

Biodiversity and Food Security – From Trade-offs to Synergies

October 29–31, 2014
Aix-en-Provence
France

Institut
Méditerranéen
de Biodiversité
et d'Ecologie
marine et continentale



Welcome to Aix-en-Provence!

A few words about IMBE

The Mediterranean Institute for marine and terrestrial biodiversity and ecology (IMBE, www.imbe.fr) belongs to Aix Marseille University, CNRS, IRD and Avignon University.

IMBE is located in Marseille, Aix-en-Provence, Avignon, Martinique and Nouméa (New Caledonia).

We study biological systems on land and in the ocean, with a particular interest in biodiversity and the functioning of ecosystems.

Our main goal is to improve conservation as well as the management of natural resources in the light of global change.

Our 200+ environmental scientists cover key areas of biodiversity, evolution, ecology, paleoecology and the human-environment relation (ecological sustainability science).

We use and develop approaches in basic and applied biology, including model development.

follow us on twitter: [@imbe_marseille](https://twitter.com/imbe_marseille)



Why are we all here?



[ARTICLE](#) |
 [COMMENTS \(1\)](#) |
 [VIDEO](#)

- World Population**
- 7 billion and counting...
 - U.N. wants better life for world of 7 billion
 - Population boom heralds global economic shifts
 - World awaits 7 billionth baby
 - Catholic condom ban not behind population boom
 - Billions can be fed, but who will pay the tab?
 - Water use rising faster than world population
 - Curb soaring population? Keep girls in school
 - The next challenge: too few people?
 - Slideshow: A world of seven billion
 - Video: Africa considers soaring birth rate

U.N. wants better life for world of 7 billion

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Crowded, stretched world awaits 7 billionth baby
 Tue, Oct 25 2011

Analysis & Opinion

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[Europe should avoid eating its seed corn](#)

By **Avril Ormsby**

LONDON | Wed Oct 26, 2011 2:29pm EDT

(Reuters) - Instead of worrying about sheer numbers when the world's population hits 7 billion next week,

MORE REUTERS RESULTS FOR:

"billion"

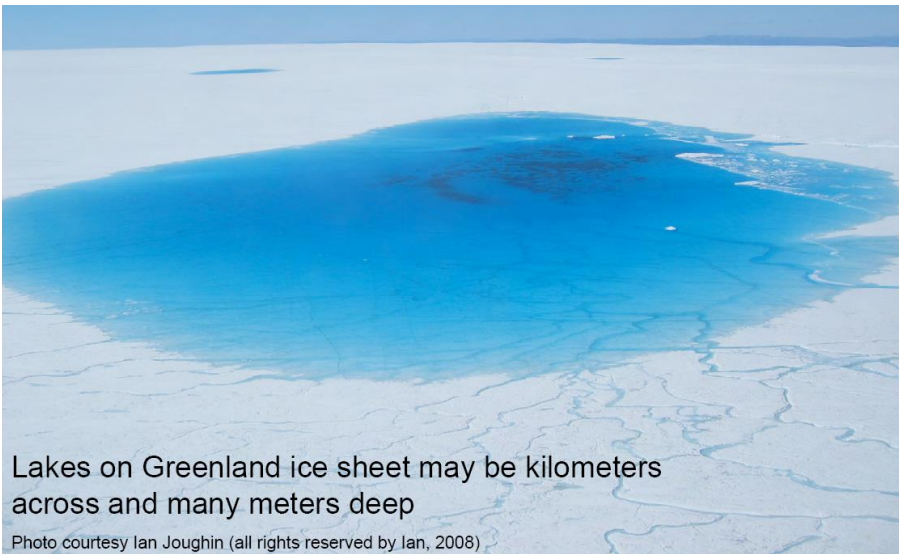




Lorraine, France, August 2003

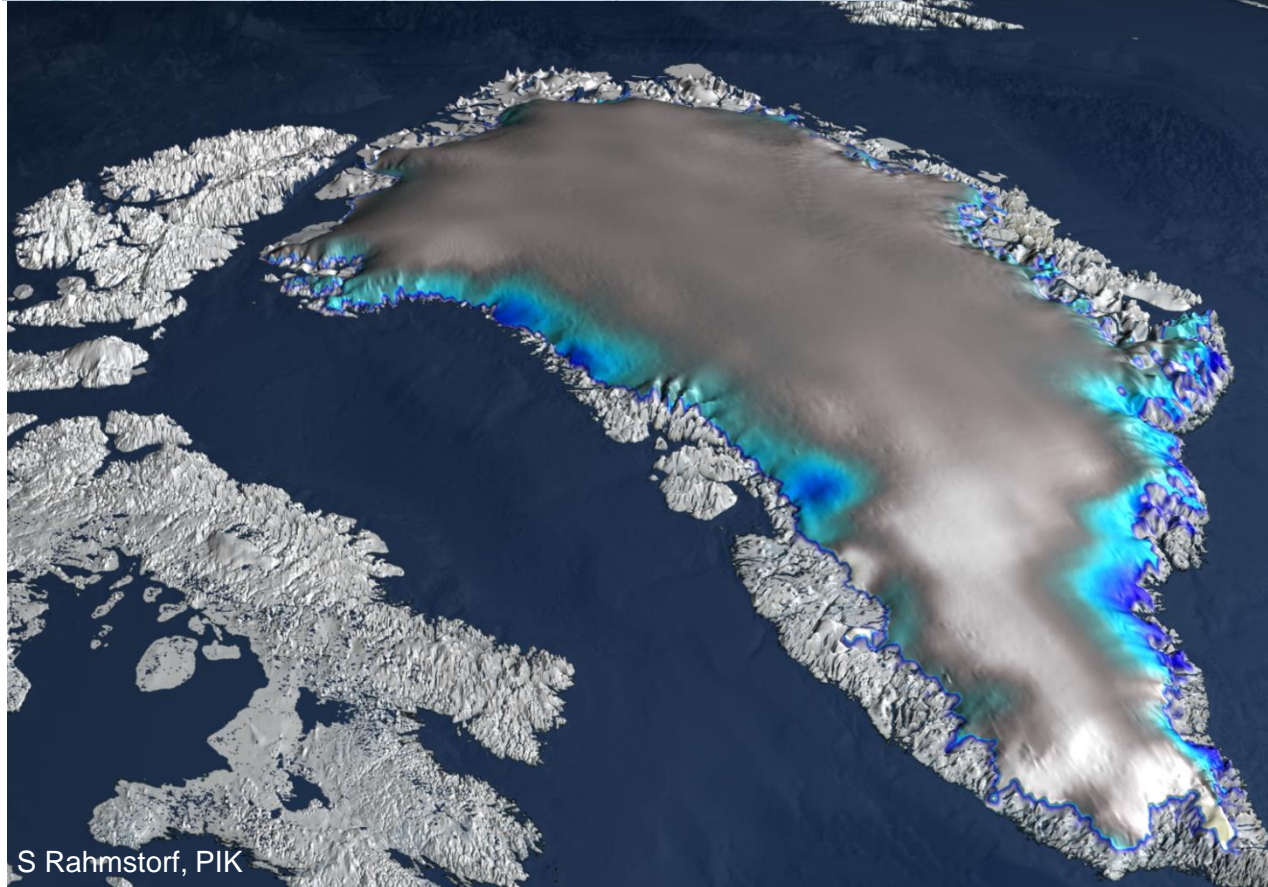


Pakistan, August 2010



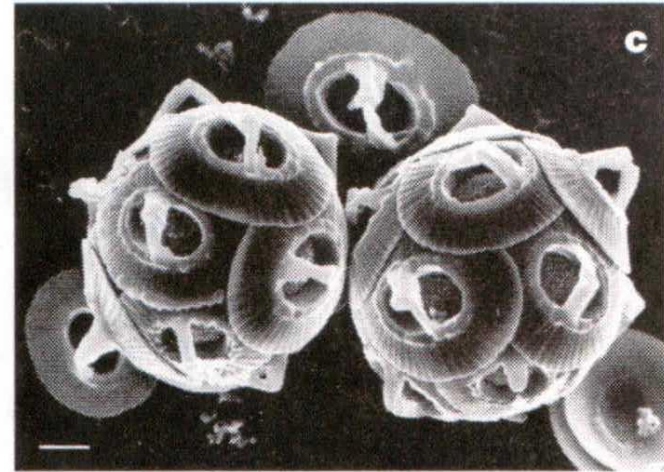
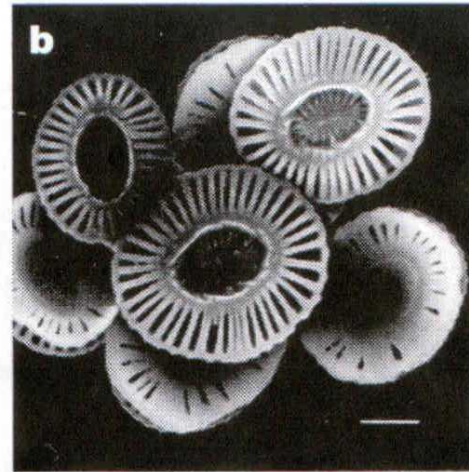
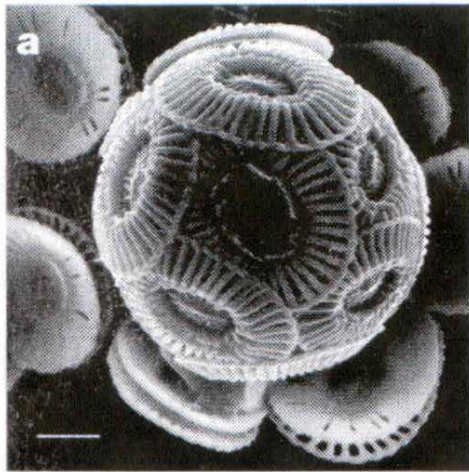
Lakes on Greenland ice sheet may be kilometers across and many meters deep

Photo courtesy Ian Joughin (all rights reserved by Ian, 2008)

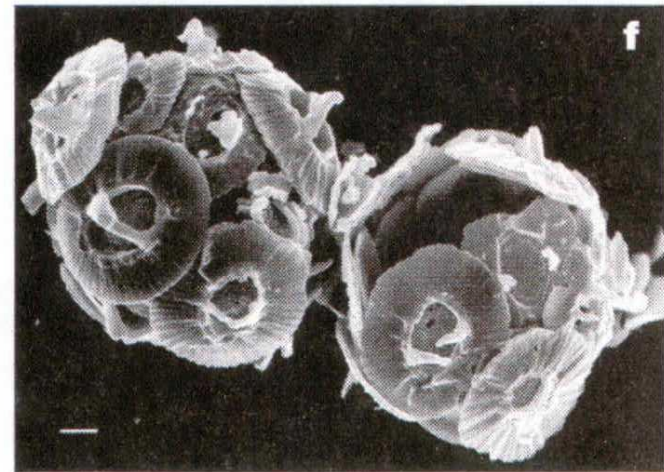
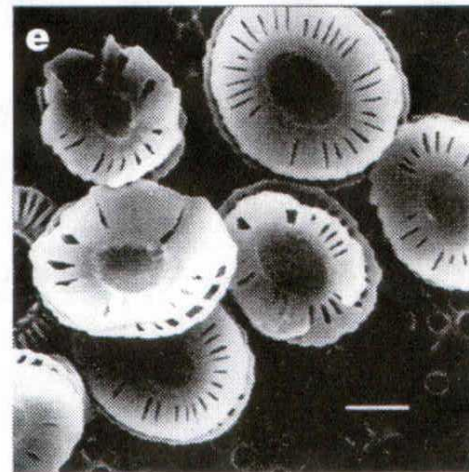
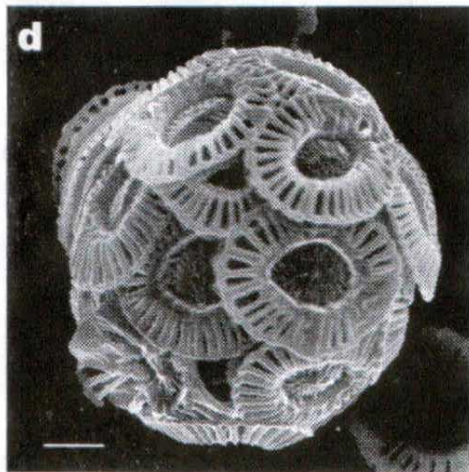


S Rahmstorf, PIK

Ocean acidification



≈ 300
ppmv
CO₂



≈ 750
ppmv
CO₂

Transgressing safe boundaries

nature

FEATURE

A safe operating space for humanity

Identifying and quantifying planetary boundaries that must not be transgressed could help prevent human activities from causing unacceptable environmental change, argue **Johan Rockström** and colleagues.

SUMMARY

- New approach proposed for defining preconditions for human development
- Crossing certain biophysical thresholds could have disastrous consequences for humanity
- Three of nine interlinked planetary boundaries have already been overstepped

Although Earth has undergone many periods of significant environmental change, the planet's environment has been unusually stable for the past 10,000 years¹. This period of stability — known to geologists as the Holocene — has seen human civilisations arise, develop and thrive. Such stability may now be under threat. Since the Industrial Revolution, a new era has witnessed the Anthropocene², in which human activities have become the main driver of global environmental change³. This could see human activities push the Earth system outside the stable environmental state of the Holocene, with consequences that are detrimental or even catastrophic for large parts of the world.

During the Holocene, environmental conditions change occurred naturally and the conditions that enabled human development. Regular temperatures, freshwater availability and biogeochemical flows all stayed within a relatively narrow range. Now, largely because of a rapidly growing reliance on fossil fuels and industrialized forms of agriculture, human activities have reached a level that could damage the systems that keep Earth in the desirable Holocene state. The result could be irreversible, leading to a state less conducive to human development⁴. Without pressure to change, the Holocene is expected to continue for at least several thousands of years⁵.

Planetary boundaries

To meet the challenge of maintaining the Holocene state, we propose a framework based on 'planetary boundaries'. These boundaries define the safe operating space for humanity with respect to the Earth system and are associated with the planet's biophysical subsystems or processes. Although Earth's complex systems sometimes respond smoothly to changing pressures, it seems that in this will prove to be the exception rather than the rule. Many subsystems of Earth react in a nonlinear, often abrupt, way, and are particularly sensitive around threshold levels of certain key variables. If these thresholds are crossed, these important subsystems, such as the monsoon system, could shift into a new state, often with deleterious or potentially even disastrous consequences for humanity⁶.

Most of these thresholds can be defined by a critical value for one or more control variables, such as carbon dioxide concentration. Not all processes or subsystems on Earth have well-defined thresholds, although such actions that undermine the resilience of such processes or subsystems — for example, land and water degradation — can increase the risk that thresholds will also be crossed in other processes, such as the climate system.

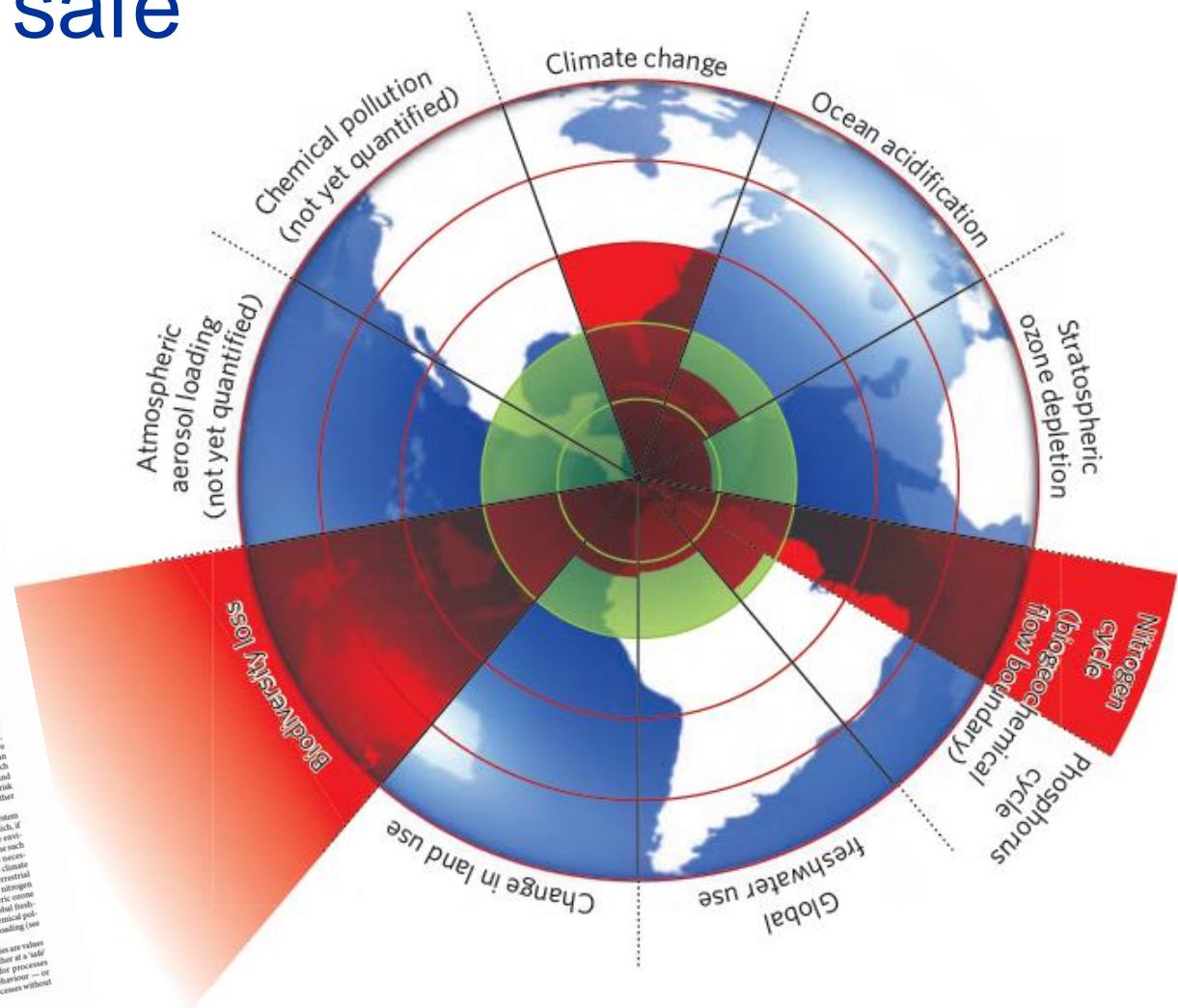
We have tried to identify the Earth system processes and associated thresholds which, if crossed, could generate unacceptable environmental change. We have found nine such processes for which we believe it is necessary to define planetary boundaries (terrestrial change; rate of biodiversity loss; climate change; nitrogen and phosphorus cycles; stratospheric ozone depletion; ocean acidification; global freshwater use; change in land use; chemical pollution; and atmospheric aerosol loading (see Table 1 and Table 2)).

Fig. 1 and Table 1

In general, planetary boundaries are values for control variables that are either at a 'safe distance from thresholds' — for processes with evidence of threshold behaviour — or at 'dangerous levels' — for processes without

Figure 1 | Beyond the boundary. The inner green shading represents the proposed safe operating space for nine planetary systems. The red wedges represent an estimate of the current position for each variable. The boundaries in three systems (rate of biodiversity loss, climate change and human interference with the nitrogen cycle), have already been exceeded.

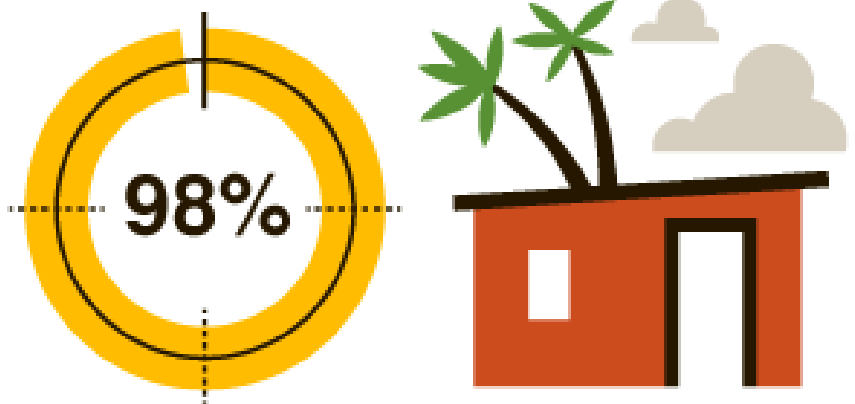
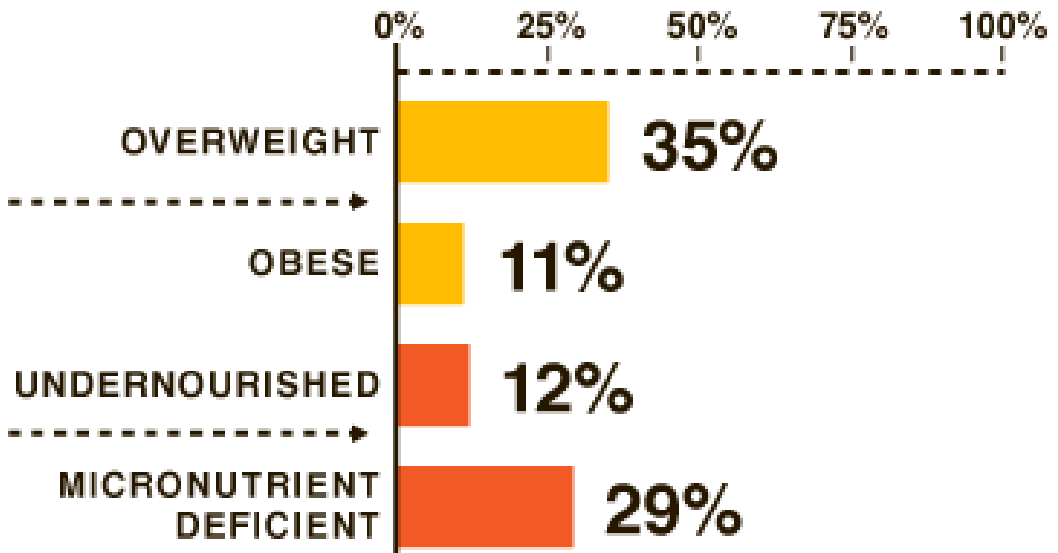
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In 2008, **1.4 BILLION ADULTS** were overweight,



842 MILLION PEOPLE are undernourished.



98% OF THESE PEOPLE live outside of high-income countries.

Undernourishment

- Almost 870 million people were chronically undernourished in the years 2010-2012 (12.5% of the global population)
- Much higher rates occur in developing countries, where 852 million people (about 15% of the population) are chronically undernourished.
- About 2 billion people do not consume a sufficient amount of vitamins and minerals.

Can nothing be done about that?

Define societal goals and targets!

Millennium Development Goals

- eight international development goals with 21 targets
- established following the Millennium Summit of the United Nations in 2000
- all 189 United Nations member states at the time and at least 23 international organizations committed to help achieve the Millennium Development Goals by 2015

Millennium Development Goals

1. To eradicate extreme poverty and hunger
2. To achieve universal primary education
3. To promote gender equality and empower women
4. To reduce child mortality
5. To improve maternal health
6. To combat HIV/AIDS, malaria, and other diseases
7. To ensure environmental sustainability
8. To develop a global partnership for development

Goal 7: Ensure environmental sustainability

- Target 7A: Integrate the principles of sustainable development into country policies and programs; reverse loss of environmental resources
- Target 7B: **Reduce biodiversity loss**, achieving, by 2010, a significant reduction in the rate of loss
 - Proportion of land area covered by forest
 - CO₂ emissions, total, per capita and per \$1 GDP (PPP)
 - Consumption of ozone-depleting substances
 - Proportion of fish stocks within safe biological limits
 - Proportion of total water resources used
 - Proportion of terrestrial and marine areas protected
 - Proportion of species threatened with extinction
- Target 7C: Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation (for more information see the entry on water supply)
- Target 7D: By 2020, to have achieved a significant improvement in the lives of at least 100 million slum-dwellers

MDGs will not be achieved by 2015

Sustainable Development Goals (SDGs)

- agreement of the UN Conference on Sustainable Development (Rio+20, 2012), to develop a set of future international development goals
- proposal contains 17 goals with 169 targets covering a broad range of sustainable development issues, including
 - ending poverty and hunger,
 - improving health and education,
 - making cities more sustainable,
 - combating climate change, and
 - protecting oceans and forests

Sustainable Development Goals (SDGs)

1. End poverty in all its forms everywhere
2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture
3. Ensure healthy lives and promote well-being for all at all ages
4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
5. Achieve gender equality and empower all women and girls
6. Ensure availability and sustainable management of water and sanitation for all
7. Ensure access to affordable, reliable, sustainable and modern energy for all
8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Sustainable Development Goals (SDGs)

10. Reduce inequality within and among countries
11. Make cities and human settlements inclusive, safe, resilient and sustainable
12. Ensure sustainable consumption and production patterns
13. Take urgent action to combat climate change and its impacts
14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development
15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
17. Strengthen the means of implementation and revitalize the global partnership for sustainable development

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Goal 2. End hunger, achieve food security and improved nutrition, and promote sustainable agriculture

- 2.1 by 2030 end hunger and ensure access by all people, in particular the poor and people in vulnerable situations including infants, to safe, nutritious and sufficient food all year round
- 2.2 by 2030 end all forms of malnutrition, including achieving by 2025 the internationally agreed targets on stunting and wasting in children under five years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women, and older persons
- 2.3 by 2030 double the agricultural productivity and the incomes of small-scale food producers, particularly women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets, and opportunities for value addition and non-farm employment
- 2.4 by 2030 ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters, and that progressively improve land and soil quality
- 2.5 by 2020 maintain genetic diversity of seeds, cultivated plants, farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at national, regional and international levels, and ensure access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge as internationally agreed
- 2.a increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development, and plant and livestock gene banks to enhance agricultural productive capacity in developing countries, in particular in least developed countries
- 2.b. correct and prevent trade restrictions and distortions in world agricultural markets including by the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round
- 2.c. adopt measures to ensure the proper functioning of food commodity markets and their derivatives, and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility

Goal 12. Ensure sustainable consumption and production patterns

- 12.1 implement the 10-Year Framework of Programmes on sustainable consumption and production (10YFP), all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries
- 12.2 by 2030 achieve sustainable management and efficient use of natural resources
- 12.3 by 2030 halve per capita global food waste at the retail and consumer level, and reduce food losses along production and supply chains including post-harvest losses
- 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
- 12.5 by 2030, substantially reduce waste generation through prevention, reduction, recycling, and reuse
- 12.6 encourage companies, especially large and trans-national companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle
- 12.7 promote public procurement practices that are sustainable in accordance with national policies and priorities
- 12.8 by 2030 ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature
- 12.a support developing countries to strengthen their scientific and technological capacities to move towards more sustainable patterns of consumption and production
- 12.b develop and implement tools to monitor sustainable development impacts for sustainable tourism which creates jobs, promotes local culture and products
- 12.c rationalize inefficient fossil fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development

- 14.1 by 2025, prevent and significantly reduce marine pollution of all kinds, particularly from land-based activities, including marine debris and nutrient pollution
- 14.2 by 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration, to achieve healthy and productive oceans
- 14.3 minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels
- 14.4 by 2020, effectively regulate harvesting, and end overfishing, illegal, unreported and unregulated (IUU) fishing and destructive fishing practices and implement science-based management plans, to restore fish stocks in the shortest time feasible at least to levels that can produce maximum sustainable yield as determined by their biological characteristics
- 14.5 by 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on best available scientific information
- 14.6 by 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, and eliminate subsidies that contribute to IUU fishing, and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the WTO fisheries subsidies negotiation *
- 14.7 by 2030 increase the economic benefits to SIDS and LDCs from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism
- 14.a increase scientific knowledge, develop research capacities and transfer marine technology taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular SIDS and LDCs
- 14.b provide access of small-scale artisanal fishers to marine resources and markets
- 14.c ensure the full implementation of international law, as reflected in UNCLOS for states parties to it, including, where applicable, existing regional and international regimes for the conservation and sustainable use of oceans and their resources by their parties

Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

- 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
- 15.2 by 2020, promote the implementation of [sustainable management of all types of forests](#), halt deforestation, restore degraded forests, and increase afforestation and reforestation by x% globally
- 15.3 by 2020, [combat desertification](#), and restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land-degradation neutral world
- 15.4 by 2030 ensure the [conservation of mountain ecosystems, including their biodiversity](#), to enhance their capacity to provide benefits which are essential for sustainable development
- 15.5 take urgent and significant action to [reduce degradation of natural habitat, halt the loss of biodiversity](#), and by 2020 [protect and prevent the extinction of threatened species](#)
- 15.6 ensure fair and equitable [sharing of the benefits arising from the utilization of genetic resources](#), and promote appropriate access to genetic resources
- 15.7 take urgent action to [end poaching and trafficking of protected species of flora and fauna](#), and address both demand and supply of illegal wildlife products
- 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
- 15.9 by 2020, [integrate ecosystems and biodiversity values into national and local planning](#), development processes and poverty reduction strategies, and accounts
- 15.a mobilize and significantly increase from all sources financial resources to [conserve and sustainably use biodiversity and ecosystems](#)
- 15.b mobilize significantly resources from all sources and at all levels to [finance sustainable forest management](#), and provide adequate incentives to developing countries to advance sustainable forest management, including for conservation and reforestation
- 15.c enhance global support to efforts to [combat poaching and trafficking of protected species](#), including by increasing the capacity of local communities to pursue sustainable livelihood opportunities

Those are the societal goals and targets.

But what does science have to do with all that?

Science cannot provide solutions.
But we can contribute to finding them!

Some keywords for the contribution of science:

Openness

Transdisciplinarity

Dialogue

Engagement

Co-Design

Rigour

Expertise

How to
best
organize
all this?

**3rd International Conference
on Biodiversity and the
UN Millennium Development Goals**

**Biodiversity and Food Security
From Trade-offs to Synergies**

CONFERENCE

Aix-en-Provence, FRANCE
Aix-Marseille University
October 29-31, 2014

Organized by:
Institut Méditerranéen de Biodiversité et d'Ecologie

In partnership with:
Leibniz Association
& Centre National de la Recherche Scientifique

Local Partner: CEREGE; Plan Bleu; OT-MED; Université
Aix Marseille; Région PACA



Be welcomed by and among friends (Robert Chenorkian (CNRS-InEE) and Klement Tockner (WGL))

Hear some expert presentations

- Biodiversity, the Millennium Development Goals, Health, Water and Biodiversity (Heribert Hofer, IZW)
- Climate, biodiversity and food security (Josef Settele, UFZ)
- Biodiversity and Food Security (José Sarukhán, UNAM)

Have a drink and begin to discuss (Aix-en-Provence Town Hall, 7pm)

Hear and discuss more expert presentations (Thursday)

Discuss your own work and draw conclusions (Friday)

Conference Sessions

1. **Environmental changes and food security: consequences and opportunities** (Sandrine Paillard & Alexandra Lux)
2. **Green economy, food security, and biodiversity** (Klement Tockner & Jean-Michel Salles)
3. **Sustainable use of biodiversity** (Deborah Goffner & Ulrich Stachow)
4. **Conceptual pitfalls in the food-biodiversity nexus** (Jörn Fischer & Muriel Tichit)
5. **Science-based opportunities to reconcile food security, biodiversity conservation and sustainable development** (Heribert Hofer & Wolfgang Cramer)

Friday Workshops

- Four thematic workshops, following the four main sessions of the conference
- Please, **each poster contributor prepare a 2 minutes long oral statement** for the workshop (no slides)

But before we begin, let us think about life after this conference. My personal “wish list”:

1. Aim your work towards solutions
2. Communicate your findings

Communication

- Scientific publications, in whatever journal
- A Special Feature in Regional Environmental Change (you are all invited to submit papers, look for details in your programme)
- A joint paper, resulting from our workshops?
- Communication to the “general public”, by whatever means you have (follow @imbe_marseille)
- Engage with civil society, your town, your village, your neighbourhood, your friends

But before we begin, let us think about life after this conference. My personal “wish list”:

1. Aim your work towards solutions
2. Communicate your findings
3. Use national and international networks to learn from others

Networks

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<http://www.leibniz-gemeinschaft.de/en/research/leibniz-research-alliances/biodiversity/>

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Start » Research » Leibniz Research Alliances » Biodiversity

► Scientific Profile

► Research Focus Areas

▼ Leibniz Research Alliances

Leibniz Network on Biodiversity - A Leibniz Research Alliance

Biodiversity is precious: It guarantees us goods and services such as clean water, food and natural resources.

futureearth
research for global sustainability

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DIVERSITAS celebrates 23 years of existence and transitions Future Earth

The Celebration, which takes place in Seville, Spain, on 30th September 2014, will convene one hundred guests representing past and present members DIVERSITAS community.

Our research themes

- DYNAMIC PLANET
- GLOBAL SUSTAINABLE DEVELOPMENT
- TRANSFORMATIONS TOWARDS SUSTAINABILITY

<http://www.futureearth.org/projects/ecoservices>

ecoSERVICES

Photo: Andrew Hendry

ecoSERVICES is dedicated to investigating the impact of biodiversity change on ecosystem functioning and services, and human well-being. Its mission is to:

- Understand the link between biodiversity and ecosystem functioning;
- Identify the relationship between ecological functions and ecosystem services;
- Assess the effect of ecosystem service change on human well-being, and evaluate human responses to ecosystem service change.

Ecosystems play a key role for human well-being and the sustainable development of the relationship between people and the environment. Over the last decade, "ecosystem services" have been established as a unified term to encompass the sum of benefits people derive from ecosystems. It has become a popular concept and several conceptual frameworks have been proposed for exploring the links between biodiversity, ecosystem services and human well-being. The ecoSERVICES project has played a key role in these developments and now enters into a second phase involving new partnerships to address outstanding gaps.

ecoSERVICES is a core project of [DIVERSITAS](#).

[ecoSERVICES website](#)

Key contacts



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But before we begin, let us think about life after this conference. My personal “wish list”:

1. Aim your work towards solutions
2. Communicate your findings
3. Use national and international networks to learn from others
4. Engage in your private life and in civil society for better recognition of biodiversity for sustainable development

But now let's enjoy the conference!



**...and *merci beaucoup* to Emilie, Gabriela, Ana Paula,
Laura and all others who made this possible!**

...not to forget our sponsors who are all listed in the programme!

Wednesday Opening Session

- Welcome to Aix-en-Provence (Wolfgang Cramer, IMBE)
- Welcome by CNRS-InEE (Robert Chenorkian, InEE Deputy Director)
- Welcome by the Leibniz-Association (Klement Tockner, Coordinator Biodiversity, WGL)
- Biodiversity, the Millennium Development Goals, Health, Water and Biodiversity (Heribert Hofer, IZW, Berlin)
- Climate, biodiversity and food security (Josef Settele, UFZ, Halle)
- Biodiversity and Food Security (José Sarukhan, UNAM)