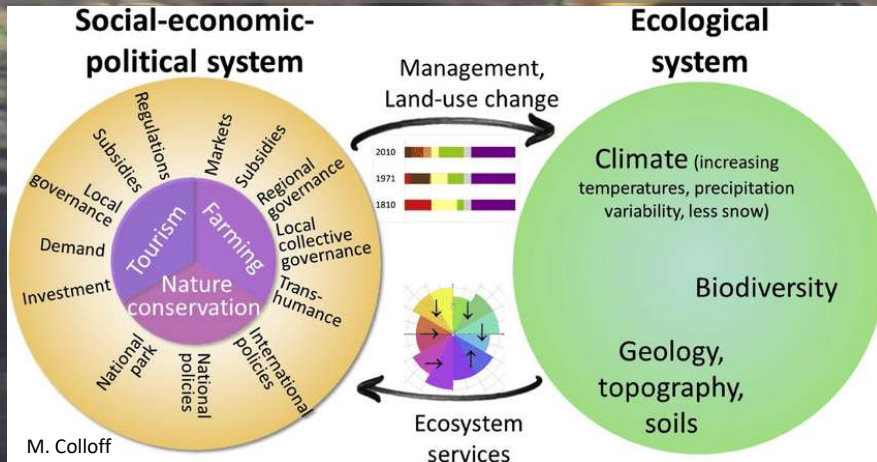


# River Culture: Maintaining biological and cultural diversities of inland water socio-ecosystems



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United Nations  
Educational, Scientific and  
Cultural Organization



UNESCO Chair  
River Culture

# Contents of my talk 1/2

The importance of inland water socio-ecosystems

Have we forgotten the inland water socio-ecosystems when designing the SDGs?

Understanding ecosystem functions: the development of concepts

The environmental imprint on cultural development (we forget that)

Biological and cultural evolution: what is different?

Limits of natural cultural evolution: "Impossible is nothing"?

When did things break bad? What precisely went wrong?

Why didn't we sense it? Our sensory equipment and time scales

Delusive ecosystem resilience. There is no Big Bang when K is surpassed

The SANDOZ experience: Do we need catastrophies for taking action?

# Contents of my talk 2/2

The River Culture Concept: trying to get back into harmony between man and river

How to (re-)integrate "old" knowledge into river management

Options:

The five tenets of the RivCult Concept

Sanctuary rivers

Think Hausmann

Create Man-River-Encounter sites

Experiences from Urban River Restoration: psychology of actions

# A drop of water keeps us\* alive.

Less than 1 permill of the global water is **surface freshwater**

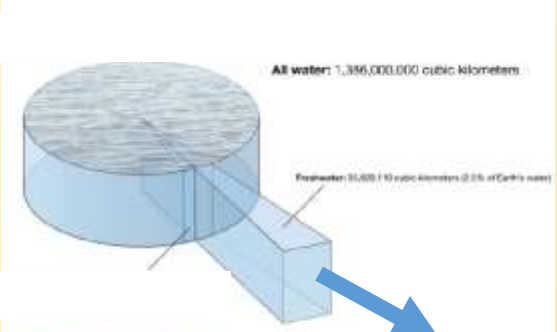
0.3% of 2.5% = **0.0075%**



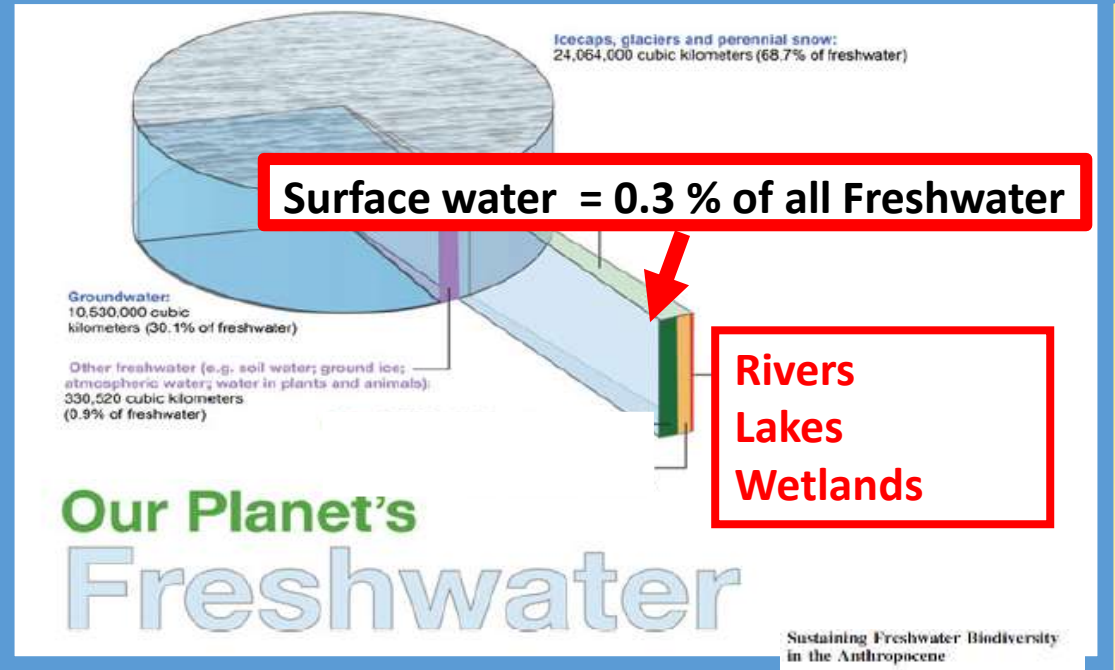
1 Liter



0.075 Milliliter



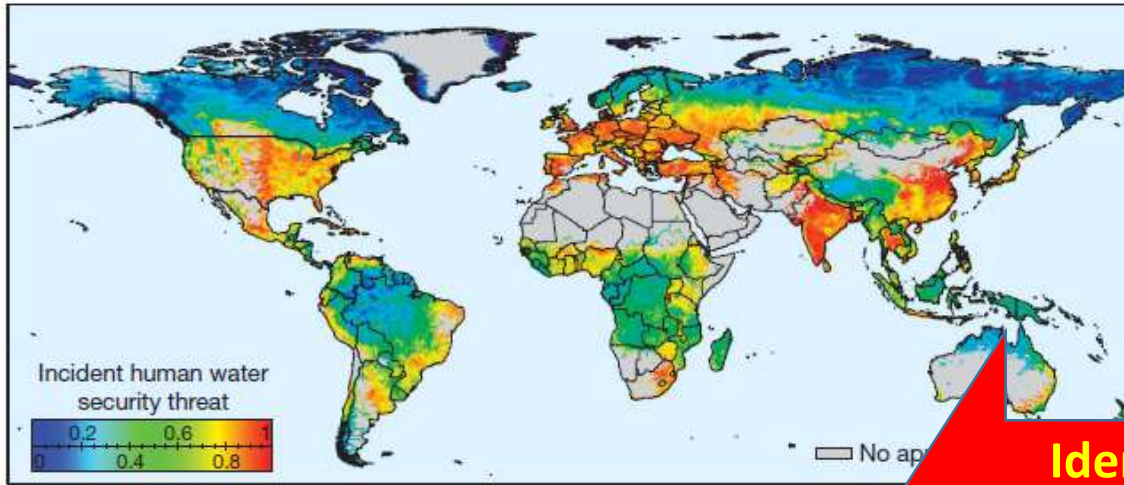
**Freshwater = 2.5% of all Earth's water**



\*us = 700 mio tons humans and domestic animals, 100 mio ton other vertebrates, some bugs and plants...

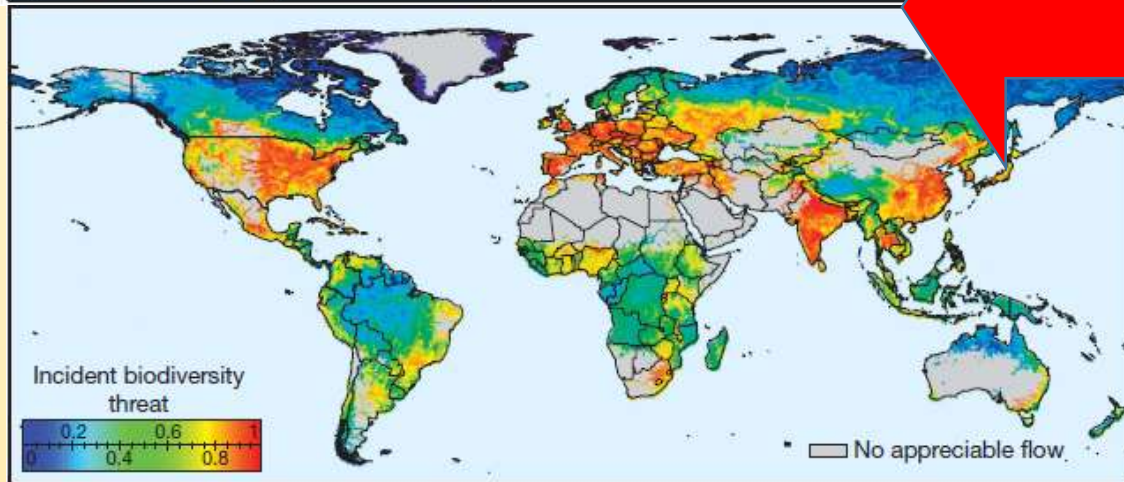
Sustaining Freshwater Biodiversity in the Anthropocene  
 Juan Garcia-Moreno, Ian J. Harrison, D. Balgova, V. Chaudhary, W. Darroch, T. Farrell, C. Sary, S. Tockner and N. Tahir

# The importance of inland water socio-ecosystems



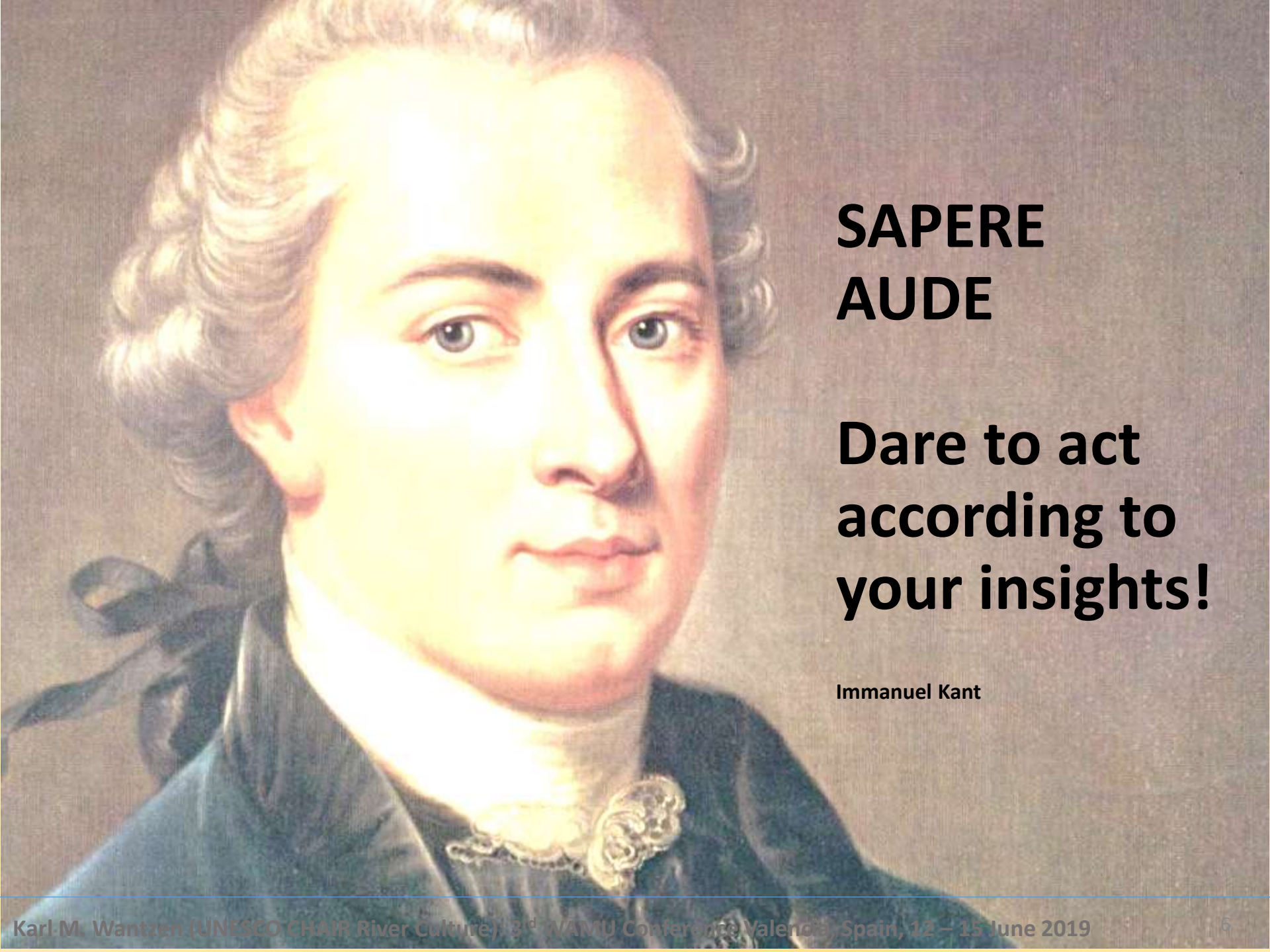
Human  
water  
security

Identical types of  
menaces



Incident  
biodiversity  
threat

30 SEPTEMBER 2010 | VOL 467 | NATURE



**SAPERE  
AUDE**

**Dare to act  
according to  
your insights!**

Immanuel Kant

# SDGs → water: *USE & CONTROL* for human benefit



[sustainabledevelopment.un.org](https://sustainabledevelopment.un.org)

# 2015 UN-Water Annual International Zaragoza Conference. Water and Sustainable Development: From Vision to Action. 15-17 January 2015

6.1 by 2030, achieve universal and equitable access to safe and affordable drinking water for all.

6.2 by 2030, achieve access to adequate and equitable sanitation and hygiene for all, and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.

6.3 by 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated waste water, and increasing recycling and safe reuse by x% globally.

6.4 by 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity, and substantially reduce the number of people suffering from water scarcity.

6.5 by 2030 implement integrated water resources management at all levels, including through transboundary cooperation as appropriate.

**6.6 by 2020 protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes. → IS THAT ALL ???**

6.A by 2030, expand international cooperation and capacity-building support to developing countries in water and sanitation related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies.

6.B support and strengthen the participation of local communities for improving water and sanitation management.

[https://www.un.org/waterforlifedecade/waterandsustainabledevelopment2015/open\\_working\\_group\\_sdg.shtml](https://www.un.org/waterforlifedecade/waterandsustainabledevelopment2015/open_working_group_sdg.shtml)



# **2015 UN-Water Annual International Zaragoza Conference. Water and Sustainable Development: From Vision to Action. 15-17 January 2015**

**3.3 by 2030 end the epidemics of AIDS, tuberculosis, malaria, and neglected tropical diseases and combat hepatitis, water-borne diseases, and other communicable diseases;**

**3.9 by 2030 substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water, and soil pollution and contamination;**

**11.5 by 2030 significantly reduce the number of deaths and the number of affected people and decrease by y% the economic losses relative to GDP caused by disasters, including water-related disasters, with the focus on protecting the poor and people in vulnerable situations;**

**12.4 by 2020 achieve environmentally sound management of chemicals and all wastes throughout their life cycle in accordance with agreed international frameworks and significantly reduce their release to air, water and soil to minimize their adverse impacts on human health and the environment;**

**15.1 by 2020 ensure conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements;**

**15.8 by 2020 introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems, and control or eradicate the priority species.**

[https://www.un.org/waterforlifedecade/waterandsustainabledevelopment2015/open\\_working\\_group\\_sdg.shtml](https://www.un.org/waterforlifedecade/waterandsustainabledevelopment2015/open_working_group_sdg.shtml)

# Do the SDGs sufficiently consider the inland water socio-ecosystems (Our main life support system)?

2015 UN-Water Annual International Zaragoza Conference...

*6.6 by 2020 protect and restore water-related ecosystems, including mountains <headwaters?>, forests, wetlands, rivers, aquifers and lakes*

[https://www.un.org/waterforlifedecade/waterandsustainabledevelopment2015/open\\_working\\_group\\_sdg.shtml](https://www.un.org/waterforlifedecade/waterandsustainabledevelopment2015/open_working_group_sdg.shtml)

**Is that all? How about....**

**→ *Maintain and restore vital ecosystem functions?***

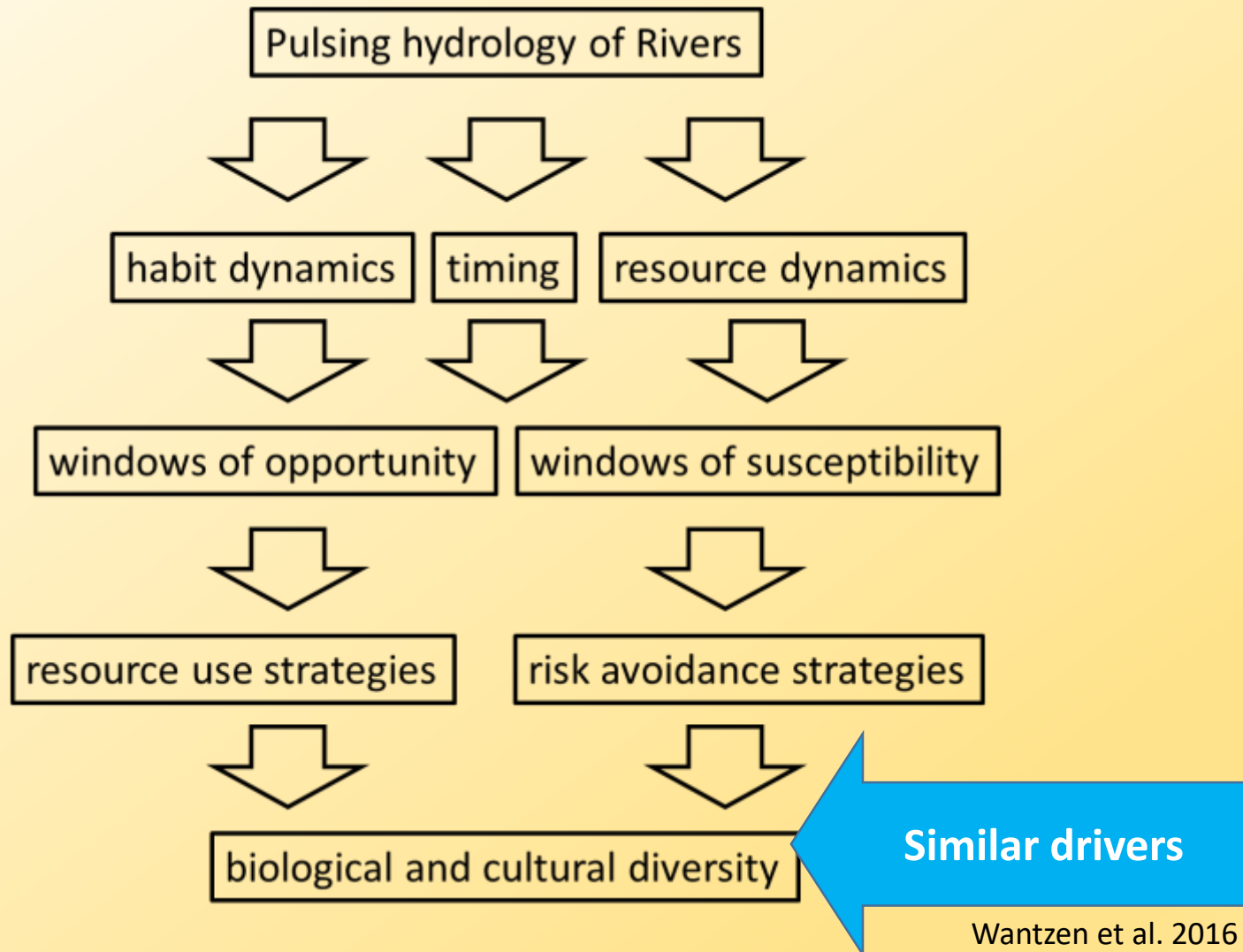
**→ *Conservation of biological and cultural diversity related to rivers, lakes, wetlands, aquifers?***

**.... are there more important issues than the maintenance of the global life-support systems?**

# Concepts on river system patterns and functions



# River Culture Concept: Rivers create, select, and disperse biological *and* cultural diversities



Wantzen et al. 2016 River Culture Concept

# River Culture Concept:

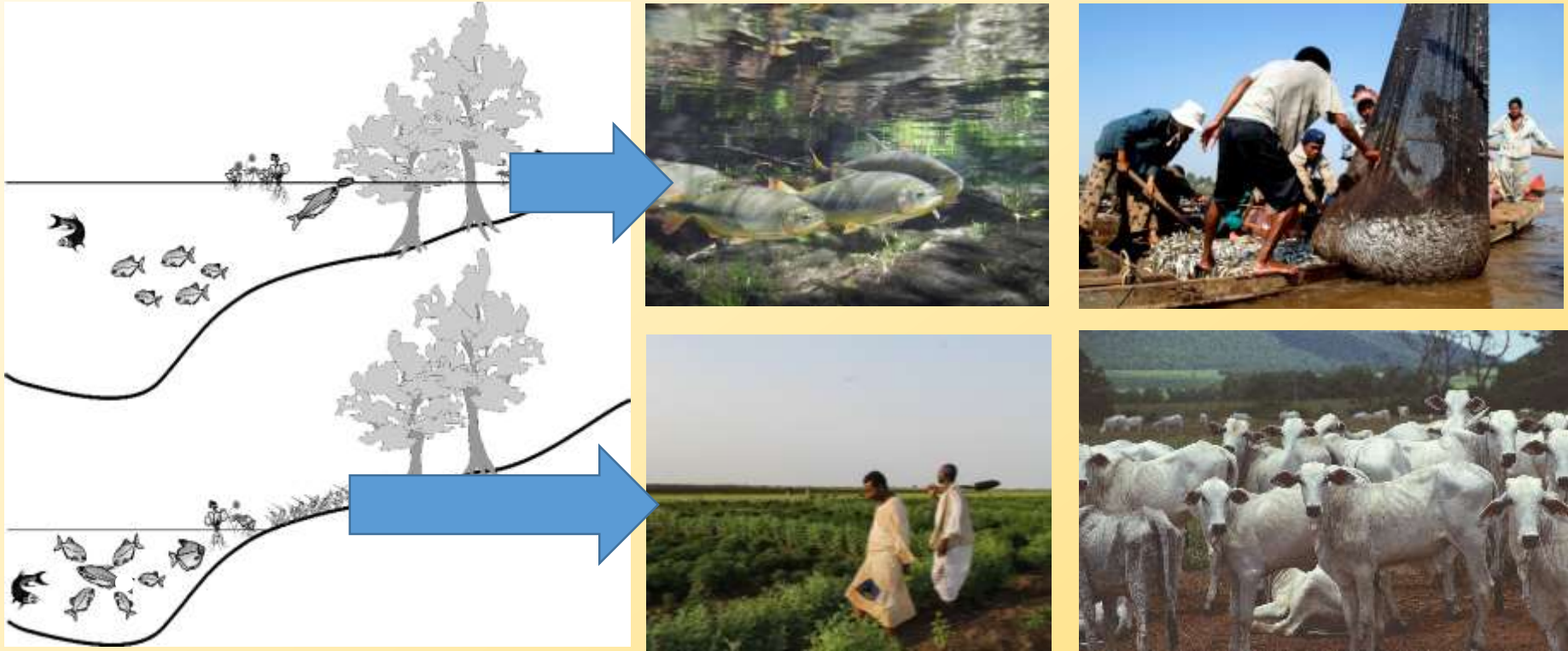


**Wantzen, Karl M.**, Ballouche, A., Longuet, I., Bao, I., Bocoum, H., Cissé, L., Chauhan, M., Girard, P., Gopal, B., Kane, A., Marchese, M. R., Nautiyal, P., Teixeira, P., Zalewski, M. (2016): River Culture: an eco-social approach to mitigate the biological and cultural diversity crisis in riverscapes. *Ecohydrology & Hydrobiology* Volume 16, Issue 1, February 2016, Pages 7–18

<http://dx.doi.org/10.1016/j.ecohyd.2015.12.003>

# The environmental imprint on cultural development

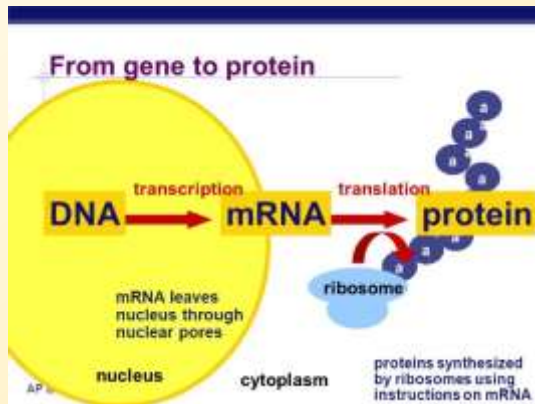
(Culture comes from *colēre* (latin), *coleo*, *colui*, **cultus** : to cultivate, to cherish, to honour)



Wantzen et al. Aquatic Sciences 2002, Junk & Wantzen: Floodpulse concept update FAO 2004

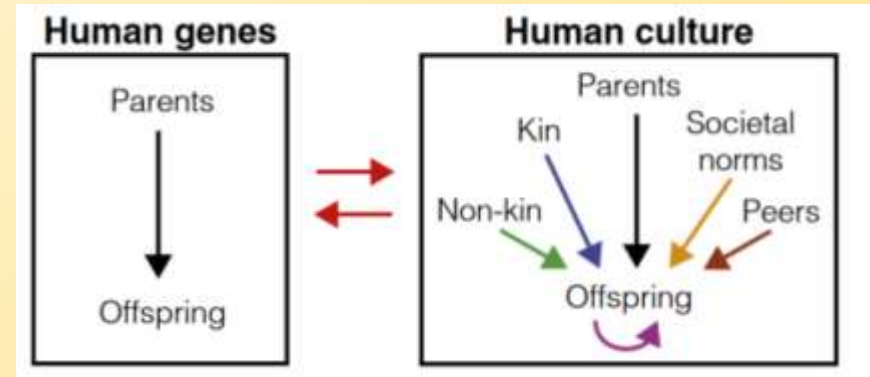
Junk, W. J. & K. M. Wantzen. 2004. The Flood Pulse Concept: New Aspects Approaches and Applications – an Update. Pages 117-140 in R. L. Welcomme & T. Petr (eds.): Proceedings of the Second International Symposium on the Management of Large Rivers for Fisheries: Vol. 2. Food and Agriculture Organization & Mekong River Commission. FAO Regional Office for Asia and the Pacific, Bangkok. RAP Publication 2004/16. FREE PDF online

# Biological (slow) and Cultural (fast) Evolution

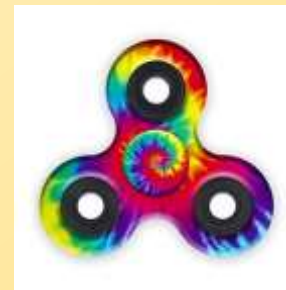


## Bio-Evolution:

- environmental reality check
- conservative, matter-bound
- Linear (parents to offspring)
- 1 Mio years for a new vertebr. species



Creanza et al. PNAS 2017



## Cultural Evolution:

- environmental-independent process
- almost independent of matter
- "viral" dispersal
- extremely fast

# Biocultural diversity MELTDOWN

Nature (and traditional cultures) cannot cope with technology

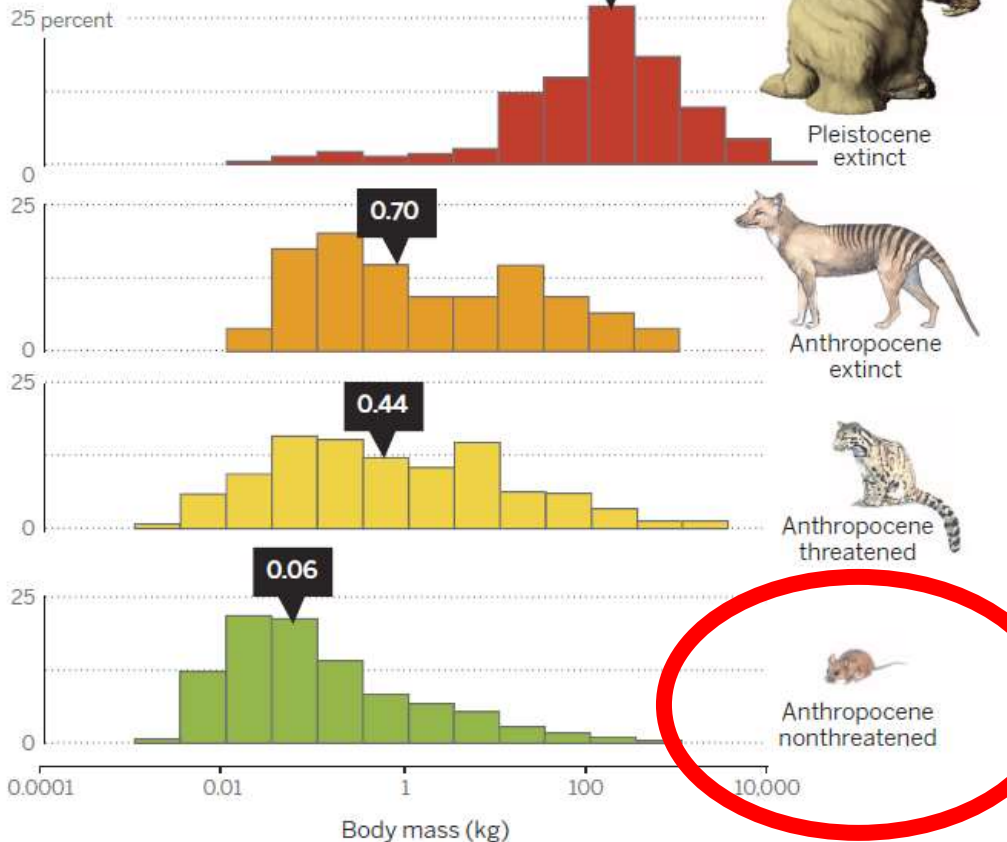


[Blue Ocean Network](#)



## Size-differential defaunation

Frequency of extinction (median value highlighted)



**Fig. 3. Extinction and endangerment vary with body size.** Comparing data on body size of all animals that are known to have gone extinct in Pleistocene or are recently extinct (<5000 years B.P.) shows selective impact on animals with larger body sizes (median values denoted with black arrow). Differences in body masses between distributions of currently threatened and nonthreatened species suggest ongoing patterns of size-differential defaunation (Kolmogorov-Smirnov test,  $K = 1.3$ ,  $P < 0.0001$ ) (19). [Animal image credits: giant sloth, C. Buell; others, D. Orr]

***Our way of life is a decision to eradicate nearly all animal species that weigh more than 60 grams***

**Defaunation in the Anthropocene**  
Rodolfo Dirzo *et al.*  
*Science* **345**, 401 (2014);  
DOI: 10.1126/science.1251817

***We have changed the rules of selection:  
survival of the ~~fittest~~ , but of the  
best adapted to banalised environments***

Survivor genes:

- small-bodied, low quality demand
- fast reproduction and adaptation
- low sensitivity against heat and pollutions
- low commercial interest
- ubiquitous, "aggressive, invasive species"

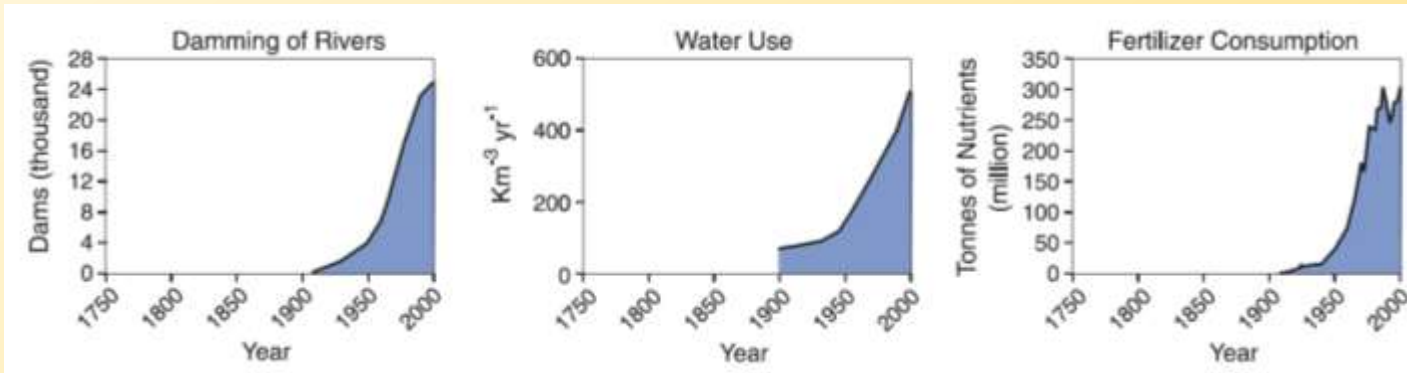
**..... all others have no  
right to survive in the  
Anthropocene ???!**



**Similar for cultural diversity**

<http://www.danubesurvey.org/jds2/node/114.html>

# Limits of growth: "*Impossible is nothing*"?

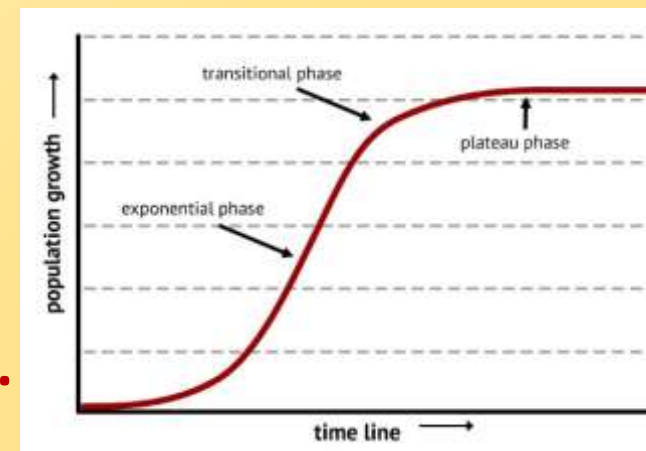


Steffen Ambio 2011

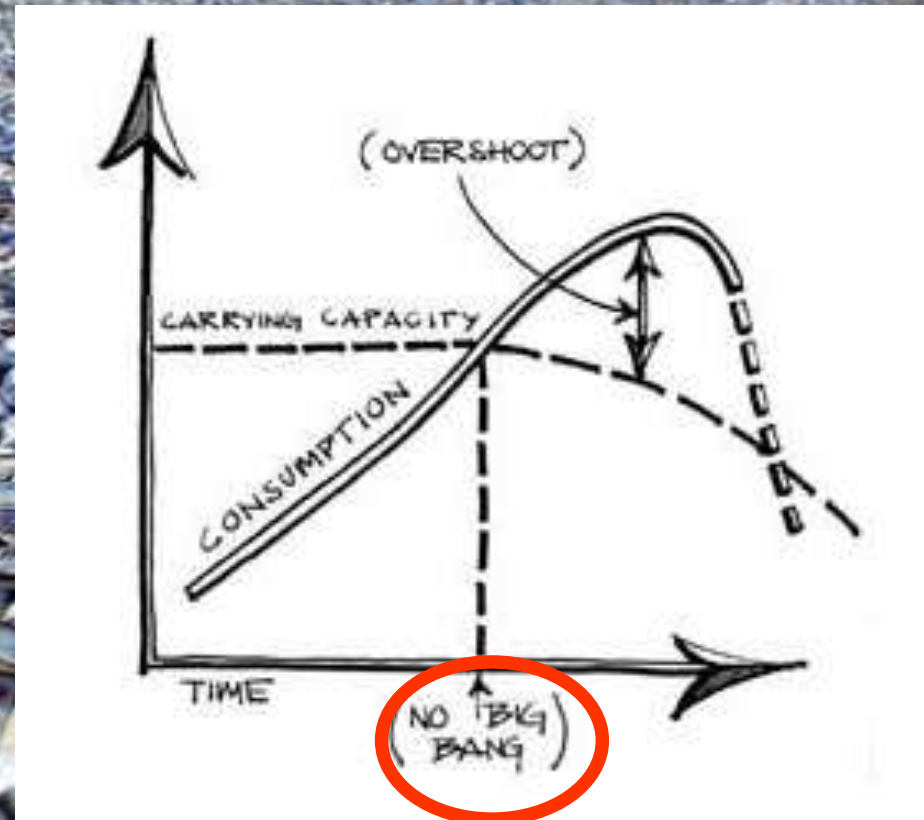
How about....

- *Unlimited growth on limited space?*
- *Unlimited use of limited resources?*
- *Survival of species that cannot keep pace with environmental changes?*

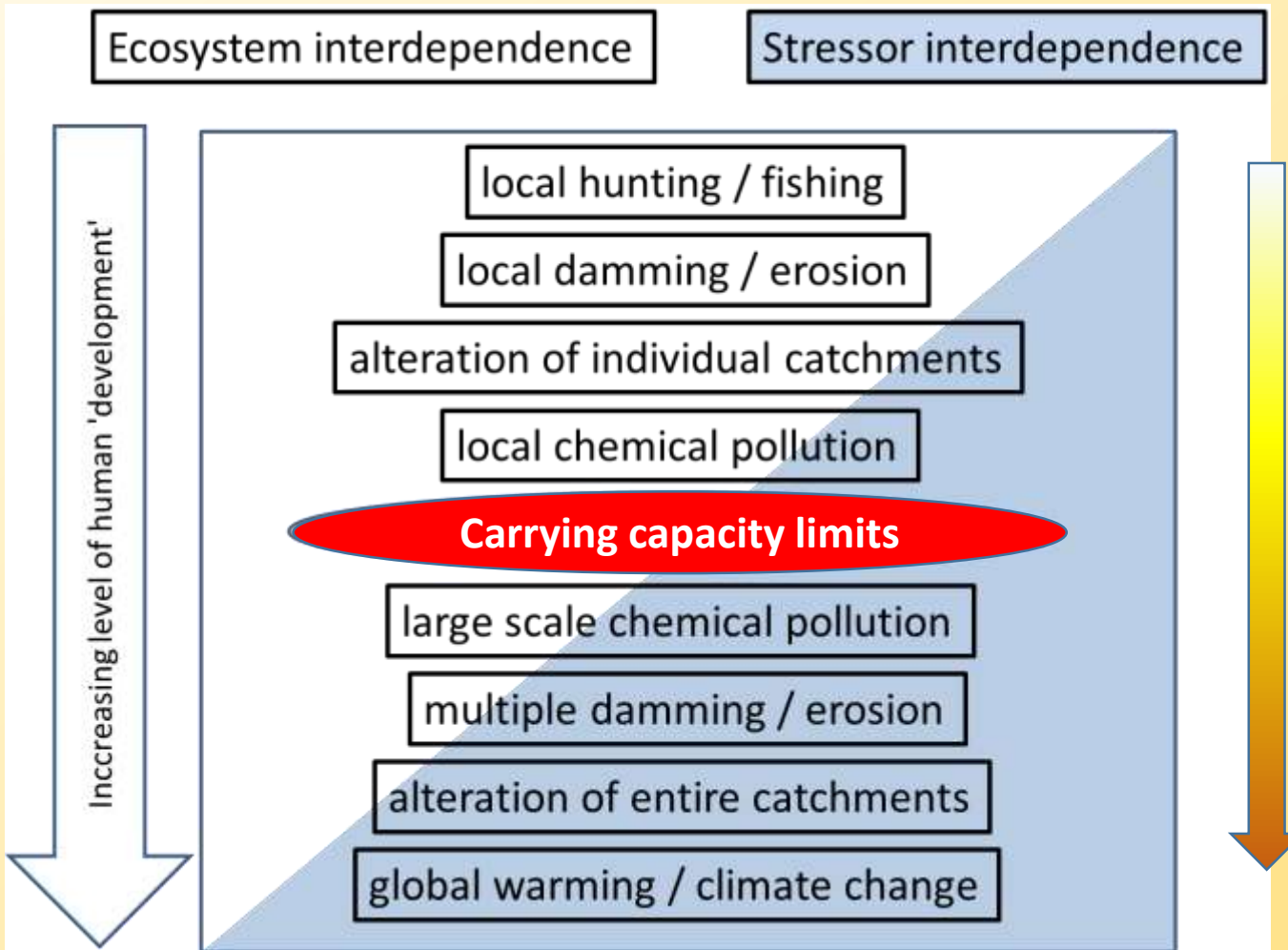
→ **Biological systems show sigmoidal growth. Feed-back mechanisms stop growth in time.**



Delusive ecosystem resilience. There is **no Big Bang** when the carrying capacity has been surpassed



# When did things break bad (in rivers)?

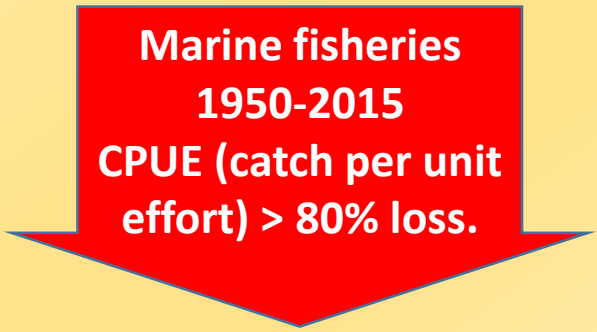
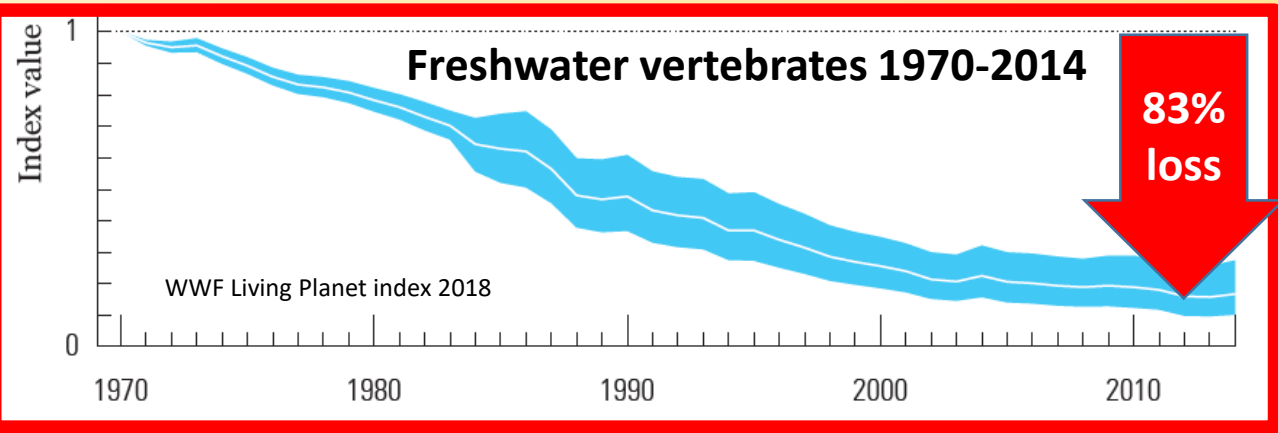
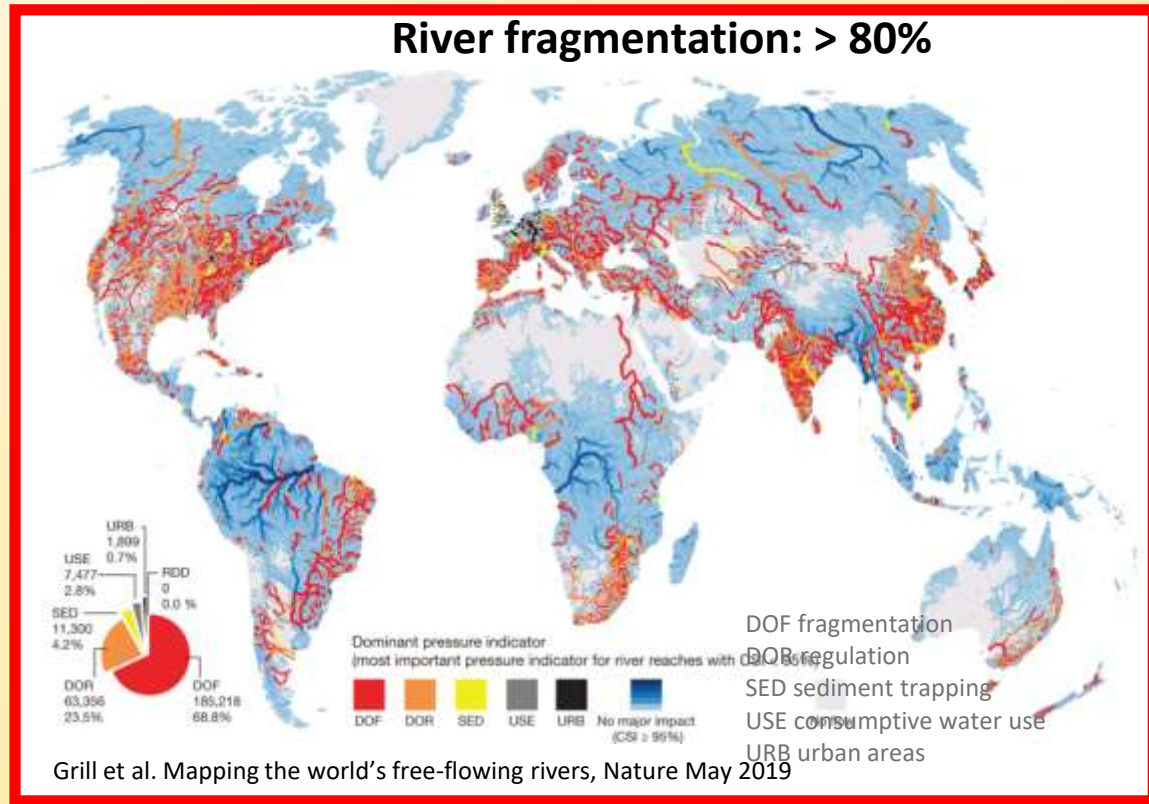


Wantzen et al. 2016: River Culture Concept

# What precisely went wrong?



Chris Jordan/US Fish and Wildlife Service



Rousseau et al Evolution of global marine fishing PNAS May 2019

# Why didn't (don't) we sense it?



charleroi.blogs.sudinfo.be, <http://psychoutblog.com>

Genetically speaking, humans are pleistocenic survival machines...

- *able to react to immediate threats, but unable to imagine long-term and non-linear processes*
- *cooperate well in groups up to 100 persons, but require **narratives** (independent of the physical reality) to collaborate in larger groups*
- ***decision-taking** is mostly emotional, short termed*
- ***confound** perception with reality*
- *the human brain **masks "unpleasant"** sensations*

**→ The consequences of our development go far beyond the capacities of our sensorial and mental equipment**

# A simple test proving lacking capacity to judge about future (complex) events



- a) Would you prefer that I cut off your little left finger?
- b) ... or remove 1 kg of pure oxygen per minute during the morning session?

Answers:

- a) your finger will be sewn back to the hand in 1 hour
- b) you are dead (and so is the rest of the audience)







*Me engana que eu gosto!*

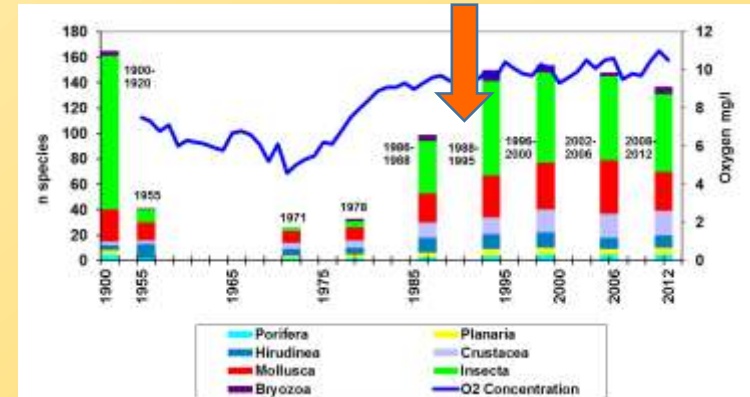
**I know it (but I do not want to know it), so cheat me please!**

# The SANDOZ experience (1.11.1986): Do we need catastrophies for taking action?



Giger, Env. Sci. Poll.Res. 1990

- Establishment of a warning system
- Legal reinforcement
- Intensified collaboration
- Joint planning
- Flood protection measures
- Biomonitoring, habitat restoration



Wantzen et al. in Rivers of Europe book, 2019

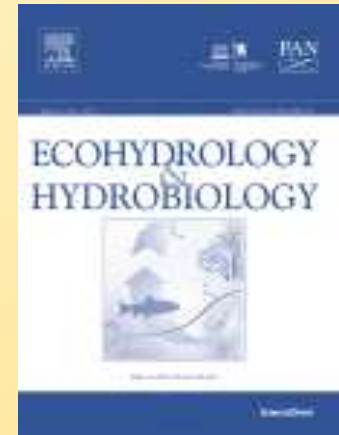
## River Culture Concept

- *harmony between man and river (rhythm)*
- *psychology of care (feel for your river)*



*Diving girls in a cristal river,  
Nobres, Brazil 2008  
(c) KM Wantzen*

# The River Culture Approach



1. Reset values and priorities in riverscape management
2. Live in the Rhythm of the Waters
3. Transform traditional use forms
4. 'Ecosystem bionics': use nature's strategies
5. 'Basins of political responsibility'
6. *Create Man-River-Encounter sites*
7. *Think Hausmann: Delapidation is possible*
8. *Sanctuary Rivers*

1-5: Wantzen et al (2016): River Culture (Hydroecol. & Ecohydrology)  
6,7: several communications arising

# Create Man-River-Encounter sites: *How would you like your river? (...and how to integrate Mother Nature?)*



Munich (Germany) – Aude Zingraff

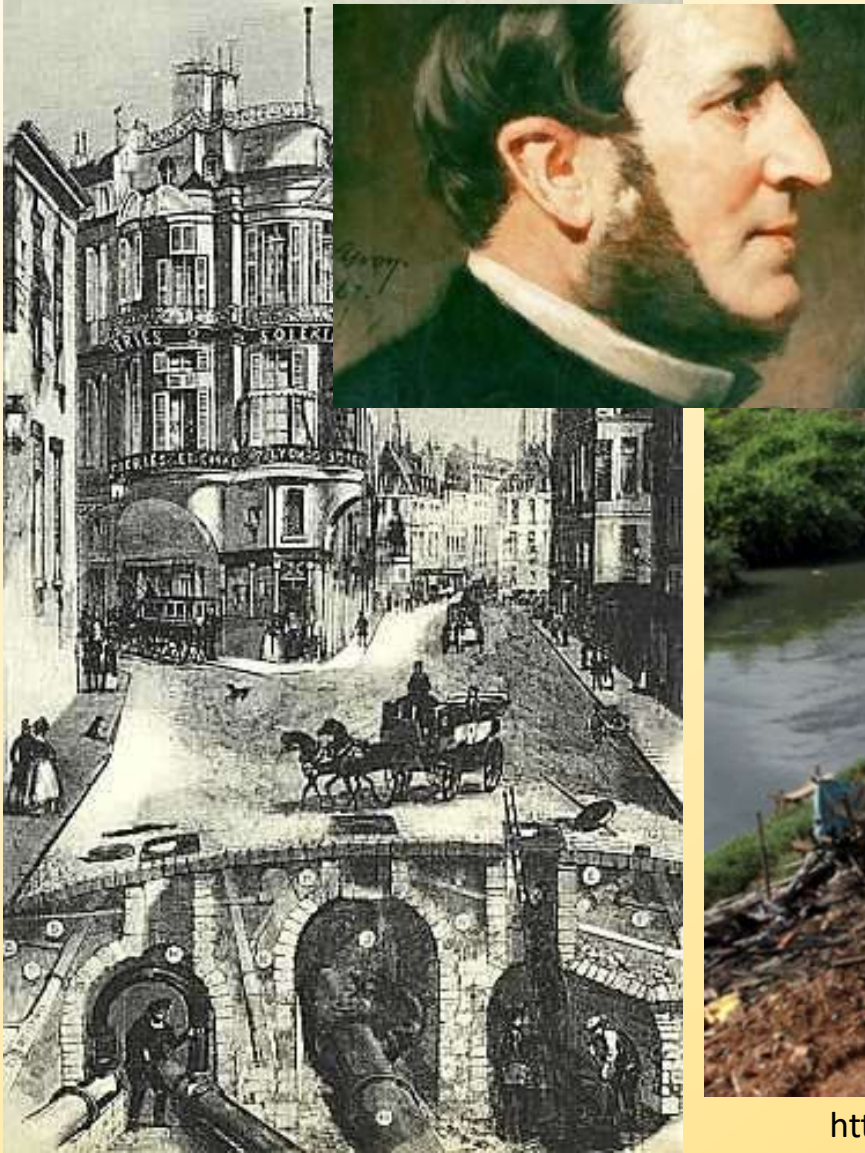
Zingraff-Hamed, A.; Greulich, S.; Wantzen, K. M.; Pauleit, S. (2017a): *Societal Drivers of European Water Governance: a Comparison of Urban River Restoration Practices in France and Germany*. Water



Lyon (France) <http://www.fetedeslumieres.lyon.fr>

Zingraff-Hamed, A.; Greulich, S.; Pauleit, S.; Wantzen, K. M. (2017b): *Urban and rural river restoration in France: a typology*. Regional Environmental Change

# Think Hausmann... ...for nature!



- Demolish grey structure (concrete), but offer acceptable housings for the poor.
- Re-establish blue-green infrastructure
- Re-establish ecosystem functions, biological and cultural diversities
- Re-connect humans and nature



<http://www.biocidade.curitiba.pr.gov.br/biocity/12.html>

# Sanctuary Rivers

Definition: *"Sanctuary Rivers are rivers of regional or global importance for the maintenance of key ecosystem functions, biological and cultural diversities. They require full protection or restoration of their natural flow regime (flood pulse, environmental flows), their water quality, their riparian floodplains, their longitudinal connectivity of water and sediments, including the complete removal of dams and other buildings that would disturb the natural dynamics. A strategic plan is needed to protect or restore Sanctuary Rivers representative of each landscape type or biome". (K. M. Wantzen & The World Fish Migration Day)*



Rufiji, Tanzania

# Experiences from Urban River Restoration: the psychology of taking action (Manuelzão project)



- strong *identification potential*, broad public support
- *joint interest* (here: public healthcare)
- cultural linkages not yet lost, high level of *education*
- excellent *communication*, unusual PR (kayak), TV
- well-functioning *administration*, interested in project
- timely *political background* (Eco92)
- undammed, well protected tributaries (*references*)
- new cultural (arts), and societal (laws) processes
- environmental education, *citizen science*

Wantzen et al. **Urban Hydrosystem Restoration in the Global South**,  
*Sustainability*, 2019, 11, 4975; doi:10.3390/su11184975





# How to (re-)integrate "old"\* knowledge into river management?

- ❖ use-forms adapted to nature (humans and biota)
- ❖ "commercially unrelevant" activities
- ❖ religious, spiritual, aesthetic linkages (learn to take care)
- ❖ knowledge of elder persons, of past societies

Book arising:

*River Cultures: Life as a dance to the rhythm of the water*



...2020!

# You are invited to (co) author a paper!

## ***River Cultures: Life as a dance to the rhythm of the waters***

***Using a bio-cultural perspective, the book has several specific objectives:***

- (i) to highlight and to give testimony of the specific **biocultural richness** of selected rivers and their value as heritage, in order to prepare actions to safeguard them, or to re-activate them*
- (ii) to evidence the **linkages and mechanisms between natural and cultural phenomena***
- (iii) to analyse the mechanisms of **biocultural diversity: evolution and degradation***
- (iv) to make suggestions, how biocultural strategies may be used for the case-study site and elsewhere, by **identifying transferrable action elements***
- (v) to engage a **dialectical discussion** concerning the diverging views of human sovereignty and control over nature vs. that of adaptation of human use forms to nature.*

**contact: RiverCultureBook <[riverculturebook@karlmwantzen.de](mailto:riverculturebook@karlmwantzen.de)>**

# Water museums and biocultural conservation



1. **Create curiosity and show the beauty of nature and the wealth of bio/cultural diversity by using unusual perspectives (scale, vertical views) or sensorial entries**
2. **Communicate the problem (*'loss of everything'*: species, space, life support)**
3. **Visualise the benefits of a healthy nature (4D-Cinema: sounds, smell, Temperature)**
4. **Re-establish intergenerational memory**
5. **Explain the interactions (interactive games)**
6. **Show that change is possible (e.g., Rhine)**
7. **2021-30 UN Decade Ecosystem Restoration**

# Gracias por su atención!



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