



Leibniz Institute for Zoo  
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# Biodiversity & the UN Millenium Development Goals - sustainable policy, health, water, food, energy...

## A summary of the two first conferences

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# The challenges of the UN MDG



# 1<sup>st</sup> International Conference on Biodiversity and the UN Millennium Development Goals: December 01-03, 2010

# 1st conference: a survey of topics



- Human health, infectious diseases & biodiversity
- Bioenergy & biodiversity: from competition to synergy
- Integrated water management & biodiversity conservation
- improving the livelihoods of people & ecosystem services
- Human resilience and adjustment to changes in biodiversity
- Global sustainability and the biodiversity science – policy landscape
- Workshops, debates ... and 4 conclusions...



Leopoldina  
Nationale Akademie  
der Wissenschaften



# Conclusions:



- The **relevance** of biodiversity to human well-being is greatly underestimated.
- Fundamental **knowledge gaps** still exist regarding the state of biodiversity, its loss and its ecosystem functions and services, particularly in the deep sea, soils and freshwaters, and in the genetic and microbial components of biodiversity.
- There are conflicts and trade-offs as well as **undervalued synergies** between biodiversity protection and improvement of human well-being
- Innovative research efforts are needed...it has become clear that biodiversity has to be considered in a broader context and that science is **lagging behind** the actual societal needs.



December 3, 2010

## „The Frankfurt declaration 2010“

International Conference on  
Biodiversity and the  
UN Millennium Development Goals:  
Challenges for Research and Action

Frankfurt/Main  
Senckenberg-Museum  
Germany

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Delegates to the Frankfurt Conference on „Biodiversity and the UN Millennium Development Goals“ which took place 1-3 December 2010 agree that biodiversity critically underpins human livelihood and well-being and conclude:

- (1) The relevance of biodiversity to human well-being is greatly underestimated. Biodiversity and biodiversity change directly interact with, and have an impact on water availability, food production, human health, climate change, natural hazards etc., and this needs to be better understood and more widely disseminated.  
Biodiversity research needs to be developed into a fast-acting, transdisciplinary science that focuses on the links between nature and human society.  
In particular, biodiversity research needs to be strategically linked to the following MDGs: Hunger and poverty, Health, Environmental sustainability, Gender equality and empowerment of women.
- (2) Fundamental knowledge gaps still exist regarding the state of biodiversity, its loss and its ecosystem functions and services, particularly in the deep sea, soils and freshwaters, and in the genetic and microbial components of biodiversity.  
A major increase in basic research efforts is required to fill these gaps. We urgently need to go beyond case studies to understand the underlying mechanism of the causes and consequences of rapid biodiversity change.  
In particular, we need to better understand and predict how biodiversity changes as a consequence of external drivers such as land use change, invasive species, or climate change, single and in concert.  
We therefore need more basic research on the functioning of nature conservation (e.g. tipping point research).  
Rapid assessment tools, widely applicable indicators and long-term monitoring strategies have to be developed, tested, evaluated and implemented.
- (3) There are conflicts and trade-offs as well as undervalued synergies between biodiversity protection and improvement of human well-being. Loss of biodiversity has substantial implications for infectious diseases, bioenergy, agriculture, fisheries etc.  
Comprehensive research is needed to understand these conflicts and trade-offs and to identify and use synergies to tackle biodiversity-related MDGs.  
Foreign aid and development need to be based on this knowledge.

International Conference on  
Biodiversity and the  
UN Millennium Development Goals:  
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biodiversity-conference2010.de

There is little knowledge or research and no policies concerning the response of people to biodiversity change worldwide, in particular the 2 billion subsistence households, a major group of curators of agrobiodiversity.

There is a need to incorporate traditional knowledge systems regarding the conservation and sustainable use of biodiversity as a product of long-lasting interactions between human society and nature.

Although increasing the number and size of protected areas is valuable, this alone will not stop biodiversity loss or protect biodiversity on its own. Ecosystems need to be managed as coupled social-ecological systems.

There is a strong need to put biodiversity at the heart of governance – people are not above the tapestry of life.

- (4) Innovative research efforts are needed. With the failure of the 2010 targets and the 20 new targets so enthusiastically adopted in Nagoya at the Conference of the Parties of the Convention on Biological Diversity (COP 10), it has become clear that biodiversity has to be considered in a broader context and that science is lagging behind the actual societal needs.

The organisers of the Frankfurt conference take this event as a starting-point for a five-year campaign to advance strategies for the protection, management and sustainable use of biodiversity to underpin the successful implementation of the MDGs, by encouraging, communicating and pursuing research towards these goals.

The conservation and sustainable use of biodiversity will greatly benefit if research and policy development explore and recognise the strong links between cultural and biological diversity across the world.

Long-term, close partnerships between biodiversity, human health, agriculture, socio-economic and anthropological research domains must be established.

There is an urgent need to strengthen the science-policy interface to make existing knowledge available and to bring in questions from policy to the scientific community.

A major effort is required to increase the public awareness about biodiversity values and benefits for the sake of both nature and people.

# 2<sup>nd</sup> International Conference on Biodiversity and the UN Millennium Development Goals: ***Biodiversity and Health*** April 16-18, 2013

# Summing up: biodiversity & health



- (Key) insights
  - Changes in ecosystem health
  - Biodiversity and infectious diseases
  - The role of microbial biodiversity
  - Biodiversity and people
  - Role of urban environments
  - Time scale of anthropogenic impacts
- (Key) questions and challenges
- Conclusion



# Changes in ecosystem health



- Ecosystem health has been massively changed through the **downgrading** of planet earth by removing top predators in natural ecosystems and introducing top predators as invasive species to new ecosystems
- invasion ecology needs to improve **concepts** and theory about invasive species and needs high quality data
- we do not know much about novel species communities because we know little about invasive species and their ecological and evolutionary consequences
- landscape effects (composition of landscape, structural characteristics) can be as important as species richness to drive the transmission of pathogens

- the emergence of infectious diseases is related to **ecosystem disruption** and destruction, and improved access to previously inaccessible habitats
- **Bushmeat consumption** encouraged the jump of dangerous emerging pathogens into people as a new host (HIV, Ebola)
- loss of biodiversity **affects** the transmission of infectious diseases, by changing the abundance of host or vector, or changing the behaviour of host, vector or parasite
- infections from remote parts of the world are particularly **dangerous** to industrialised nations, since their populations are **immunologically naive** (as are their doctors because of the limitations of their training)

# Role of microbial biodiversity



- The role of *Streptomyces* and other **micro-organisms** as drivers of organismic interactions is underestimated
- Higher fungi are a treasure trove for wonderful **substances** and biological defence mechanisms
- There are **new technologies** available to scan microbial biodiversity for identifying new antibiotics for the medical treatment of people
- **Landscape** effects are important to understand the interactions of micro-organisms with food plants

# Time scales of anthropogenic impacts

- ~10 years before a **modified ecosystem** may become stable and pathogen transmission to people may be **reduced**
- ~10-20 years before **changes in agriculture** may modify the dynamics of pathogen-carrying small mammal populations to reach a tipping point and dramatically **increase** pathogen transmission to people
- ~50-90 years after **bushmeat** consumption of pathogen-carrying mammals until a dangerous novel pathogen may spread across human populations

# Biodiversity and people



- modern life demands a high degree of **exhausting attention** with the potential outcomes of mental fatigue and burnout
- natural environments provide stimuli that demand a high degree of attention **without** the person getting exhausted
- this is why natural environments in cities support physical and mental **restoration** of urban citizens
- **public health** arguments can support acceptance of nature conservation in urban areas

# (Key) challenges

- Human population size
- The **fight against diseases** begins with improving health in the remotest and poorest regions of the world
- People **transmit pathogens** dangerous to susceptible primates and other hosts in natural ecosystems
- **Characterising** the urban natural environment in a consistent way across cities and countries for public health and climate change planning purposes
- Finding **appropriate functional indicators** and measures for biodiversity in natural environments beyond labelling them as green or blue spaces (e.g. natural nature reserves vs nurtured arboricultural or horticultural park spaces)



# Conclusion

- Biodiversity is **important** for ecosystem health & human health
- Human health may not only be important to promote biodiversity, it may be a **necessary condition** to improve the conservation of biodiversity

# Role of urban environments



- urban nature provides important **ecosystem services** which gain importance for public health
- white-painted buildings and urban trees are more efficient than green roofs and green walls to cope with **heat waves** and reduce heat stress
- urban ecosystems **cannot** replace all habitat functions of “historical” / natural / “original” ecosystems
- urban ecosystems can contribute to **biodiversity conservation** for some taxa –challenging traditional conservation strategies
- urban parks **promote** human health

# (Key) questions

- Is there any link between biodiversity of micro-organisms and biodiversity of higher organisms?
- Can we predict which species are successful as invasive species and which pathogens are emerging pathogens in the sense of jumping into novel hosts?
- Which tree species should be planted now to cope with urban heat waves in 50 years?
- How do ecosystem services of natural spaces in urban environments relate to their biodiversity?
- How does public health relate to the biodiversity of “natural” or “nurtured” green/blue spaces in anthropogenic environments?