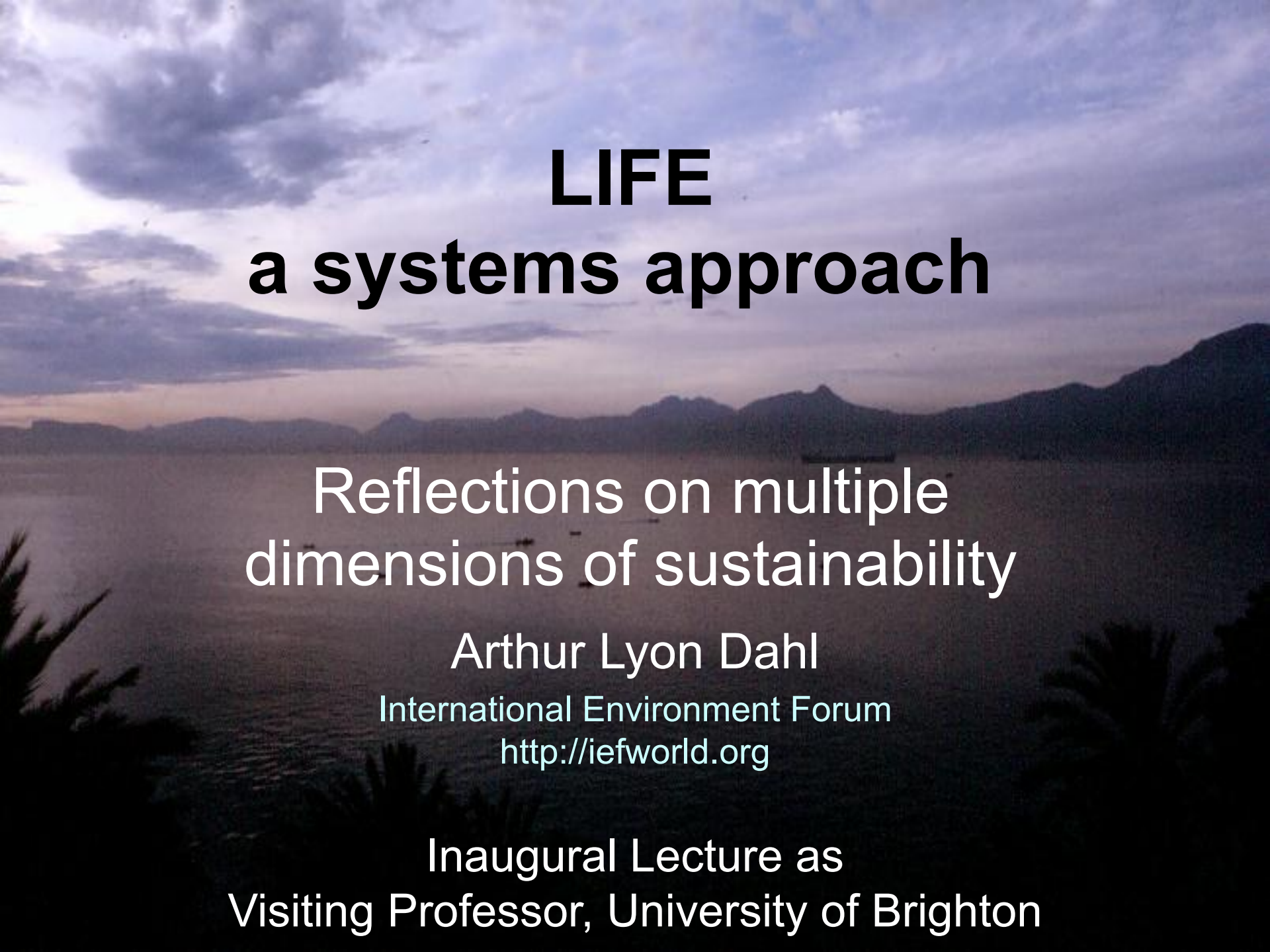


LIFE
a systems approach

Reflections on multiple dimensions of sustainability

Arthur Lyon Dahl
International Environment Forum
http://iefworld.org

Inaugural Lecture as
Visiting Professor, University of Brighton

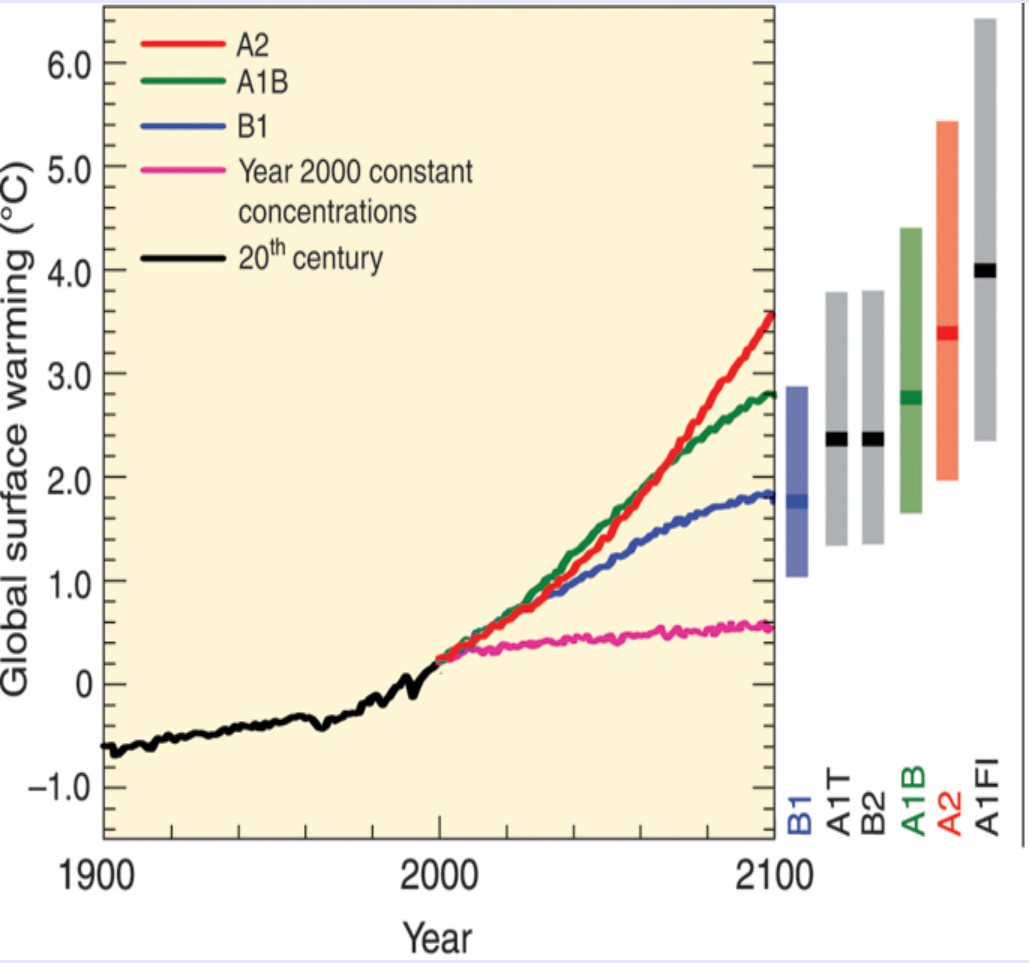
Science

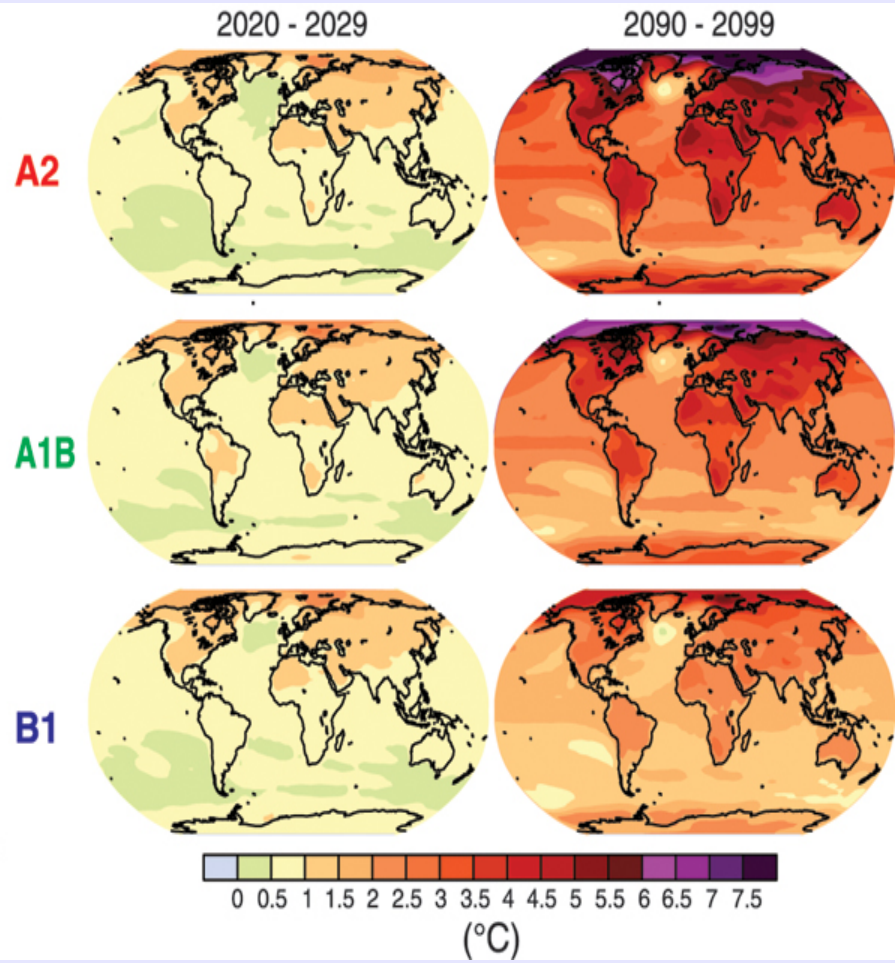
is the great knowledge system upon which modern civilization has been built

but something is missing

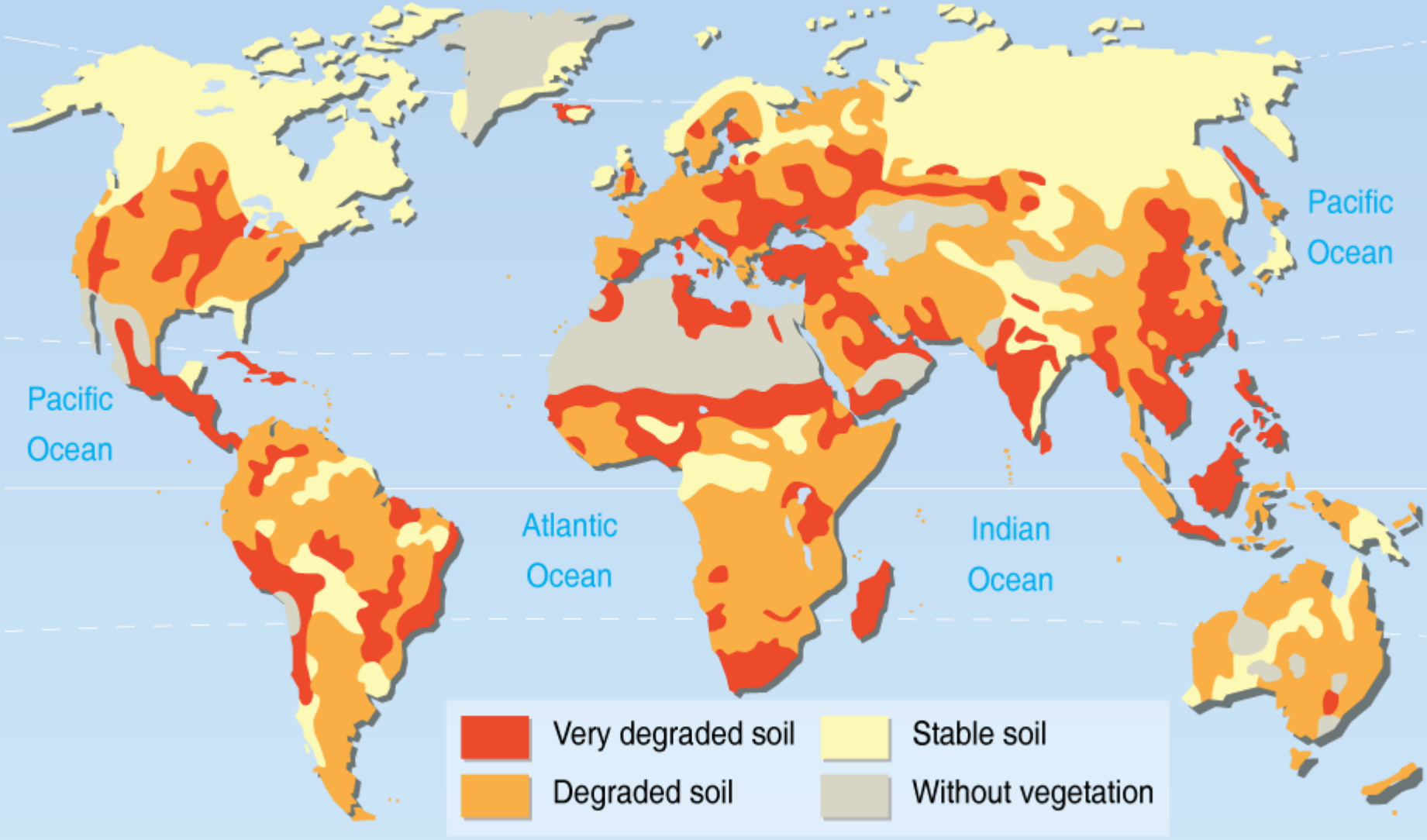
Climate Change projections

IPCC 2007





Soil degradation

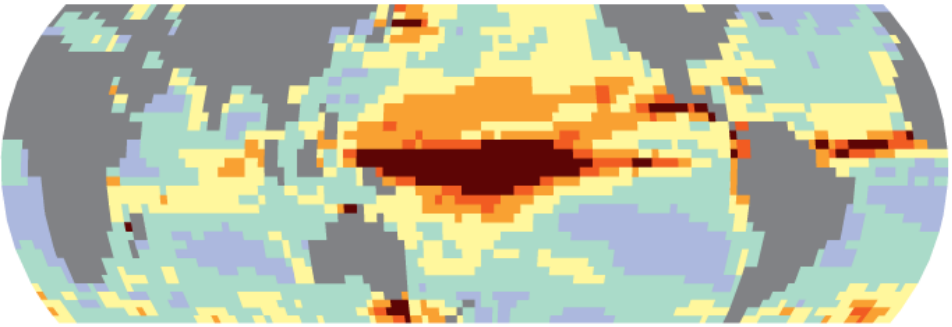


Source: UNEP, International Soil Reference and Information Centre (ISRIC), World Atlas of Desertification, 1997.

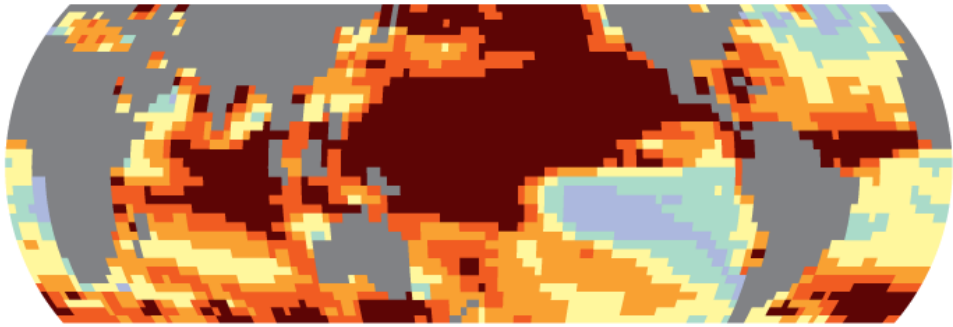
Philippe Rekacewicz, UNEP/GRID-Arendal

Climate change and coral reefs

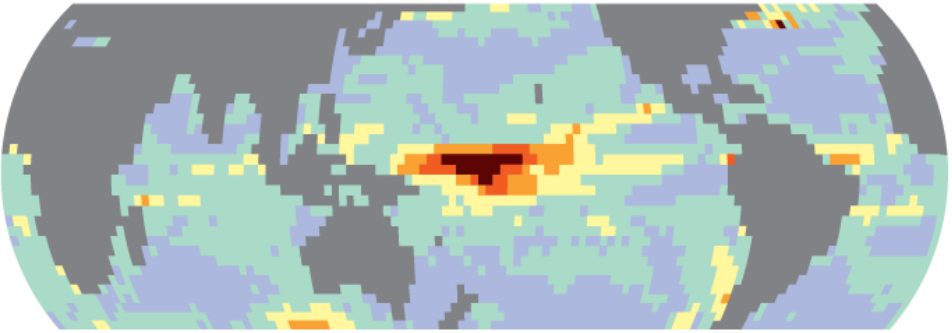
HadCM3 model, SRES A2a scenario
2030-2039



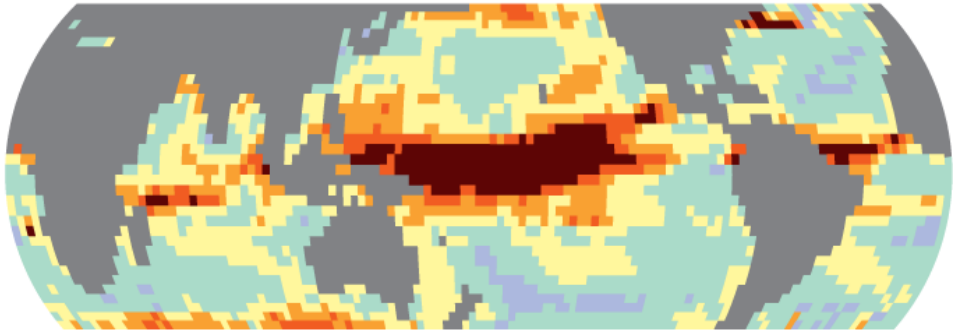
2050-2059



PCM-PCM model, SRES A2a scenario
2030-2039



2050-2059

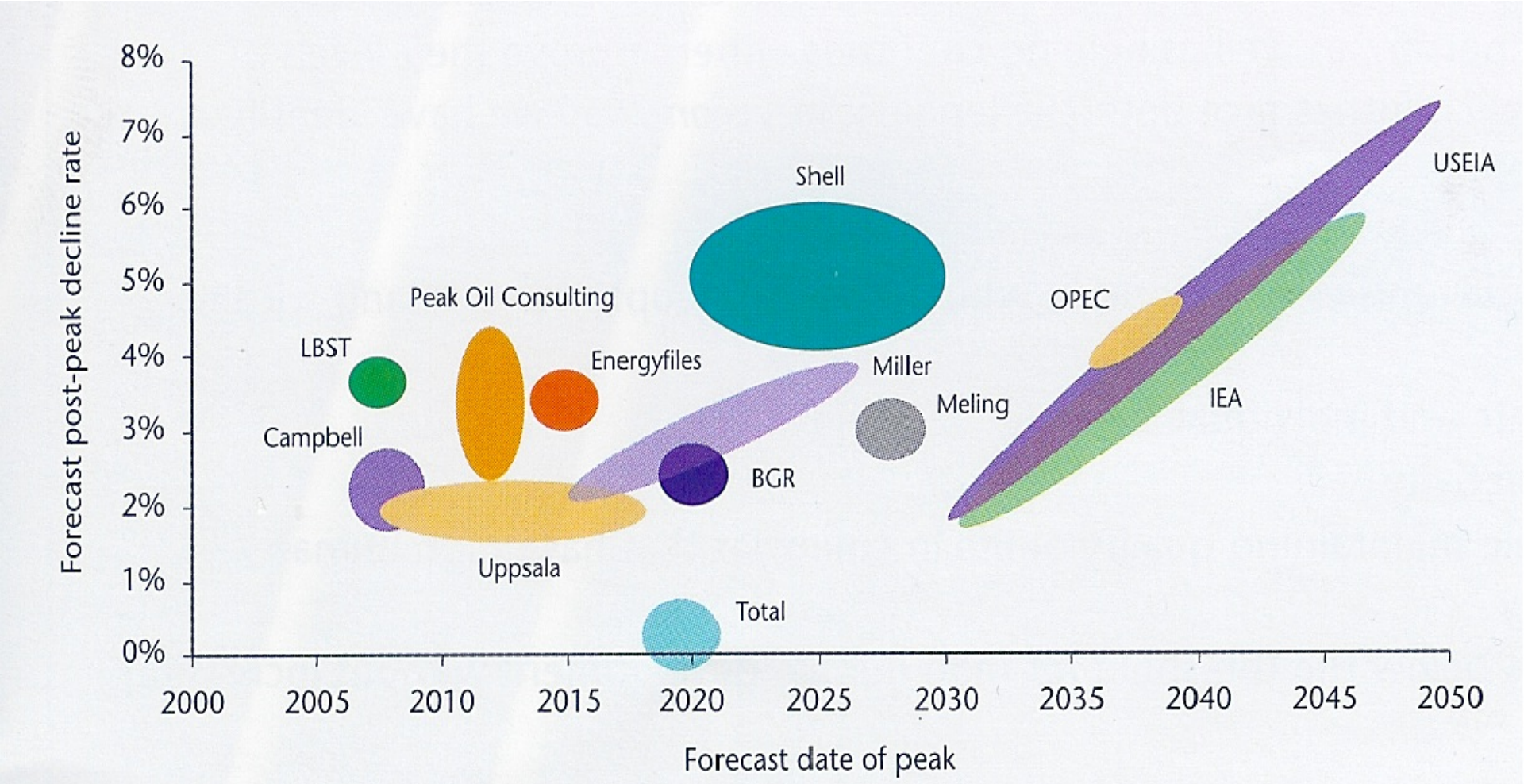


Climate scenarios

Annual degree heating months

Forecasts of Peak Oil

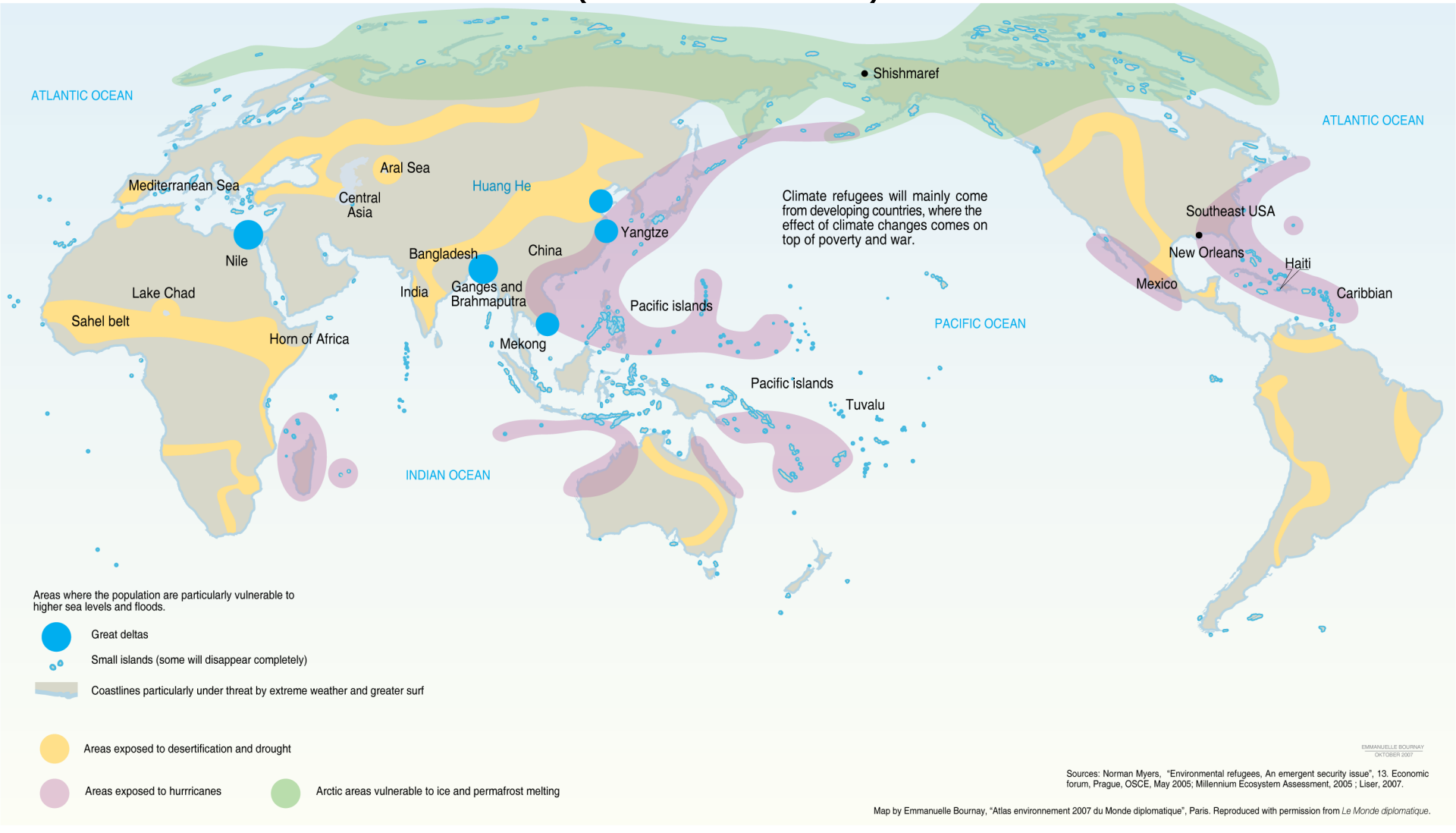
(WBCSD, *Vision 2050*, 2010)



e: UKERC, *The Global Oil Depletion Report*, 2009

Predicted Climate Refugees 2100

(IAASTD 2008)



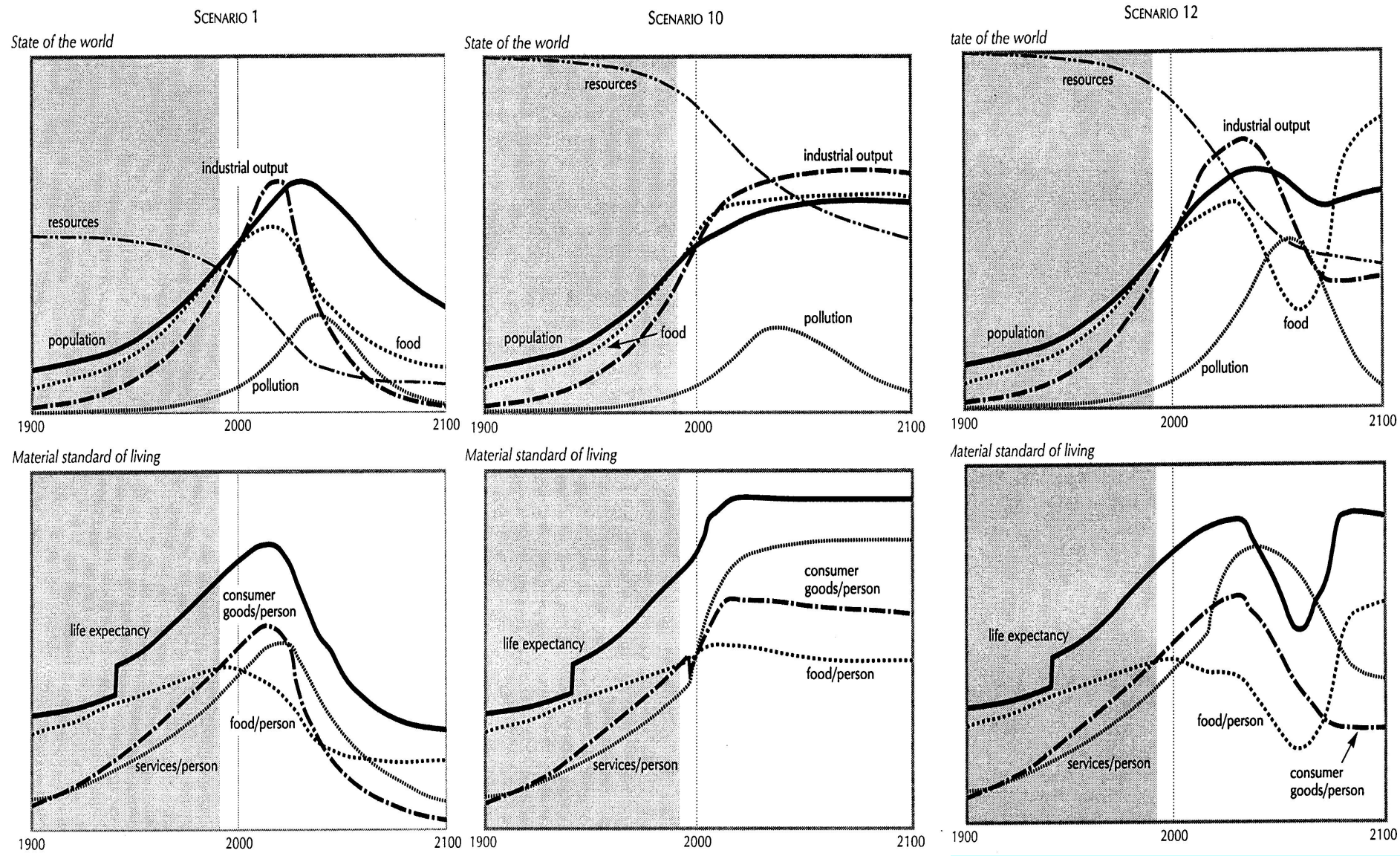
Sources: Norman Myers, "Environmental refugees, An emergent security issue", 13. Economic forum, Prague, OSCE, May 2005; Millennium Ecosystem Assessment, 2005 ; Liser, 2007.

Despite our science, we seem to be heading for catastrophe

- UK Chief Scientist (19 March 2009): the world faces a 'perfect storm' of problems in 2030 as food, energy and water shortages interact with climate change to produce public unrest, cross-border conflicts and mass migrations

Limits to Growth (1900-2100)

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



Business as usual

Transition 1995

Transition 2015

How can we reconcile humanity and the environment?

(Mark Tobey, *Head of Boy,* 1955)

Multi-level Systems

- Living systems (Biology)
- Ecosystems (life in an environment)
- Human-environment systems
- Systems and information
- Economic systems
- Systems of governance and management
- Human systems: social, spiritual
- The planetary system

Sustainability is a systems concept

- Not a goal to be reached but a balance to be maintained in space and in time
- Involving complex interactions in the whole system that maintains life on Earth (the **environmental** component)
- Including the human system (the **social** and **economic** components)
- That must respect planetary limits

My Research Questions

- What do all systems have in common?
- How do the parts make a dynamic whole?
- How does evolutionary progress come with dynamic equilibrium?
- What are the system control mechanisms and information flows?
- How do we maintain or restore balance?
- What unites rather than divides?

Issues raised by this talk

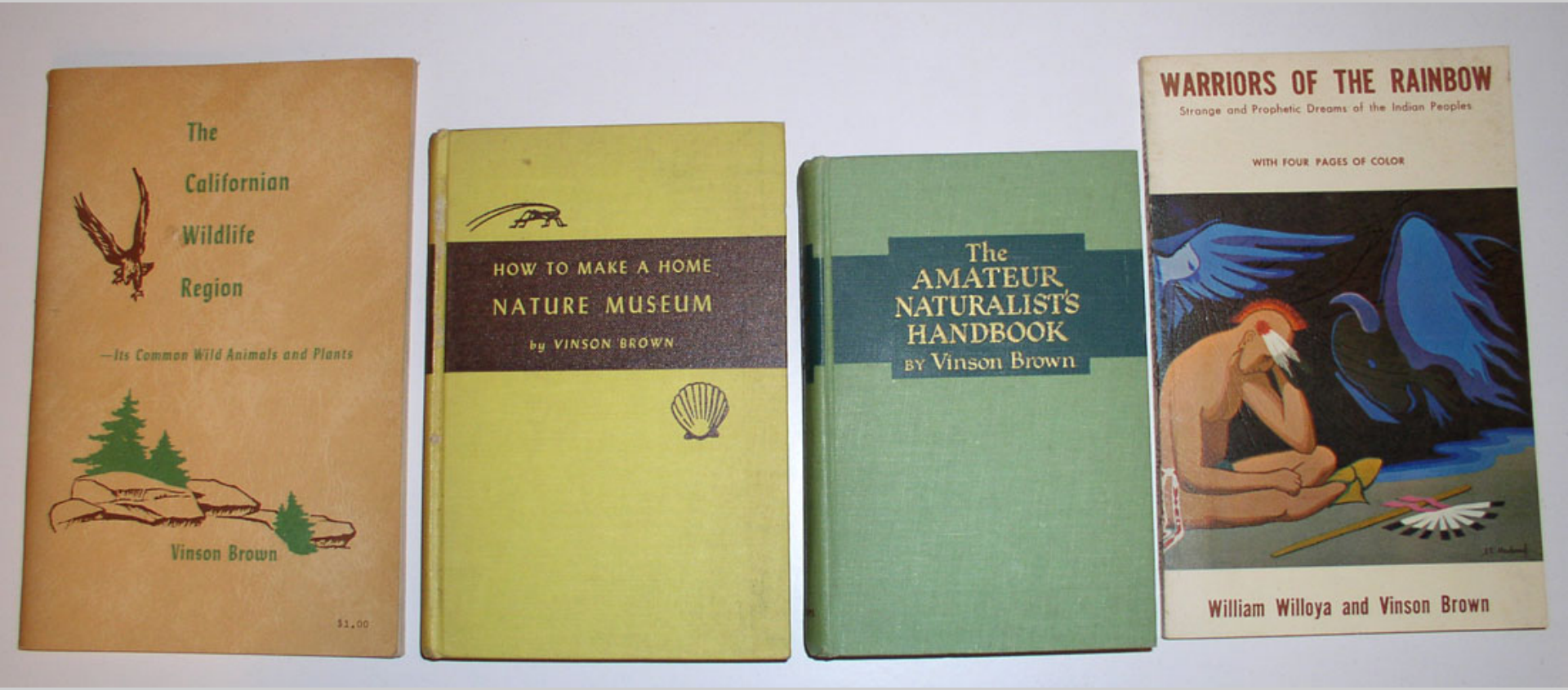
- Specialization versus generalization
- Analysis of the parts vs. integration
- Disciplines vs. inter/multi/trans-disciplinarity
- Basic versus applied science
- Ivory tower versus action in the real world
- A scientific elite or science for everyone
- Areas off limits to science (like religion)
- Intangible feelings nature can inspire like beauty, awe, wonder, humility, a sense of connection

California coast

California coast

Childhood mentor: Vinson Brown

naturalist and Bahá'í



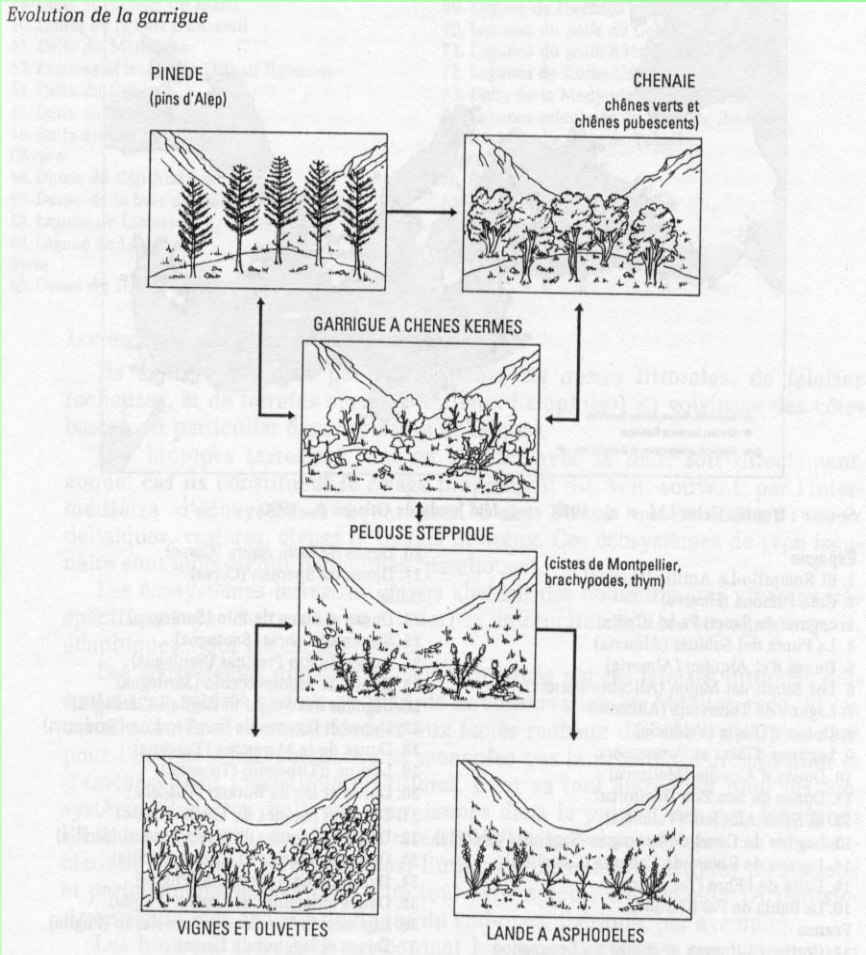
Biology: the science of life

(Mark Tobey, *Jeweled Jungle*, 1958)

Biology: living systems

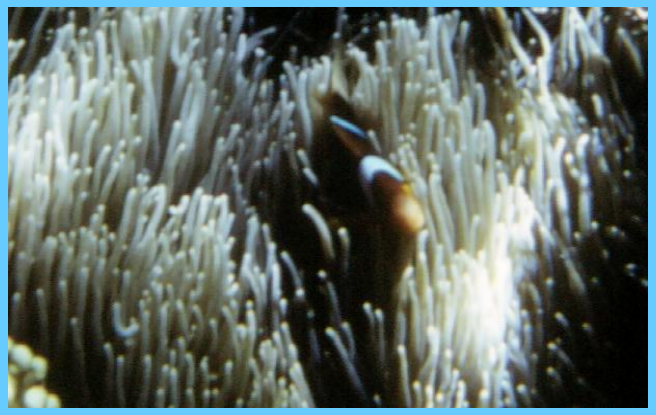
Multiple levels of complexity
(molecule, gene, cell, organ, organism, species, ecosystem)

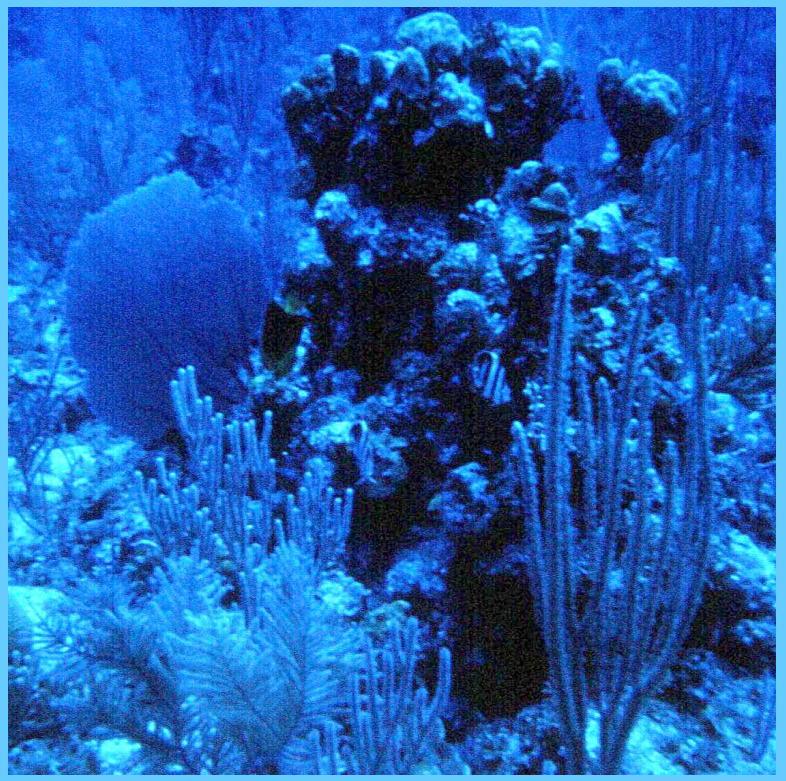
- Stanford University 1960-1964
- Evolution with Paul Ehrlich
- Senior Honors with Peter Raven (polyploidy and speciation)
- Publication on food preferences in periwinkles
- A.B. in Biological Sciences



Ecology: systems dynamics

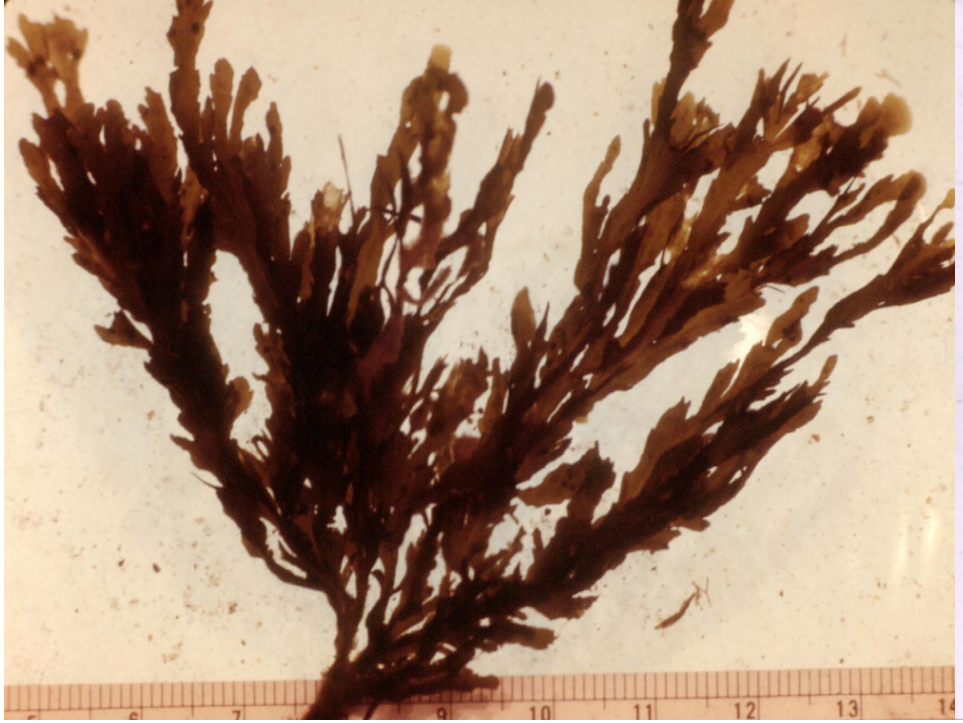
- Diversity, stability, efficiency
- Dynamic equilibria
- Competition, collaboration, symbioses
- Vulnerability/resilience

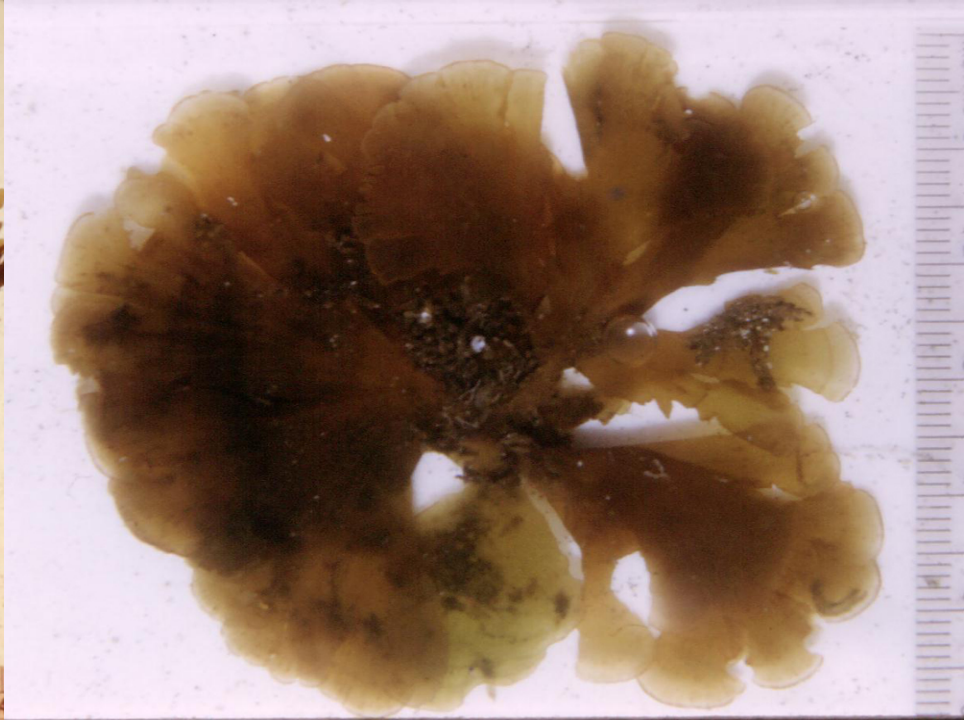




Marine Biology and Ecology

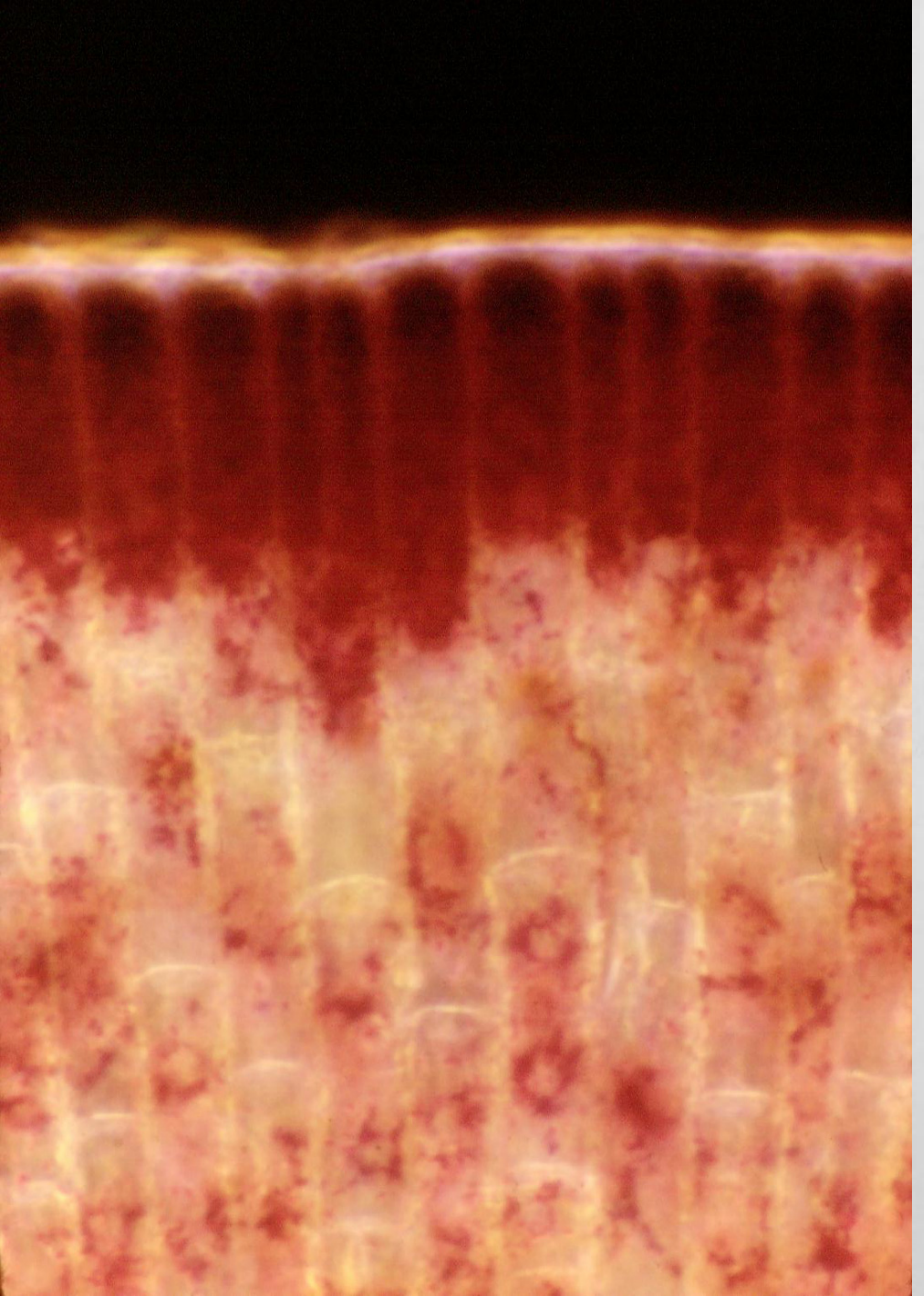
Ph.D in Biology. University of California, Santa Barbara 1969

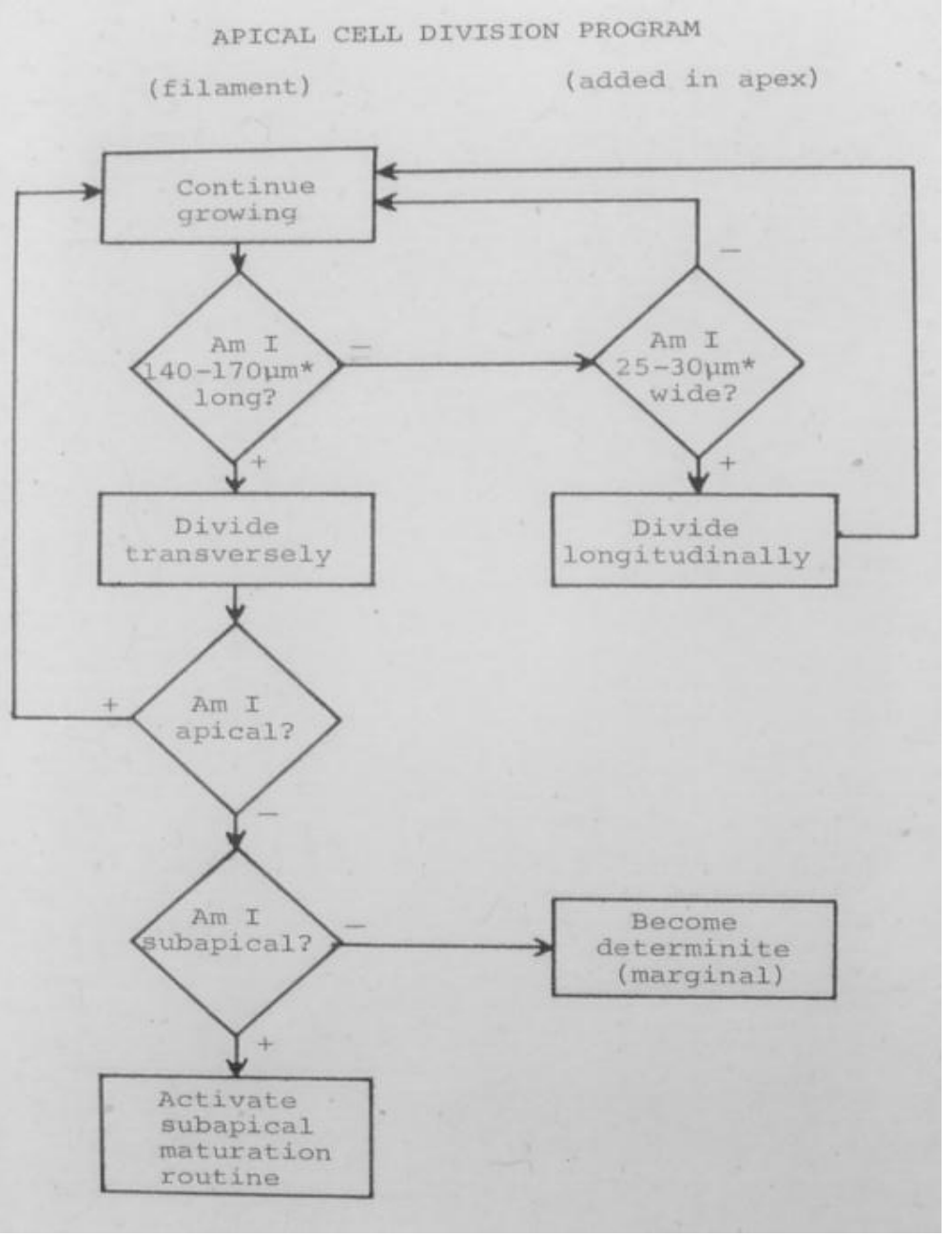




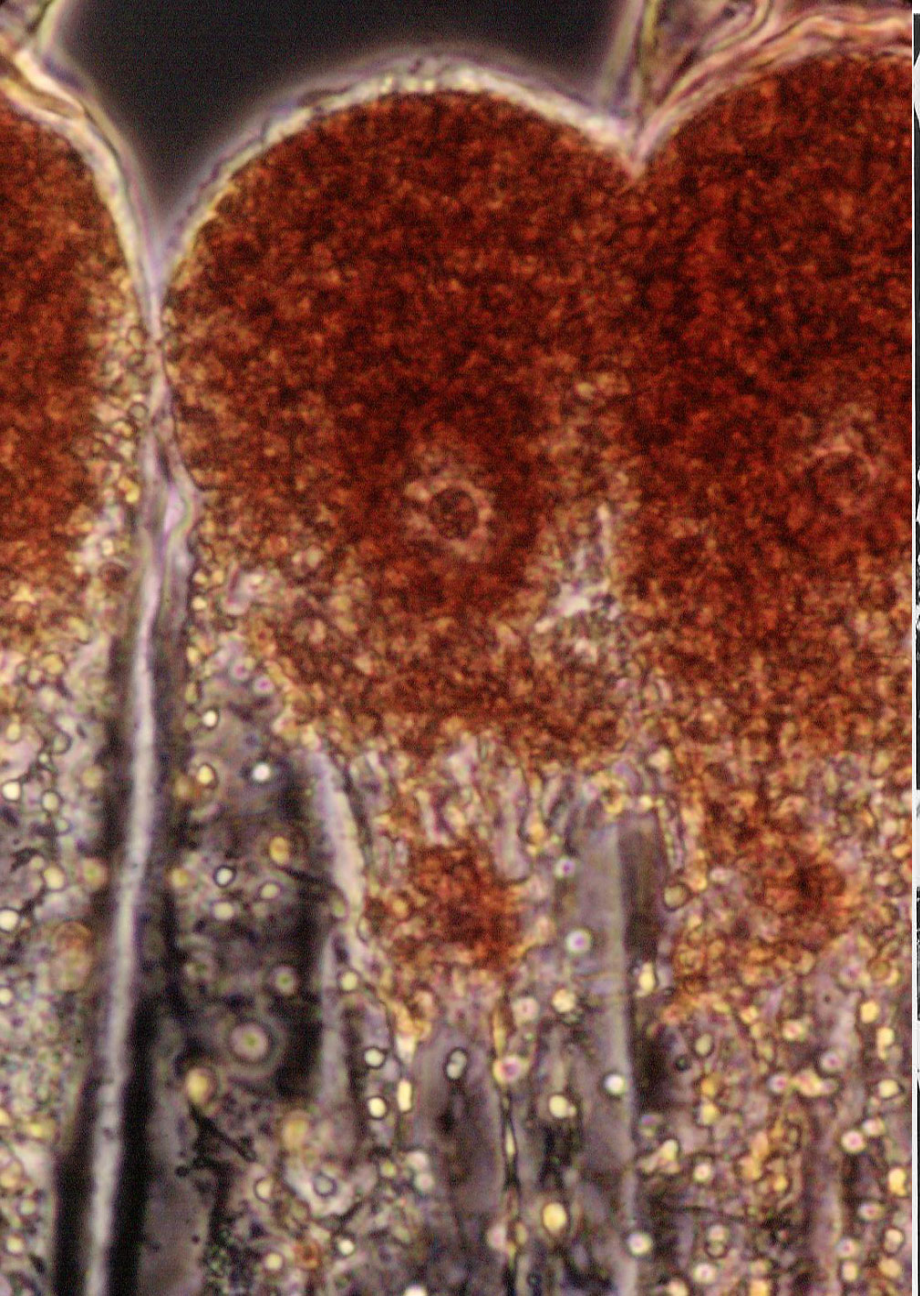
Why does the form of the plant differ so much in different habitats?

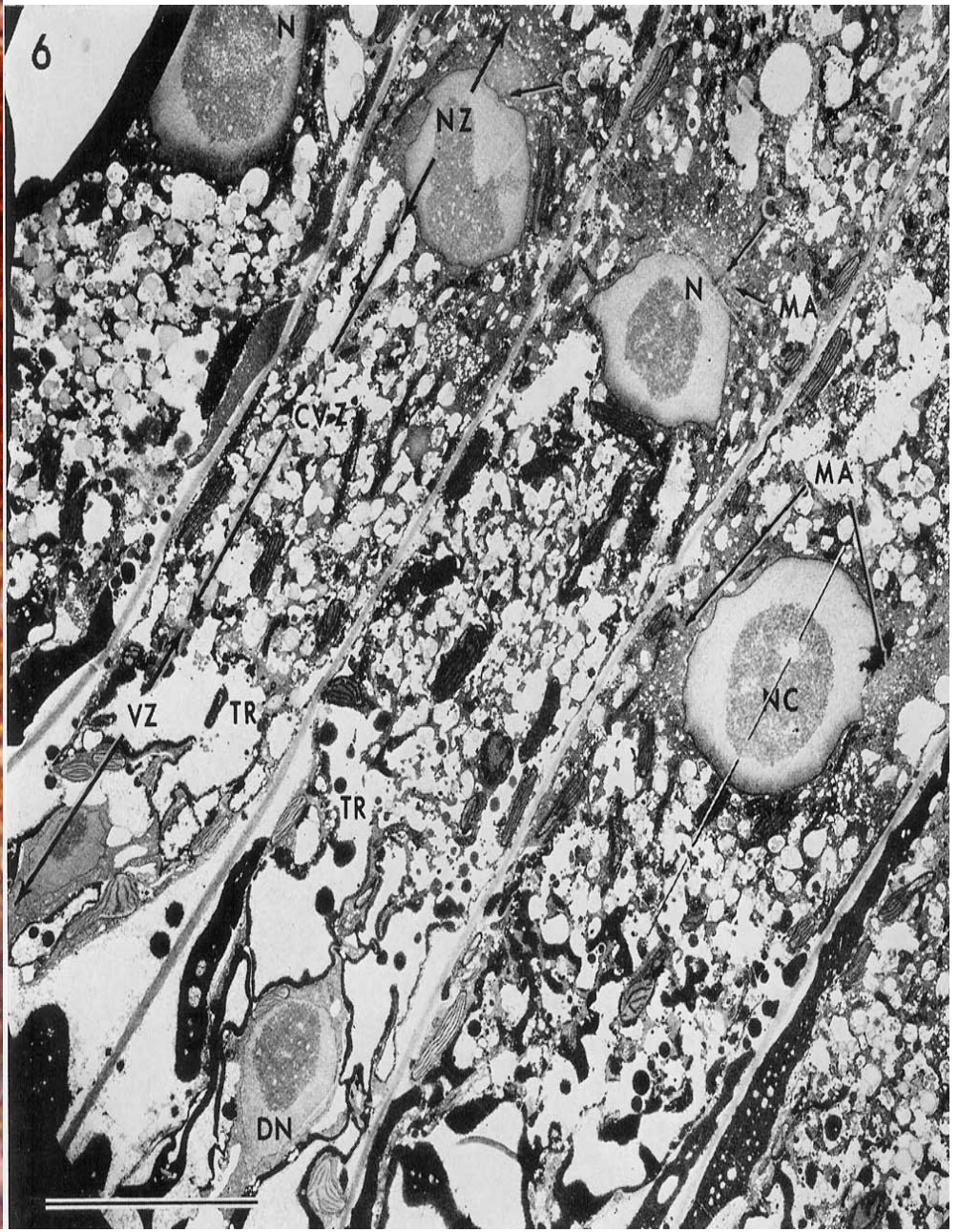
Development, Form and Environment in the Brown Alga *Zonaria farlowii* 1964-1969



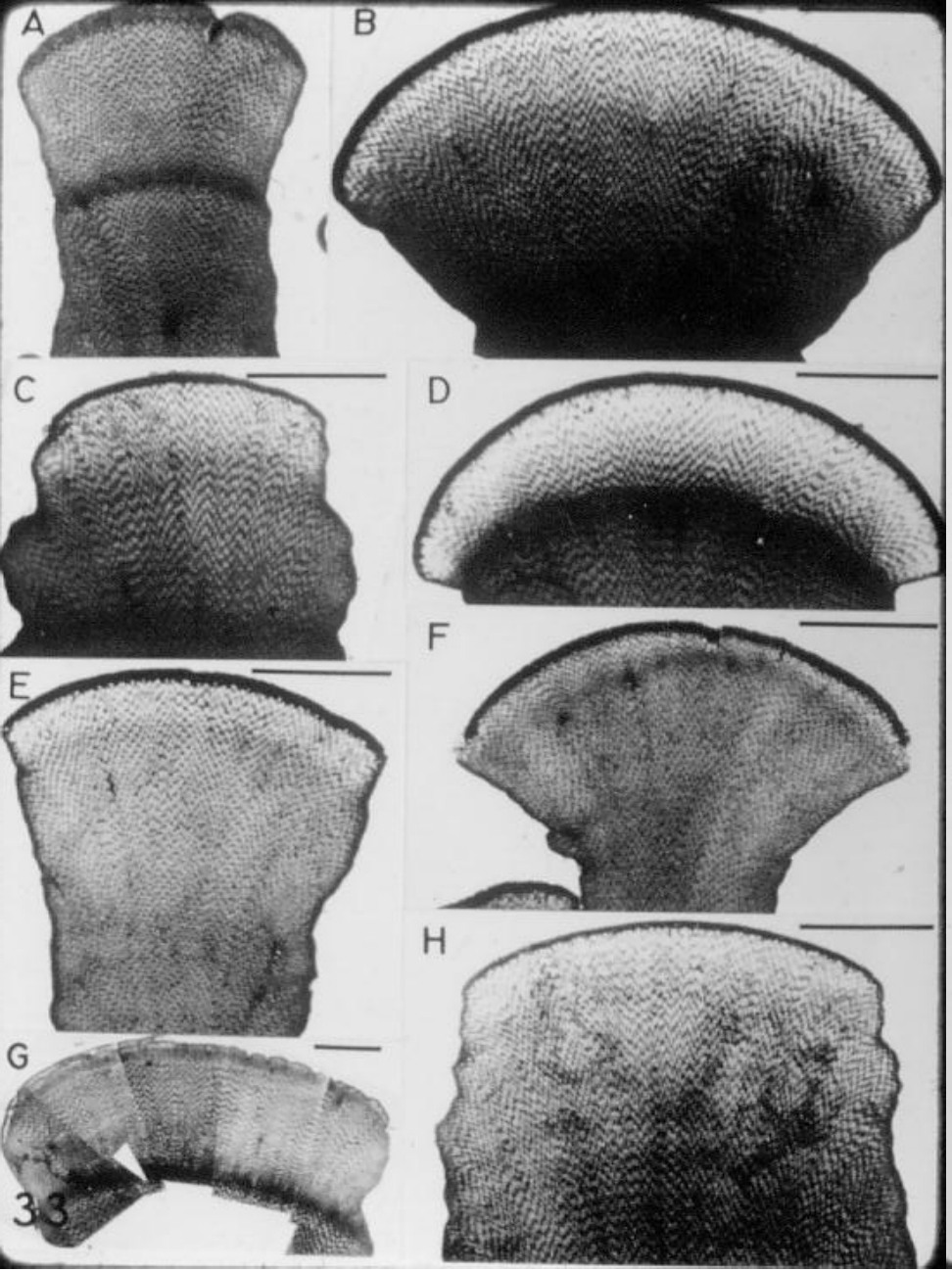


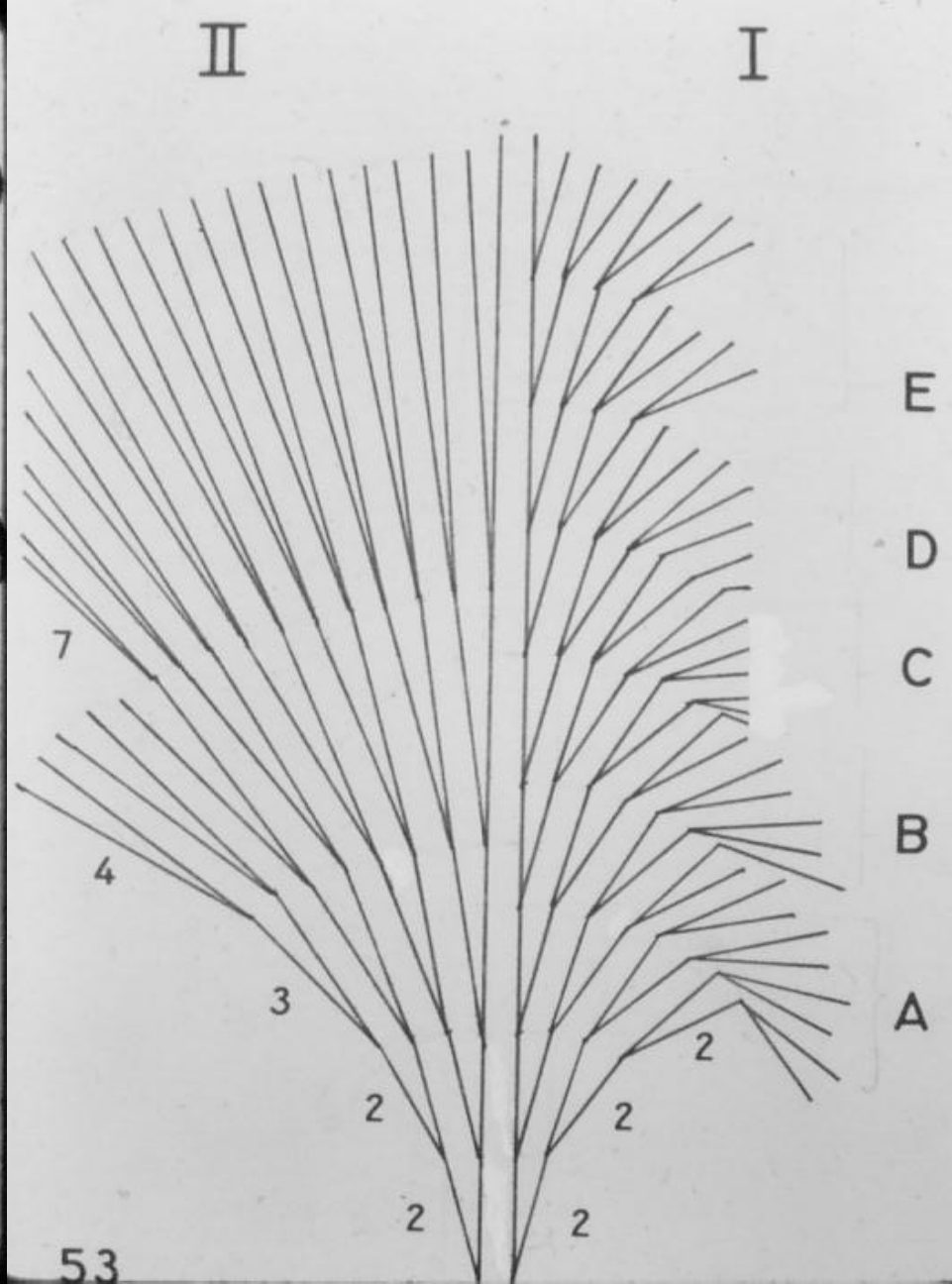
Zonaria: what does a cell need to know?





Zonaria: how does cell structure relate to form?





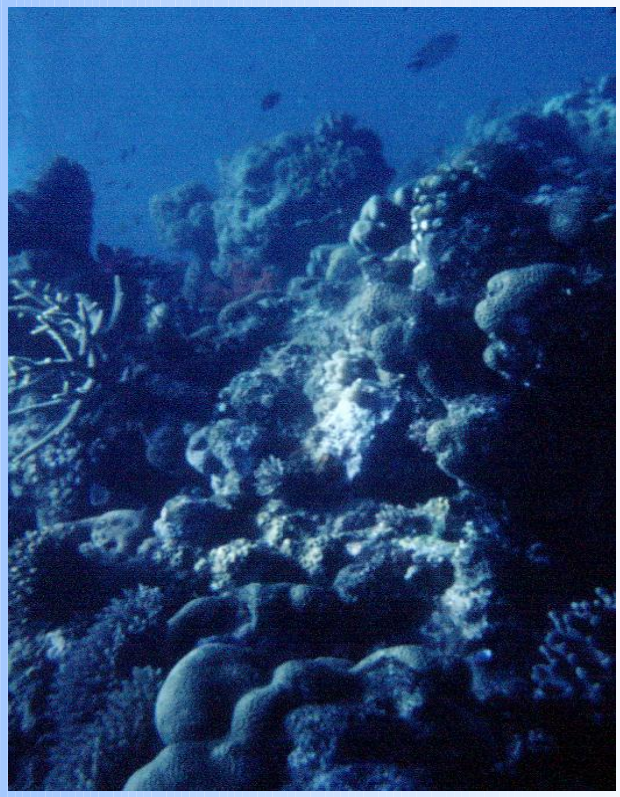
Zonaria: how are different forms generated?

The systems lesson: complexity can develop from simple rules and interactions

(Garden of Linnaeus, Sweden)

Biology provided the elements of a systems approach

- A way of thinking
- Dynamic
- Processes
- Cause and effect
- Interactions
- Integration
- Emergent properties



The Environmental Challenge

(Mark Tobey, *Traffic,* 1959)

First Wave of Environmental Movement

- Audubon Bird Census, 1955-57
- Marine Parks Conference, Tokyo, 1966
- Santa Barbara Oil Spill, 1969
- Environmental Problems of American Samoa, 1969-1970
- First Earth Day, Washington, D.C., 1970
- Environmental Education, Belize, 1972
- Represented Bahá'í International Community at Stockholm Conference 1972

Santa Barbara oil spill 1969

How to become an environmental advisor to developing countries?
(Chin-do, Korea, 1966)

Smithsonian Institution
1969-1974

- Associate Curator (Algae), Department of Botany, National Museum of Natural History
- Coral reef ecology
- PRINUL
- Long-term reef monitoring American Samoa

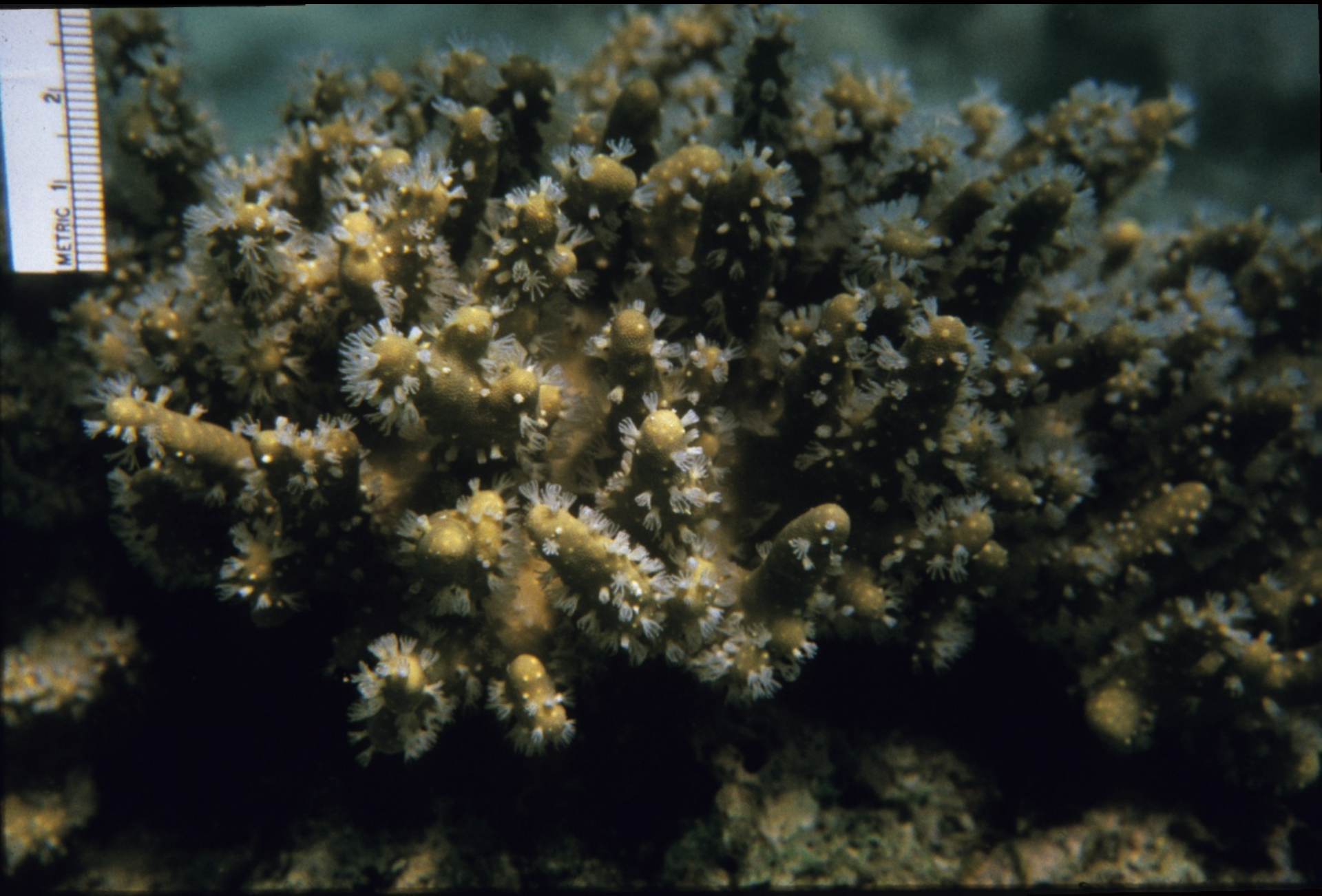
Research on coral reef ecosystems

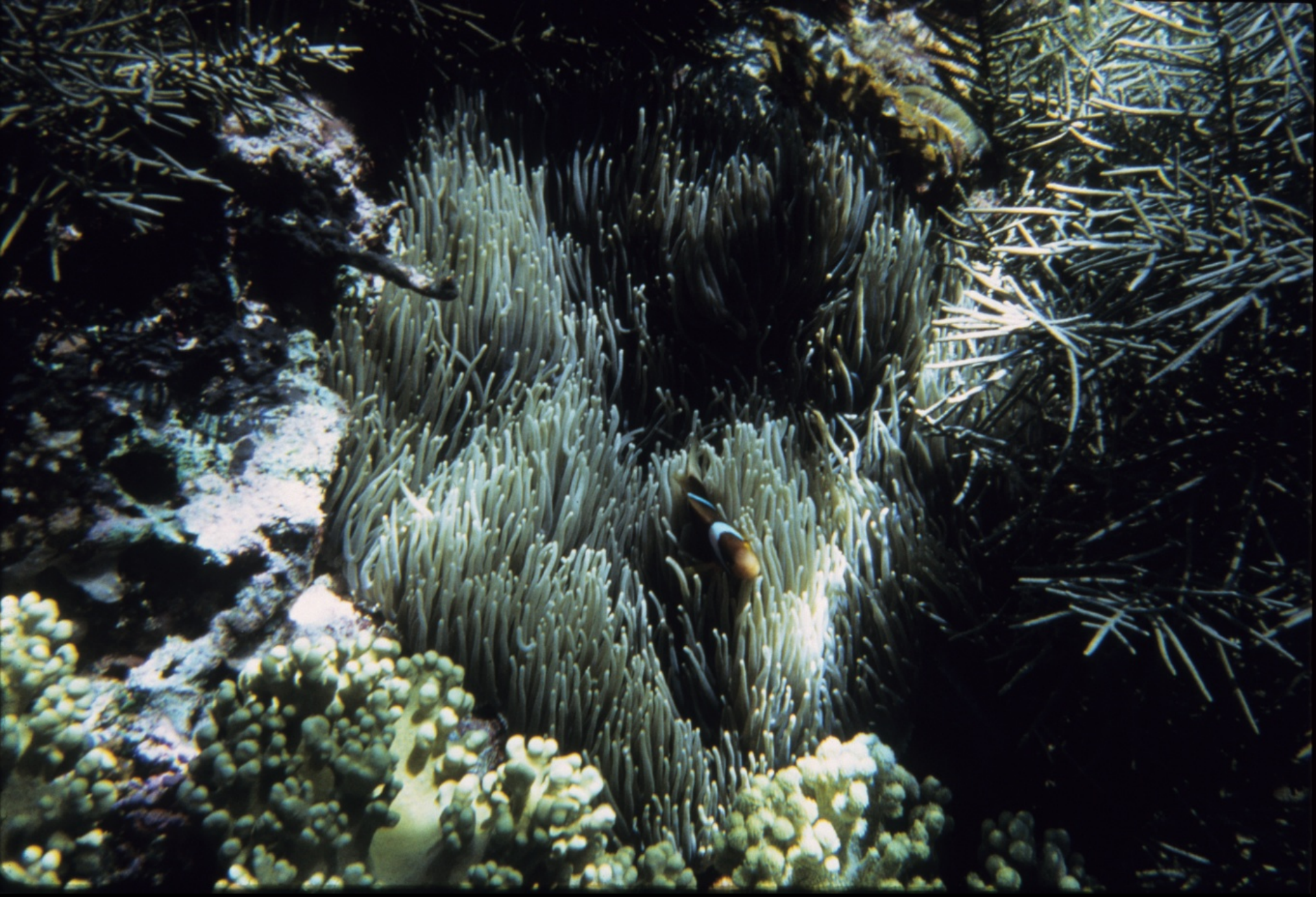
Complex spatial organization

Coral reef like a city


METRIC 1 2 3

Coral animals with symbiotic algae





Clownfish and anemone (mutual assistance)

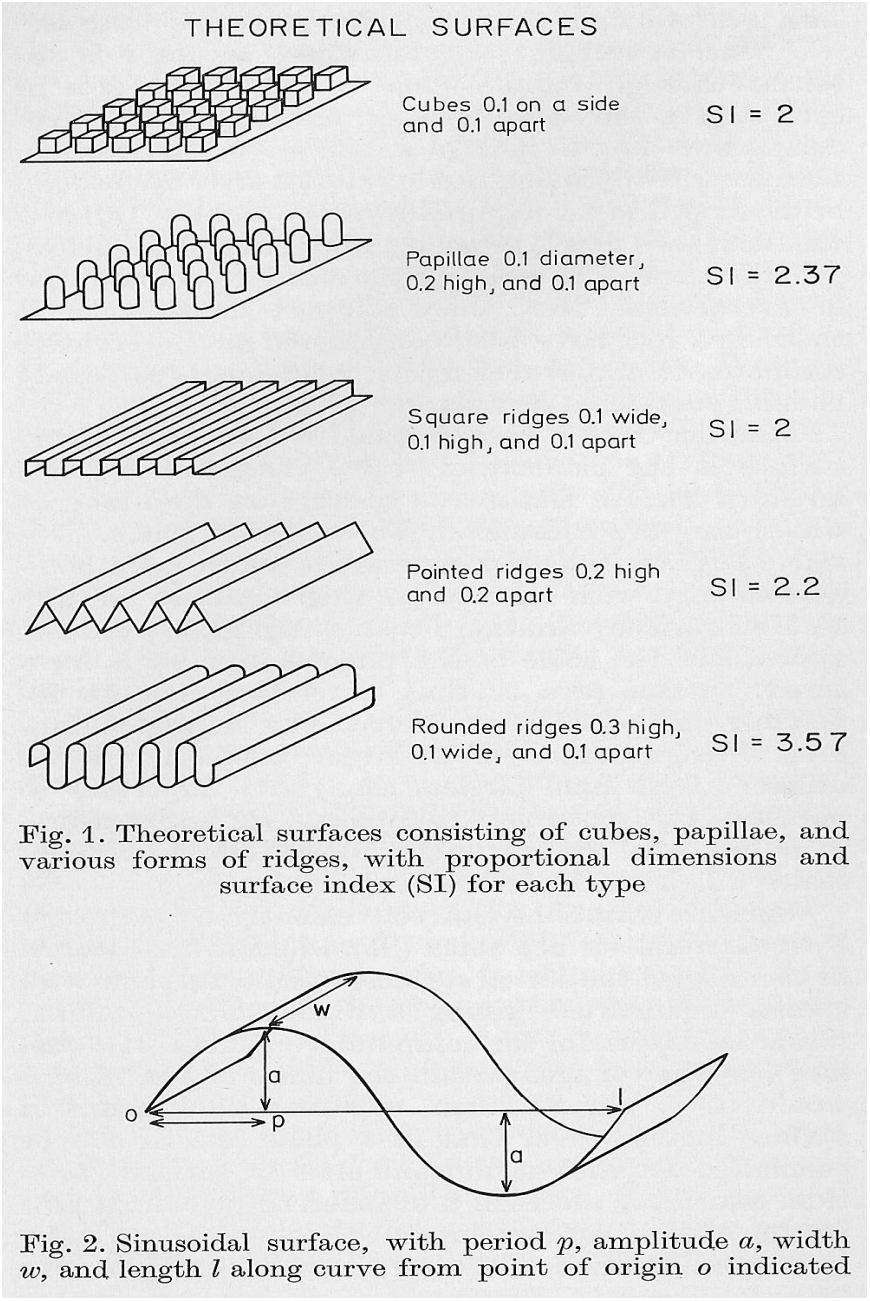
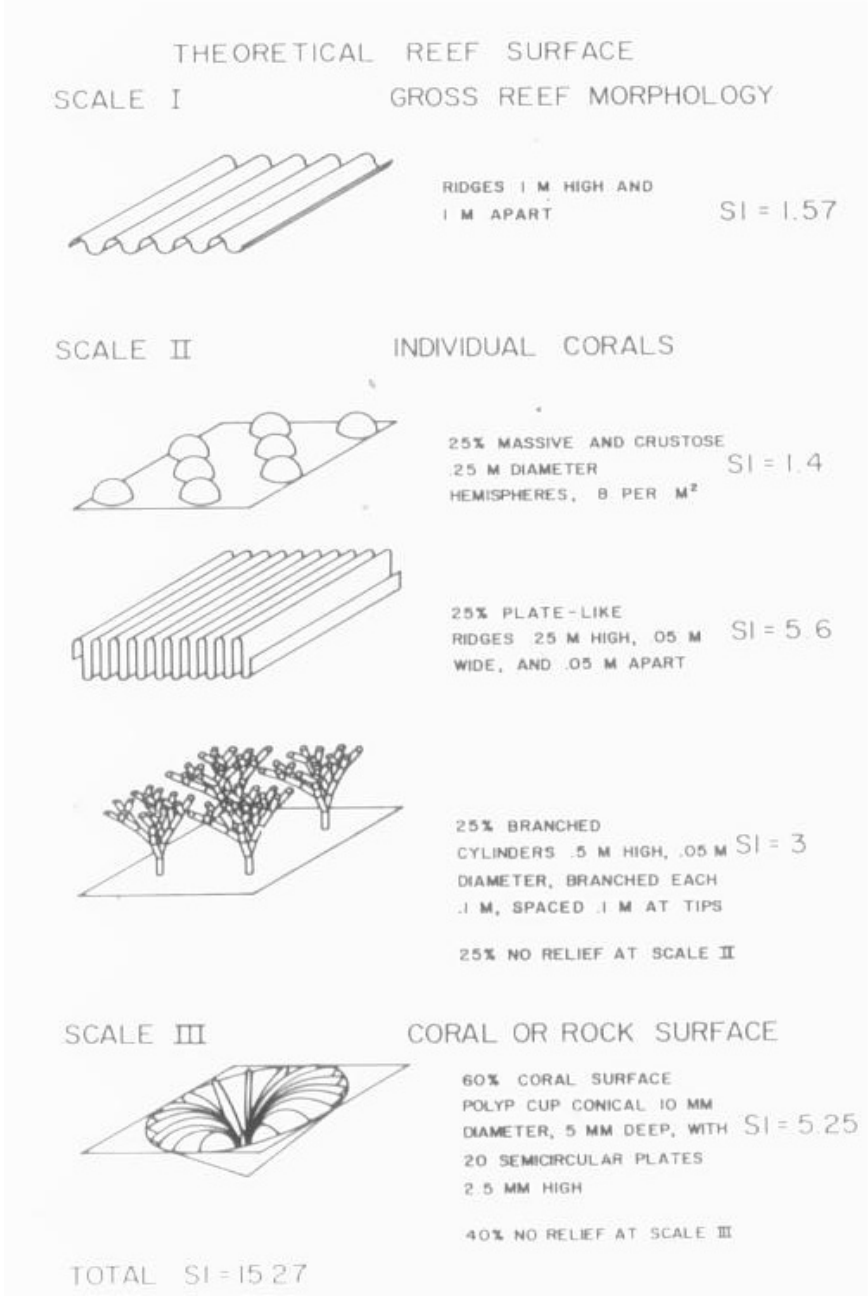


Fig. 1. Theoretical surfaces consisting of cubes, papillae, and various forms of ridges, with proportional dimensions and surface index (SI) for each type

Fig. 2. Sinusoidal surface, with period p, amplitude a, width w, and length l along curve from point of origin o indicated



Indicators of ecosystem function

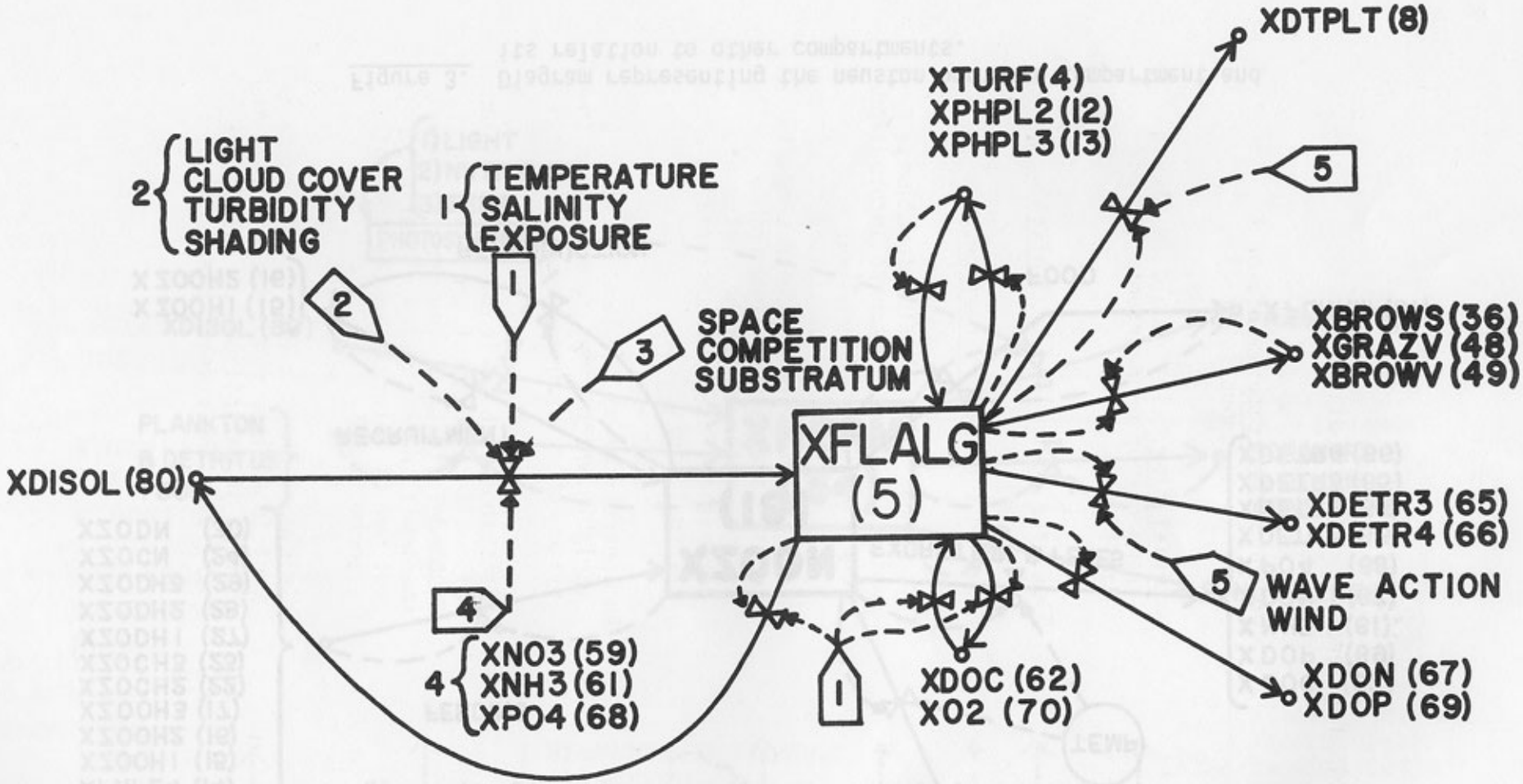


Figure 2. Diagram representing the fleshy macro-algal compartment and its relation to other compartments.

Modeling the coral reef ecosystem

Modeling the coral reef ecosystem

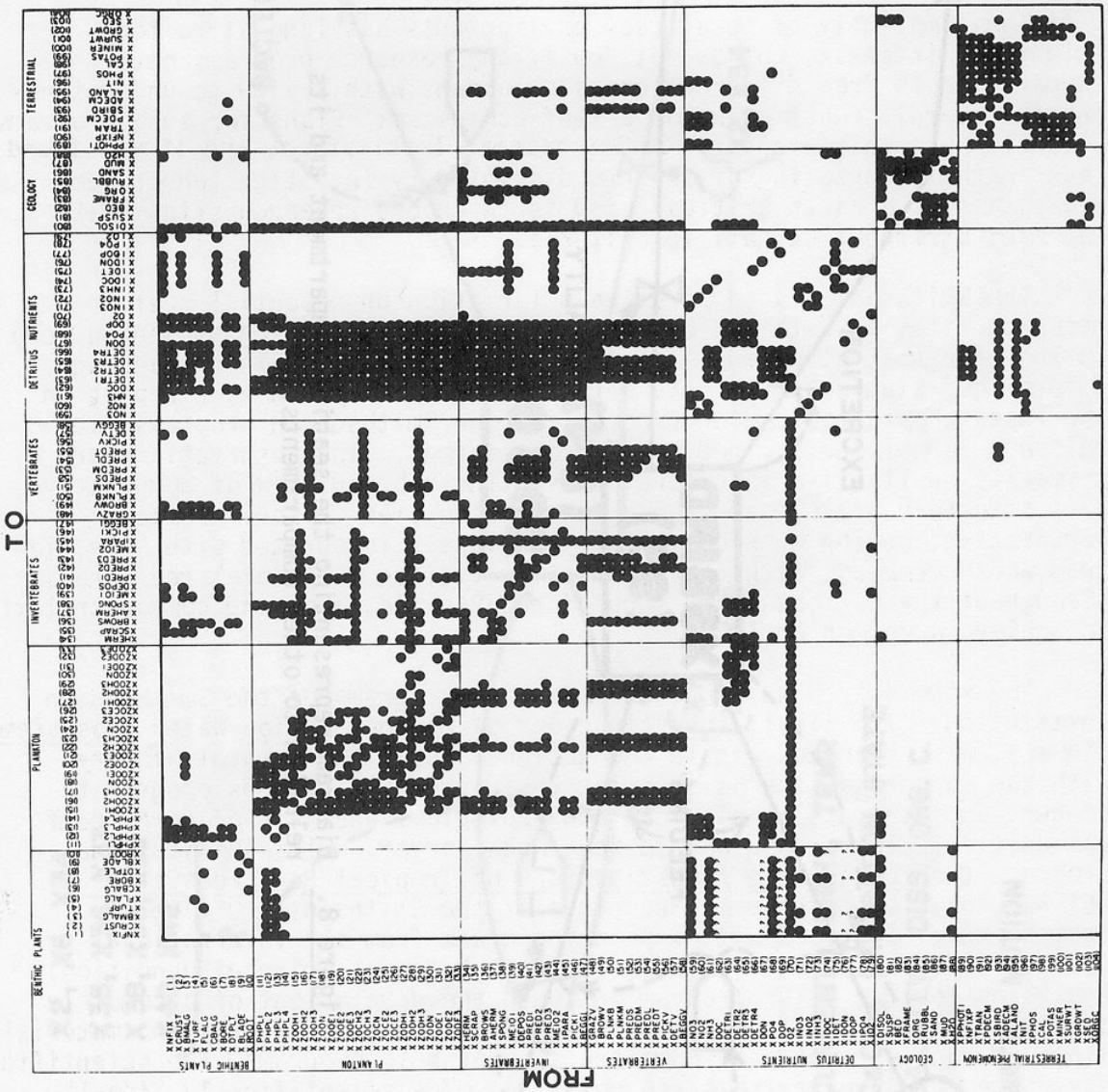


Figure 9. CITRE preliminary ecosystem matrix; reef-flat submodel. The dots indicate carbon or carbon-equivalent flows from compartments on the left to compartments along the top. Blanks indicate no connectivity, and the question marks indicate possible carbon flow between various organic compounds and benthic plants.

Sustainability in the coral reef ecosystem:

- Efficient solar energy and materials capture by generating large surface area
- Efficient energy transfers within system, symbioses
- Little waste, effective recycling
- High complexity and integration
- Dynamic and resilient to perturbation
- Maximizes total productivity, not just most productive

Organizing to address the challenges to coral reefs

- UNEP Coral Reef Unit 2000-2002
- International Coral Reef Action Network

Human Dimensions of a Systems Approach

(Mark Tobey, *Urban Renewal*, 1964)

In our present materialistic world, the human side of sustainability has been neglected.

Our world has become polarized between economic liberalism and social welfare, the political right and left, as if we had to choose one or the other.

Sustainable development should bring the economic and social together with the environmental as complementary aspects of a whole that is human development.

An Island

Man and Nature
reduced to its simplest expression

Smithsonian Institution

Carrie Bow Cay Field Station

1972

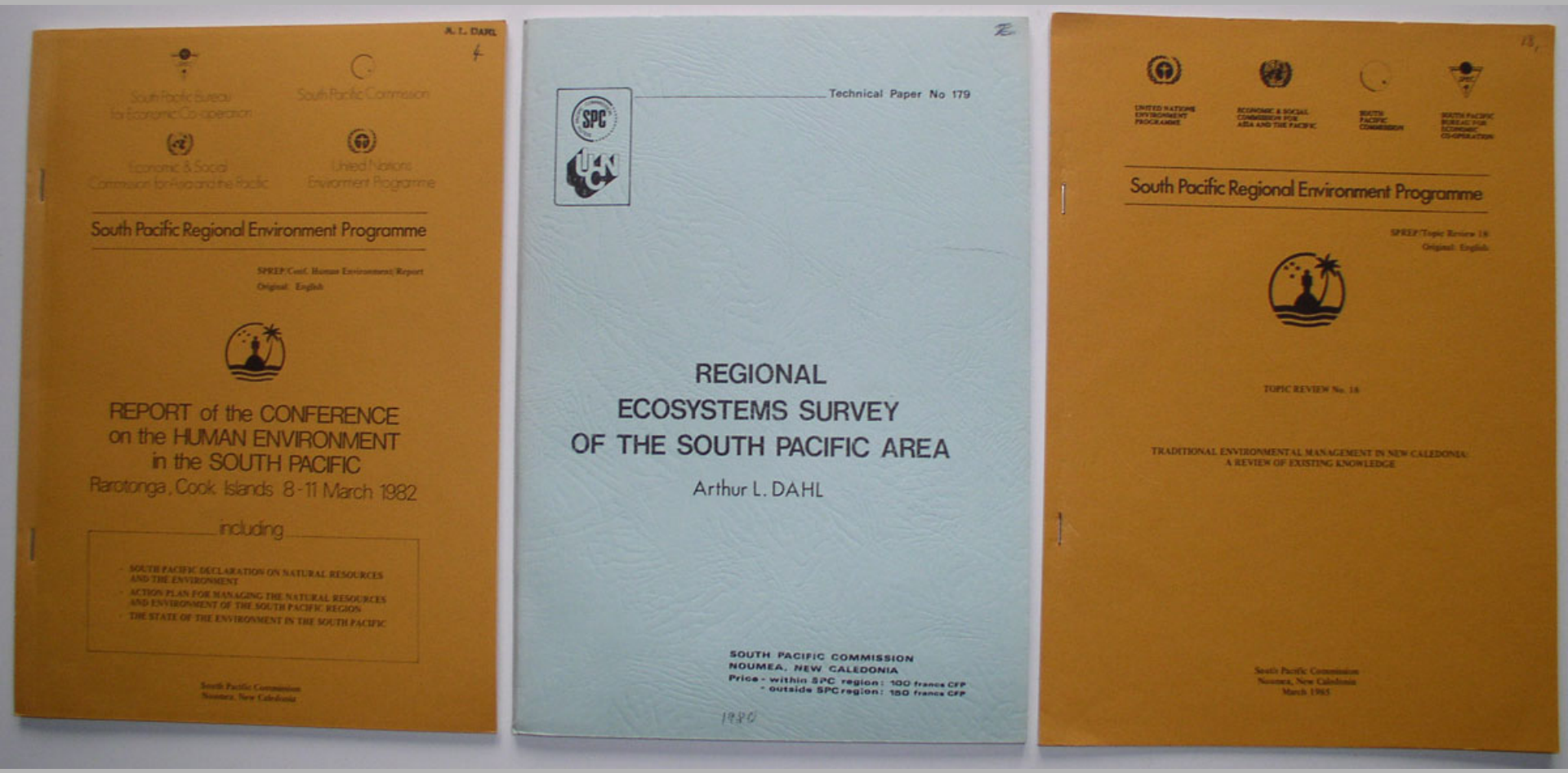
South Pacific Commission
Noumea, New Caledonia 1974-1985

- Regional Ecological Adviser
- Convention on Conservation of Nature in the South Pacific
- Regional Ecosystems Survey
- South Pacific Regional Environment Programme

Eutrophication in Hawaii

Islands as microcosms of human/environment systems
Republic of Nauru

From the mountain to the sea
Tahiti, French Polynesia


South Pacific Bureau for Economic Co-operation
South Pacific Commission
Economic & Social Commission for Asia and the Pacific
United Nations Enviorment Programme
South Pacific Regional Environment Programme
REPORT of the CONFERENCE on the HUMAN ENVIRONMENT in the SOUTH PACIFIC
Rarotonga, Cook Islands 8-11 March 1982
including
SOUTH PACIFIC DECLARATION ON NATURAL RESOURCES AND THE ENVIRONMENT
ACTION PLAN FOR MANAGING THE NATURAL RESOURCES AND ENVIRONMENT OF THE SOUTH PACIFIC REGION
THE STATE OF THE ENVIRONMENT IN THE SOUTH PACIFIC
Technical Paper No 179
REGIONAL ECOSYSTEMS SURVEY OF THE SOUTH PACIFIC AREA
Arthur L. DAHL
SOUTH PACIFIC COMMISSION
NOUMEA, NEW CALEDONIA
Price - within SPC region: 100 francs CFP
- outside SPC region: 150 francs CFP
1980
South Pacific Regional Environment Programme
TRADITIONAL ENVIRONMENTAL MANAGEMENT IN NEW CALEDONIA: A REVIEW OF EXISTING KNOWLEDGE

SPC - SPREP

Coral Reef Monitoring Handbook

ARTHUR LYON DAHL
Regional Ecological Adviser
South Pacific Commission

Based on techniques developed at an
Expert Meeting on Coral Reef Monitoring
(Motupore Island Research Centre, Papua New Guinea, August 1978)

SOUTH PACIFIC COMMISSION
NOUMEA, NEW CALEDONIA

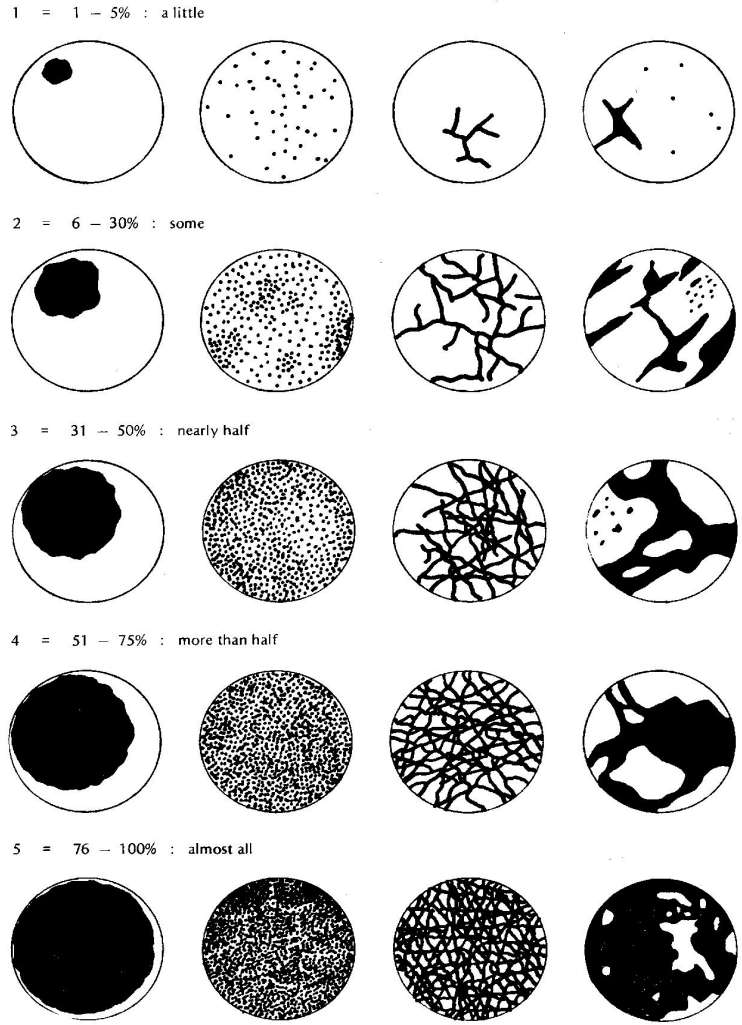


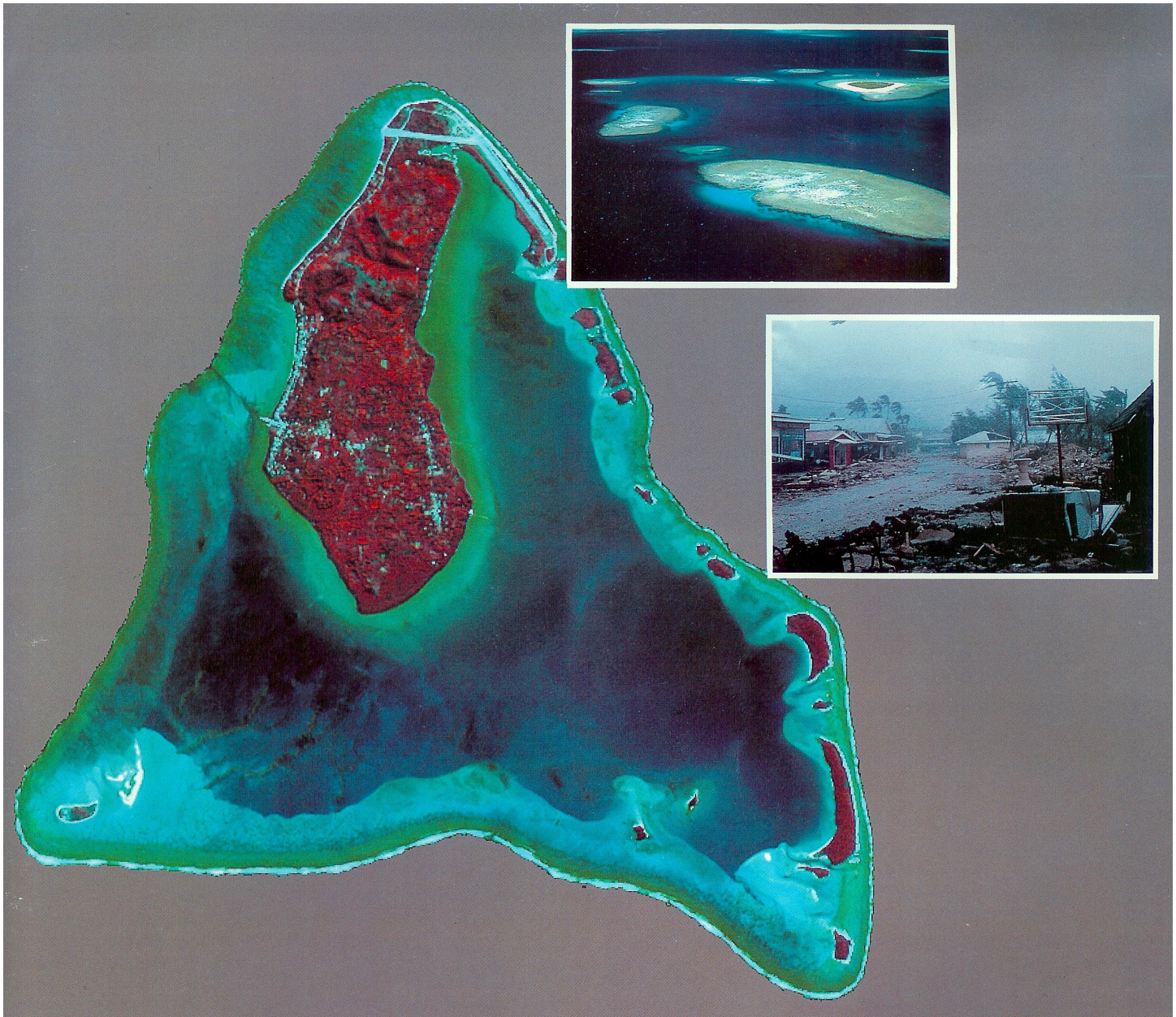
Figure 3. Percent cover

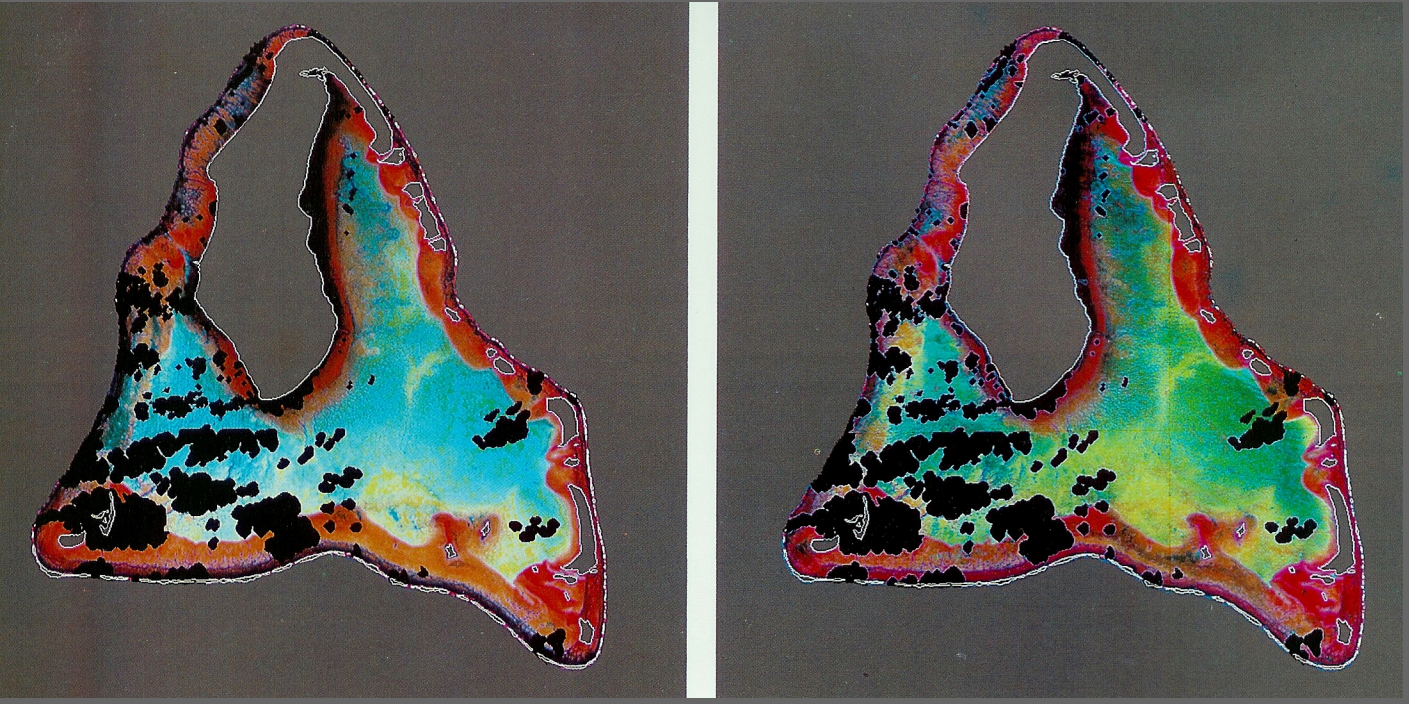
Science accessible to everyone

Training Programme in Small Island Environmental Management

Islands as dynamic systems

Aitutaki, Cook Islands, assessing cyclone impact

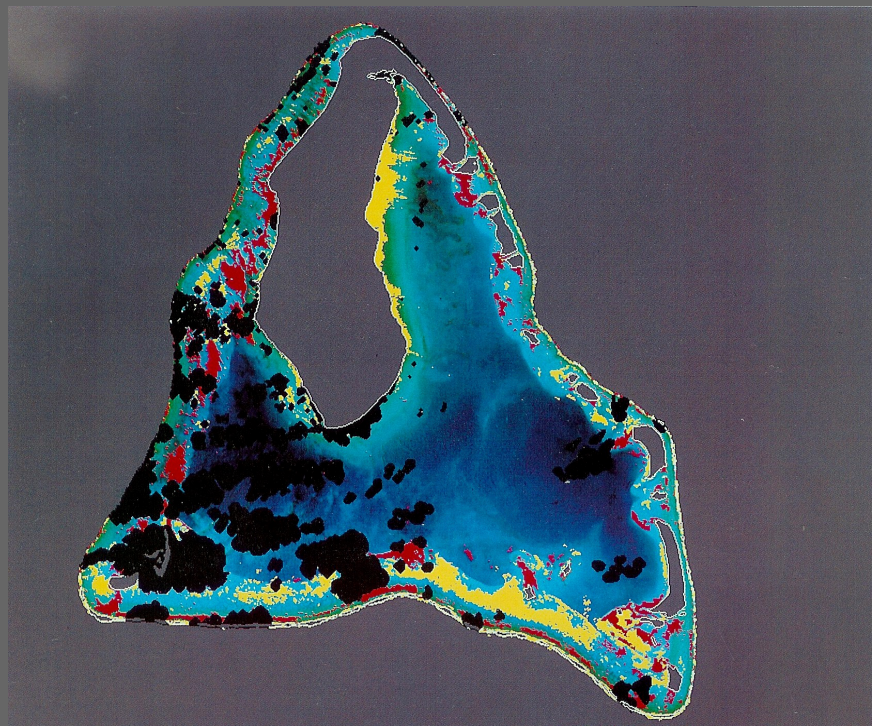




before after

Aitutaki, Cook Islands

assessing cyclone impact



DAHL Annotated

UNEP

REGIONAL SEAS

directories and bibliographies: no. 35

Island Directory

Preliminary edition

Prepared by the

World Conservation Union (IUCN)
Commission on Ecology
Task Force on Conservation of Island Ecosystems

in collaboration with the

United Nations Environment Programme

based on the work of
Arthur Lyon Dahl

UNEP, 1991

Review of the Protected Areas System in Oceania

A systems approach to Islands

Islands Database (1987)

Indicators

(new Global Islands Database)

ISLAND DIRECTORY TABLES

IMPORTANT ISLANDS AT RISK

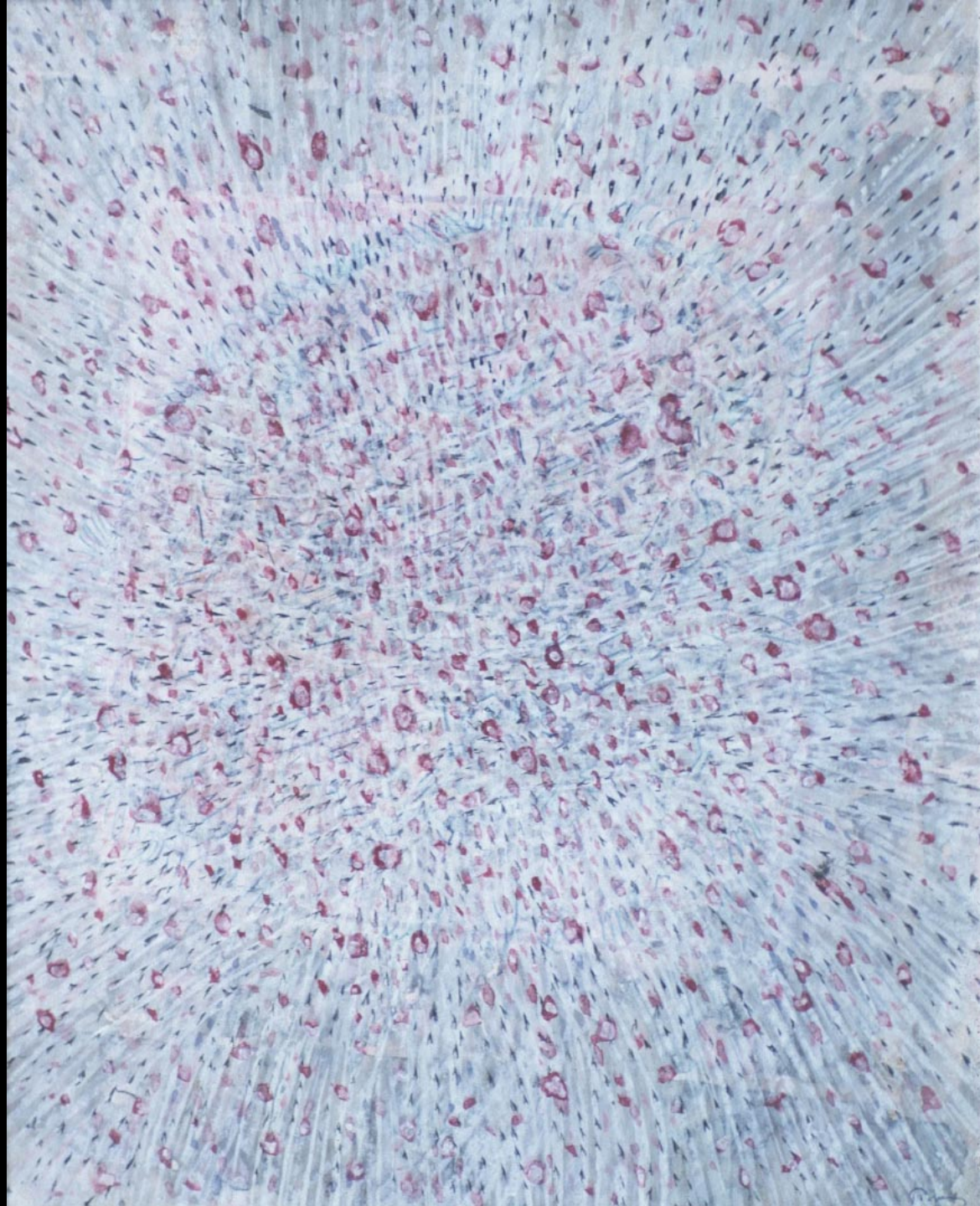
With both high conservation importance and high human impact
CIT = Terrestrial Conservation Importance Index
CIM = Marine Conservation Importance Index
HI = Human Impact Index; Data = Data Quality

CIT	CIM	HI	Island	Country	Data
13	2	6	Efate	Vanuatu	1
11	2	8	Fatuhiva	France - French Polynesia - Marquesas Is	1
15	1	7	Teraina	Kiribati - Line Islands	2
14	2	8	Hiva Oa	France - French Polynesia - Marquesas Is	1
14	2	9	Ua Pou	France - French Polynesia - Marquesas Is	1
12	8	6	Lakeba	Fiji	2
16	2	8	Nuku Hiva	France - French Polynesia - Marquesas Is	1
14	5	8	Basse Terre	France - Guadeloupe	2
17	1	9	Principe	Sao Tome and Principe	3
13	3	11	Tutuila	United States - American Samoa	3
11	7	10	Rarotonga	Cook Islands	3
11	8	10	Mangareva	France - French Polynesia - Gambier Is.	1
16	7	8	Tabuaeran	Kiribati - Line Islands	2
12	3	15	Eiao	France - French Polynesia - Marquesas Is	1
16	9	6	Taveuni	Fiji	2
13	12	6	Tinian	United States - Northern Mariana Islands	2
19	9	8	Kadavu	Fiji	2
16	3	15	St Vincent	St Vincent	2
13	14	8	Ascension	United Kingdom - Ascension Island	3
24	0	11	Bioko	Equatorial Guinea	2
18	12	8	Pohnpei	Federated States of Micronesia	2
15	16	8	Ovalau	Fiji	2
24	1	12	Sao Tome	Sao Tome and Principe	3
18	10	10	Santa Rosa	United States - California	3
26	4	9	Dominica	Dominica	3
13	18	8	Rotuma	Fiji	2
14	5	17	Tahiti	France - French Polynesia - Society Is.	1
30	3	7	Reunion	France - Reunion	2

Systems lessons from Islands

- Human-environment interactions are just as complex on a small scale
- The real problems are human rather than scientific
- Whole systems approaches, integrating both the requirements of natural systems and the human communities, with their cultures, institutions and values, as well as economies and social systems, would be necessary to make the transition towards sustainability
- Solutions must be appropriate to each local environment, very different from the model proposed by the western economic system

Systems at the Global Level



(Mark Tobey, *New Genesis*, 1958)

United Nations Environment Programme 1989-2002

- Deputy Director, Oceans and Coastal Areas (Regional Seas)
- Coordinator, UN System-wide Earthwatch, including global observing systems and Integrated Global Observing Strategy Partnership
- Director, Coral Reef Unit; International Coral Reef Action Network

UNEP

The Planetary System

UN System-wide Earthwatch

- Global assessments of the environment
- Scientific advisory processes
- Indicators of sustainable development
- Global observing systems
- Integrated Global Observing Strategy Partnership
- Information for decision-making

IGOS

Integrated Global Observing Strategy

International Systems of Governance

(Mark Tobey, *Space Architecture*, 1943)

United Nations Conference on the Human Environment, Stockholm 1972
representing Bahá'í International Community

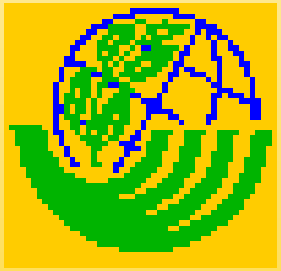
Small Islands Developing States

- South Pacific Commission 1974-1982
- South Pacific Conference on the Human Environment, Rarotonga, 1982
- South Pacific Regional Environment Programme
- IUCN Task Force on Island Conservation 1986-1990
- Agenda 21 - Islands 1992
- Small Islands Developing States (SIDS)
- Barbados Programme of Action 1994
- Mauritius International Meeting of SIDS 2005
- IUCN Thematic Group on Islands 2009-

United Nations Conference on
Environment and Development

EARTH SUMMIT

AGENDA 21



The United Nations
Programme of Action
from Rio, 1992

Secretariat, responsible for Chapter 17:

Oceans, Coastal Areas, Islands

follow up: Commission on Sustainable Development

World Summit on Sustainable Development, Johannesburg 2002

Launching “type 2” partnerships (ICRAN)

International Environment Forum parallel events:
- sustainability indicators
- education
- local science
- business

Climate Change Conference

Copenhagen, December 2009

International Environmental Governance

UNEP Major Groups & Stakeholders Advisory Group on International Environmental Governance 2010-2013

How do we build institutions for governance at the scale of the problem?

How do we ensure that planetary resources are managed sustainably and equitably?

How do we overcome the limitations of national sovereignty in a globalized world?

How do we prepare for the coming migrations?

Lessons learned

- Threats to the planetary environment can only be addressed globally.
- Ultimately, the planet's resources need to be managed and equitably distributed globally.
- But there is very little science in environmental diplomacy. Diplomats give priority to national interest, political expediency, negotiating tactics, fear of creating precedents.
- Environment is not a priority when the economy is at stake.
- There is little concern for the common interest.
- An international system based on national sovereignty cannot easily deal with global problems.

The governance challenge ahead

- The coming United Nations Conference on Sustainable Development in Rio de Janeiro in 2012 will consider governance for sustainability and the green economy.
- Will this be enough for the great transition?
- The limits to growth are coming closer.

Systems and information

(Mark Tobey, New World Dimensions I, 1954)

Information and Organization

- Chemical system: the atoms
- Biological system: DNA
- Mechanical system: concept
- Institutional system: statutes, laws, regulations, practices and customs
- Human social system: values, beliefs, cultures

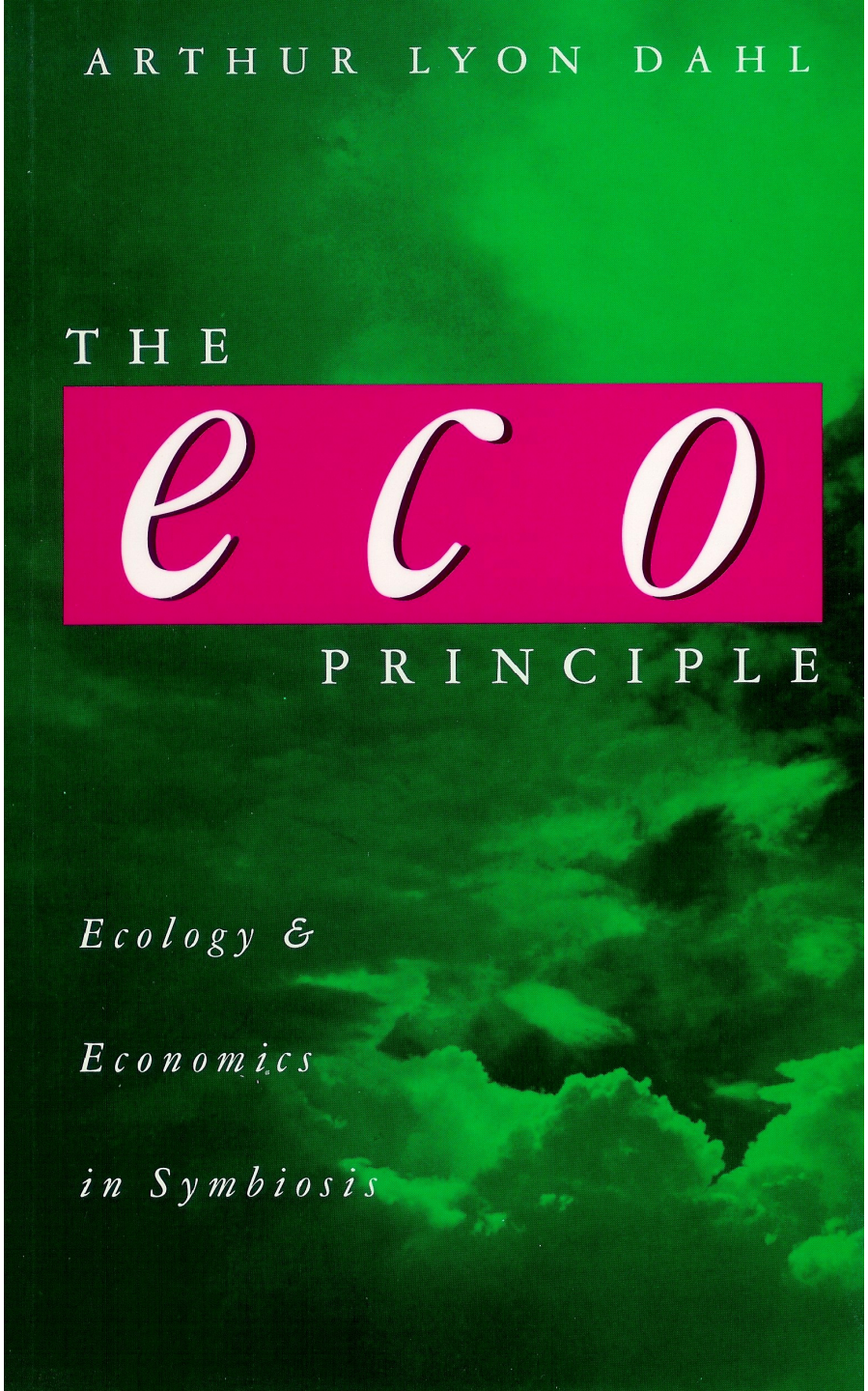
Transmission of information

- Communication systems
- Economy (minimum necessary)
- Control of information flow
- Feed-back
- Nested sub-systems
- Subsidiarity
- Indicators

What is sustainability?

Integrating science, economic development, values

1996



International Environment Forum A Baha'i inspired organization addressing the environment and sustainable development

Organization of environmental professionals bringing values and ethical approaches for sustainability

members in +50 coutries

http://iefworld.org

Economic Systems

(Mark Tobey, *Coliseum*, 1942)

Economic Development

When people think of development, they first think of **economic development**, and this is one of the three pillars of sustainable development. Yet while the world has become wealthier, the extremes of wealth and poverty have also increased, a trend which is itself **unsustainable**.

The Western economic system has failed to deliver on its development promises in much of the world. Some of its **problems** are over-specialization; the limitation of economic perspectives to what is traded in the market; the fact that people are secondary; the economic benefits of negative activities; unjust relations in trade and the global economy; a narrow view of employment; waste and pollution; the economists' short-term perspective; the preoccupation with growth; and the lack of global governance.

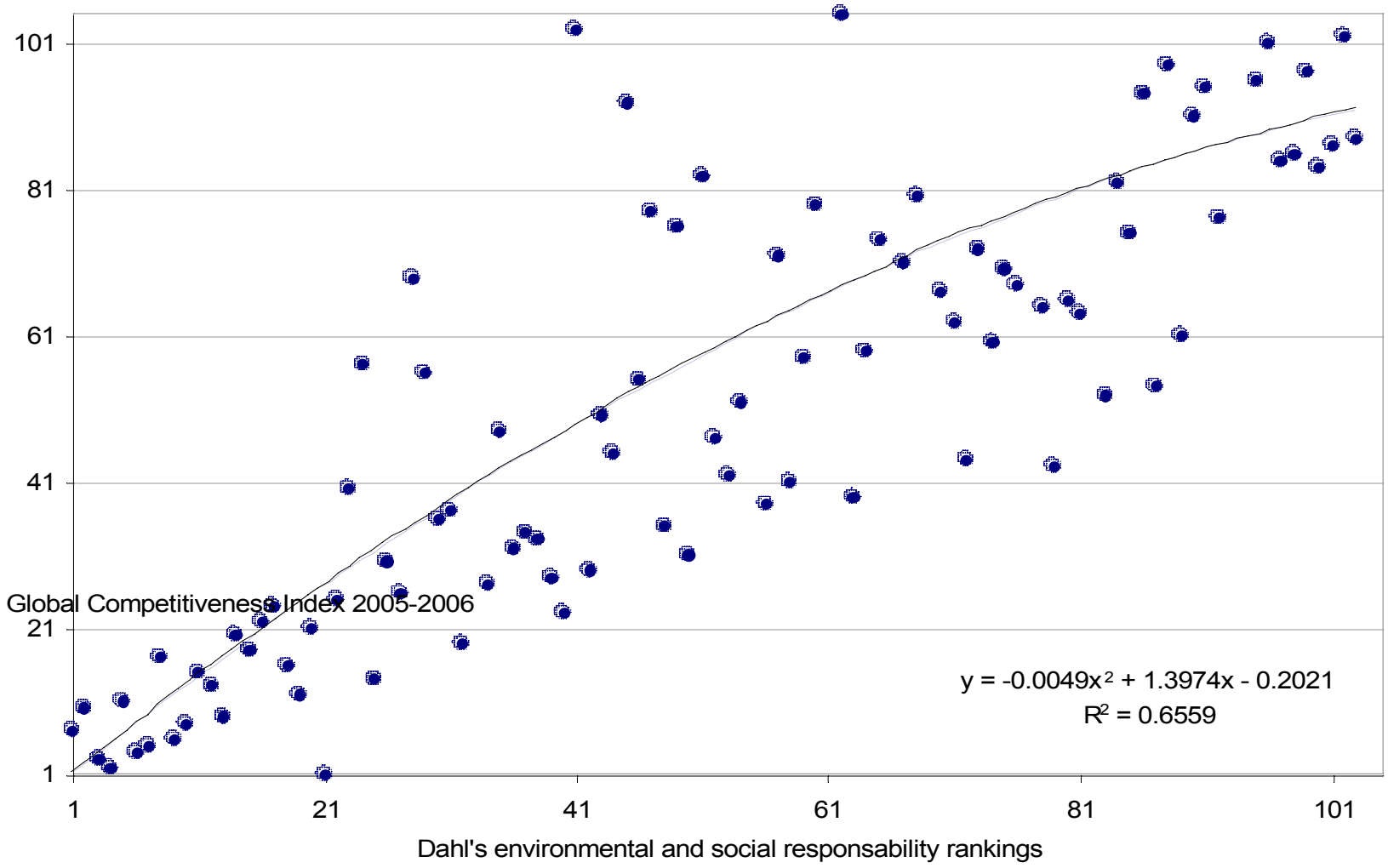
The Competitive Edge in Environmental Responsibility

Based on the

Executive Opinion Survey of the World Economic Forum

- Dahl, Arthur Lyon (2004). "The competitive edge in environmental responsibility", p. 103-110. In Michael E. Porter, Klaus Schwab, Xavier Sala-i-Martin and Augusto Lopez-Claros, *The Global Competitiveness Report 2004-2005*. World Economic Forum. Houndmills, UK and New York: Palgrave Macmillan.

Competitiveness vs. Social and Environmental Responsibility

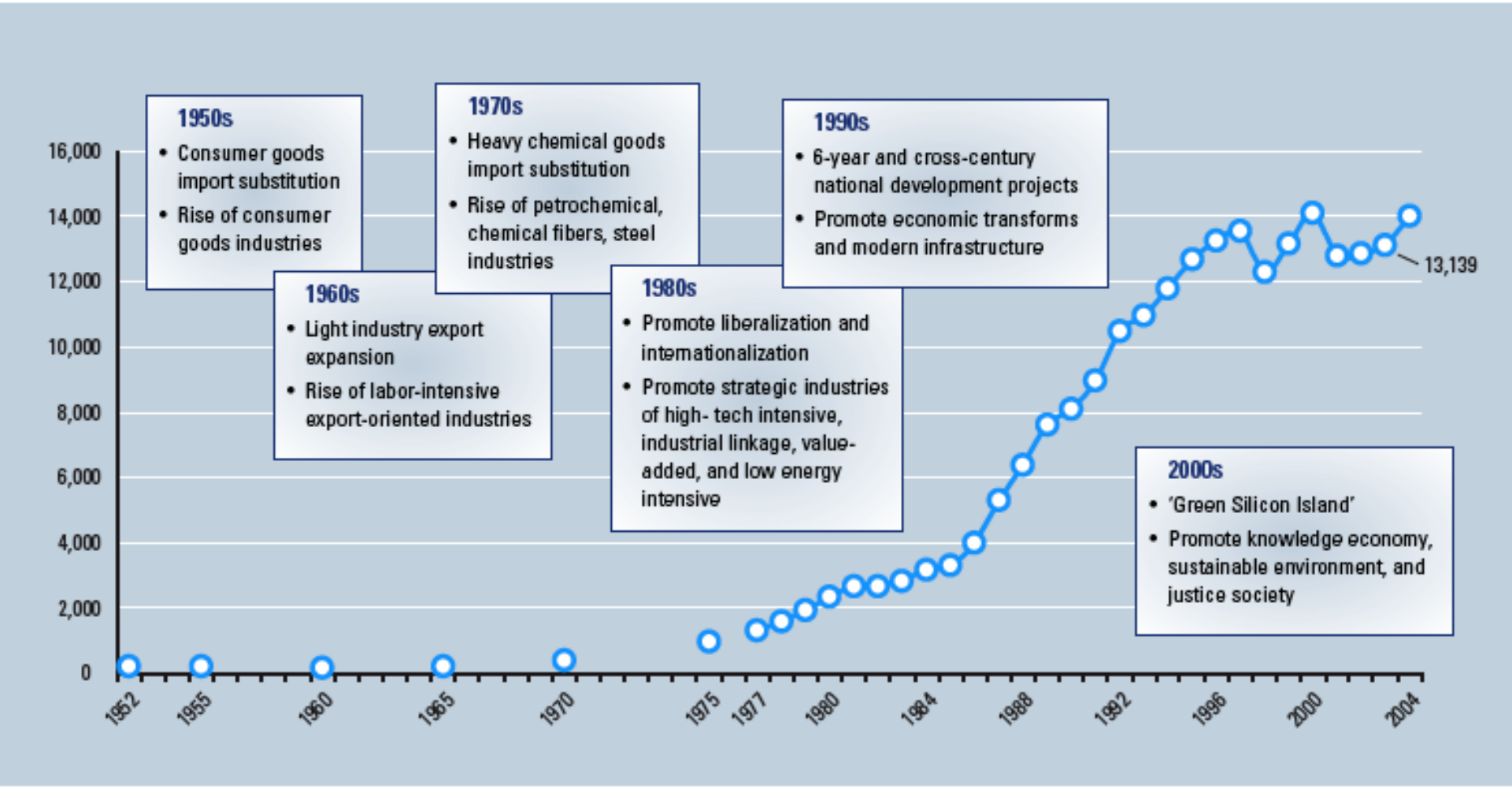


Taiwan as a case study

- How could a poor tropical island country see its GNP/capita go from $196 to $14,032 in 50 years?
- 13th in World Economic Forum Global Competitiveness Ranking
- 7th in WEF Technology Index
- 4th in production value of IT hardware

Arthur L. Dahl and Augusto Lopez-Claros. **"The Impact of Information and Communication Technologies on the Economic Competitiveness and Social Development of Taiwan"**, Chapter 3.3, pp. 107-118, in Soumitra Dutta, Augusto Lopez-Claros and Irene Mia, ***The Global Information Technology Report 2005-2006: Leveraging ICT for Development***. *World Economic Forum/INSEAD. Houndmills and New York: Palgrave Macmillan, 2006.*

Taiwan GNP per capita income
and historical development of economy



Source: Center for Economic Planning and Development, 2005b.

European Bahá'í Business Forum

Board of Directors, 2001-present

http://www.ebbf.org

Systems Indicators

(Mark Tobey, *Lovers of Light*, 1960)

What is an indicator?

An indicator is a sign that stands for or represents something, or more specifically a variable that summarizes or simplifies relevant information, makes a phenomenon visible or perceptible, or quantifies, measures and communicates relevant information

(Gallopin, in Moldan et al., 1997).

Indicators of Sustainability

- **Commission on Sustainable Development** indicators:
  http://www.un.org/esa/dsd/dsd_aofw_ind/ind_csdindi.shtml
- **Environmental Sustainability Index** (ESI):
  http://www.yale.edu/esi/
- **Environmental Performance Index** (EPI):
  http://www.yale.edu/epi/
- **Environmental Vulnerability Index** (EVI):
  http://www.vulnerabilityindex.net/
- **SCOPE projects on indicators of sustainability**

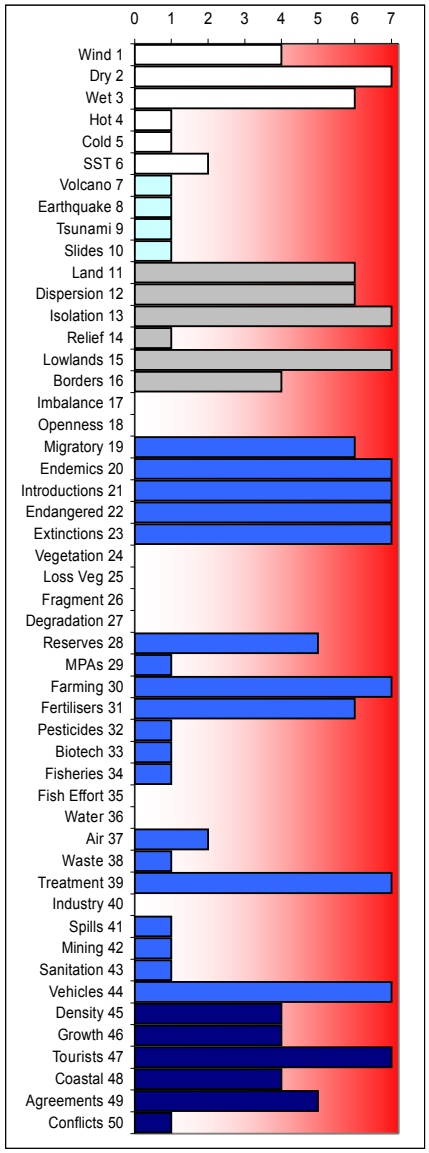
More about indicators on the IEF indicators page:
http://iefworld.org/elind.htm

The Environmental Vulnerability Index EVI 2004

UNEP

SOPAC

Cook Islands



Resilient ⟷ Vulnerable
Blanks = No data or Not applicable;
EVI scores are 1-7

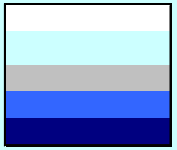
	SCORE	DATA%
EVI	**383**	**82**
CLASSIFICATION:	**Extremely vulnerable**	

ASPECTS OF VULNERABILITY:

Hazards	3.07	84
Resistance	5.50	100
Damage	5.00	60

LEGEND FOR INDICATOR TYPES:

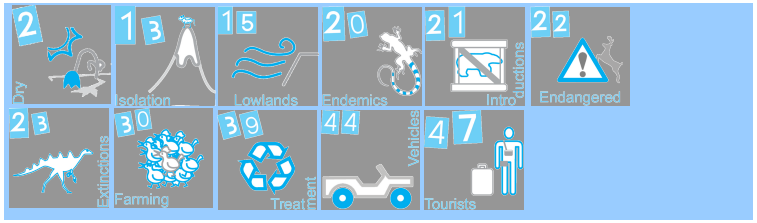
Weather & Climate
Geology
Geography
Resources & Services
Human Populations



POLICY-RELEVANT SUB-INDICES:

Climate Change	4.36	85
Exposure to Natural Disasters	2.82	100
Biodiversity	5.21	74
Desertification	3.86	64
Water	4.56	69
Agriculture / Fisheries	4.09	58
Human Health Aspects	3.40	83

ISSUES OF GREATEST ENVIRONMENTAL VULNERABILITY:

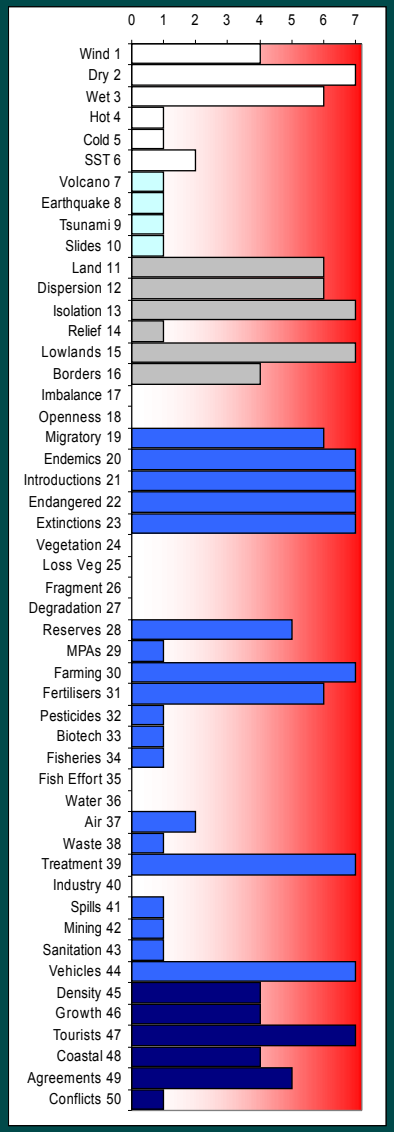


ISSUES OF LEAST VULNERABILITY OR GREATEST RESILIENCE:

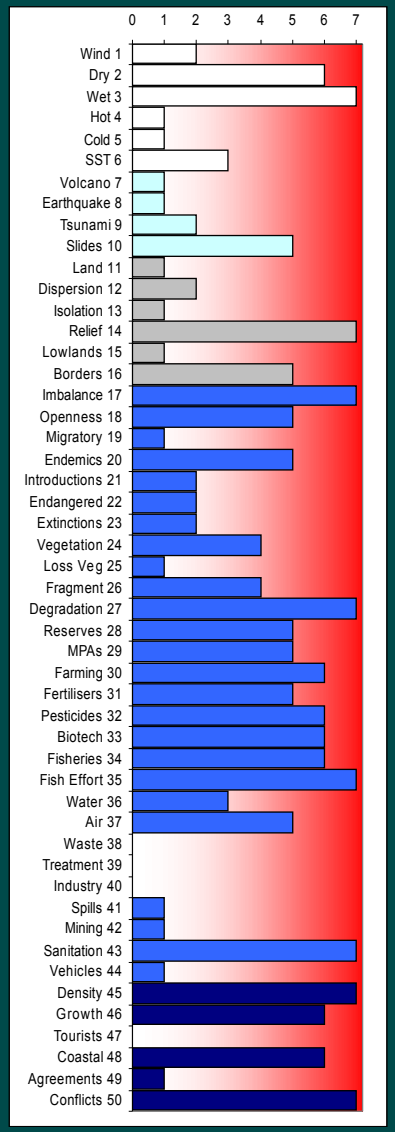
CHANGES SINCE LAST EVALUATION None, this is first assessment

11/01/2005

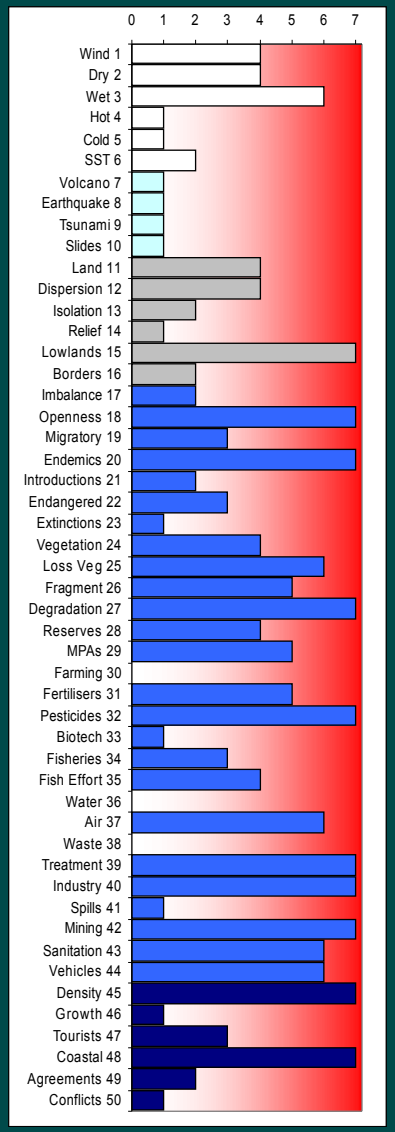
Cook Islands



India

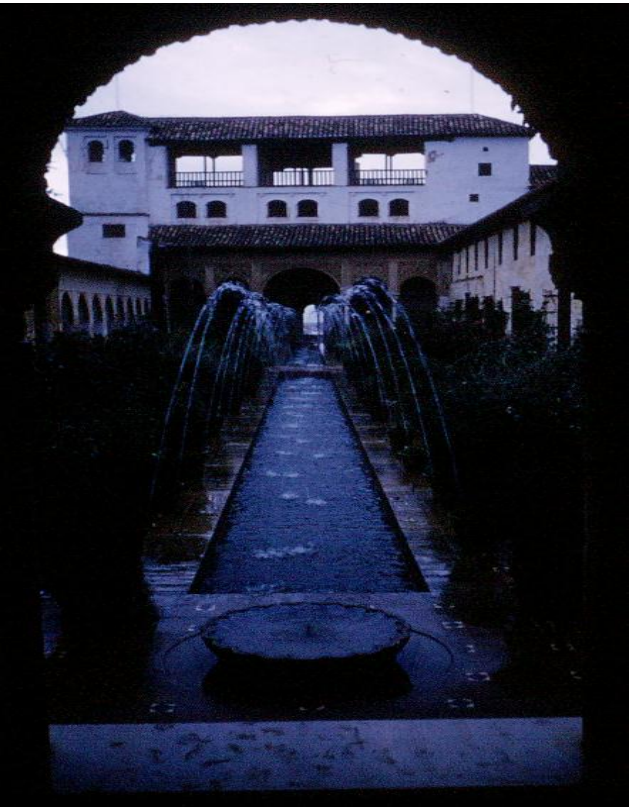


Trinidad & Tobago



The way forward - a systems view

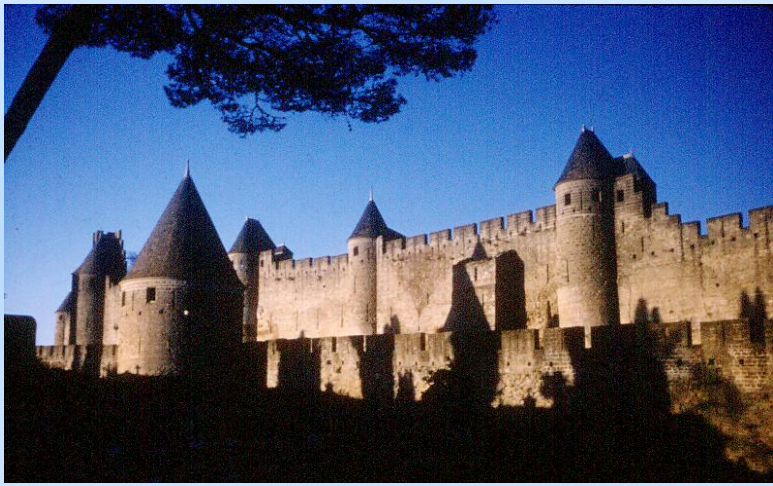
(Mark Tobey, *The New Day*, 1945)



Civilizations have come and gone, and ours?

Choices before society

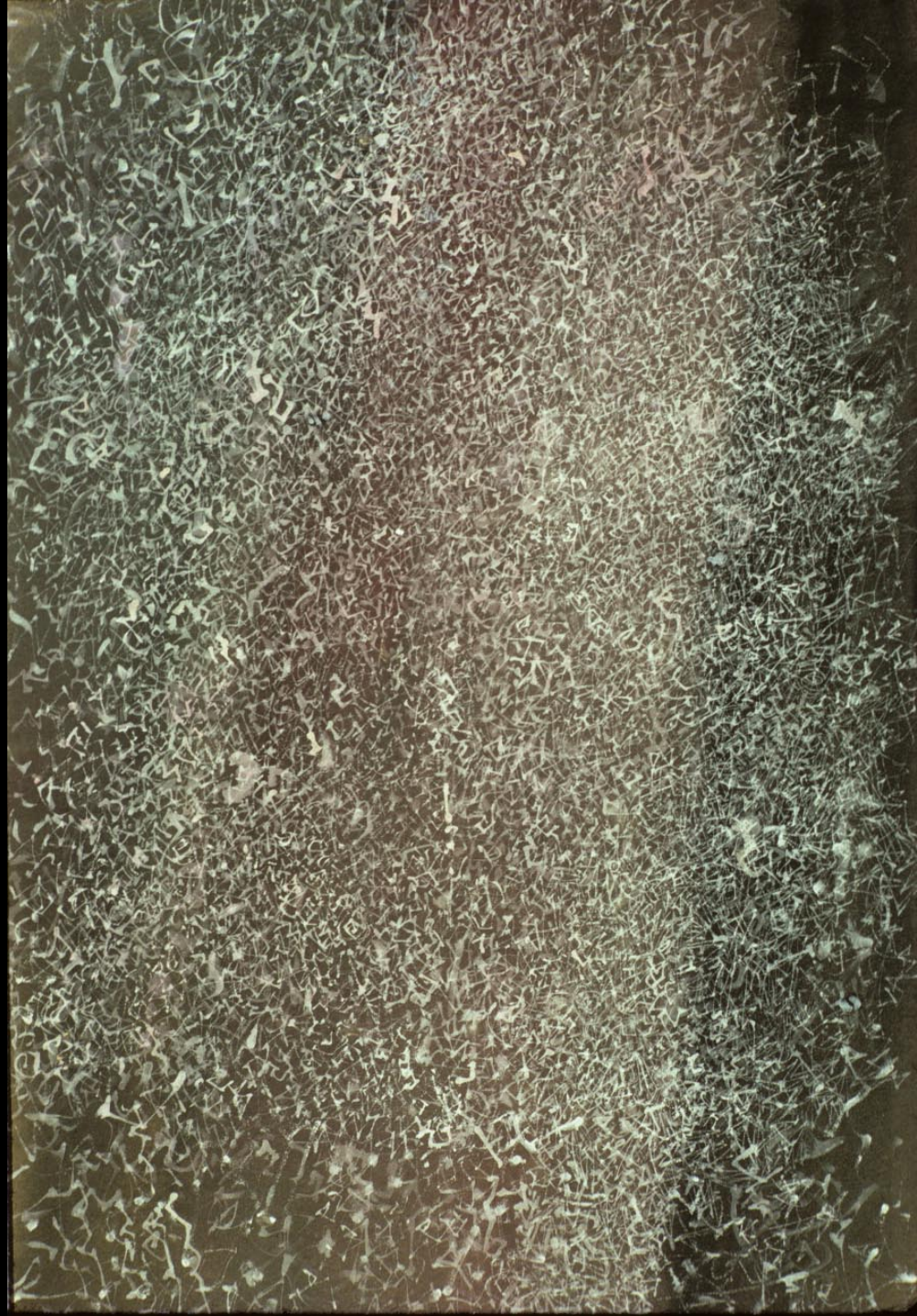
- Business as usual
- Fortress world
- Transition to sustainability



Adding a fourth dimension to Sustainability

- It is customary to consider three dimensions or "pillars" of sustainable development: economic, social and environmental
- It is necessary to add a fourth dimension, less tangible but equally important, including the cultural, institutional or organizational, and ethical/spiritual aspects defining the rules by which human society operates
- In systems terms, this is the information dimension

Human Systems have a Spiritual Dimension



(Mark Tobey,
Meditative Series No.VIII, 1954)

Human Life
A complex multilevel system

- Biological organism
- Social entity, complex communities
- Potential for emergent properties of a “spiritual” being with ethics, values, ideals
- Struggle of self/ego towards mature altruistic adult
- Growth of intangible (soul) towards absolute (God)

Spirituality

- The science of the physical world lacks tools to address this level of widespread human experience.
- It is unreasonable, even arrogant, to deny the importance of this level and to limit reality to only what science can measure.
- Religion, defined as a knowledge system and a domain of human experience, rather than specific institutional manifestations, has a place in considerations of sustainability.

Sustainable development is at the interface of science and ethics

- We need to redefine "development" (= growth for economists) within a more universal framework including society, culture, science and spirituality
- What is our purpose as individuals and as a society? What is our vision of the future?
- Ethics and values are what determine how humans relate to each other
- They are the social equivalent of DNA, encoding the information through which society is structured

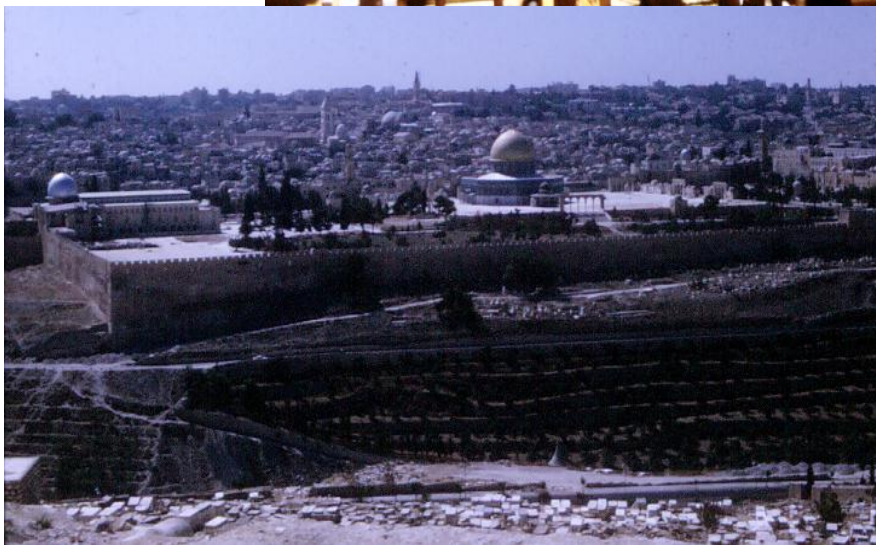
Ethical system for sustainability

- Behaviour change is fundamental to transition to sustainability
- Requiring motivation, emotional commitment, self-sacrifice, spirit of service
- Are there “selfish values” with collective evolutionary advantage that tip balance toward altruism and cooperation?
- Oneness of humankind with higher levels of organization, complexity and efficiency
- What values do we “programme” humans with to evolve a more desirable society?

Some values for sustainability

- Unity in diversity
- Solidarity – elimination of poverty
- Justice
- Trustworthiness
- Moderation
- Social responsibility
- A cooperative and altruistic economic system creating employment for all
- Sustainable environmental management

Religion is the ethical domain of human experience



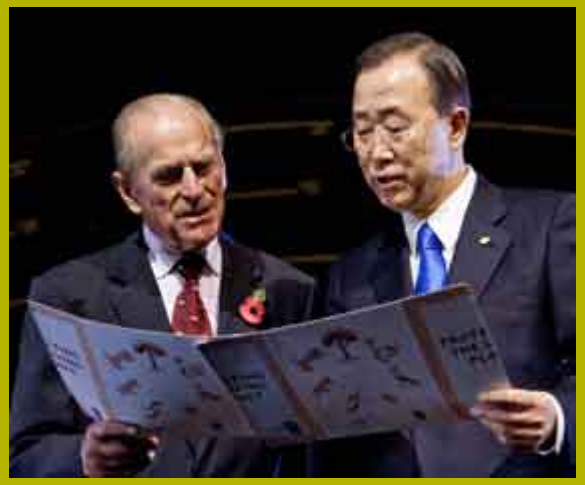
My spiritual direction has come from the Bahá'í Faith

- Evolutionary concept of religion, one common faith
- Harmony of science and religion
- Oneness of humanity
- Independent investigation of truth
- Sustainable environmental management
- Moderation in material civilization
- Federated world government
- Essential part of my personal life system

Science and Religion

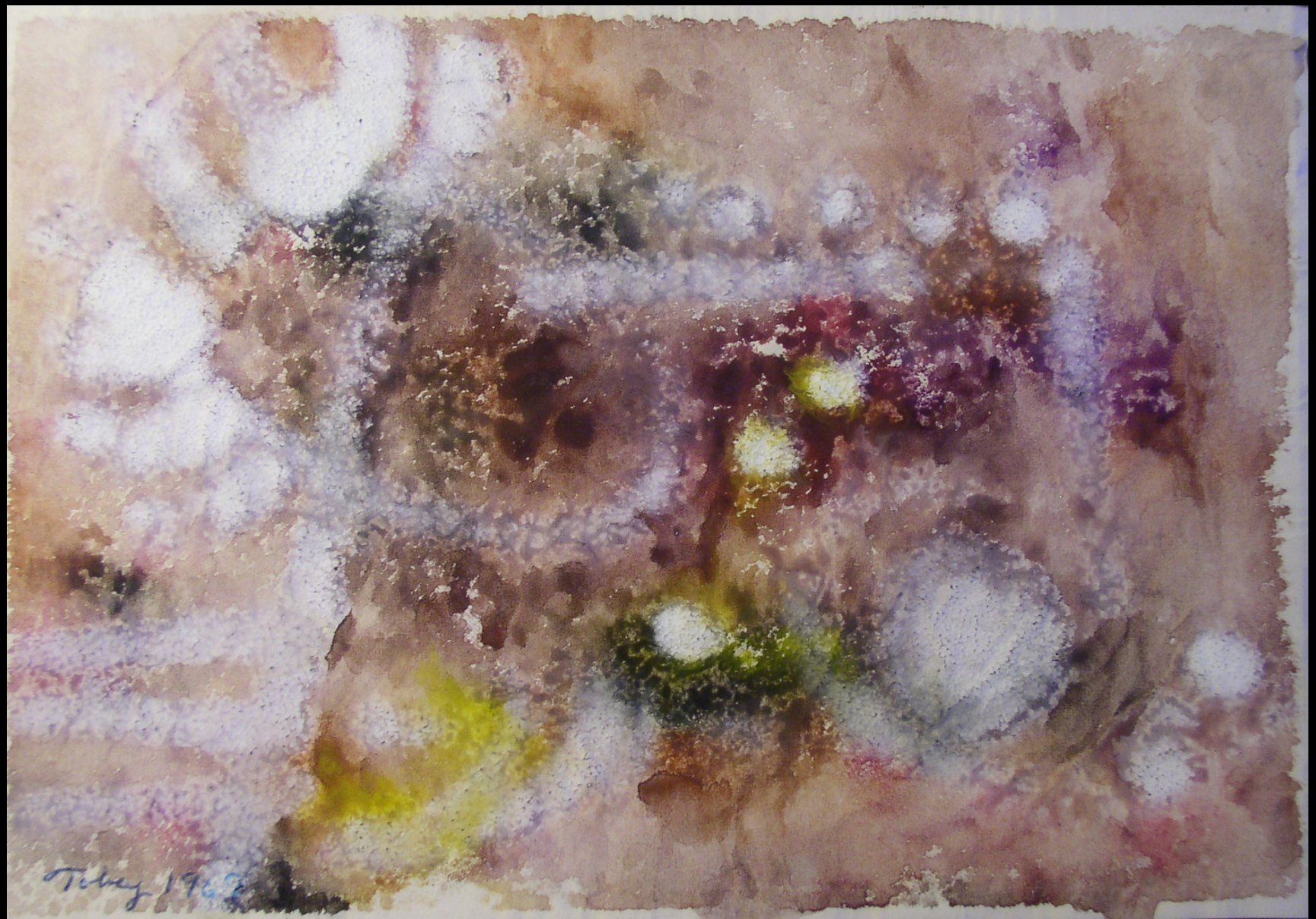
- Two great knowledge systems
- Complementary: science is values neutral; religion focuses on values
- One underlying truth
- Both require reason
- Must be in balance
- Science without religion → materialism
- Religion without science → superstition

Windsor Celebration of Climate Change Action Plans 2009



Values-based Indicators

(Mark Tobey, untitled, 1967)



The concept behind this conference

- All of this provides an explanation for the logic of this conference and the values-based indicators project that has organized it.
- We started by asking if we can measure that values dimension or its manifestations.
- Our aim was to make the invisible visible (and thus recognize the importance of values in human systems behaviour and the need to manage for and increase them).
- We wanted tools to direct our own evolution towards an ever-advancing civilization.

ESD inds

The Development of Indicators and Assessment Tools for CSO Projects Promoting Values-based Education for Sustainable Development

ESDinds project

Measuring the values dimension in projects and organizations

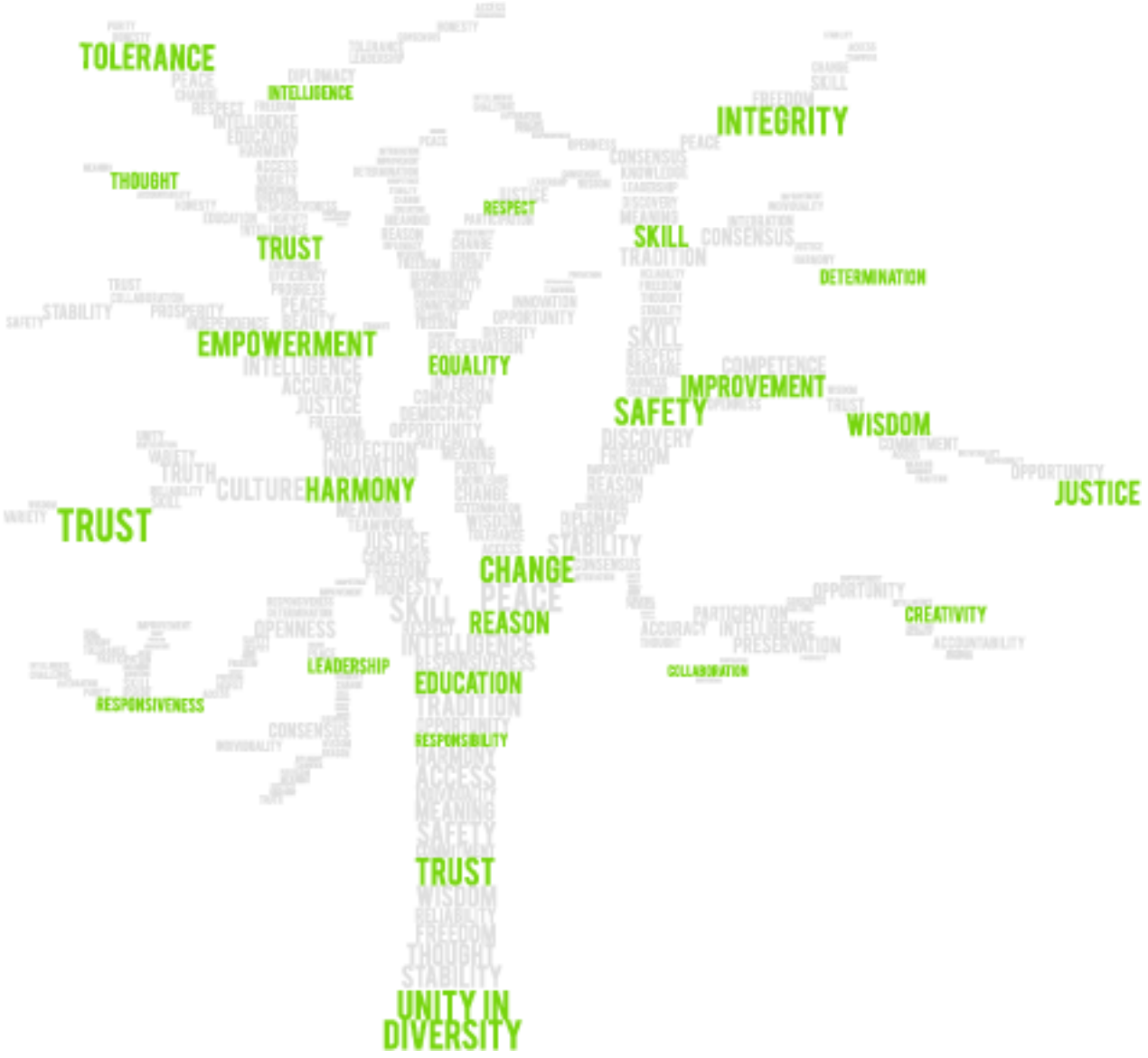
Making the Invisible Visible

wevalue.org

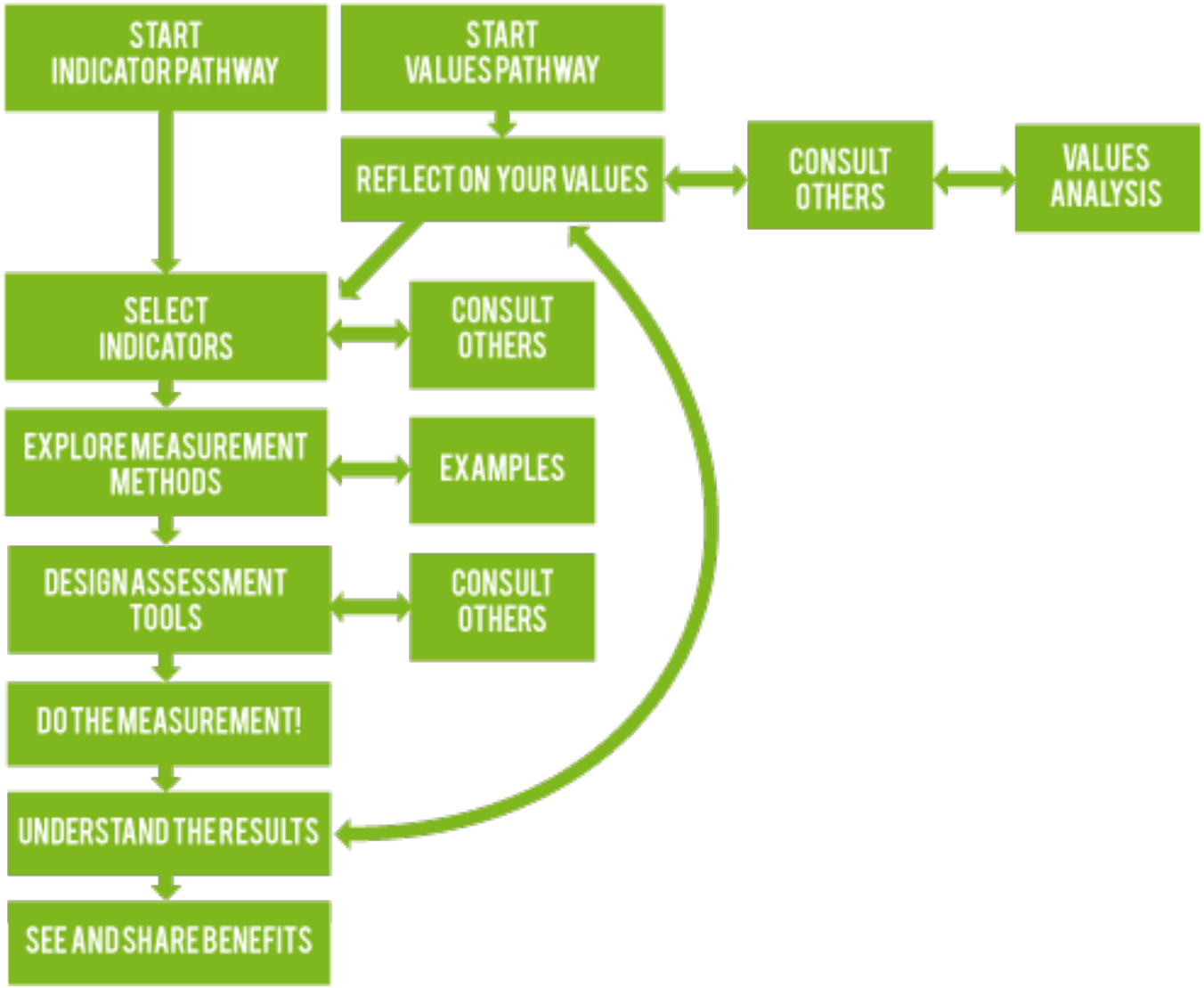
tools for values-based indicators

Building a community of interest in values-based indicators

WE VALUE.ORG


TOLERANCE
INTELLIGENCE
INTEGRITY
THOUGHT
RESPECT
TRUST
SKILL
DETERMINATION
EMPOWERMENT
EQUALITY
IMPROVEMENT
SAFETY
WISDOM
JUSTICE
HARMONY
TRUST
CHANGE
REASON
CREATIVITY
LEADERSHIP
EDUCATION
COLLABORATION
RESPONSIVENESS
RESPONSIBILITY
TRUST
UNITY IN DIVERSITY

The WeValue Process



What integrative principles?

A systems approach to life in many dimensions

(Mark Tobey, *Aerial Centers*, 1967)

Elements of a sustainable systems paradigm

- balance
- moderation/optimal size
- subsidiarity
- efficiency
- de-materialization
- integration, closed cycles
- management of information
- indicators
- natural systems as inspiration

To achieve sustainability, we must...

- redefine our goal and purpose based on the oneness of humanity
- understand the evolutionary processes pushing globalization
- identify the major driving forces behind unsustainable trends
- define and implement the responses necessary to put us on sustainable trajectories
- establish a foundation of ethical principles to motivate changes in human behaviour

The Human Transformation

- Defining a framework of values necessary to choose the right direction towards human prosperity, sustainability, and an ever-advancing world civilization based on the oneness of humanity.
- Science and religion, the two great complementary knowledge systems, must be in balance, to help us understand not only what and how, but why?
- Everyone must be educated in science and values, investing in human capital as the best way to develop human potential.
- Education is also the only way to ensure sustainability across generations.


No need for central planning


If we get the roles and rules right,
the systems will then evolve
sustainably in all their diversity

Academic Disciplines

- Other coherences than disciplinary coherence
- Have courage to go beyond disciplinary boundaries
- Reach beyond science, while asking scientific questions
- Use scientific method with an open mind as to its limitations
- Have honesty to recognize that we cannot know everything, rather than limiting ourselves to what we can know
- Real solutions lie beyond any one discipline, require progress at multiple levels and in many dimensions of society from values to governance

Need a new
Academic Field

- research and training in broad systems integration
- scenarios
- strategic planning
- human values and motivation
- generalists, able to look at the highest levels of organization and systems behaviour and management

to guide us towards sustainability

New Approach to Education

- Ultimately, education should empower everyone with the ability to see both the large picture and the specific actions needed at the community level within an ethical framework
- Multiple approaches to sustainability will then evolve naturally and organically as civilization advances.
- This systems perspective can inspire a new generation to see present environmental problems not as disaster but as an opportunity.

Thank you

and thank you to the
University of Brighton
for honouring me in this way

All photographs except Windsor by Arthur Lyon Dahl

Mark Tobey 1890-1976 American artist and Baha'i

More information on the themes raised in this lecture and the papers cited can be found on my web site at

http://yabaha.net/dahl

and on the web site of the

International Environment Forum A Baha'i inspired organization addressing the environment and sustainable development

http://iefworld.org