationen](http://www.bafu.admin.ch/publikationen/publikation/01794/index.html?lang=en&show_kat=/publikationen)

*“biodiversity in Switzerland is in a poor state..  
(2/3 of all habitat types endangered)”*

*“Switzerland appears to be capable controlling biodiversity” and  
“The loss of biodiversity makes it less likely that our future requirements will  
be met..(like medicare, food and material development)”*

SOER 2015 The European environment state and outlook 2015 (March 3, 2015)

A comprehensive assessment of the European environment's state, trends and prospects, in a global context.

<http://www.eea.europa.eu/soer> *A high proportion of protected species (60%) and habitat types (77%) are considered to be in unfavourable conservation status, and Europe is not on track to meet its overall target of halting biodiversity loss by 2020, even though some more specific targets are being met. Looking ahead, climate change impacts are projected to intensify and the underlying drivers of biodiversity loss are expected to persist.*

# Some concepts and definitions: Biodiversity(I)

## Top-Down and/or bottom-up Design ecosystems:

source: [http://en.wikipedia.org/wiki/Top-down\\_and\\_bottom-up\\_design](http://en.wikipedia.org/wiki/Top-down_and_bottom-up_design)

- **Top-down (ecosystems) control:** *“A top predator controls the structure or population dynamics of the ecosystem. The classic example is of kelp forest ecosystems. In such ecosystems, sea otters are a keystone predator . They prey on urchins which in turn eat kelp. When otters are removed, urchin populations grow and reduce the kelp forest creating urchin barrens . In other words, such ecosystems are not controlled by productivity of the kelp but rather a top predator.*  
<http://www.bbc.co.uk/programmes/p0038tcc>
- **Keystone species**, concept by Dr. Robert Paine 1969;  
<http://www.washington.edu/research/pathbreakers/1969g.html>:  
*“Keystone species ([http://en.wikipedia.org/wiki/Keystone\\_species#cite\\_note-paine1995-1](http://en.wikipedia.org/wiki/Keystone_species#cite_note-paine1995-1)) are usually noticed when they are removed or they disappear from an ecosystem, resulting in dramatic changes to the rest of the community. The phenomenon has been observed in a wide range of ecosystems and for a wide range of organisms.”*
- **Bottom-up (ecosystems) control:** *“The nutrient supply and productivity and type of primary producers (plants and phytoplankton) control the ecosystem structure. An example would be how plankton populations are controlled by the availability of nutrients. Plankton populations tend to be higher and more complex in areas where upwelling brings nutrients to the surface.*

*There are many different examples of these concepts. It is not uncommon for populations to be influenced by both types of control.*

## Some concepts and definitions: Biodiversity(II)

### Habitat Destruction (the destruction of natural capital):

[http://en.wikipedia.org/wiki/Habitat\\_destruction](http://en.wikipedia.org/wiki/Habitat_destruction)

- **Habitat destruction:** process in which natural habitat is rendered functionally unable to support the species present. In this process, the organisms that previously used the site are displaced or destroyed, reducing biodiversity.
- **Habitat destruction by human activity:**  
Mainly for the purpose of harvesting natural resources for industry production and urbanization.
- **Clearing habitats for agriculture:** (currently) the principal cause of habitat destruction. **other causes:** mining, logging, trawling and urban sprawl (and wars!).
- **Habitat destruction is currently ranked as the primary cause of species extinction worldwide.**  
A process of natural environmental change that may be caused by habitat fragmentation, geological processes, climate change or by human activities such as the introduction of invasive species, ecosystem nutrient depletion and other human activities mentioned below.

**“Habitat destruction” only for keystone species can destroy everything, and it will take a long time before we understand it!**

# Some concepts and definitions: Biodiversity(III)

**Drivers of Habitat Destruction** (how we destroy the natural capital)

[http://en.wikipedia.org/wiki/Habitat\\_destruction](http://en.wikipedia.org/wiki/Habitat_destruction)

- **Drivers:** The forces that cause humans to destroy habitat are known as drivers of habitat destruction. Demographic, economic, sociopolitical, scientific and technological, and cultural drivers all contribute to habitat destruction. (oder die I=PAT Gleichung!)
- **Biodiversity Hotspots:** biogeographic region with a significant reservoir of biodiversity that is under threat from humans. <http://se-server.ethz.ch/staff/af/Fi159/M/My042.pdf>  
(compare with already destroyed/endangered species  
[http://public.media.smithsonianmag.com/legacy\\_blog/bubbles.png](http://public.media.smithsonianmag.com/legacy_blog/bubbles.png))
- **Hotspot Conservation Initiatives:** Only a small percentage of the total land area within biodiversity hotspots is now protected. Several international organisations are working in many ways to conserve biodiversity hotspots.
- **Critiques of Hotspots (conservation):**  
a long list: [http://en.wikipedia.org/wiki/Biodiversity\\_hotspot](http://en.wikipedia.org/wiki/Biodiversity_hotspot)  
Want to see: regeneration map of formerly “biodiversity hot(rich) spots” in “Western Europe”

“Development towards sustainability” is much more than a “slow down” of habitat destruction through “national parks and zoo’s”!

**Goal of a real policy “development towards sustainability”:**

**the natural capital with its biodiversity has to grow (locally) again.**

**We should demand and (re)create new “oasis” of “biodiversity hotspots” in our environment. Especially in destroyed regions!**

## Some concepts and definitions: Biodiversity(IV)

**“Development towards sustainability”**: much more than a “slow down” of habitat destruction through “national parks and zoo’s”!

<http://www.bafu.admin.ch/dokumentation/fokus/11095/11708/index.html?lang=de>

Zitat:

“Die Biodiversität in der Schweiz hat seit Beginn des zwanzigsten Jahrhunderts starke Verluste erlitten. Zwischen 1900 und 2010 betrug der Flächenverlust für Auen 36%, für Moore 82% und bei den Trockenwiesen und -weiden 95%. Die Qualität der meisten Lebensräume ist zudem tief und nimmt weiterhin ab. Durch den Lebensraumverlust sind viele einst häufige Arten von sinkenden Bestandesgrössen betroffen. Von den etwa 40 000 in der Schweiz bekannten Pflanzen-, Tier- und Pilzarten ist **rund ein Drittel in ihrem Bestand bedroht. Dank den Schutzmassnahmen konnten in den letzten Jahrzehnten die Bestandesrückgänge bei einigen Arten und die Flächenverluste bei bestimmten Lebensräumen zwar gebremst, jedoch nicht gestoppt werden.**”



# Some concepts and definitions: Biodiversity(V)

*“Not everything that can be counted, counts and not everything that counts can be counted!” Einstein*

With or against nature? **“Development towards sustainability”**:  
**We know the driver of destruction: “our no limits economic system”!**  
**(1) Stop further destructions; (2) demand and create “some oasis” and “biodiversity hotspots” nearby!**  
**(3) Demonstrate how it can be done especially in destroyed regions!**  
<http://www.bafu.admin.ch/umwelt/indikatoren/08612/index.html?lang=de>



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(<http://www.youtube.com/watch?v=ihaB8AF0hZo>)

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What needs to be protected: <http://www.youtube.com/watch?v=B8WHKRzkCOY>