Natural Sciences and Society

Arthur Lyon Dahl Ph.D.

International Environment Forum (IEF)
http://iefworld.org
and
ebbf - ethical business building the future
http://ebbf.org

ABS/IEF, Toronto, Canada, 9 August 2014

Globalization

- is the logical next step in human evolution, but
- Economic globalization is driven by powerful governments and multinational businesses for their own benefit
- Social globalization is being strongly resisted
- Globalization of environmental problems threatens future sustainability
- Globalization of information makes us aware

Present unsustainability

- Population will grow to 9 billion by 2050
- Economy not creating enough employment
- 20% of population uses 80% of resources
- Energy challenge / climate change threats
- Growing water shortages
- Loss of biodiversity and ecosystem services
- Food production capacity at risk
- Extremes of wealth and poverty widening
- Financial system is vulnerable
- Governance failing to cope

Main trends in science

- Increasing specialization: renaissance polymath => gentleman naturalist => extreme specialist
- Increasing reductionism
- Technological sophistication
- Teamwork - multiple authors
- Grantsmanship - research funding
- Citation ratings, high profile journals
- Peer review - quality vs. conformity

Emerging needs

- Sustainability requires transdisciplinary approaches - natural and social sciences
- Integrated complex systems perspectives
- Emergent properties of complex systems
- Tipping points, sudden transformations, non-linear system dynamics, chaos
- Multiple levels of organization
- Linking science and policy

Science today is poorly structured to respond to these needs

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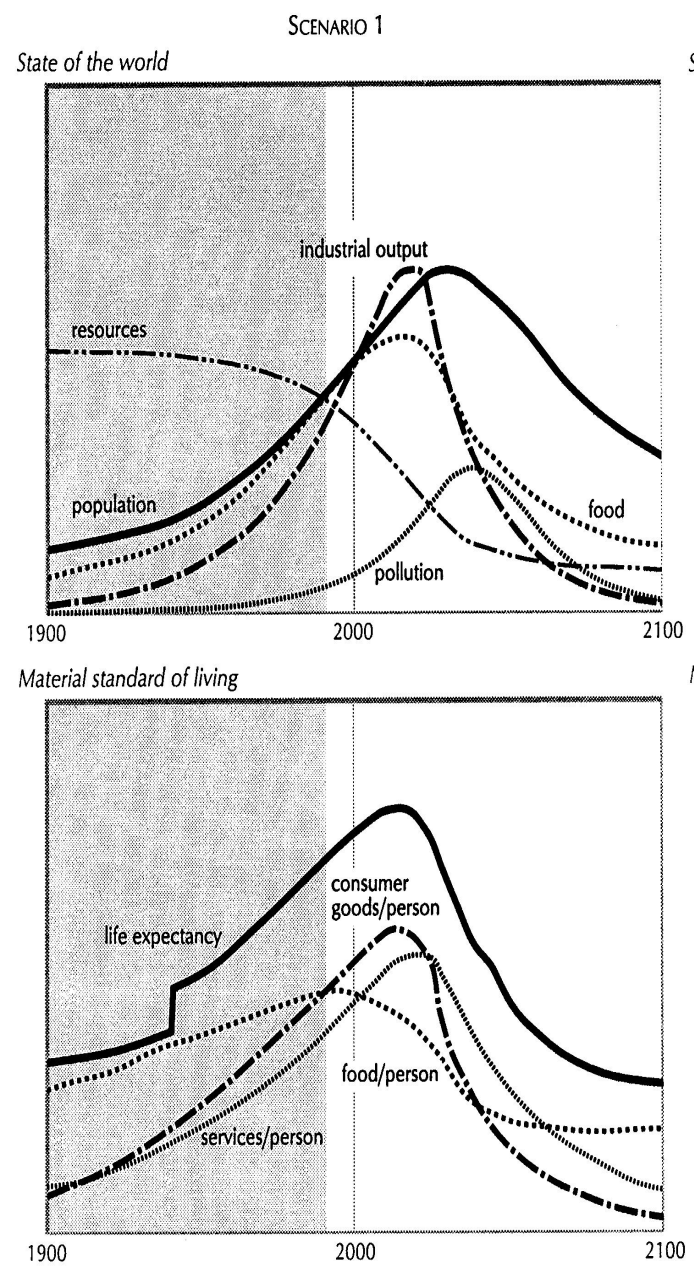
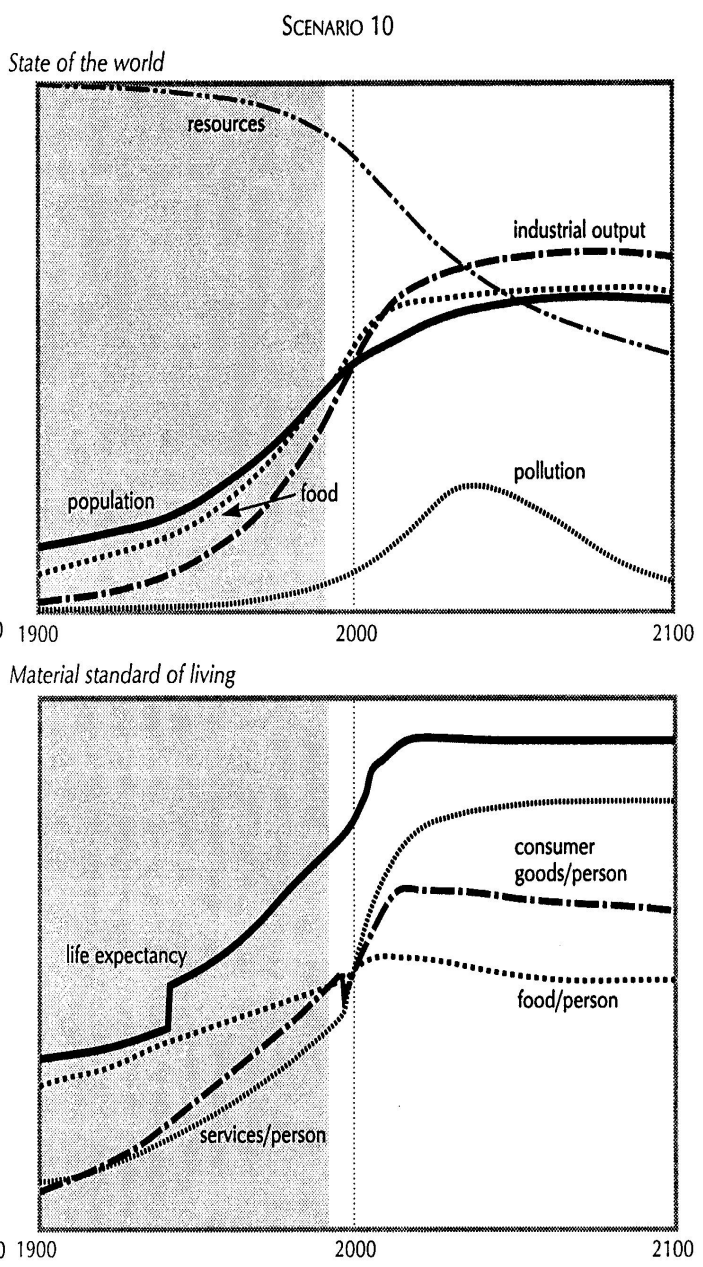
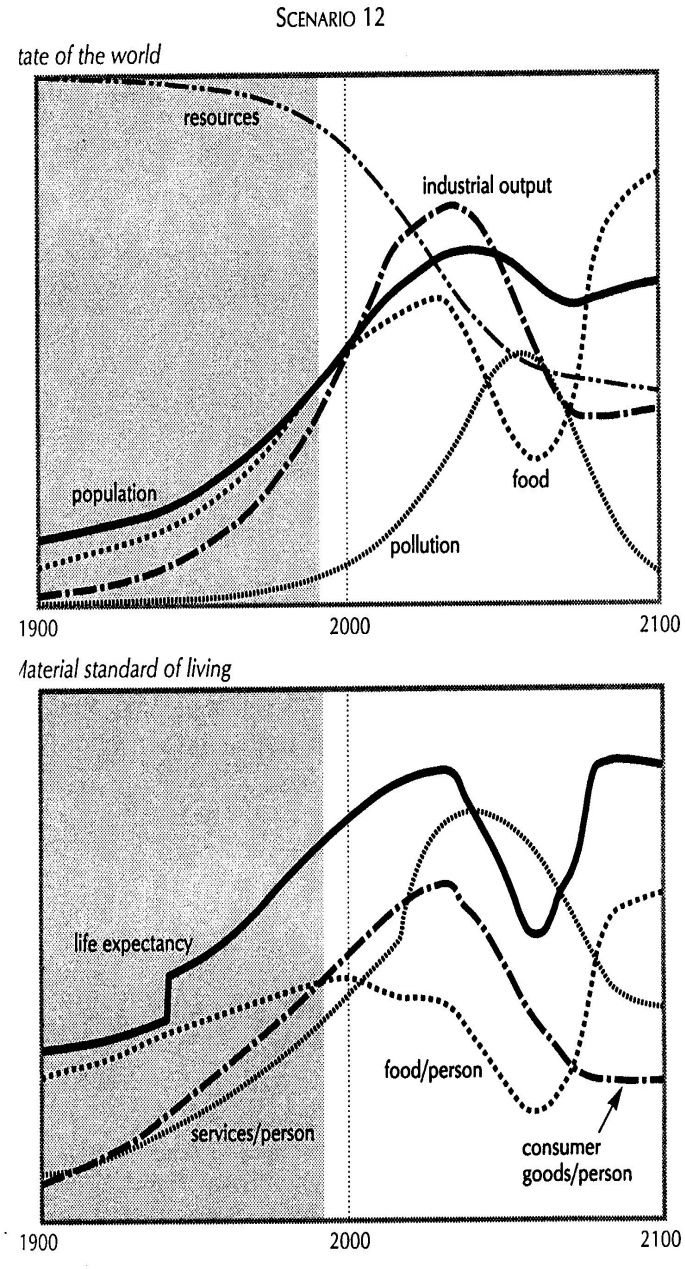
Scenarios from World 3

(Meadows et al. (1992) Beyond the Limits)





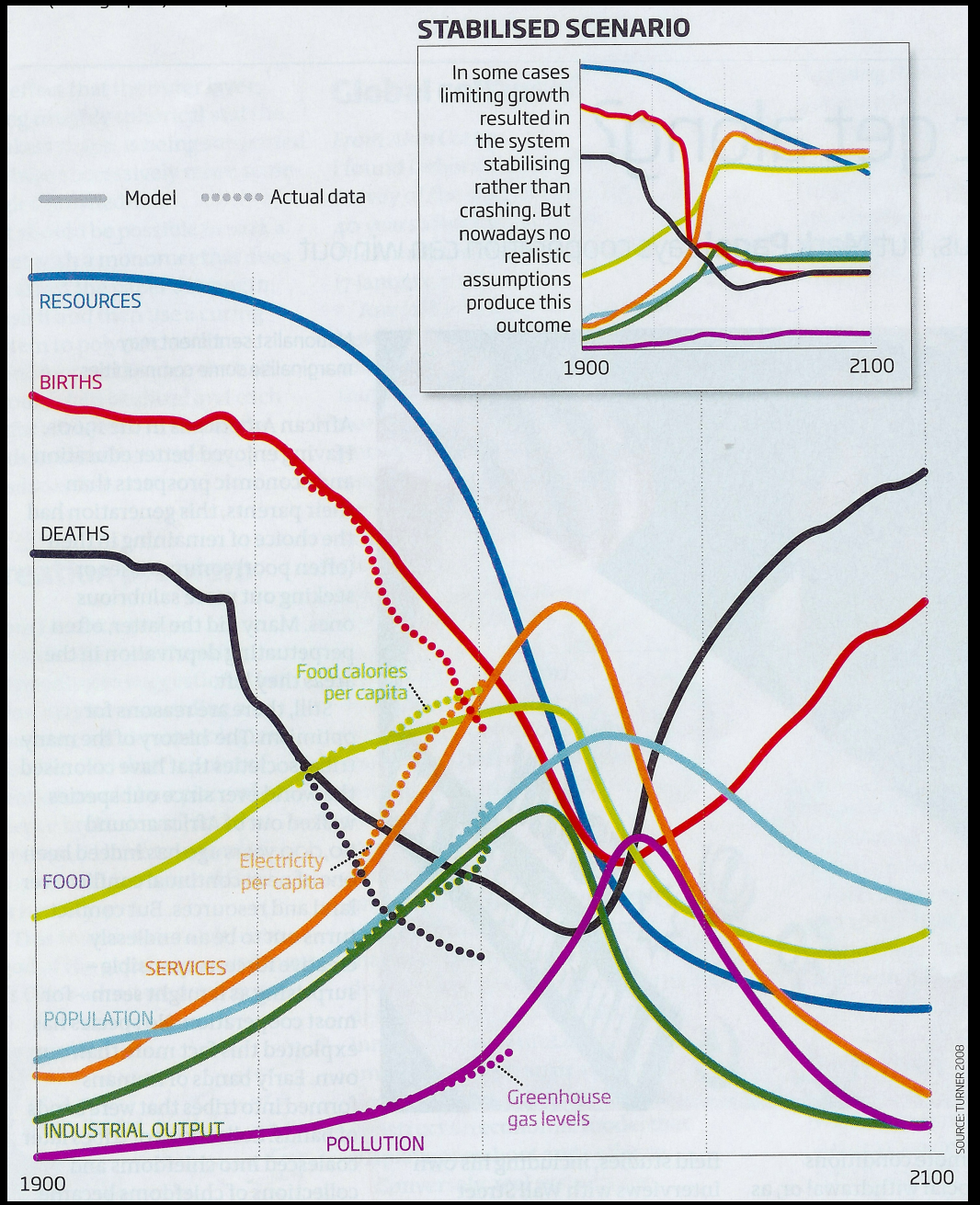


Business as usual

Transition 1995

Transition 2015

Where are we now?



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- Barrier between natural and social sciences
- Barrier between science and religion (untestable, subjective, not an acceptable source or field of study)

Breaking down the silos (post-2015 dialogue)

Anti-science Movement

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Science-derived Sustainability Indicators

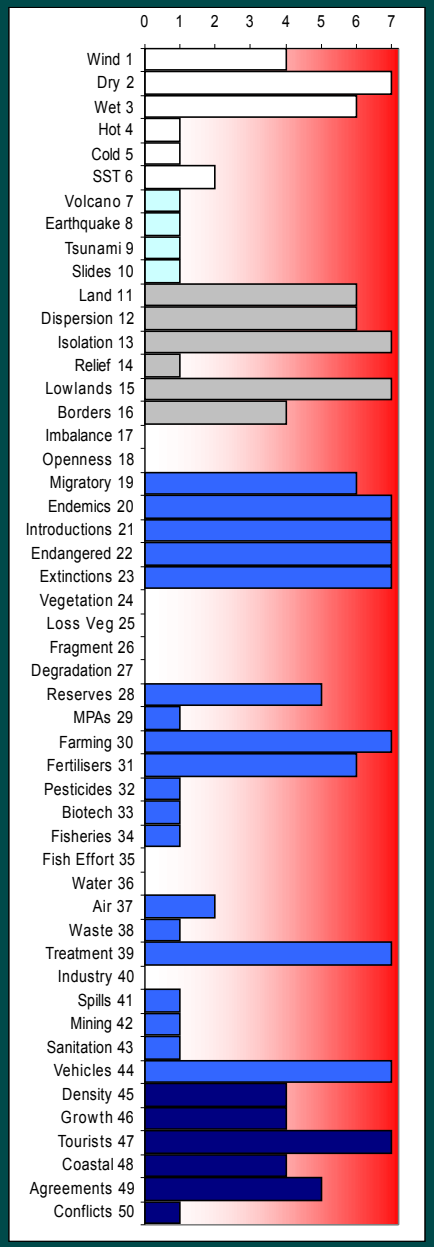
- CSD Work Programme on Indicators 1994-2006
- Environmental Vulnerability Index 2004
- Environmental Sustainability Index revised 2005
- Environmental Performance Index 2008
- Now preparing Sustainable Development Goals and Indicators for post-2015

The Environmental Vulnerability Index EVI 2004

UNEP

SOPAC

Cook Islands



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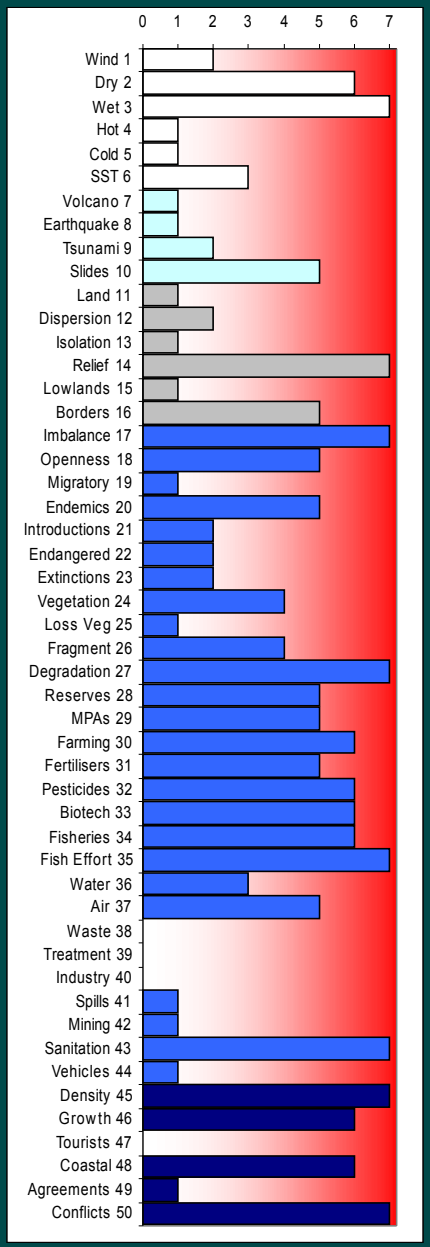

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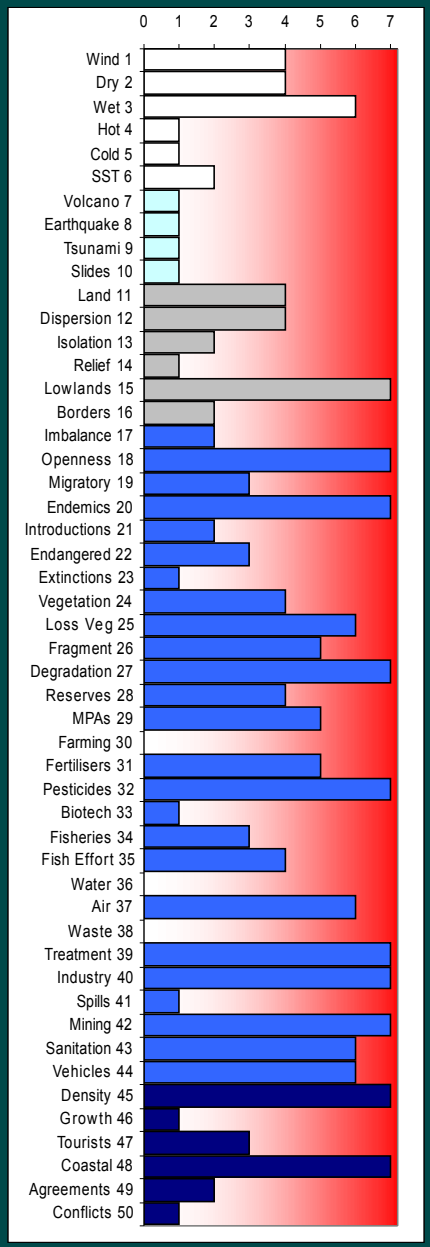

Limited political receptivity

- Short-term perspective, next election
- Powerful economic interests and lobbies
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- Lack of understanding of science
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Science has failed to solve problems

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- Priority to economics
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Science demonstrates unity

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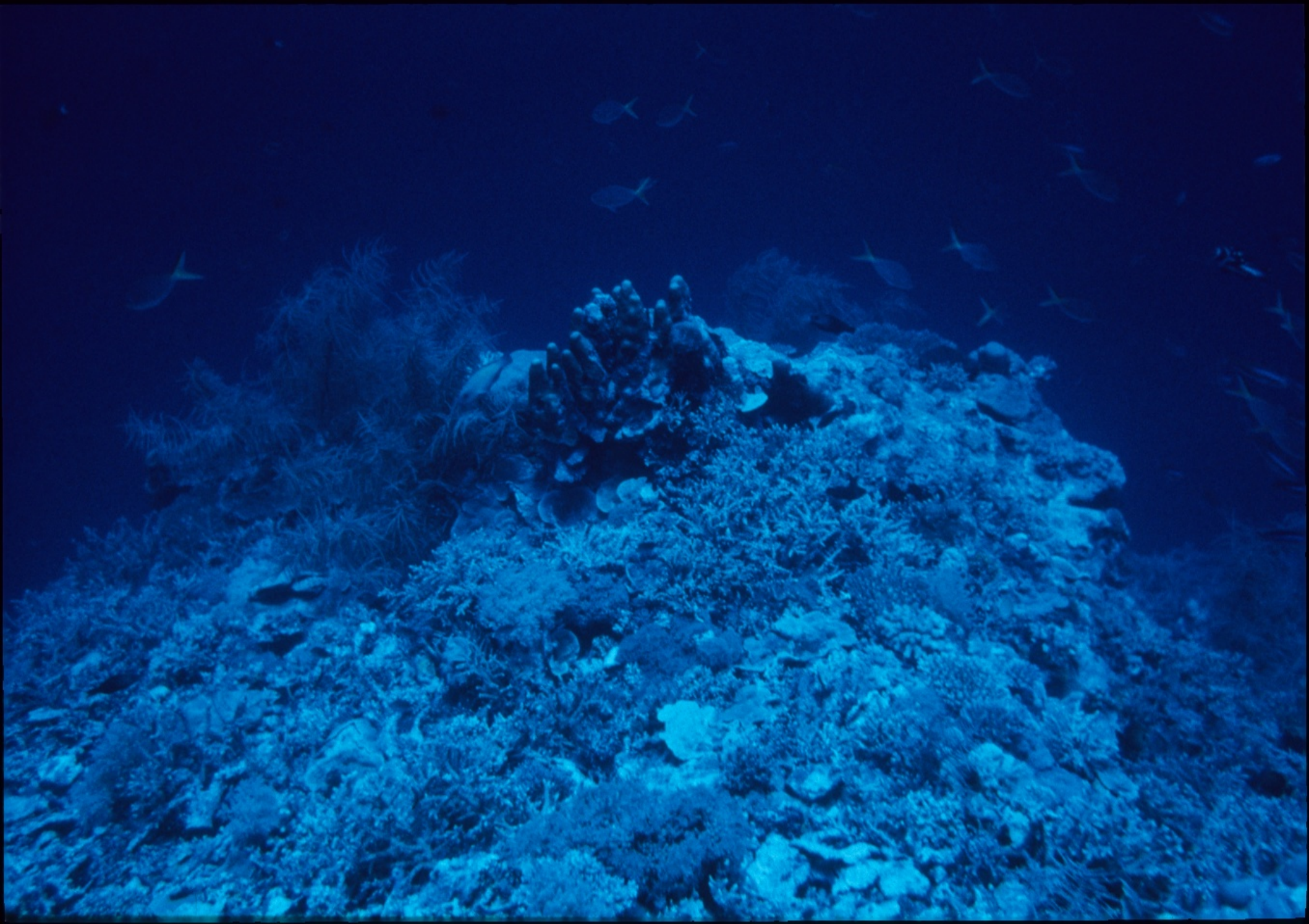
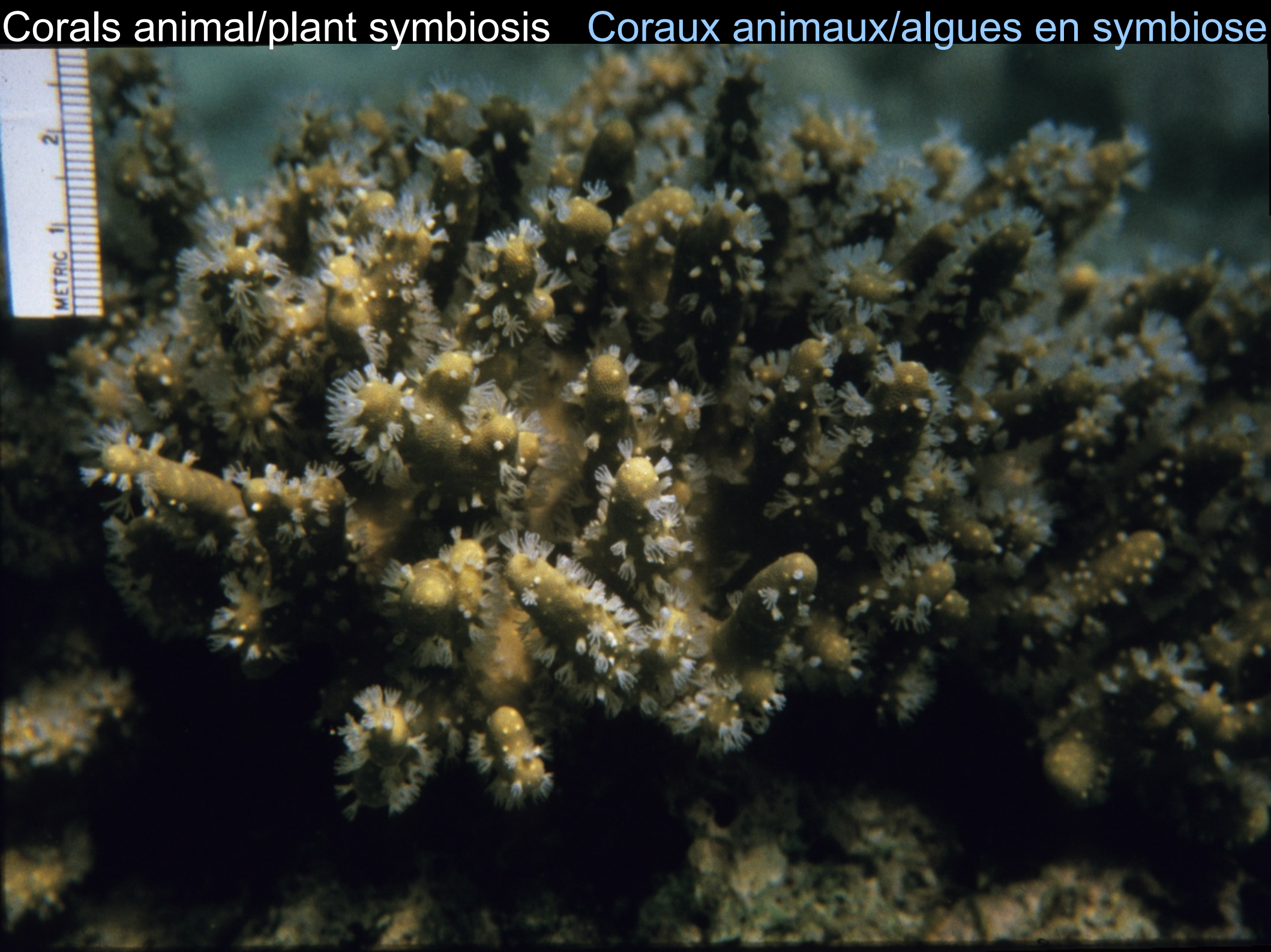
- Coral reef as complex ecosystem illustrating unity in diversity, balance, symbiosis and cooperation, emergent properties

Coral reef ecosystem L'écosystème du récif corallien



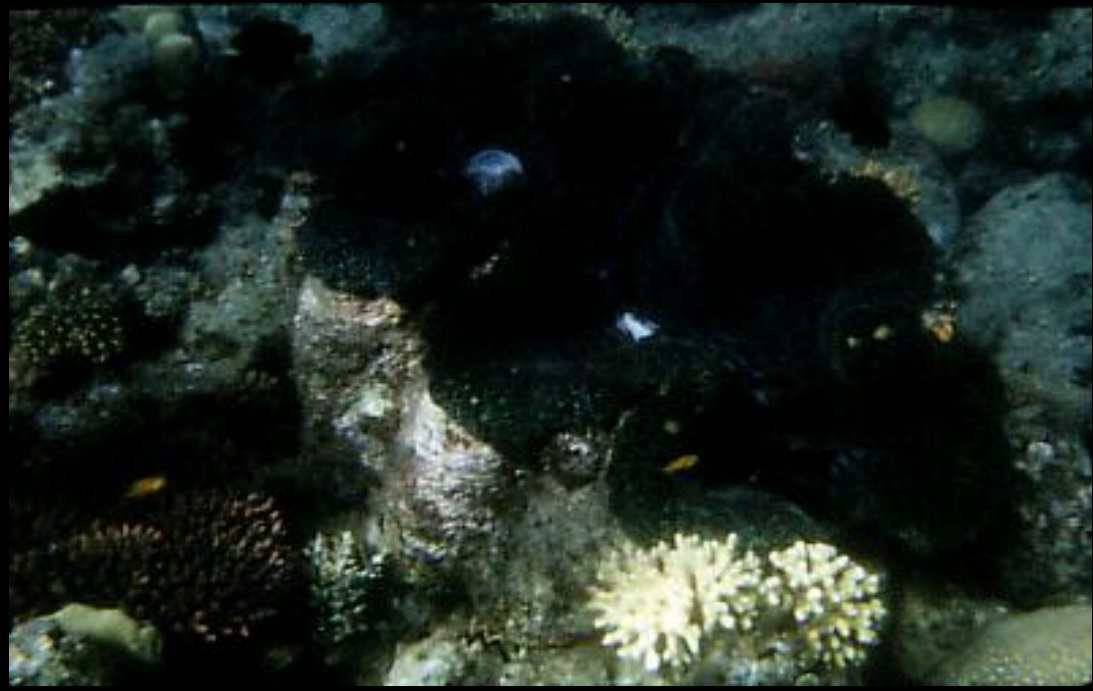
Corals animal/plant symbiosis Coraux animaux/algues en symbiose

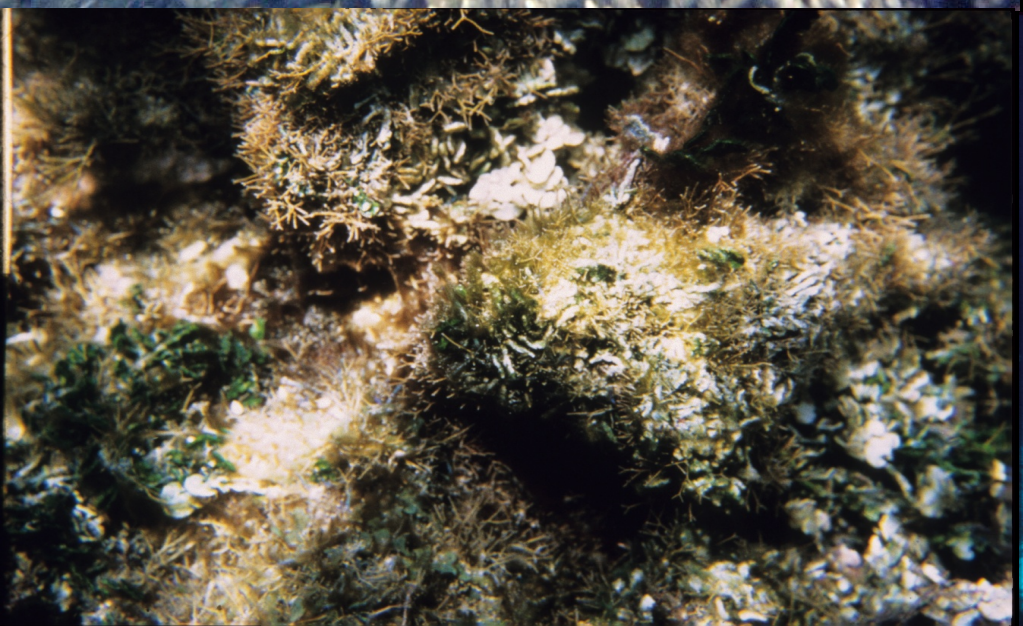


High reef biodiversity Haute biodiversité récifale

400 corals, 4000 molluscs, 1500 fish just on the Great Barrier Reef

400 coraux, 4000 mollusques, 1500 poissons juste sur le Grand Récif Barrière

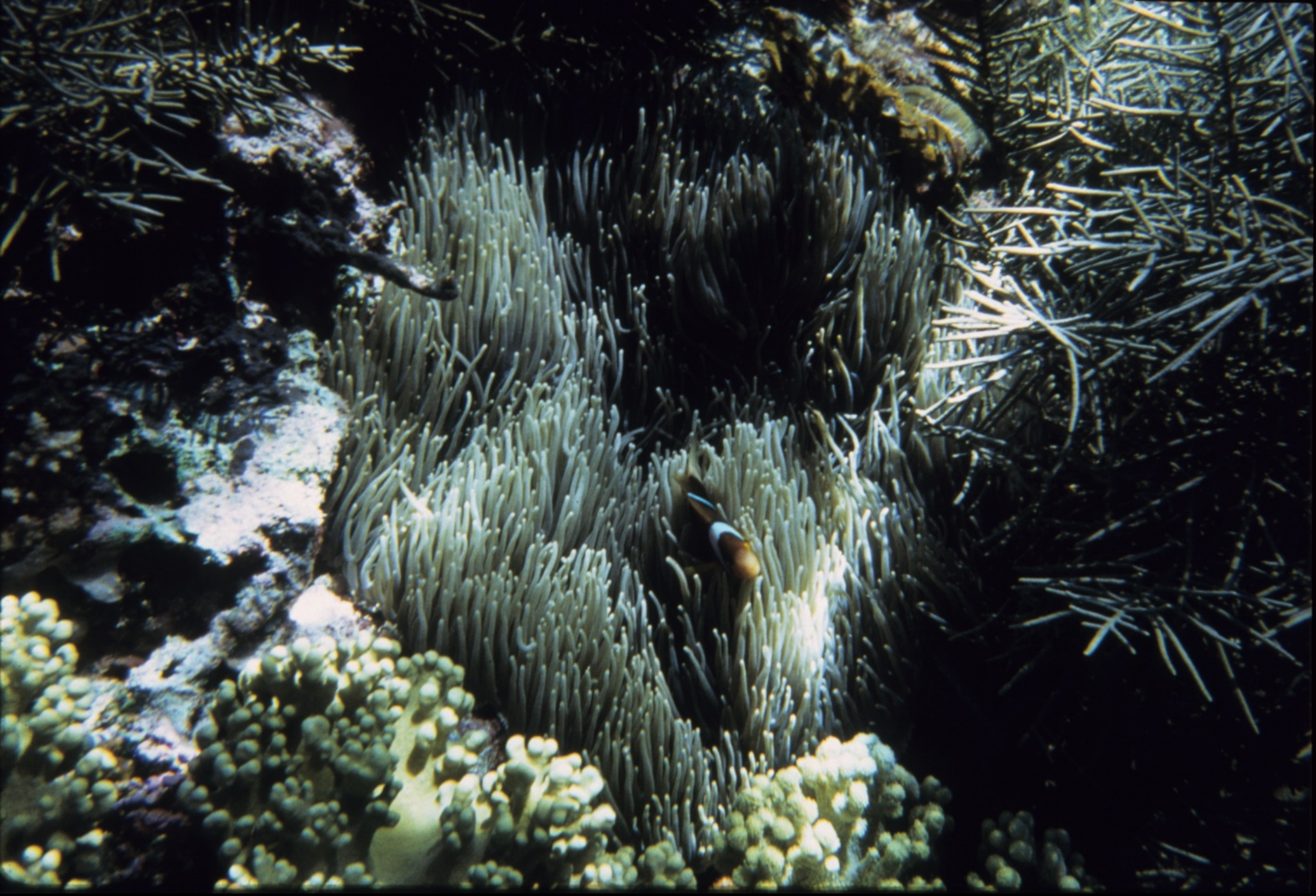




Complex spatial organization Organisation spatiale complexe

Coral reef like a city **Récif comme une ville**

Cleaner fish (collaboration) Poisson nettoyeur (collaboration)



Clownfish and anemone (mutual assistance)
Poisson clown et anémone (aide mutuelle)

Public mobilization for science

- Science education in schools
- Science journalism
- Bringing science to the grassroots level
- Public participation in monitoring and assessment
- Citizen Science (reefwatch, streamwatch)
- Indigenous science (SPREP, UNESCO)
- Local scientific institutions, science accessible to everyone

New paradigm for science

Scientific and technological activity... must cease to be the patrimony of advantaged segments of society, and must be so organised as to permit people everywhere to participate in such activity on the basis of capacity....
[This] will require the establishment of viable centres of learning throughout the world, institutions that will enhance the capability of the world's peoples to participate in the generation and application of knowledge.

(Bahá'í International Community. 1995. *The Prosperity of Humankind*)

Science & Technology for everyone

...the majority of technological development is driven by market forces that do not reflect the basic needs of the world's peoples. Furthermore, the emphasis on the transfer of technology without accompanying efforts to increase participation in the generation and application of knowledge can only serve to widen the gap between the rich and the poor—the 'developers' and the 'users' of technology. Developing the capacity for identifying technological need and for technological innovation and adaptation—in light of societal needs and environmental constraints—will be vital to social progress. The transformation of complex social realities will require the development of institutional capacity within local populations to create and apply knowledge in ways that address the specific needs of that population. This question of institutional capacity (e.g. the establishment of regional centers of research and training) constitutes a major challenge to sustainable development. If successfully met, however, the result will be to break the present unbalanced flow of knowledge in the world and dissociate development from ill-conceived processes of modernization. "Modern" technologies will be characterized by an orientation towards addressing locally defined needs and by priorities that take into account both the material and moral prosperity of society as a whole.

(Bahá'í International Community, Rethinking Prosperity: Forging Alternatives to a Culture of Consumerism, 2010)

Arthur Lyon

International Enviro

Arthur Lyon Dahl (in press) Putting the Individual at the Centre of Development: Indicators of Well-being for a New Social Contract. Paper presented at the Third Rencontres Internationales de Reims on Sustainability Studies. Post-2015 Sustainable Development Goals: Towards a New Social Contract, Reims, France, 18-20 June 2013. http://iefworld.org/ddahl13a

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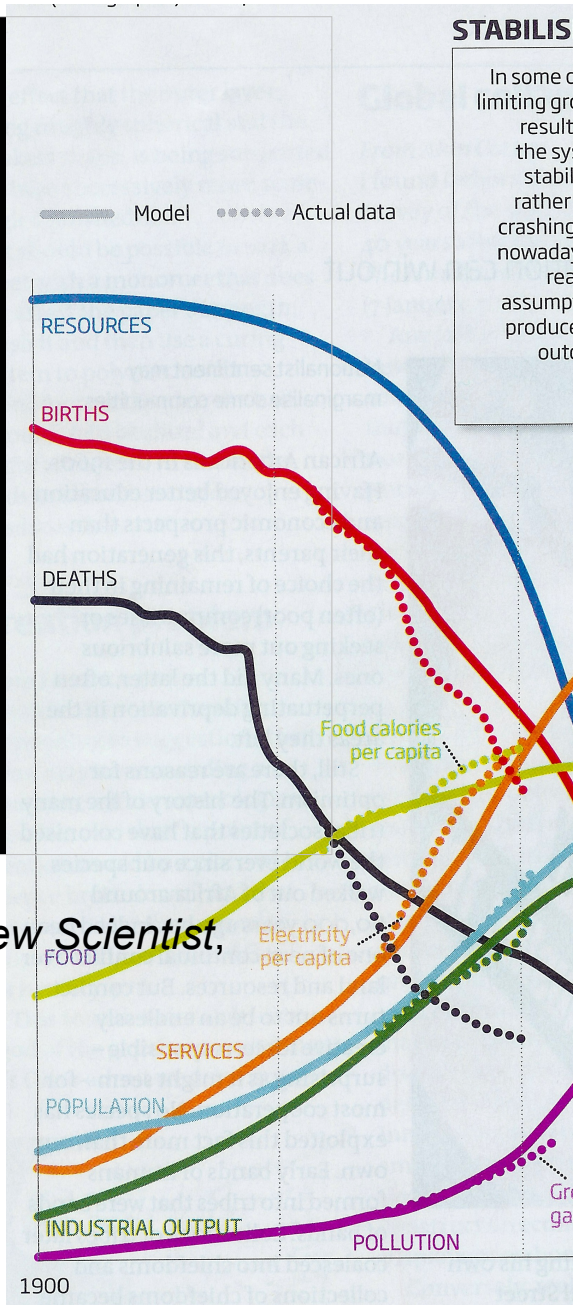

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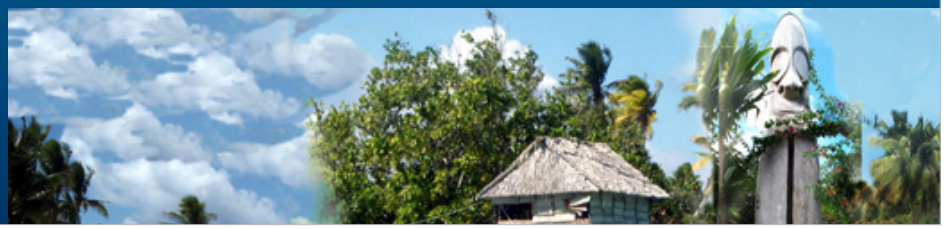

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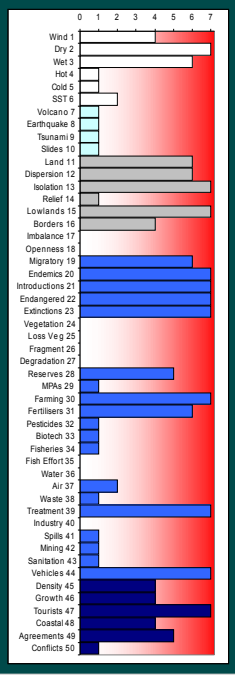

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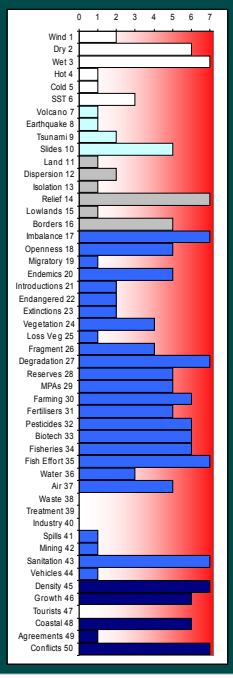

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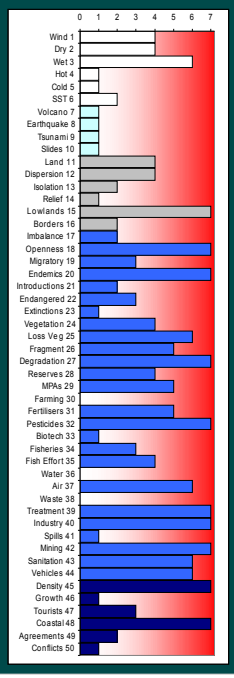

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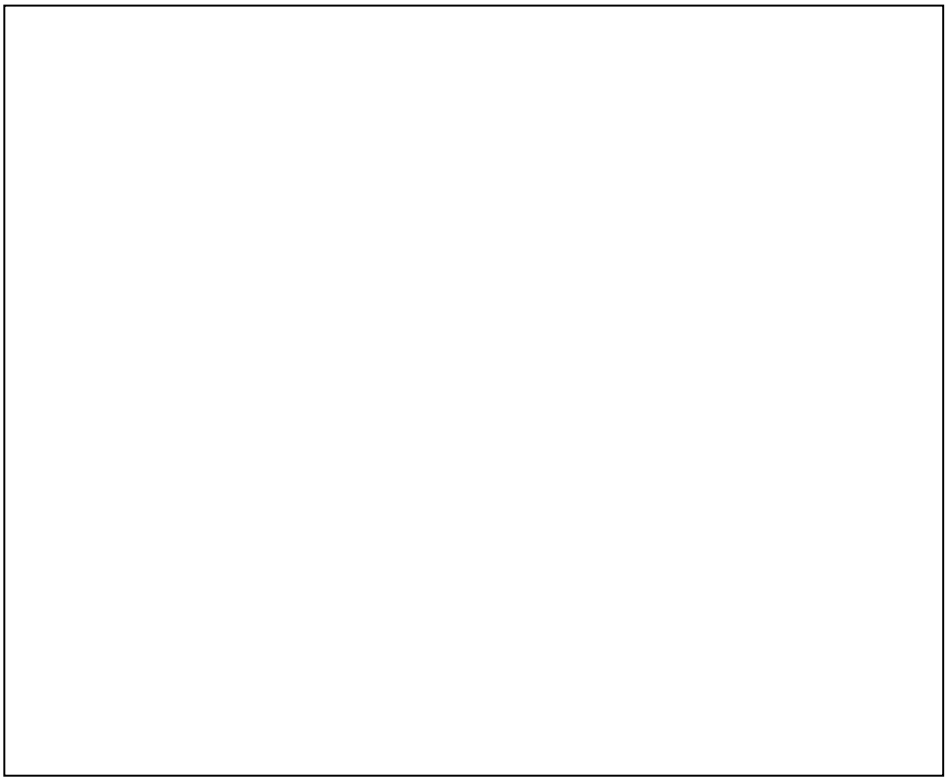

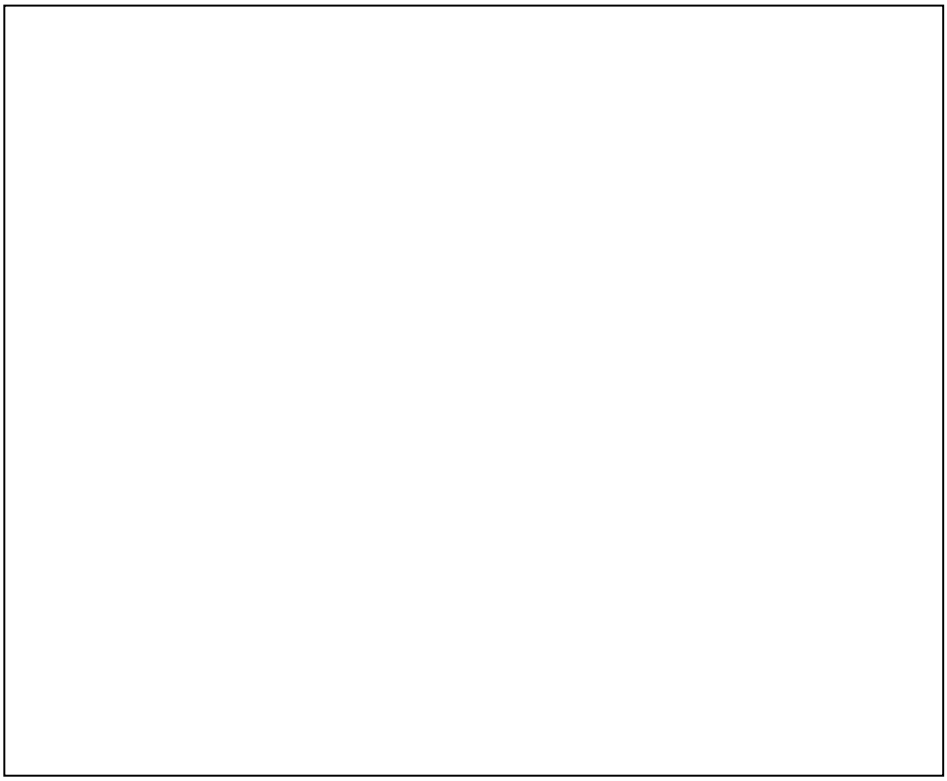

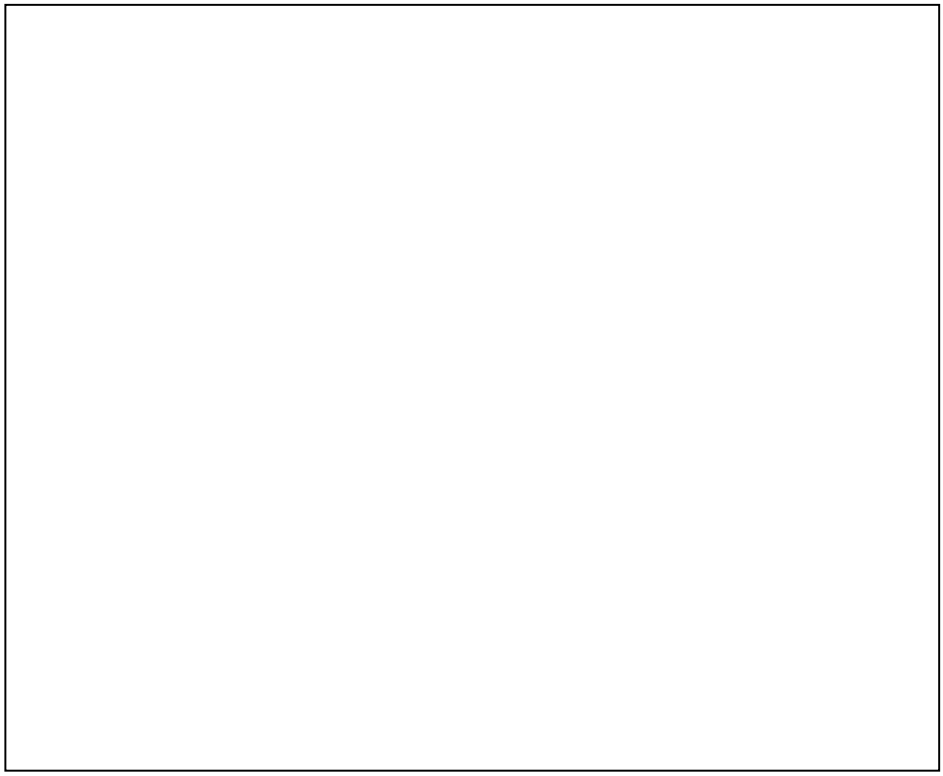

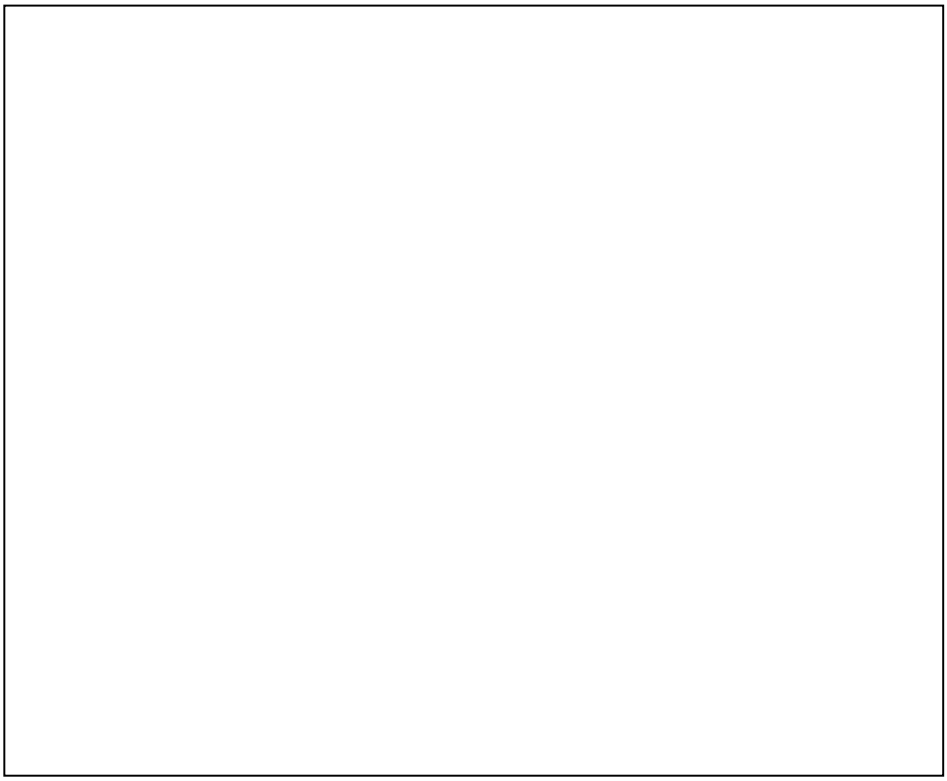

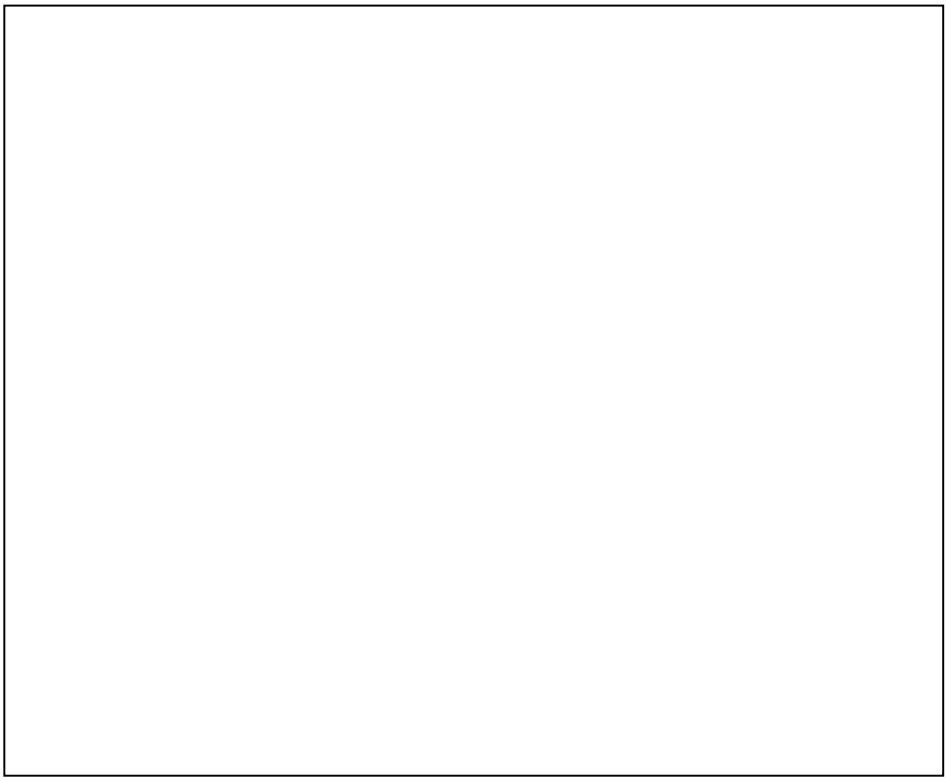

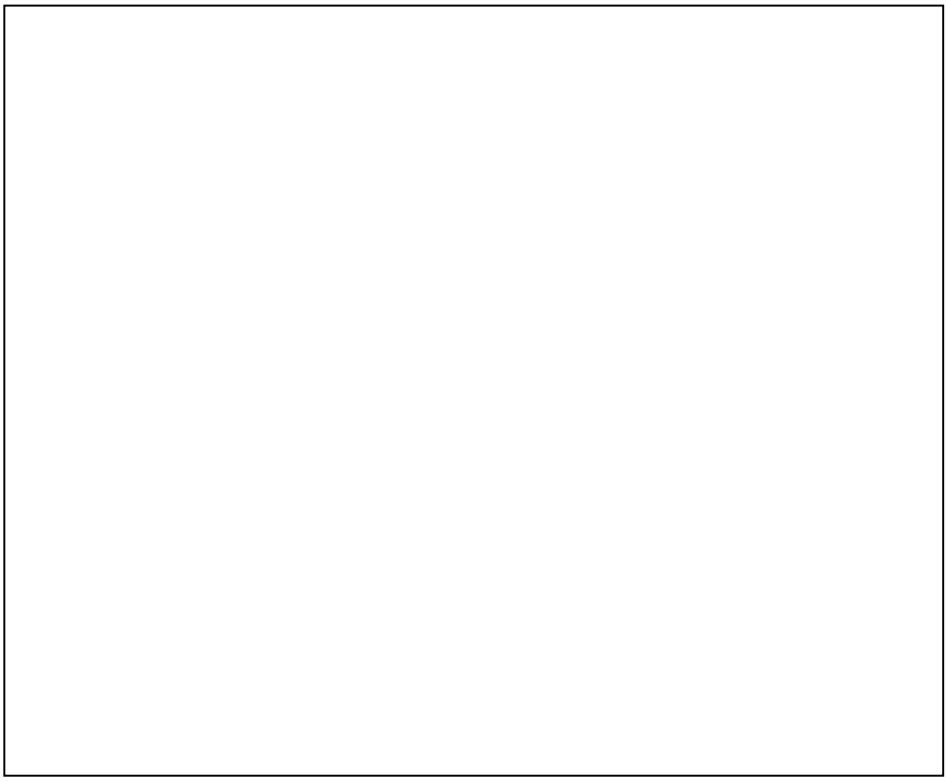

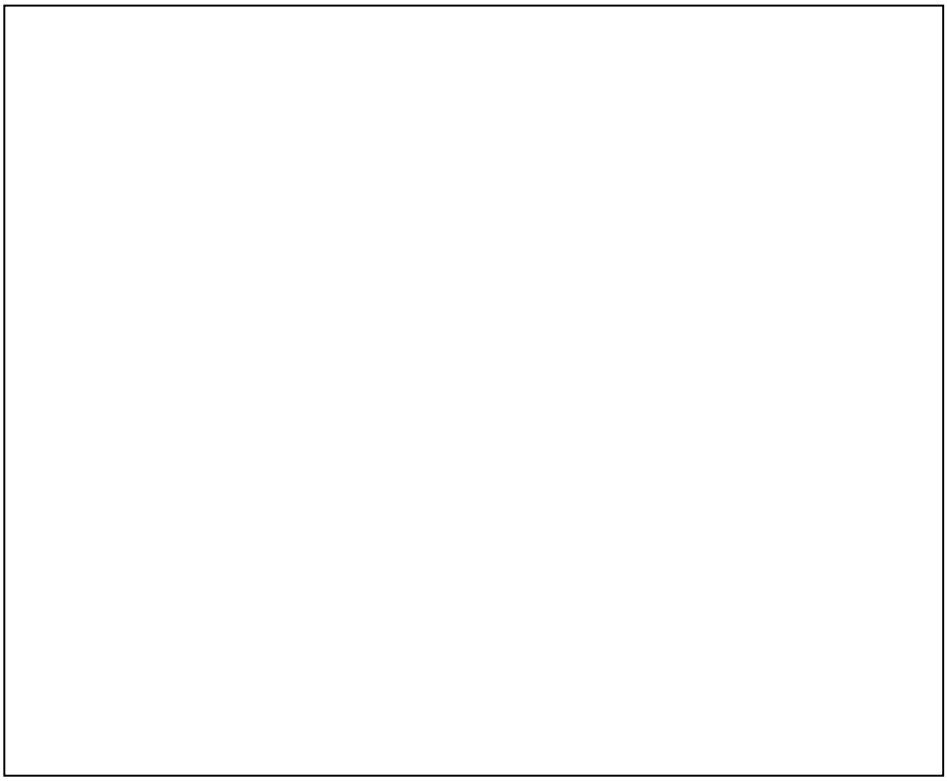

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- Public participation in monitoring and assessment
- Citizen Science (reefwatch, streamwatch)
- Indigenous science (SPREP, UNESCO)
- Local scientific institutions, science accessible to everyone

New paradigm for science

Scientific and technological activity... must cease to be the patrimony of advantaged segments of society, and must be so organised as to permit people everywhere to participate in such activity on the basis of capacity....
[This] will require the establishment of viable centres of learning throughout the world, institutions that will enhance the capability of the world's peoples to participate in the generation and application of knowledge.

(Bahá'í International Community. 1995. *The Prosperity of Humankind*)

30

Bahá'í International Community. 1995. *The Prosperity of Humankind.* A Statement Prepared by the Bahá'í International Community Office of Public Information, Haifa, Israel. http://iefworld.org/bicpros.htm

Science & Technology for everyone

...the majority of technological development is driven by market forces that do not reflect the basic needs of the world's peoples. Furthermore, the emphasis on the transfer of technology without accompanying efforts to increase participation in the generation and application of knowledge can only serve to widen the gap between the rich and the poor—the 'developers' and the 'users' of technology. Developing the capacity for identifying technological need and for technological innovation and adaptation—in light of societal needs and environmental constraints—will be vital to social progress. The transformation of complex social realities will require the development of institutional capacity within local populations to create and apply knowledge in ways that address the specific needs of that population. This question of institutional capacity (e.g. the establishment of regional centers of research and training) constitutes a major challenge to sustainable development. If successfully met, however, the result will be to break the present unbalanced flow of knowledge in the world and dissociate development from ill-conceived processes of modernization. "Modern" technologies will be characterized by an orientation towards addressing locally defined needs and by priorities that take into account both the material and moral prosperity of society as a whole.

31

(Bahá'í International Community, Rethinking Prosperity: Forging Alternatives to a Culture of Consumerism, 2010)

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