Coral reefs, key ecosystems facing the challenge of global change

Des océans sains pour une vie meilleure - Genève 9 juin 2016

Coral Reefs: The largest bio-constructions on the planet

Great Barrier Reef (Australia)
2 600 km - surface 344 400 km²

Récif barrière de Nouvelle-Calédonie
1 600 km – Surface du lagon 24 000 km²

Biological and economical importance of coral reefs

Symbiosis between an animal and microalgae is the key to this ecological success

Ecosystem services
- Total reef area: 300,000 km²
- 0.1% of sea surface area
- 30% of total known marine biodiversity

Food

Tourism

Coastal protection

WASTE

FOOD

MUCUS

1 million zoox / cm² of animal tissue

Coral reefs, rain forests of the sea

Denis Allemand

AAMO

30 milliards $/an

500 million people dependent on reefs for their survival (8% of the World population)
Valuable, but vulnerable

TO DATE:
20% of coral reefs already destroyed  
15% of coral reefs under threat within 10 years  
20% of coral reefs under threat within 40 years

GLOBAL THREATS: Coral bleaching, the divorce!
The most sensitive process to global warming

- A process that appeared in the eighties and still increasing.  
- A process that affects thousand-year-old colonies.  
- 20% of coral reefs already lost.

Global threats: Ocean Acidification
The other CO₂ problem

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<th>Year</th>
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<th>H⁺</th>
<th>HCO⁻³</th>
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<td>34%</td>
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Coral bleaching and thermal stress
Sea Surface Temperature (°C)

Source: Hoegh-Guldberg & Salih 1994
Global threats: Ocean Acidification

The other CO₂ problem

Losers and winners in coral reefs acclimatized to elevated carbon dioxide concentrations

Even if some coral species are tolerant, the reef and its complexity will disappear

The Great Barrier Reef: a dark future?

Local threats

Agricultural run-off (Queensland)

Overfishing

Global threats

Only 7% of the Great Barrier Reef has avoided coral bleaching

Coral reefs facing the challenge of ocean warming and acidification

Conclusions – Take-home messages

1. Coral Reefs are key marine ecosystems with both ecological and socio-economic importance
2. The impact of global changes on coral reefs are already visible
3. The effects of the different stressors are often synergistic
4. Local solutions (eg development of MPAs) are possible but not sufficient
5. The only long-term solution remains a strong reduction of CO₂ emissions to no more than 450 ppm in the atmosphere and a careful management
Thank you for your attention