Coral Reefs as a Model for Humanity

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International Environment Forum (https://iefworld.org)
A Bahá'í-inspired professional organization for environment and sustainability

Parliament of the World's Religions
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Photos taken in the Caribbean and the South Pacific 1969-1980

Preface

As a Bahá’í, I chose to study science, and especially ecology, to try to understand the spiritual principle of unity in diversity.

Bahá'í perspectives

The most noble and praiseworthy accomplishment of man... is scientific knowledge and attainment.

('Abdu'l-Bahá, in Bahá'í World Faith, p. 242)

Harmony of science and religion

In a world united by technology but fractured by many forms of intolerance, it is important to show the harmony and complementarity of science and religion in our search for solutions to modern problems.

Bahá’í perspectives

Nature is God's Will and is its expression in and through the contingent world.

Bahá’u’lláh

(Bahá'u'lláh, *Tablets of Bahá'u'lláh*, p. 142)

Learning from nature

Nature has over millions of years learned unity in diversity, favoring cooperation over competition, and showing what principles can lead to a sustainable ecosystem. The highly complex ecosystem of a coral reef that builds its own environment as a home for thousands of species can provide a meaningful model for humanity as we work for a world civilization founded on spiritual values.

Bahá’í perspectives

When... thou dost contemplate the innermost essence of all things, and the individuality of each, thou wilt behold the signs of thy Lord's mercy in every created thing, and see the spreading rays of His Names and Attributes throughout all the realm of being.

('Abdu'l-Bahá, Selections from the Writings of 'Abdu'l-Bahá, p. 41-42)

Principles of system organization

- Organized systems follow similar principles and models increasing efficiency and diversity
- Organization is determined by information content
- Information is stored in various ways: physical, chemical, biological, social (two knowledge systems: science and religion – values)

Principles of system organization

- In human society, information is stored in ethics and values, knowledge, science and culture, customs and traditions, and other forms of human capital
- Religions have brought the great innovations in human systems organization

Where can we look for a solution to all our problems?

Is there an example of a natural system that works like our society, only better?

How would a systems scientist or economist look at the world's most complex natural system?

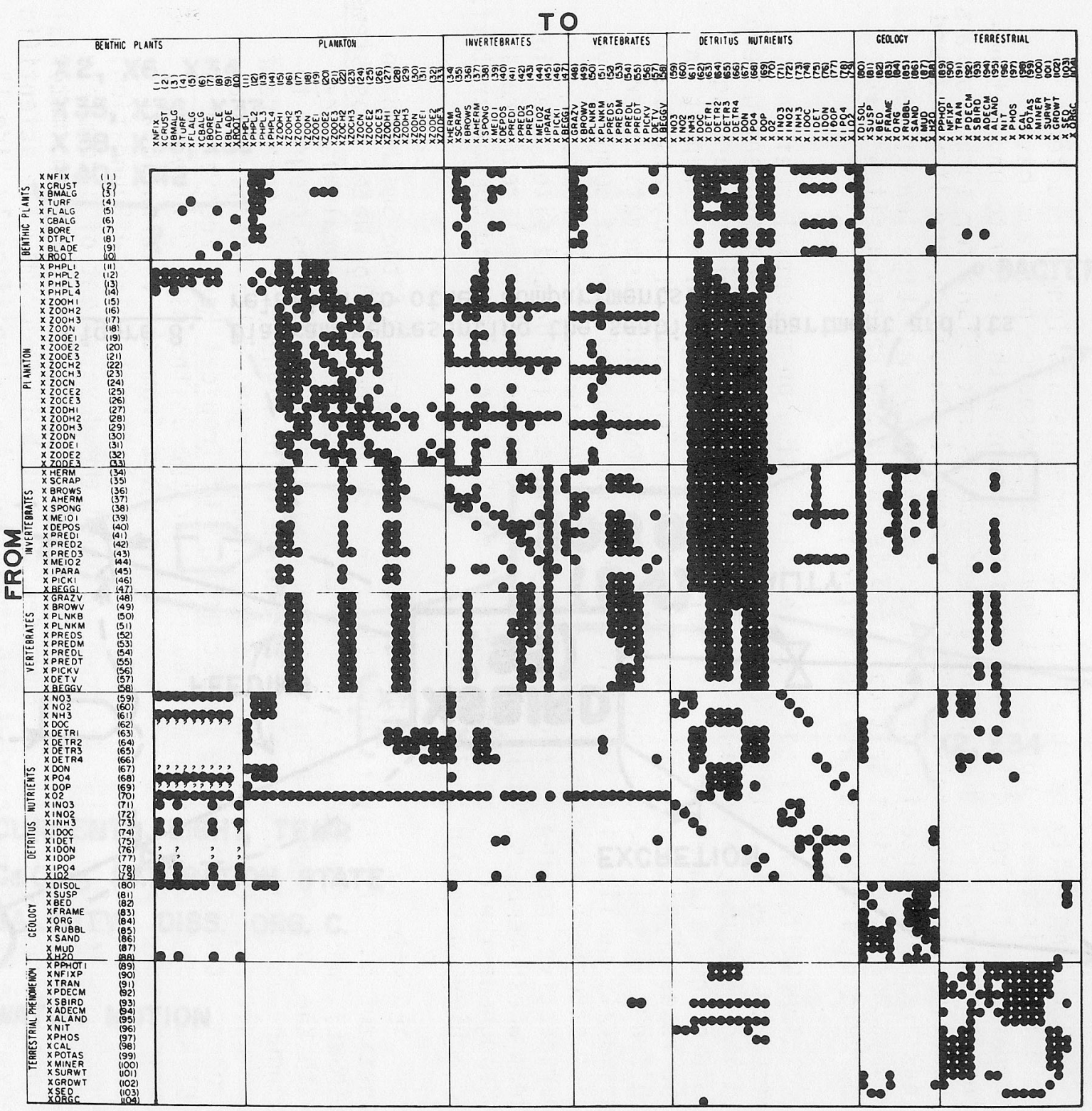
CORAL REEF ECOSYSTEM

A systems scientist's view of a coral reef

carbon flow as equivalent of GDP

104 compartments

Coral reef systems model (Dahl et al. 1974)



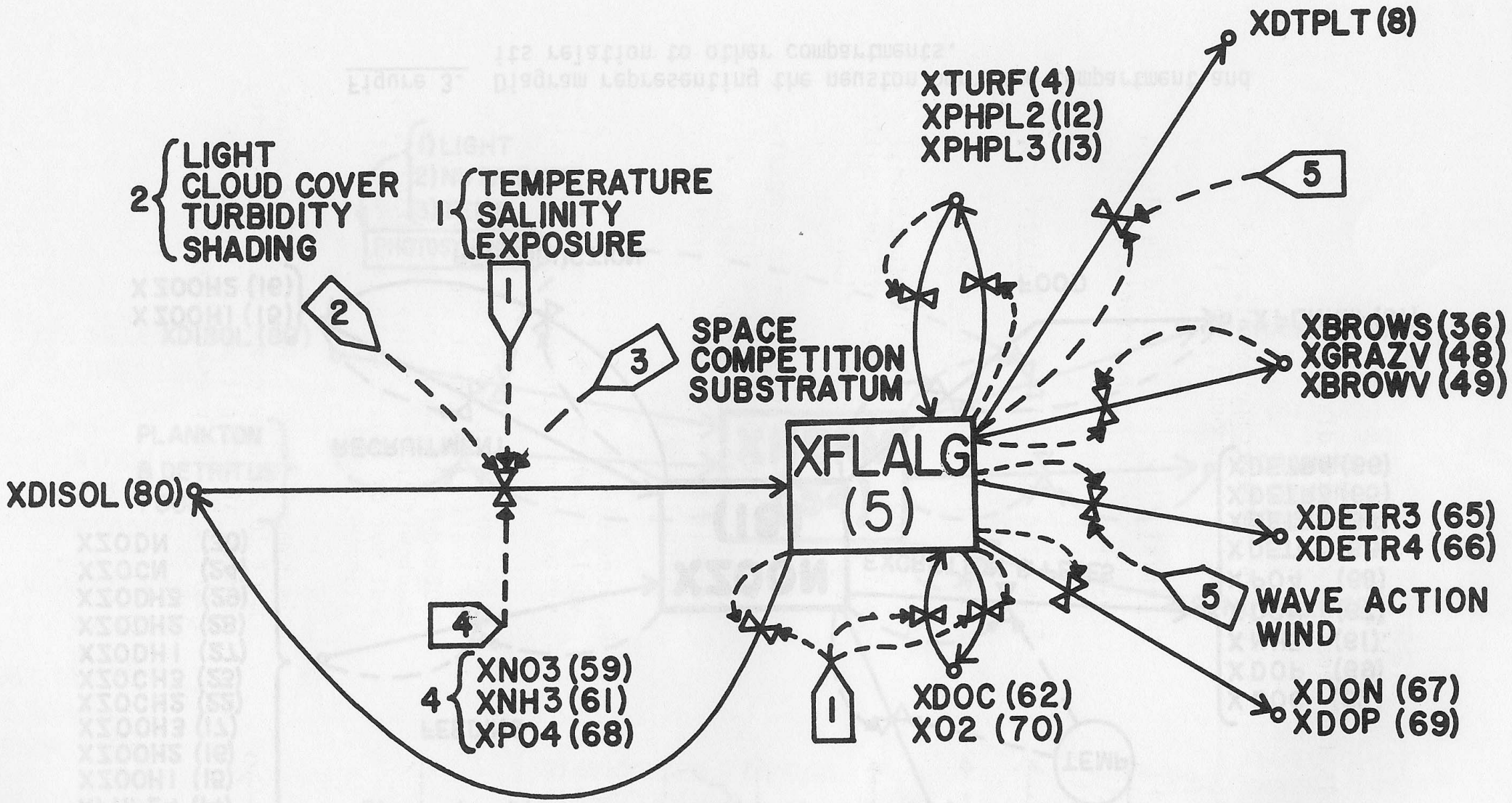
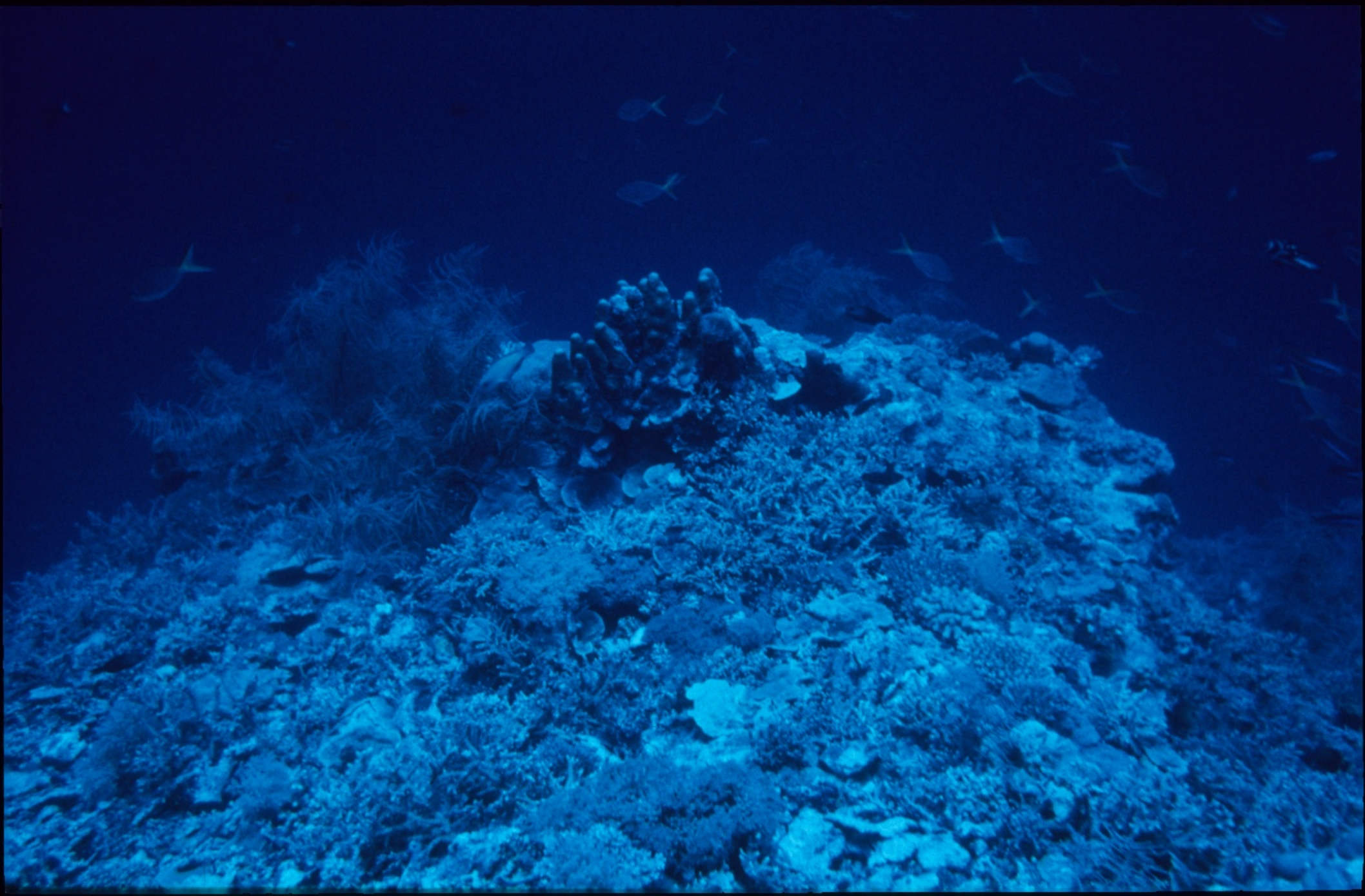


Figure 2. Diagram representing the fleshy macro-algal compartment and its relation to other compartments.

Coral reef systems model (Dahl et al. 1974)

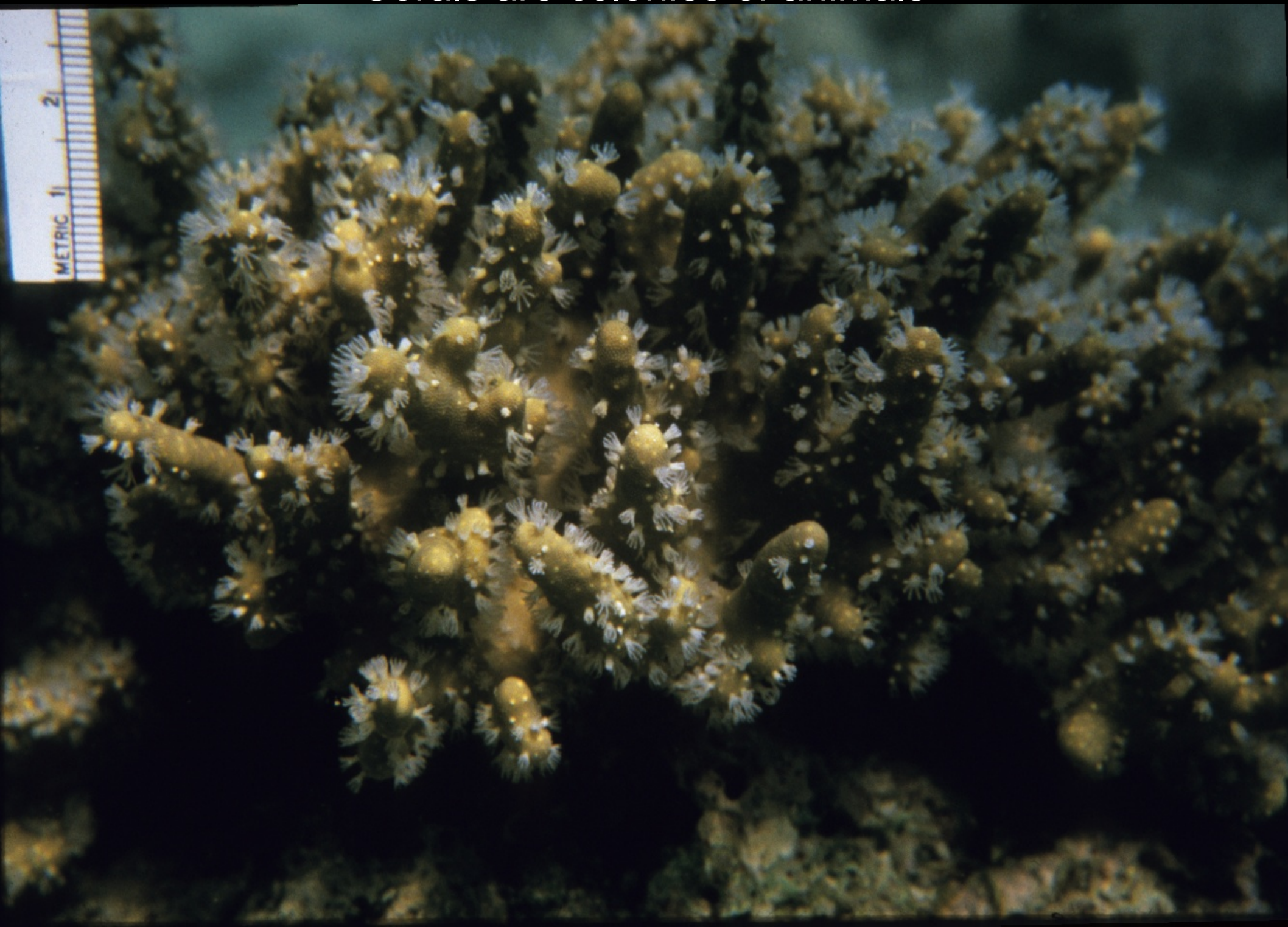
Coral reef ecosystem is more than figures



What is a coral reef?

- Ancient highly-evolved ecosystem over 20 million years old
- Rich in its diversity
- Highly productive
- In a resource-poor environment
- Dynamic, changing but resilient within limits

Corals are colonies of animals



Coral reefs line many tropical coasts

- The world's largest structures built by biological activity
- Visible from space
- Thickness: + 1 km of biological skeletons
- 500 million people live within 100 km of reefs

Grow in shallow tropical waters to access light

Fringing Reef

Barrier
Reef

Atoll

Atoll: Rose Atoll, American Samoa

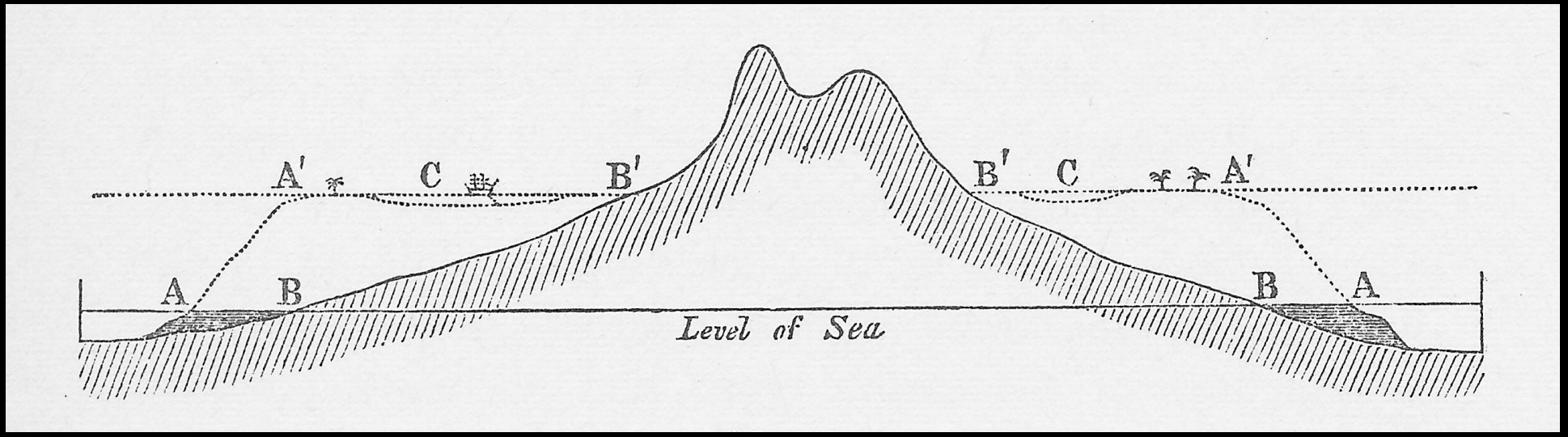
Kayangel Atoll, Palau

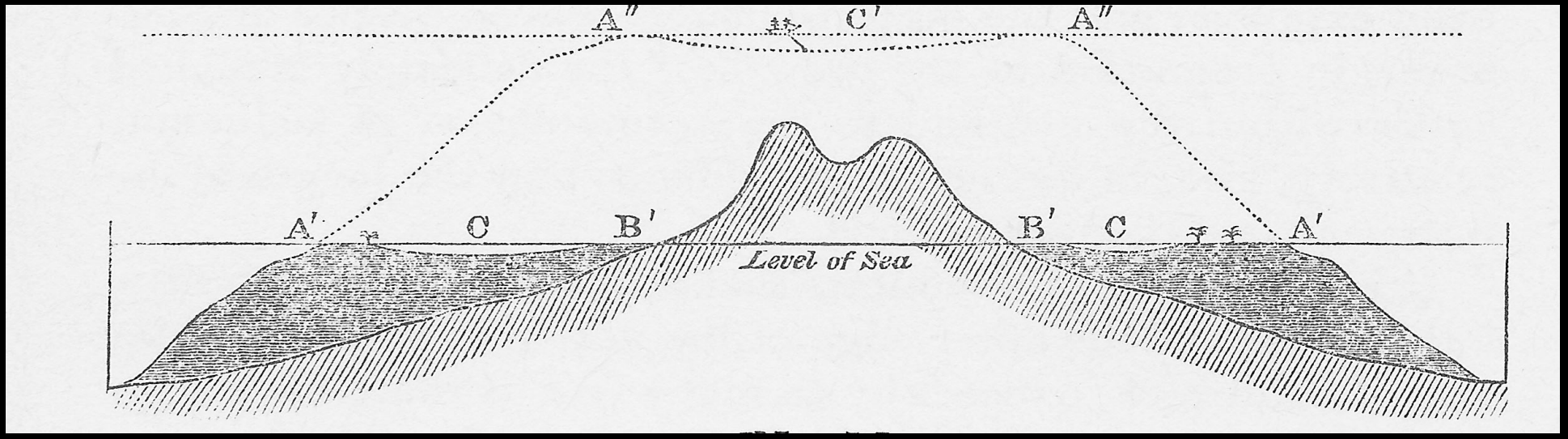
Atoll: Butaritari, Kiribati

Raised reef : Nauru

Dynamics of islands

Volcano to atoll





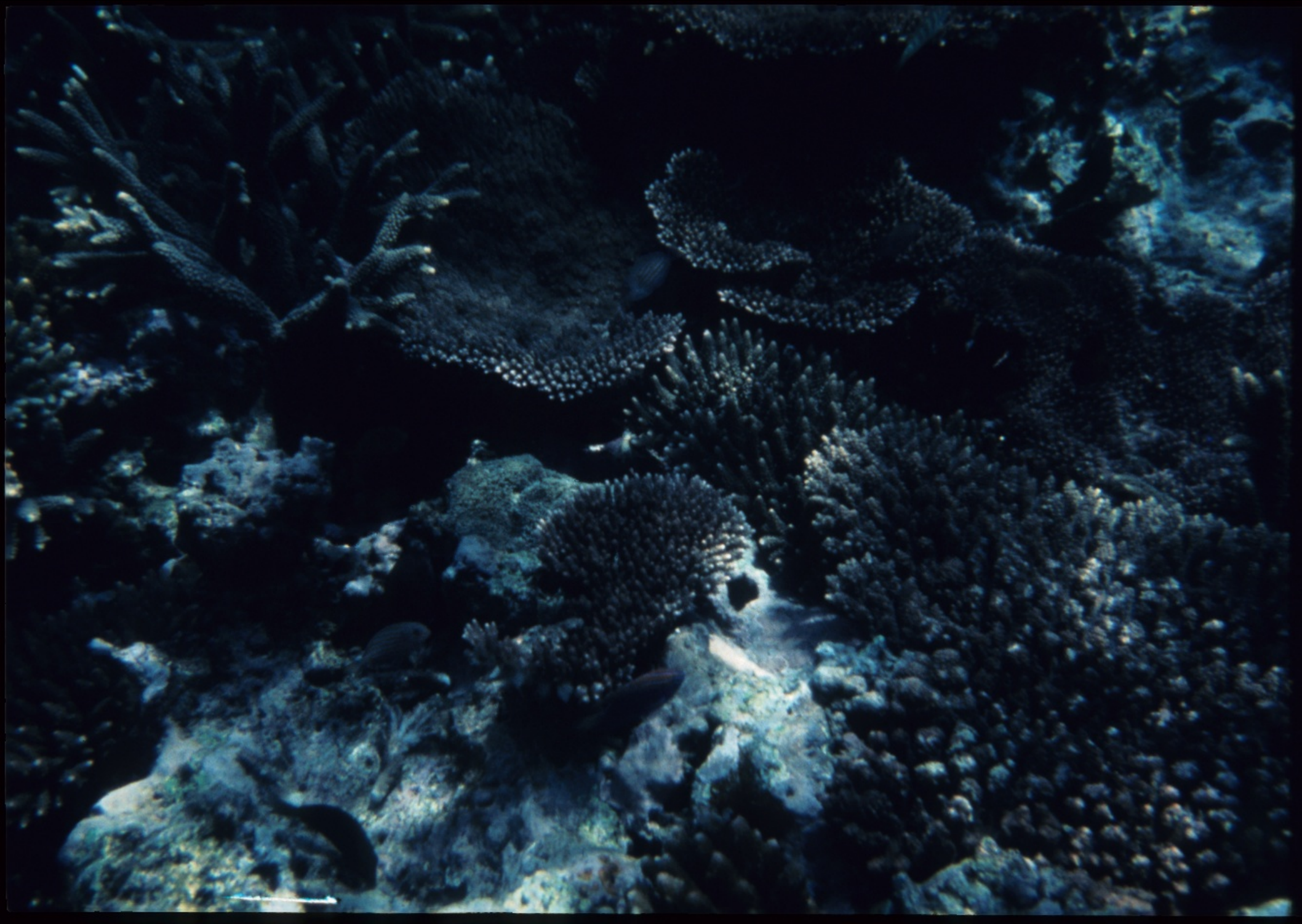
Charles Darwin. 1842. *The Structure and Distribution of Coral Reefs*

Bahá'í perspective on ecology

...the greatest relationship that bindeth the world of being together lieth in the range of created things themselves,
and... co-operation, mutual aid and reciprocity are essential characteristics in the unified body of the world of being, inasmuch as all created things are closely related together and each is influenced by the other or deriveth benefit therefrom, either directly or indirectly.

('Abdu'l-Bahá, in Compilation on Social and Economic Development, p. 12)

Builds its own environment

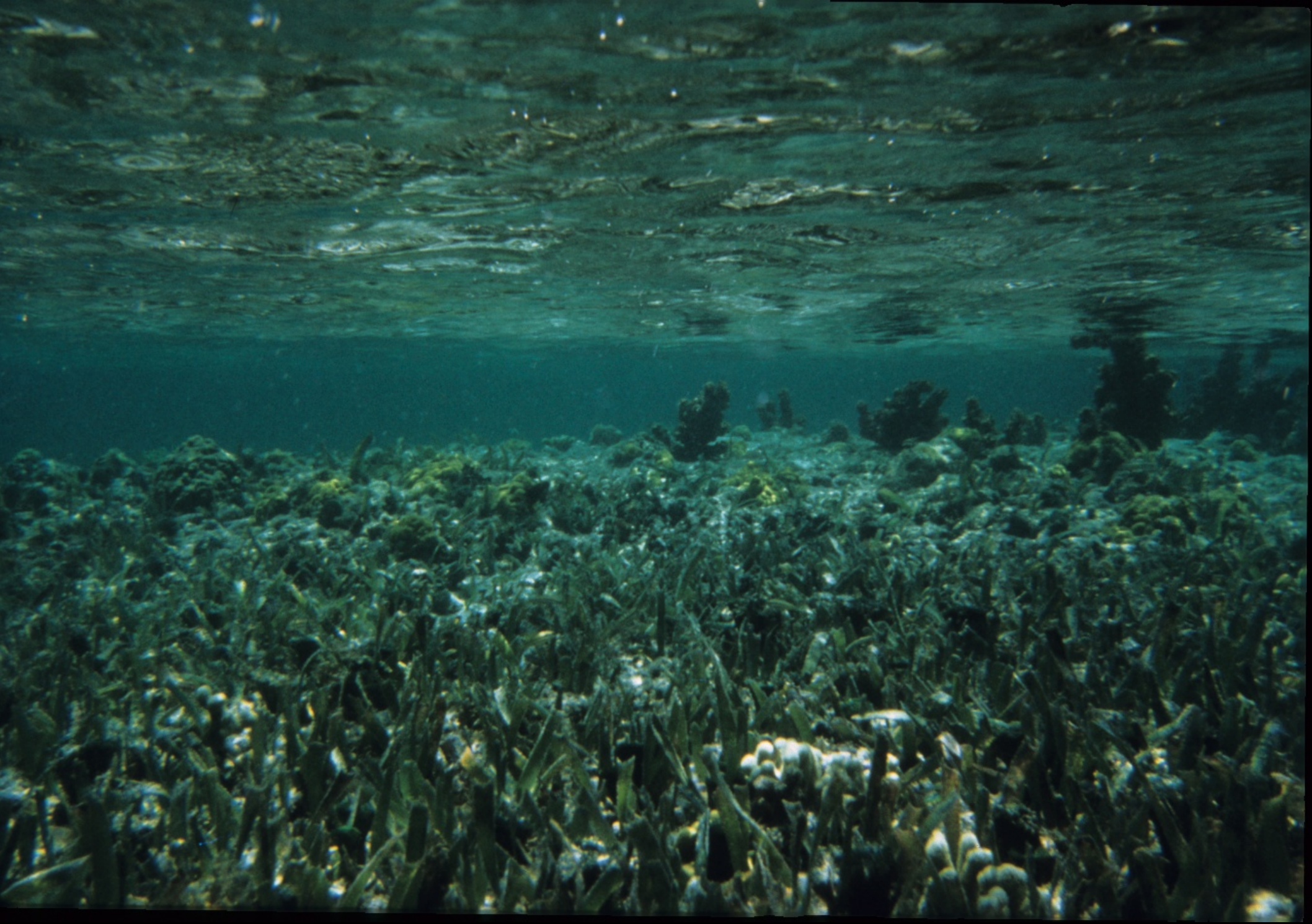


Deep reef as far as light penetrates

Reef slope, dense fast growth

Reef crest algal ridge (Pacific)

Reef crest (Caribbean)



Seagrass behind reef

Builds a whole community

Stable and dynamic
(Old coral 4-5 m diameter)

Nested systems within systems

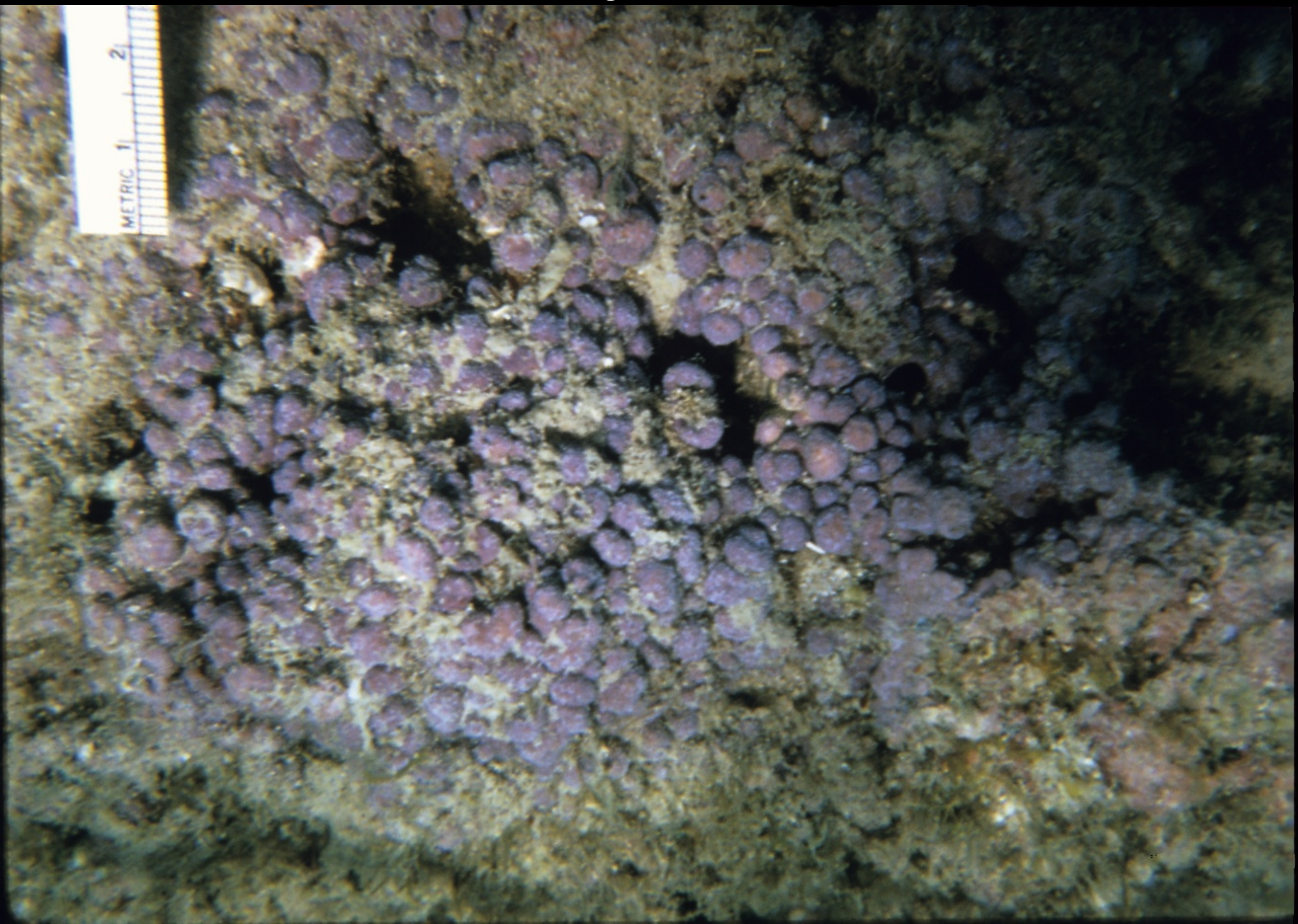
Bahá’í perspectives

Know that the order and perfection of the universe require that existence should appear in countless forms.... There must be differences of degrees and stations, of kinds and species, for existence to shine forth with the utmost perfection.

('Abdu'l-Bahá, Some Answered Questions, Chapter 32)

Each organism has its form and function: corals

Coralline algae cement reefs



Halimeda algae generate sand

How can the coral reef provide a model for our society?

Carrie Bow Cay, Belize, Research Station of the Smithsonian Institution

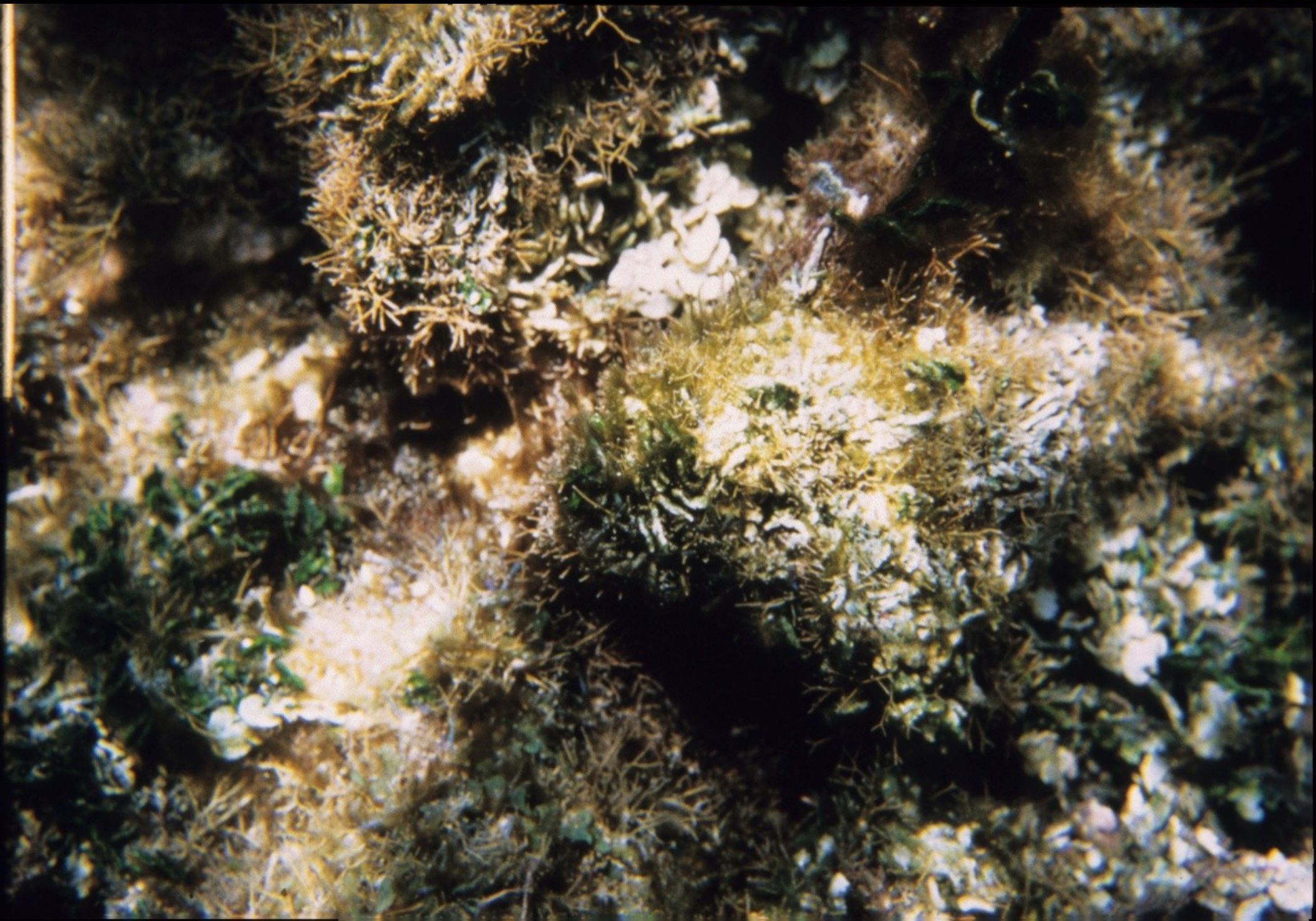
Energy efficiency

- Effective capture of maximum solar energy
- Total productivity, not highest productivity
- Rapid energy transfer
- Efficient energy use
- Little waste

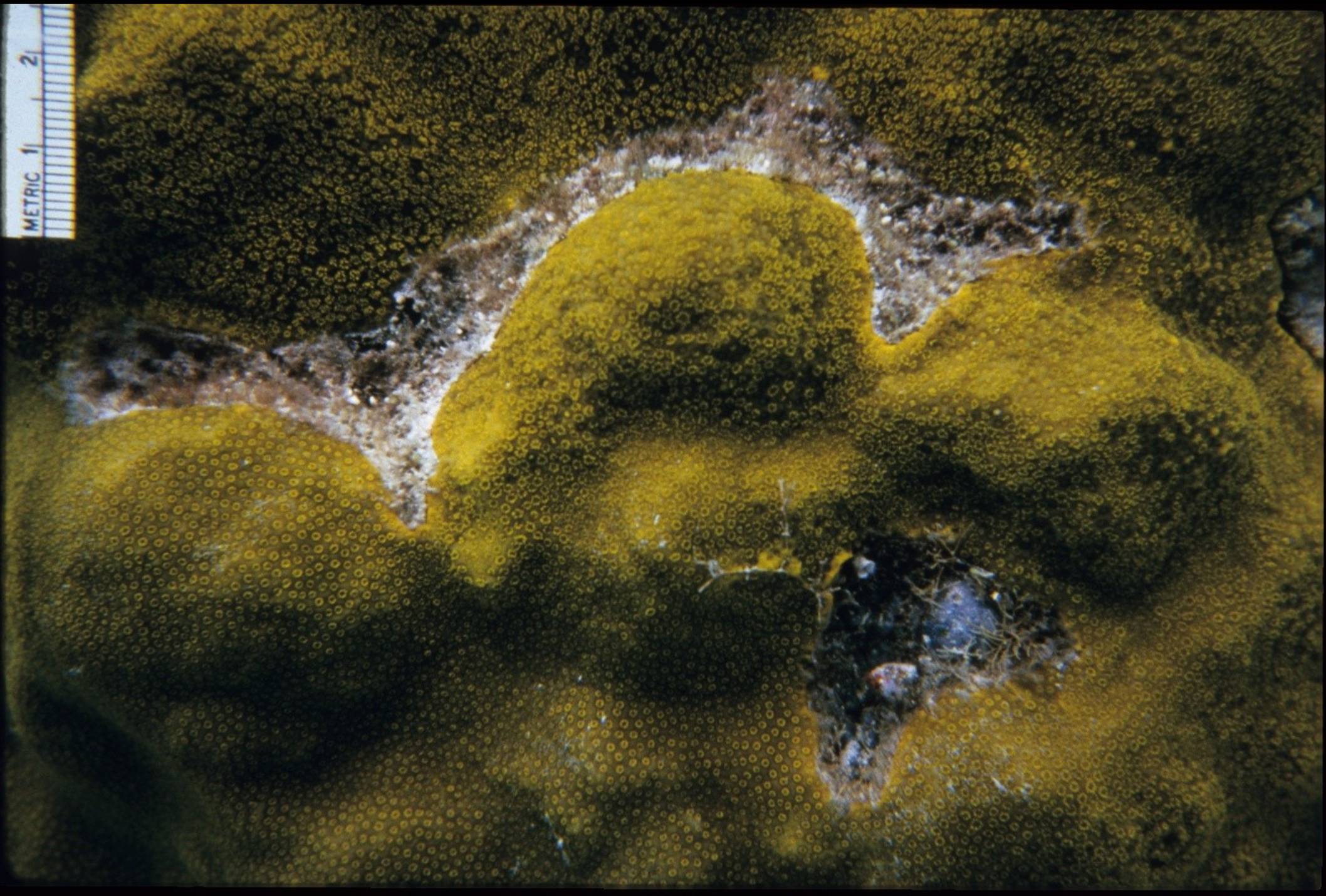
Generates large surface to absorb light

Light is required for coral growth

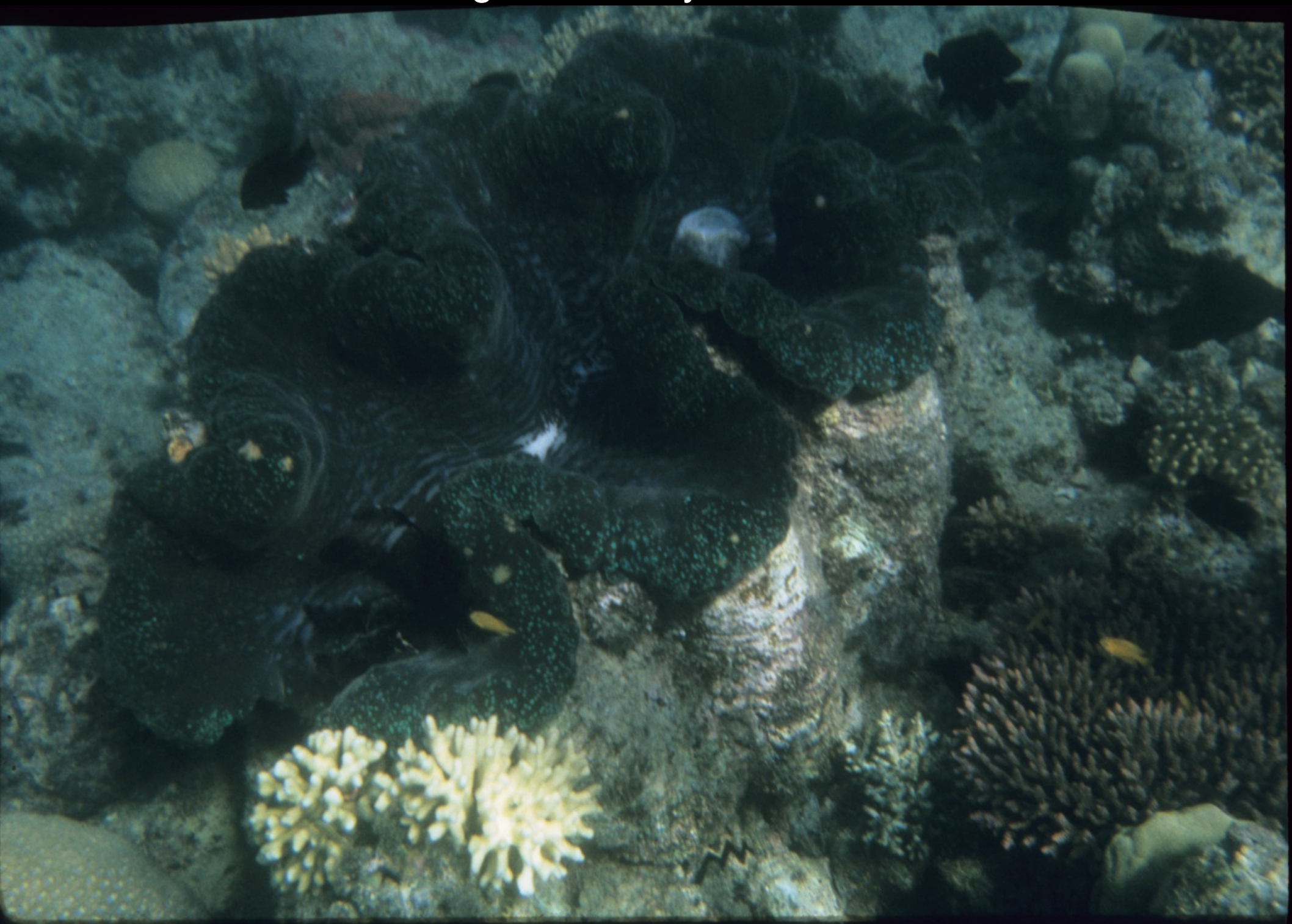
Algal turf is highly productive



Symbiosis coral/algae



Algal-animal symbioses



Population balance

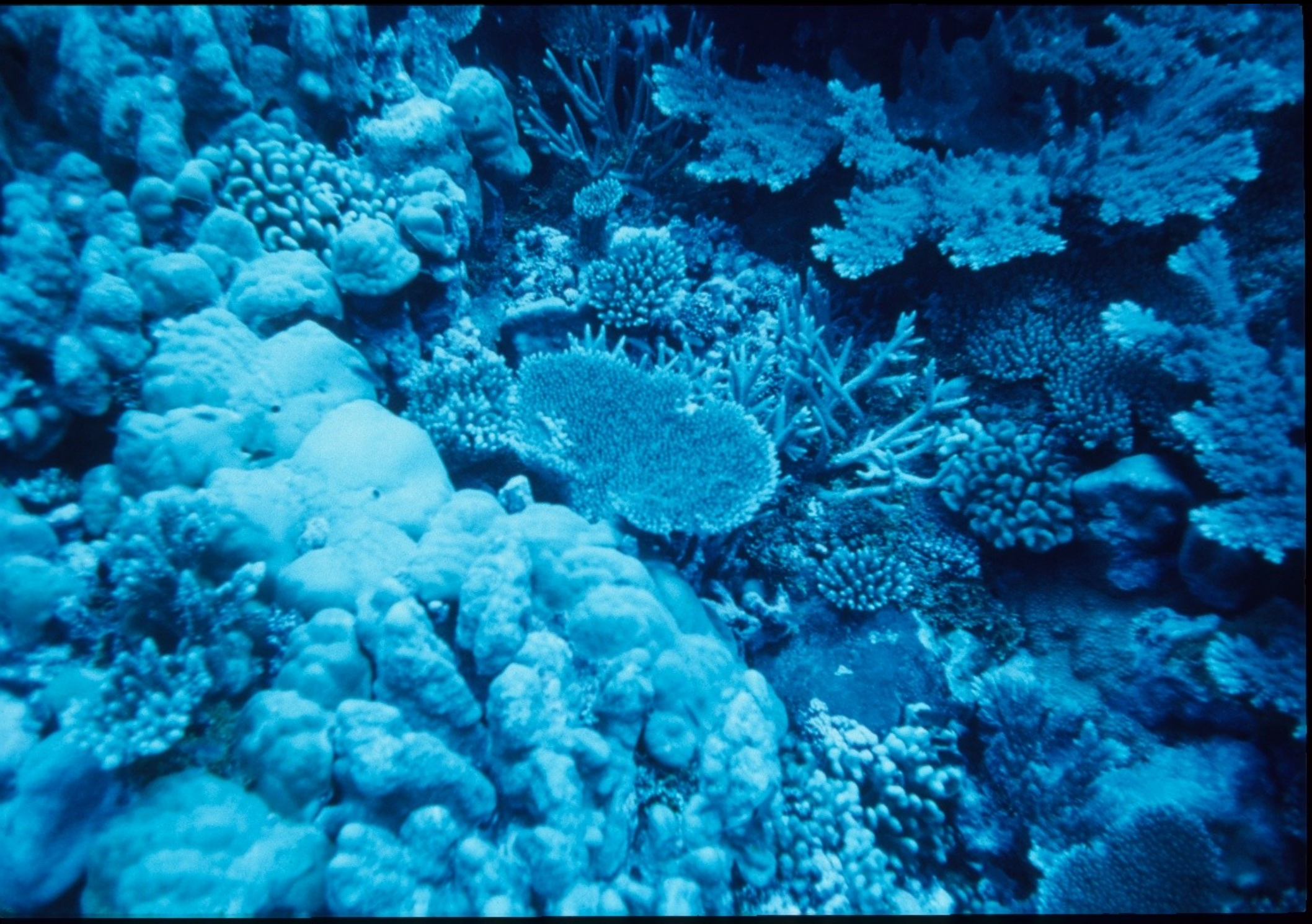
- Multiple levels of control, balance, dynamic change
- High efficiency in energy capture allows high density
- System creates additional space for population increase
- Diversity of forms and niches allows higher overall density

Bahá'í perspectives

Consider the world of created beings, how varied and diverse they are in species, yet with one sole origin. All the differences that appear are those of outward form and colour. This diversity of type is apparent throughout the whole of nature.

('Abdu'l-Bahá, Paris Talks, p. 51-53)

High density and diversity



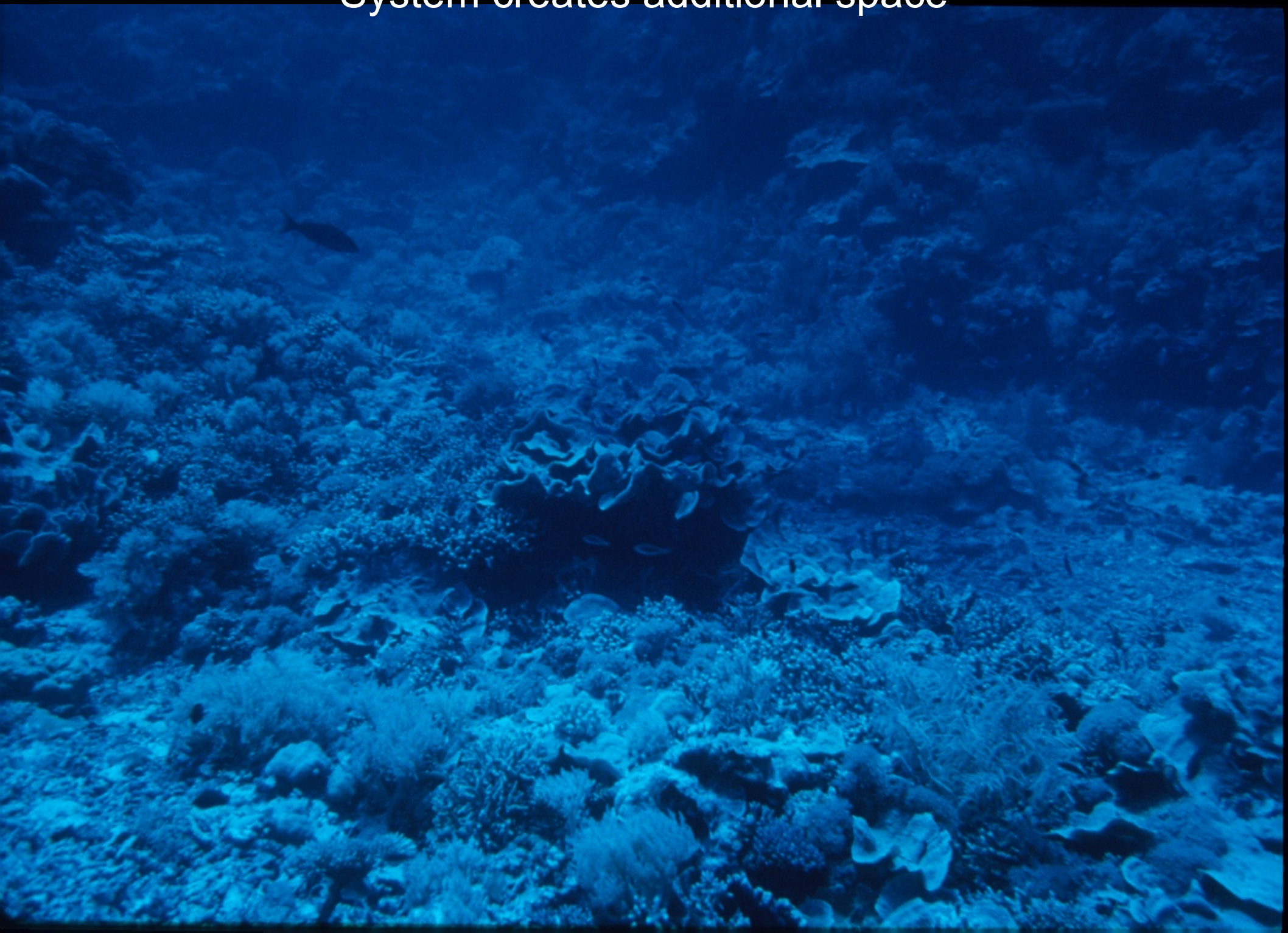
High reef biodiversity

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

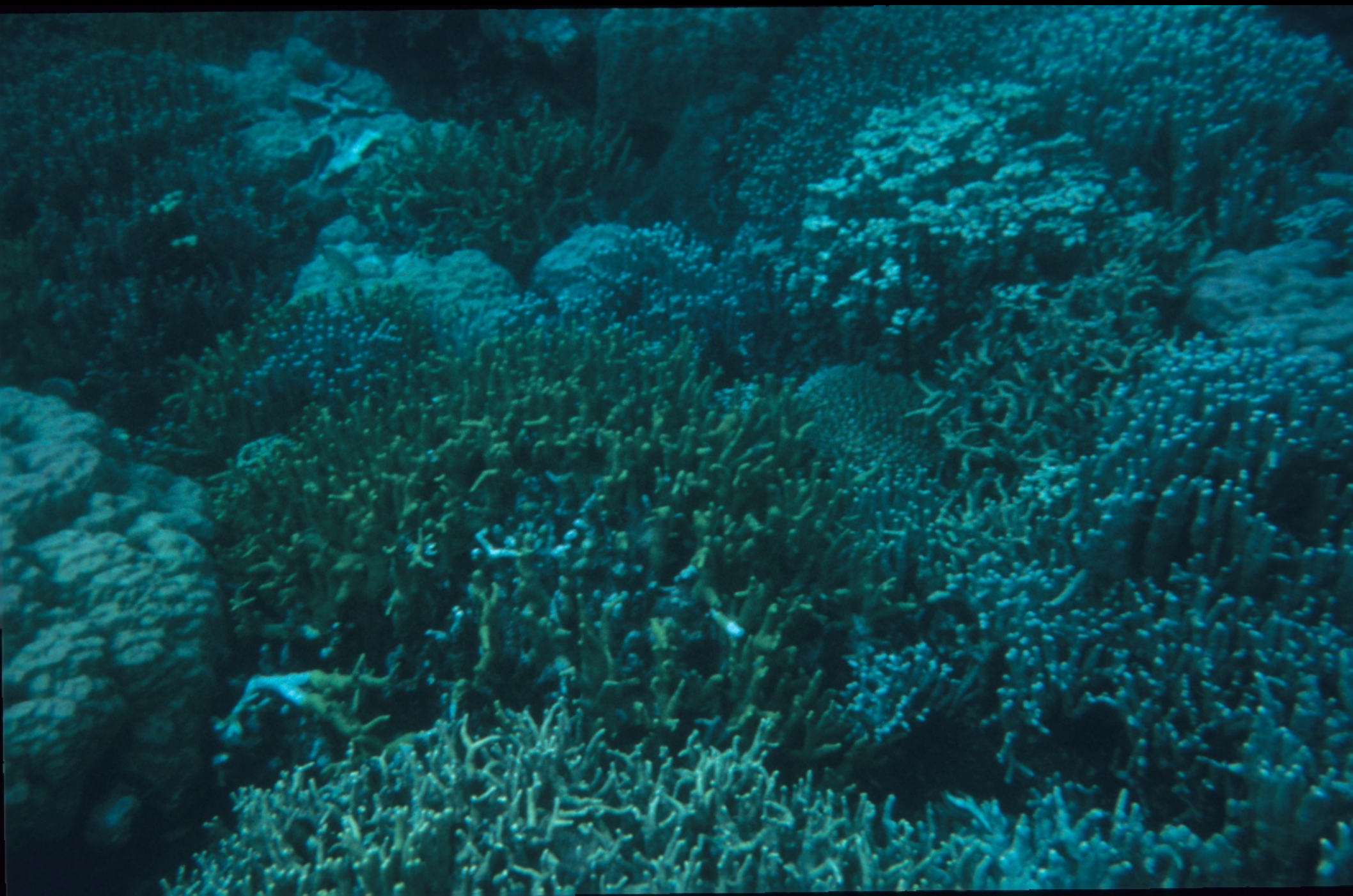
Complex spatial organization like a city

City like a coral reef

System creates additional space



Generates large functional surface



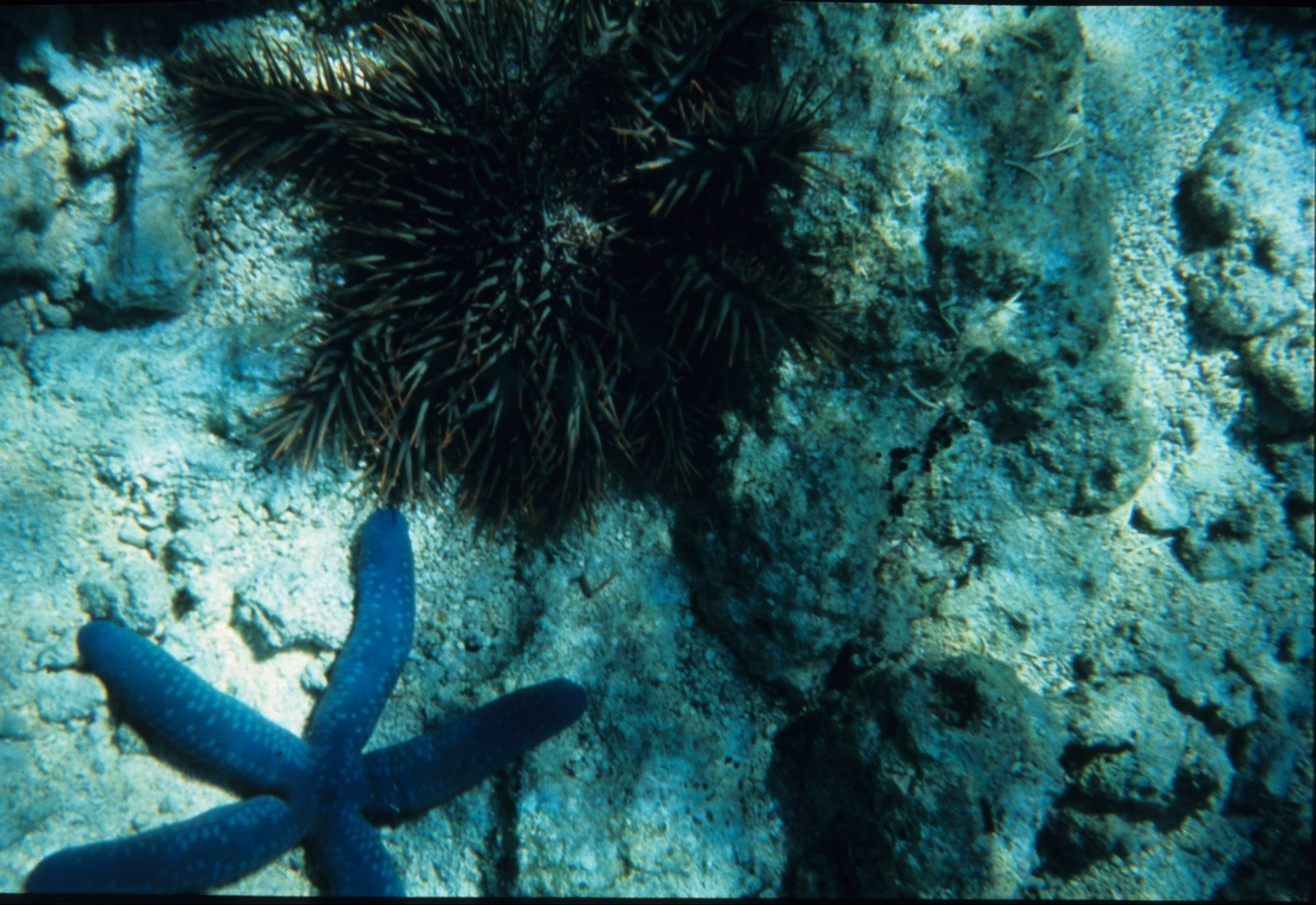
Like an apartment building

Apartment building like a coral

Bahá’í perspectives

...all beings are linked together like a chain; and mutual aid, assistance, and interaction are among their intrinsic properties and are the cause of their formation, development and growth.

('Abdu'l-Bahá, Some Answered Questions, Chpt. 46, p. 205)



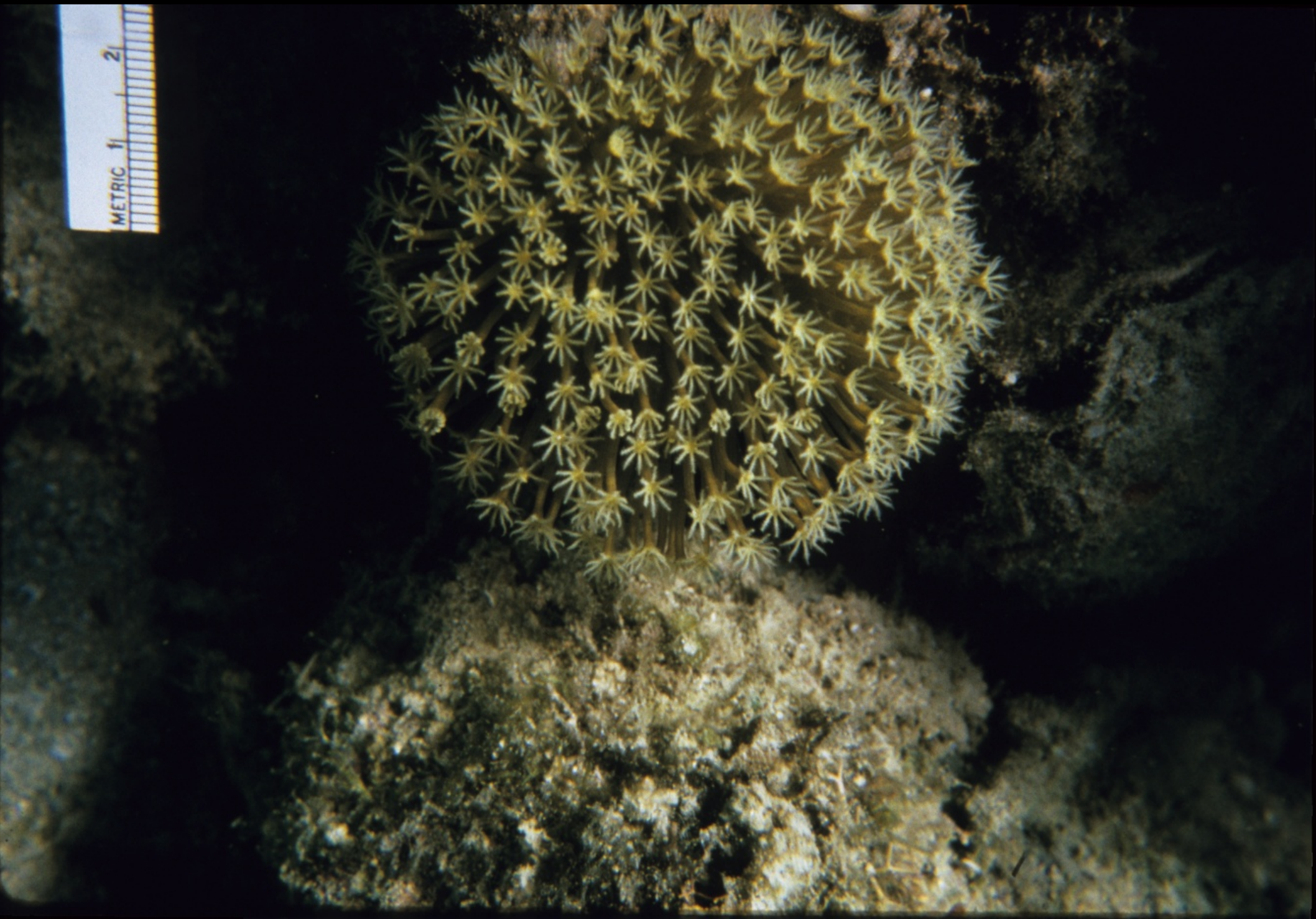
Multiple forms of population control - *Acanthaster*

Parrotfish creating space for coral regeneration

Resource management

- Highly evolved integrated system
- High standing stock at upper system levels (like human society)
- Effective capture and storage of scarce resources
- Efficient management of materials flows
- Like a circular economy

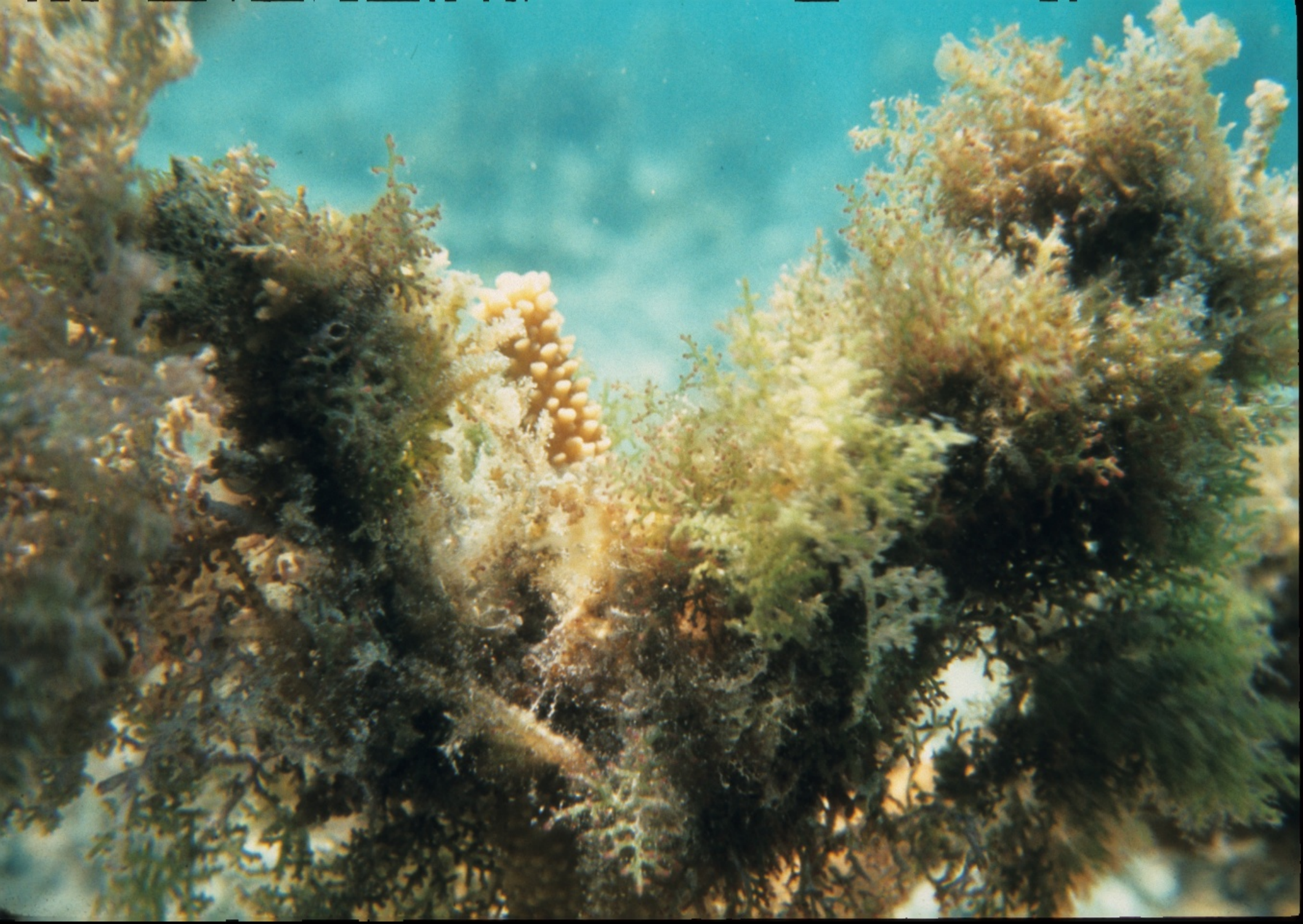
Capture of scarce resources



Alternative replacement systems

Avoiding excessive consumption

- High productivity
- Energy efficiency
- Efficient transfers in the system
- Recycling
- Wealth created and maintained within the system



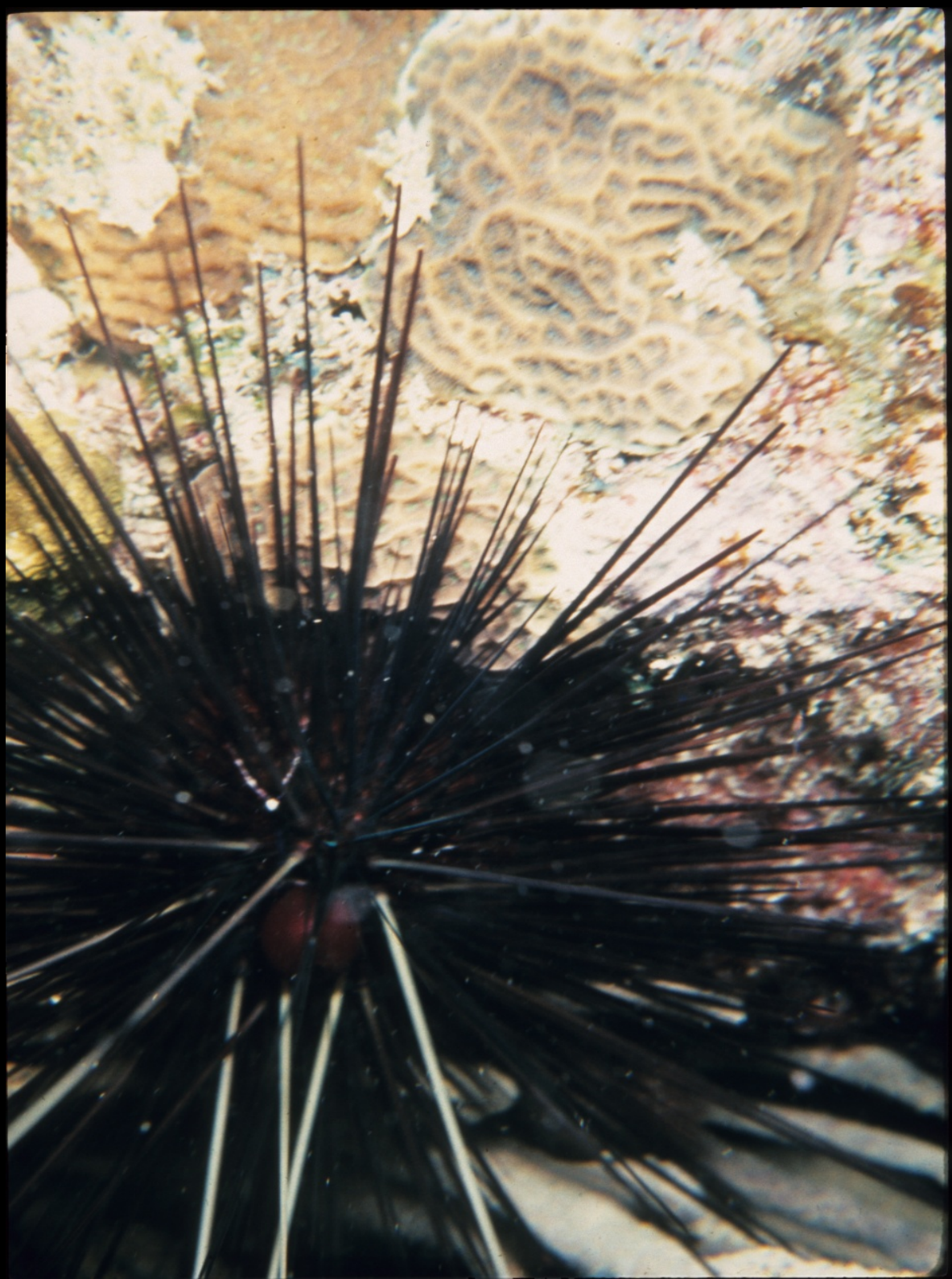
High algal productivity

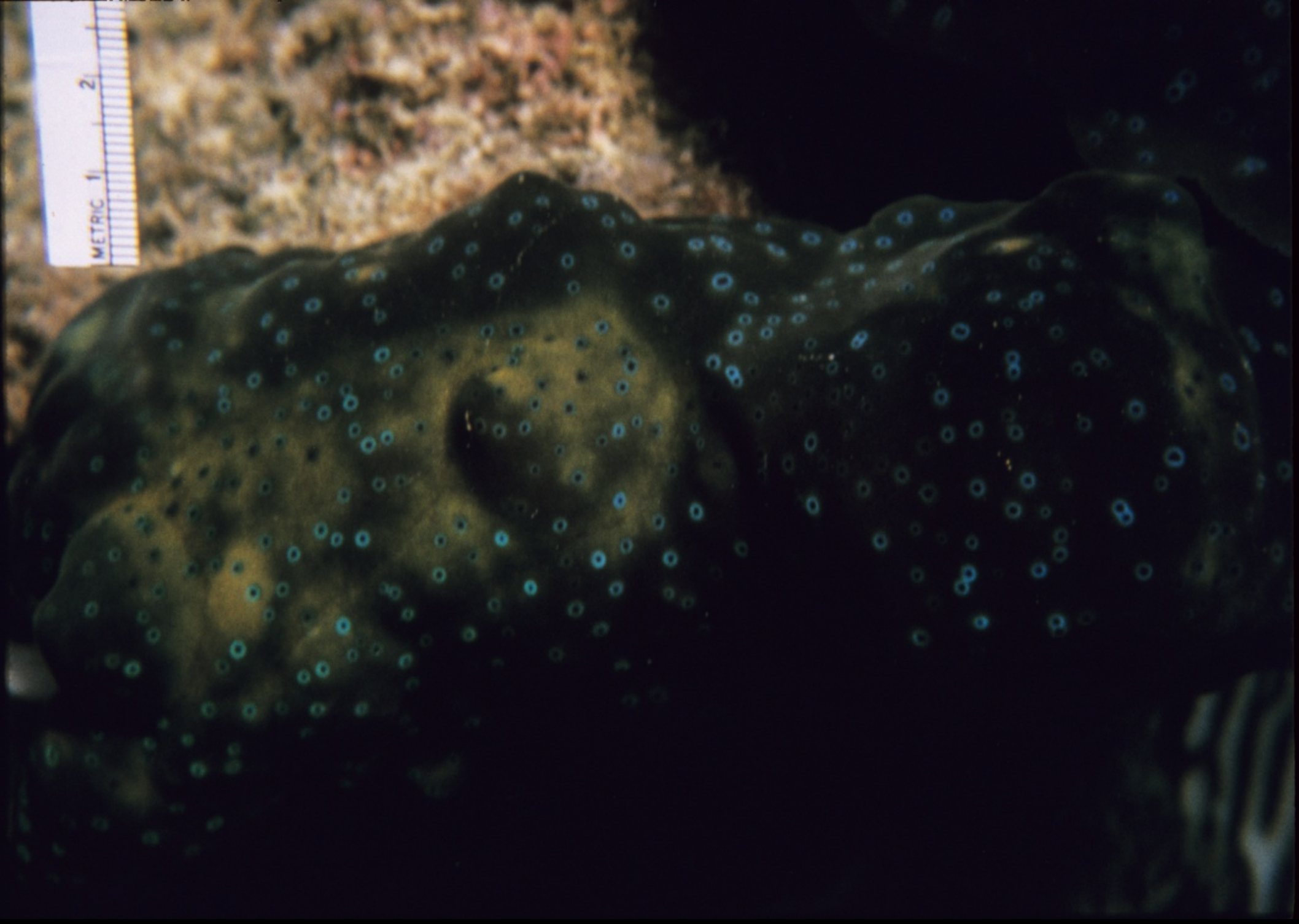
High stock of fish

Waste, pollution management

- High recycling rate
- Little loss from the system
- Diversity in the system, many different feeding strategies
- Multiple control mechanisms, pathways

Efficient waste collection and recycling





Sponges filter water

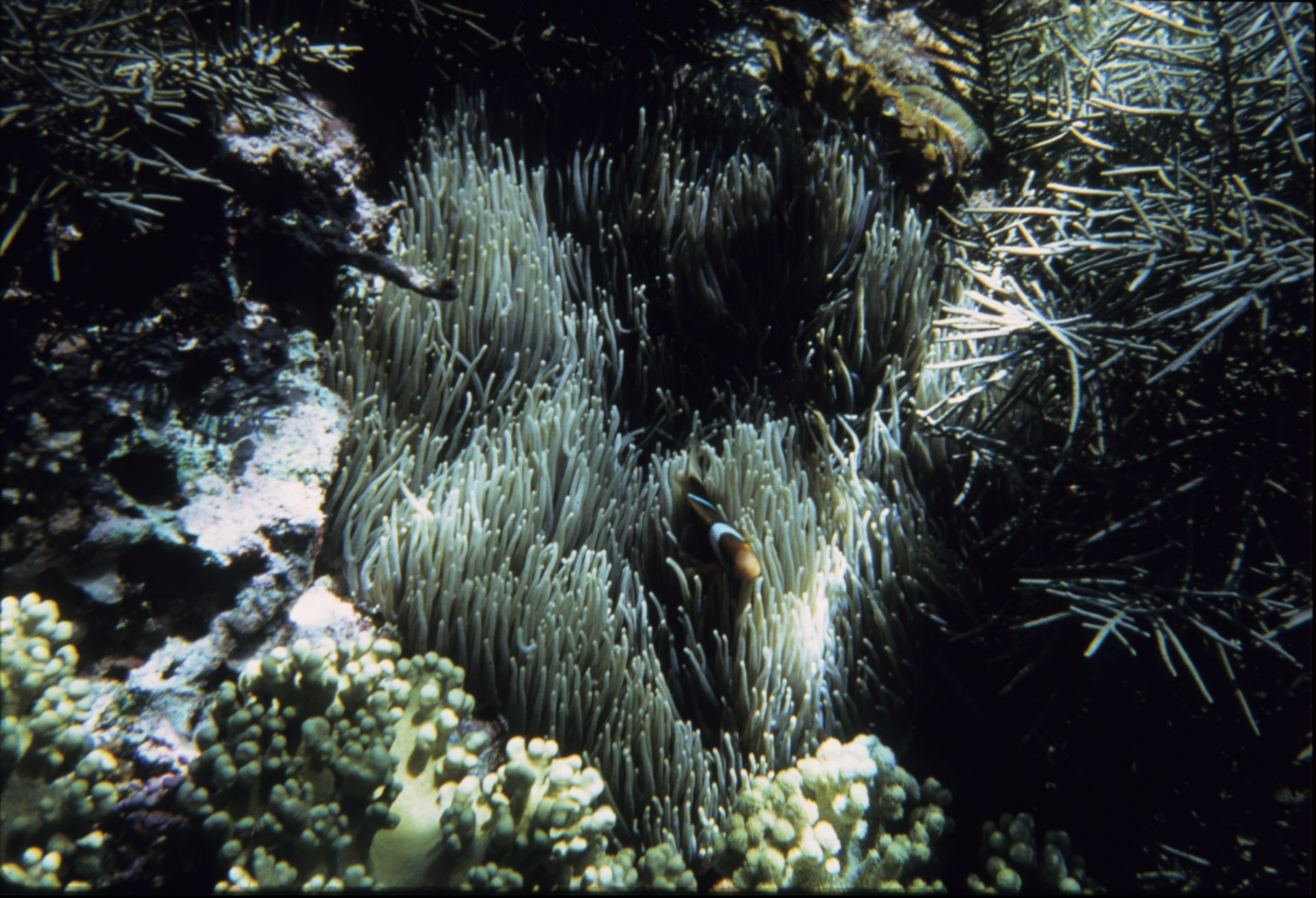
Cooperation, Integration

- Many symbioses
- Inter-specific collaboration, mutual assistance
- Every organism contributes something to the general well-being
- Balanced systems of control and regulation
- Complementarity in diversity

Shelter

Cultivation of resources

Cleaner fish (collaboration)



Clownfish and anemone (mutual assistance)

Equivalent human values

- Symbiosis = cooperation, respect, solidarity
- Balance = moderation
- Justice – a place for everyone
- Decentralization with coordination
- Unity in diversity

Bahá’í perspectives

Bahá'í Scriptures describe nature as a reflection of the sacred. ...in light of the interdependence of all parts of nature, and the importance of evolution and diversity "to the beauty, efficiency and perfection of the whole," every effort should be made to preserve as much as possible the earth's bio-diversity and natural order.

(Bahá'í International Community,
Valuing Spirituality in Development: Initial Considerations Regarding the Creation of Spiritually Based Indicators for Development.
A concept paper written for the World Faiths and Development Dialogue, Lambeth Palace, London, 18-19 February 1998)

Values in the coral reef ecosystem

Sustainable over many centuries

A dynamic, just and thriving natural order

Strongly altruistic and cooperative in nature

Providing meaningful roles for every organism

Creating great wealth in an environment of poverty

(adapted from Bahá'í International Community, *Valuing Spirituality in Development,* 1998)

Values for the economic system

Sustainability requires new values-based economic models

The aim should be a dynamic, just and thriving social order:

Strongly altruistic and cooperative in nature

Providing meaningful employment

Helping to eradicate poverty in the world.

(adapted from Bahá'í International Community, *Valuing Spirituality in Development,* 1998)

Bahá’í perspectives

The elements and lower organisms are synchronized in the great plan of life. Shall man, infinitely above them in degree, be antagonistic and a destroyer of that perfection?

('Abdu'l-Bahá, talk at Leland Stanford Junior University, Palo Alto, California, 8 October 1912. Promulgation of Universal Peace. Wilmette, Bahá'í Publishing Trust, 1982. p. 350)

Bahá’í perspectives

The civilization, so often vaunted by the learned exponents of arts and sciences, will, if allowed to overleap the bounds of moderation, bring great evil upon men.

(Bahá'u'lláh, Gleanings from the Writings of Bahá'u'lláh, CLXIV, p. 342-343, and Bahá'í World Faith, p. 138-139)

Our planet like a coral reef

- Highly dynamic and resilient within its limits
- Fragile and easily degraded when pushed beyond its natural limits
- Vulnerable to over-exploitation, pollution, climate change, biodiversity loss
- Now rapidly declining – like coral reefs
- This has been predicted since 1972

The Limits to Growth

1972

THE LIMITS TO growth

Donella H. Meadows
Dennis L. Meadows
Jørgen Randers
William W. Behrens III

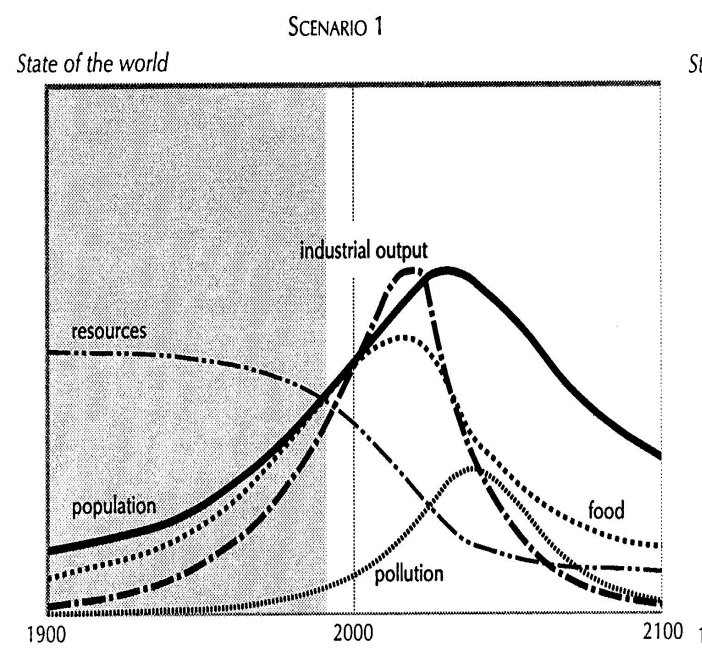
A Report for THE CLUB OF ROME'S Project on the Predicament of Mankind

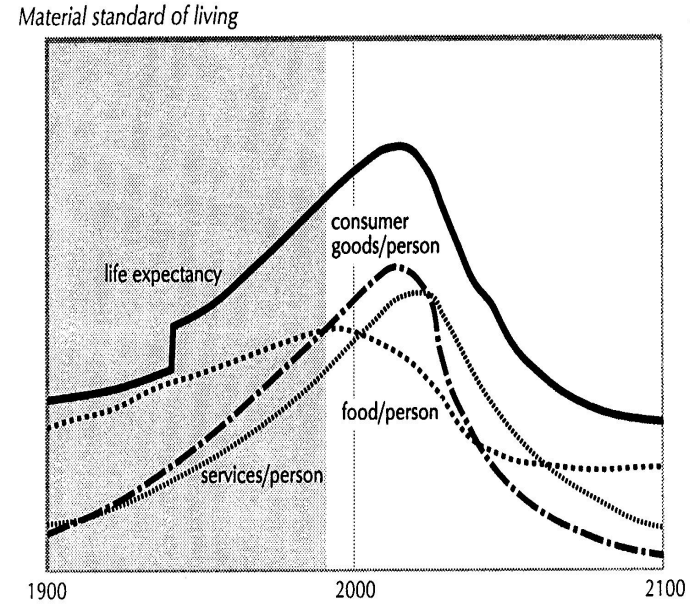
A POTOMAC ASSOCIATES BOOK $2.75

Donella Meadows and team of *Limits to Growth* 1972

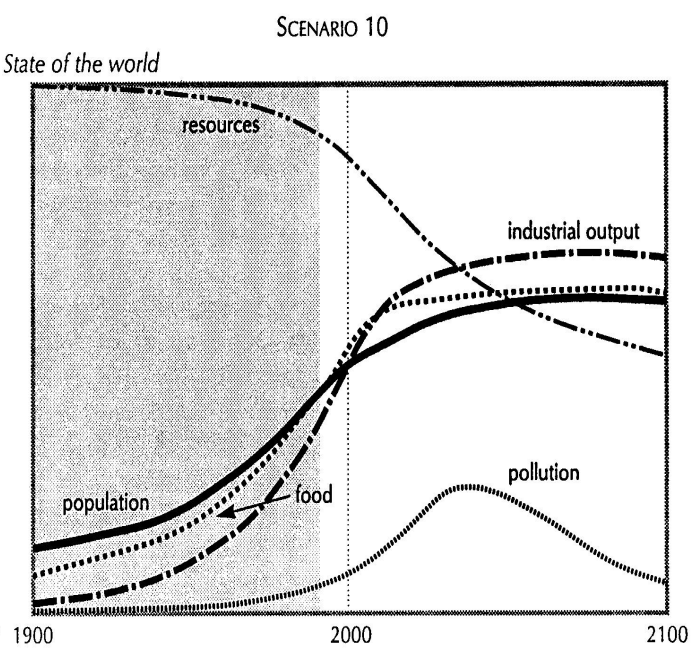
Scenarios from World 3

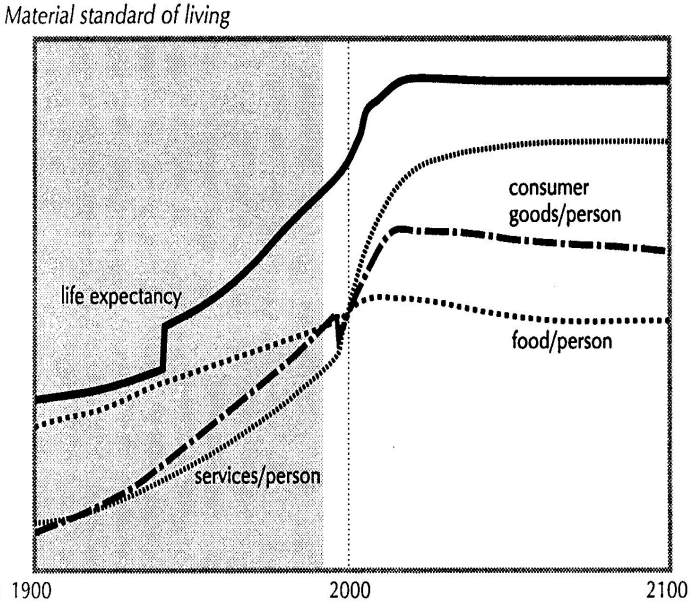
(Meadows et al. (1992) *Beyond the Limits*)



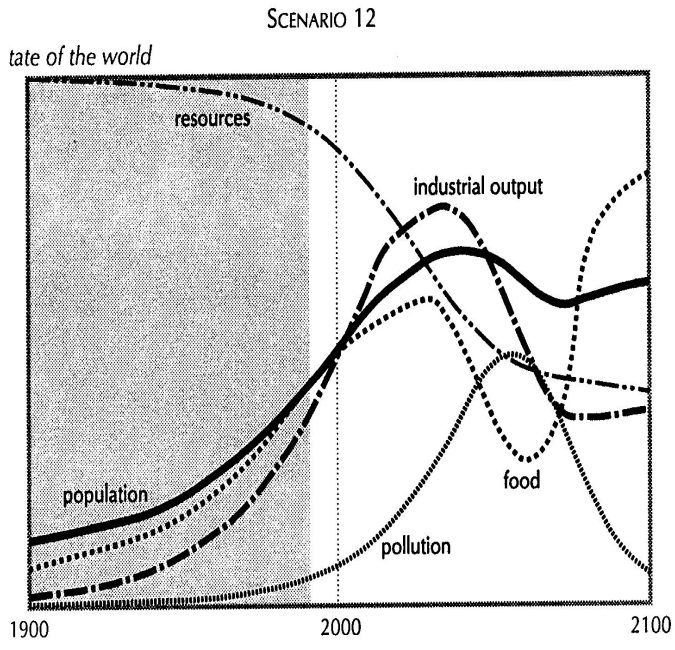


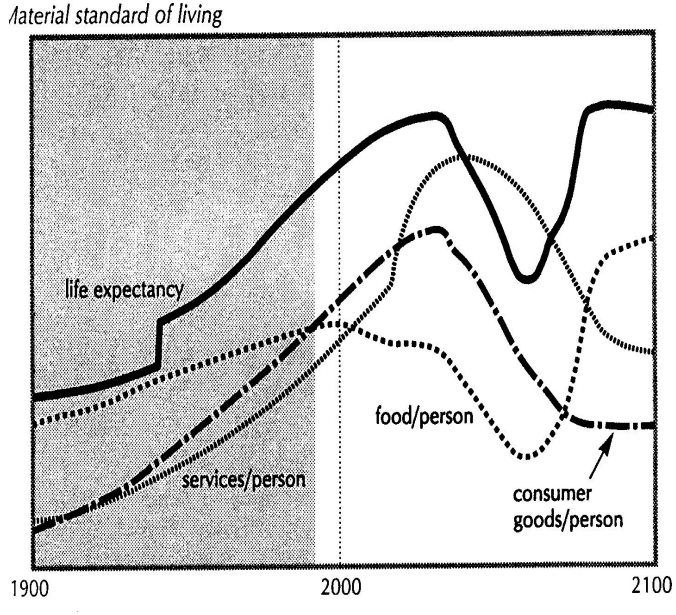
Business as usual





Transition 1995

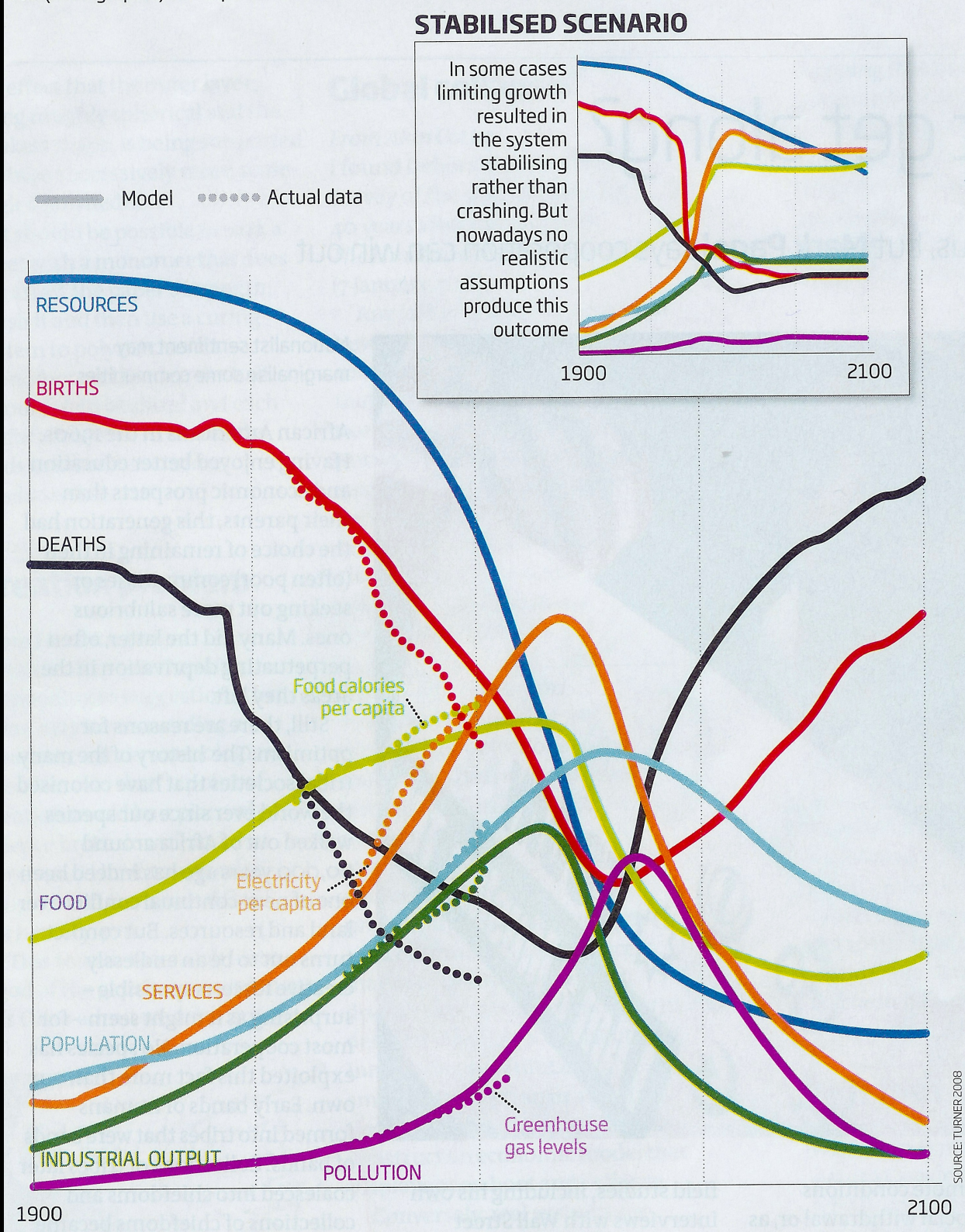




Transition 2015

Where are we now?

MacKenzie, Debora. 2012 Doomsday Book. *New Scientist*, 7 January 2012, pp. 38-41.



Bahá'í perspectives

...sustainable environmental management must come to be seen... as a fundamental responsibility that must be shouldered - a pre-requisite for spiritual development as well as the individual's physical survival.

(Bahá'í International Community, Valuing Spirituality in Development: Initial Considerations Regarding the Creation of Spiritually Based Indicators for Development. A concept paper written for the World Faiths and Development Dialogue, Lambeth Palace, London, 18-19 February 1998))

Dynamite fishing

Pollution

Coral bleaching - El Niño of 2015 - American Samoa (Catlin photo)


Are we destroying the best model
for our own future?

Opening our hearts to the world

We need compassion for both humanity and nature if we are to save the world for future generations. Seeing our spiritual values reflected in nature can inspire us both to save coral reefs from destruction by climate change, and to work for unity in diversity across our faith traditions, cultures and peoples.

Bahá'í perspectives

Cooperation is the principle that governs the functioning of [society].
...civilization [can] be seen as the outcome of a set of interactions among closely integrated, diverse components which have transcended the narrow purpose of tending to their own existence.
...so should the prosperity of every individual, every family, every people be sought in the well-being of the entire human race.

(Universal House of Justice, To the Baha'is of Iran, 2 March 2013, para. 12)

Bahá’í perspectives

Only a breakthrough in understanding that is scientific and spiritual in the fullest sense of the terms will empower the human race to assume the trusteeship toward which history impels it.

(Bahá'í International Community, The Prosperity of Humankind, Office of Public Information, Haifa, 1995)

Bahá'í perspectives

The principle of the oneness of humankind... seeks to move beyond utilitarian notions of cooperation to anchor the aspirations of individuals, communities and nations to those of the progress of humanity.

(Bahá'í International Community, Seizing the Opportunity: Redefining the challenge of climate change, 2008)

Bahá'í perspectives

As children, women, men, religious and scientific communities as well as governments and international institutions converge on this reality, we... will usher in a new paradigm by means of which we can understand our purpose and responsibilities in an interconnected world; a new standard by which to evaluate human progress; and a mode of governance faithful to the ties that bind us as members of one human race.

(Bahá'í International Community, Seizing the Opportunity: Redefining the challenge of climate change, 2008)

Can nature inspire us to transform our world in time?

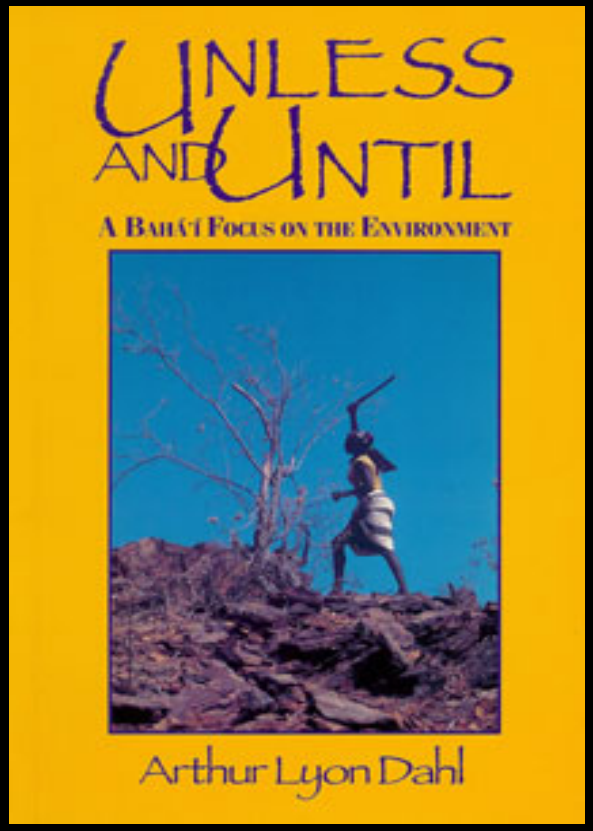
- Dawn of sustainability?

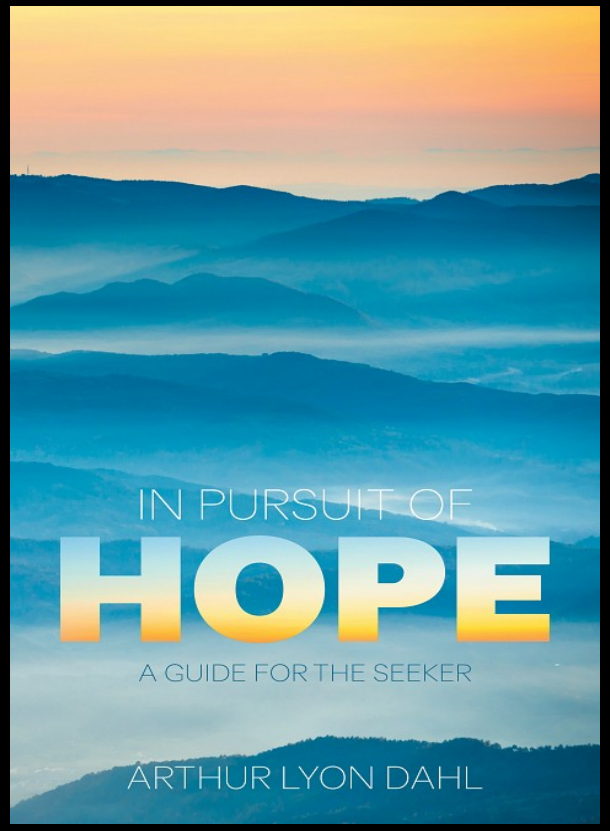
- Sunset on a devastated planet?

For further information

International Environment Forum

https://iefworld.org





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