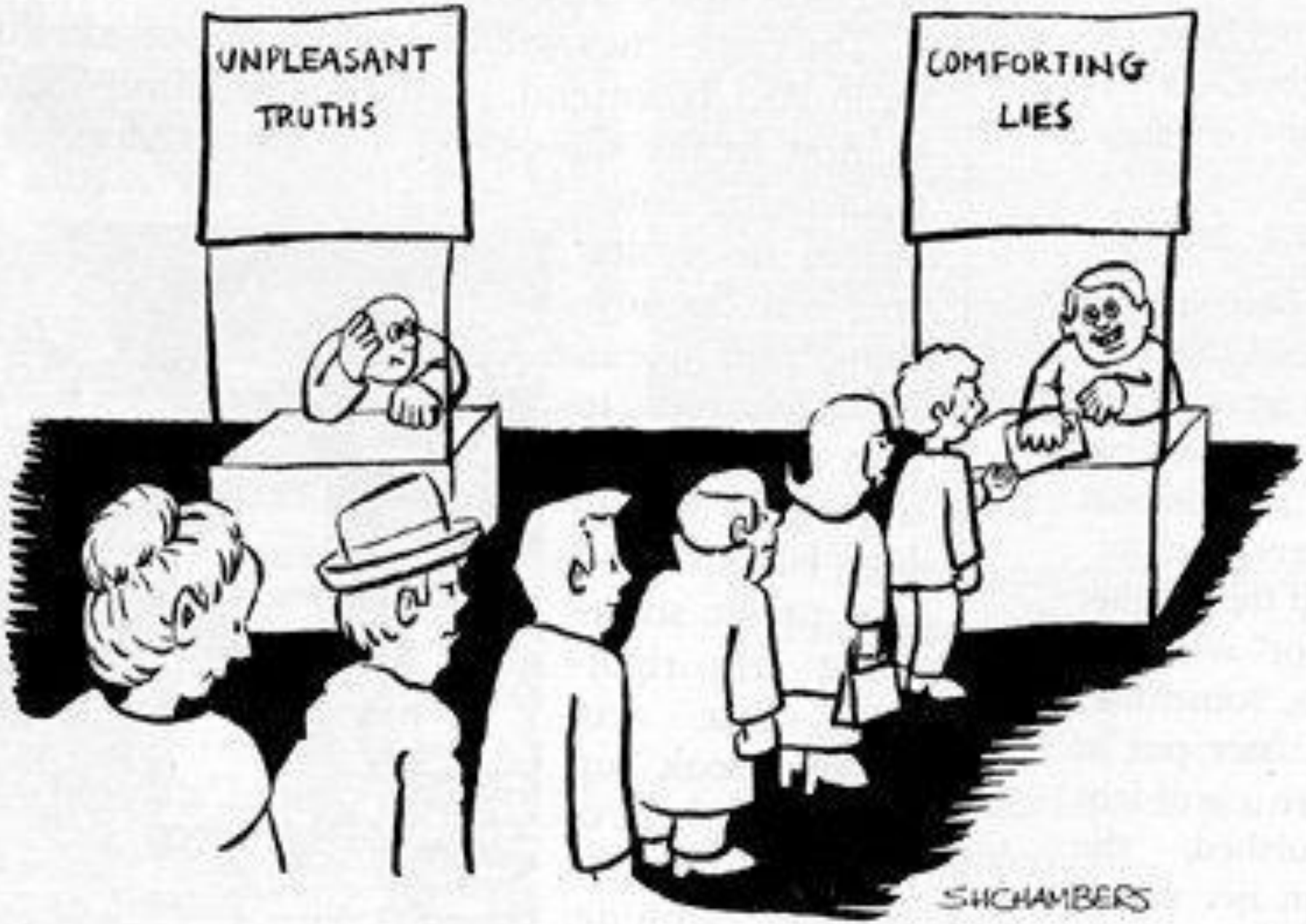
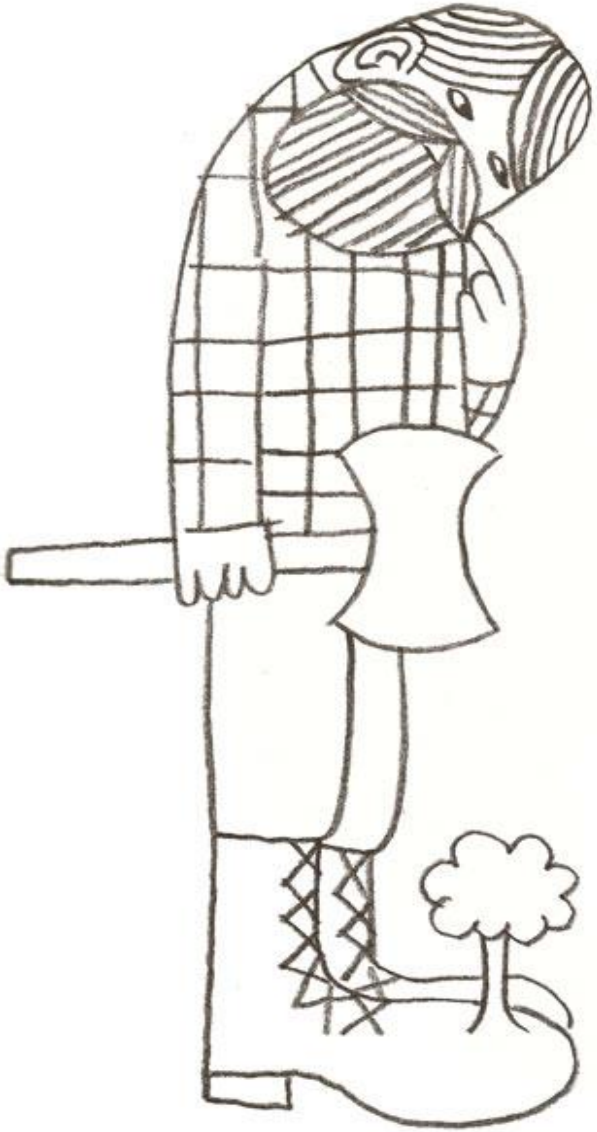
Principles of natural systems

- Anyone who believes that exponential growth can go on forever in a finite world is either a madman or an economist.

Kenneth E Boulding


WHAT YOU ENVIRONMENTALISTS HAVE GOT TO UNDERSTAND IS THE DESTRUCTION OF THE PLANET MAY BE THE PRICE WE HAVE TO PAY FOR A HEALTHY ECONOMY!


UNPLEASANT TRUTHS
COMFORTING LIES
SHCHAMBERS



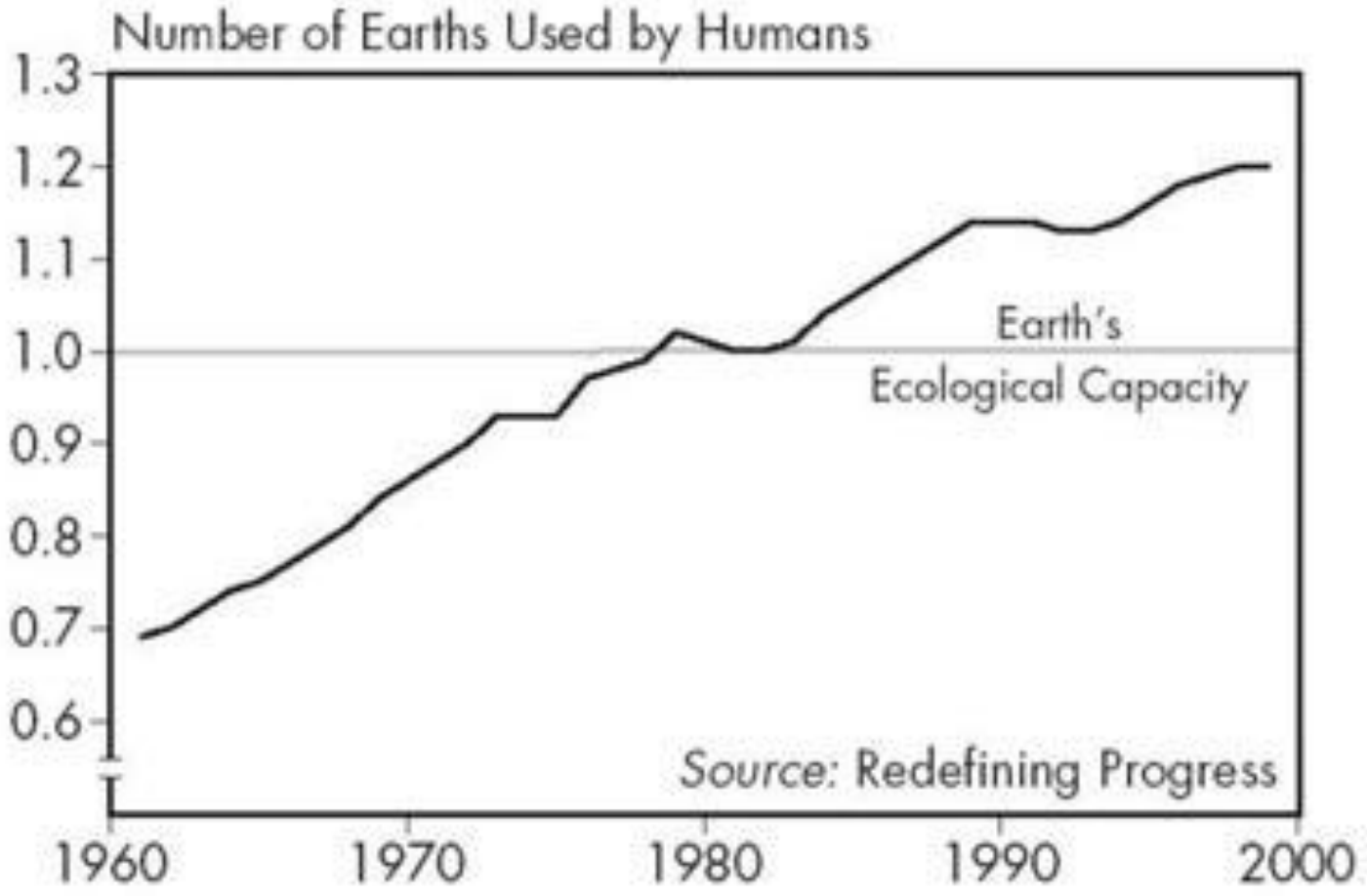
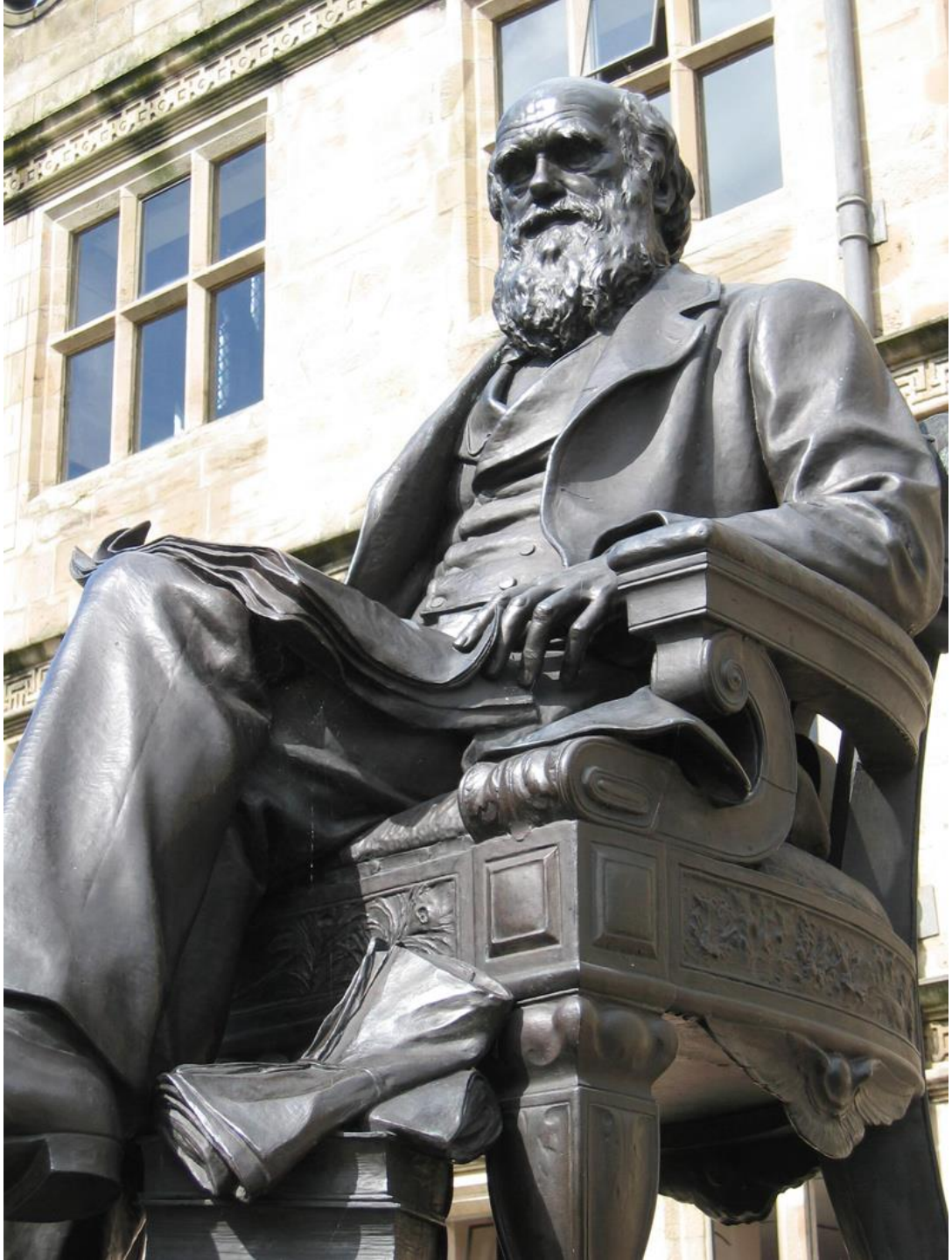


Figure 3: World Ecological Footprint, 1961–99

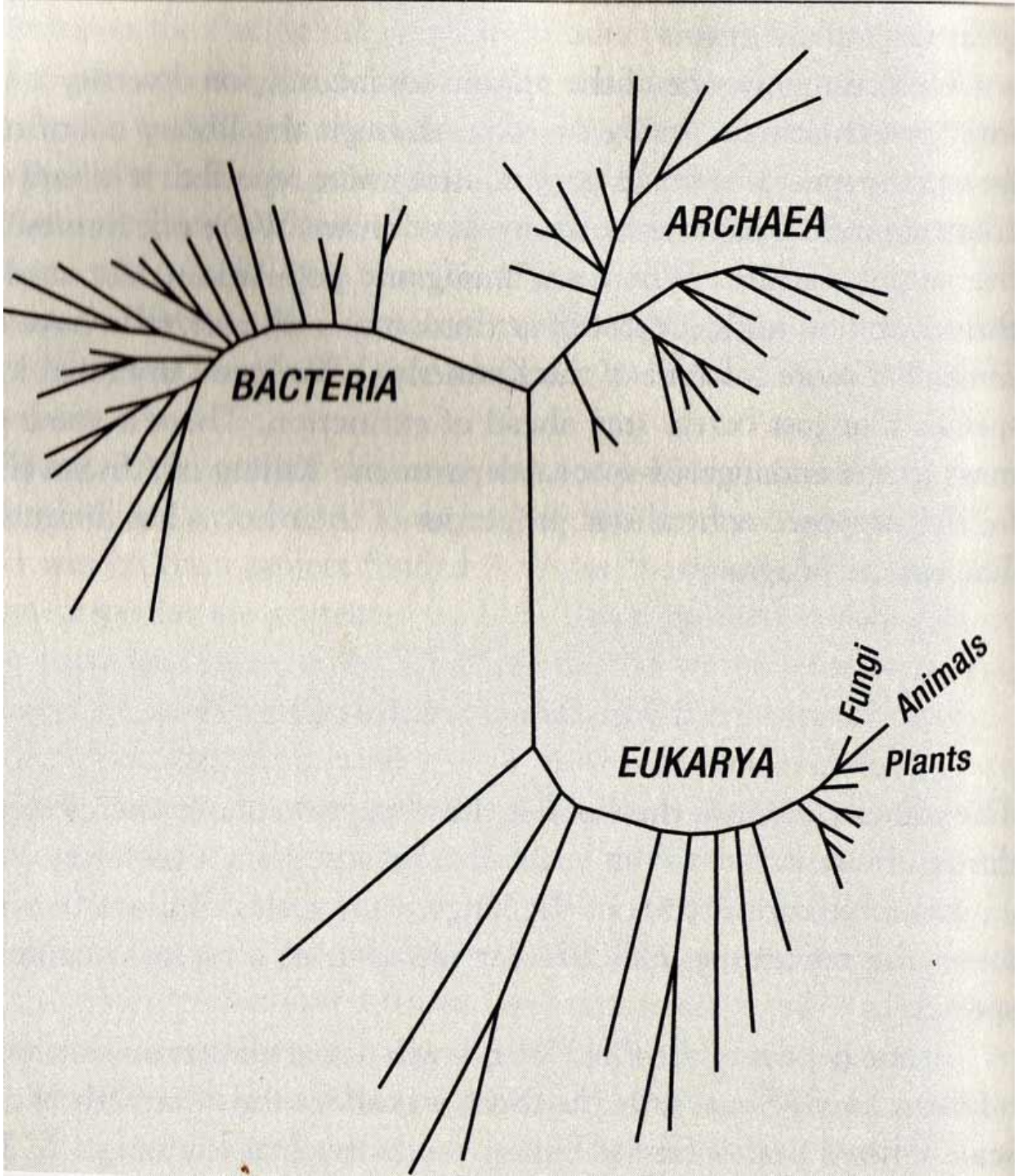
Nature as a teacher

- Exploring ecological principles



Observation

- The problem is the solution
- Make the smallest intervention required
- The most elegant solutions are so simple, they can even be invisible

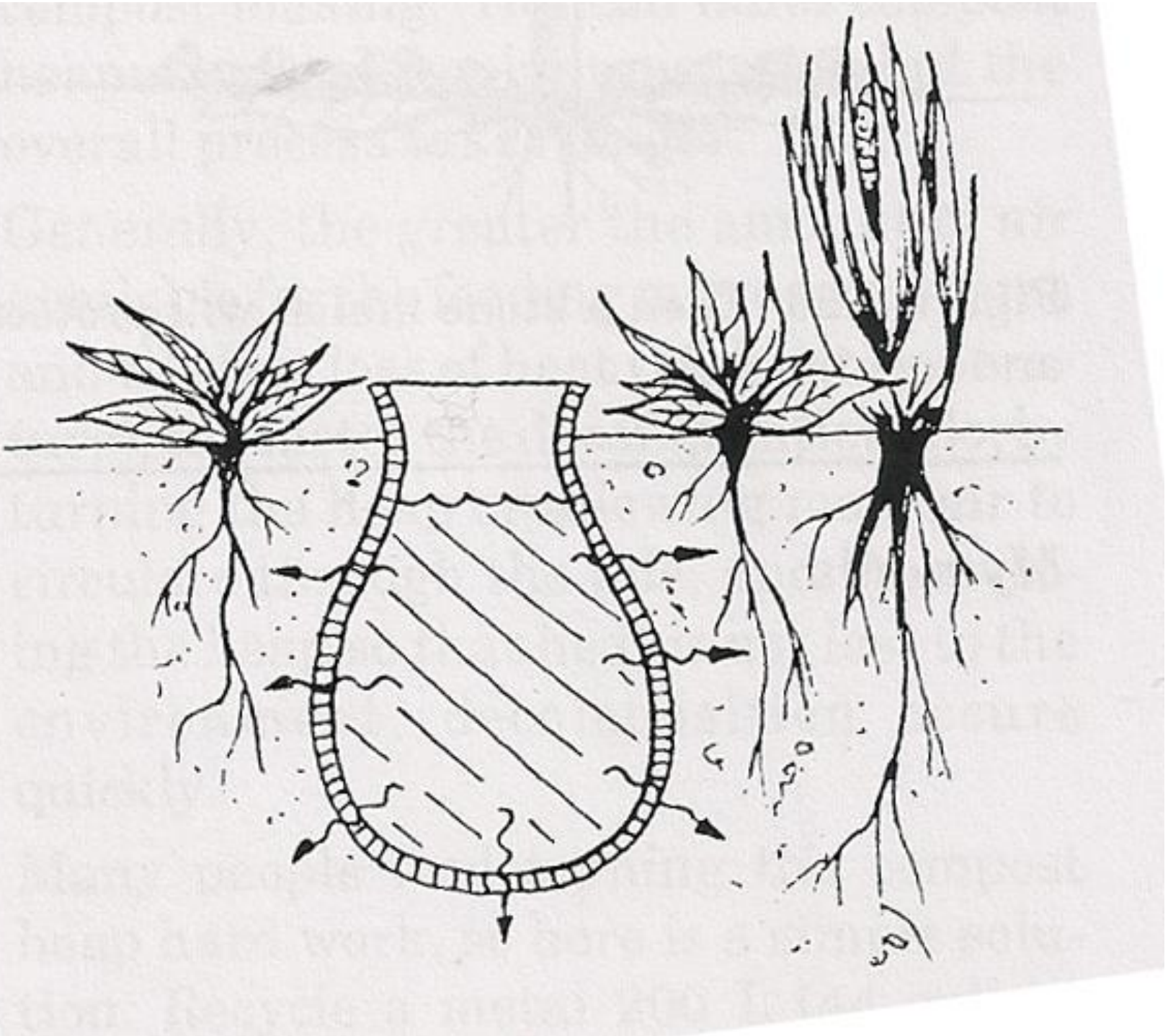

ARCHAEA
BACTERIA
EUKARYA
Fungi
Animals
Plants

Life is a chemical reaction

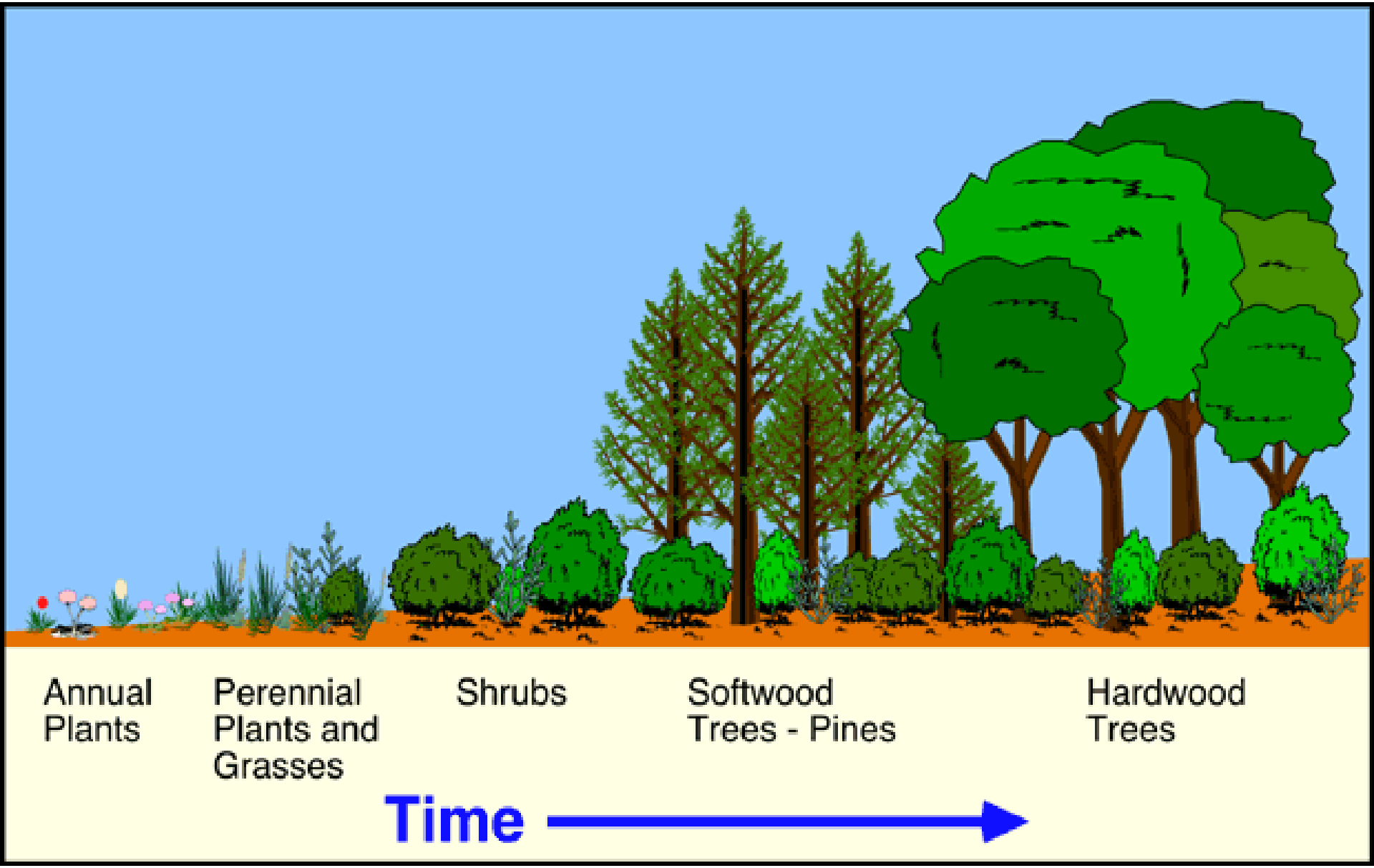
Catch & store energy

Photosynthesis, Sun + Air and Water makes sugar

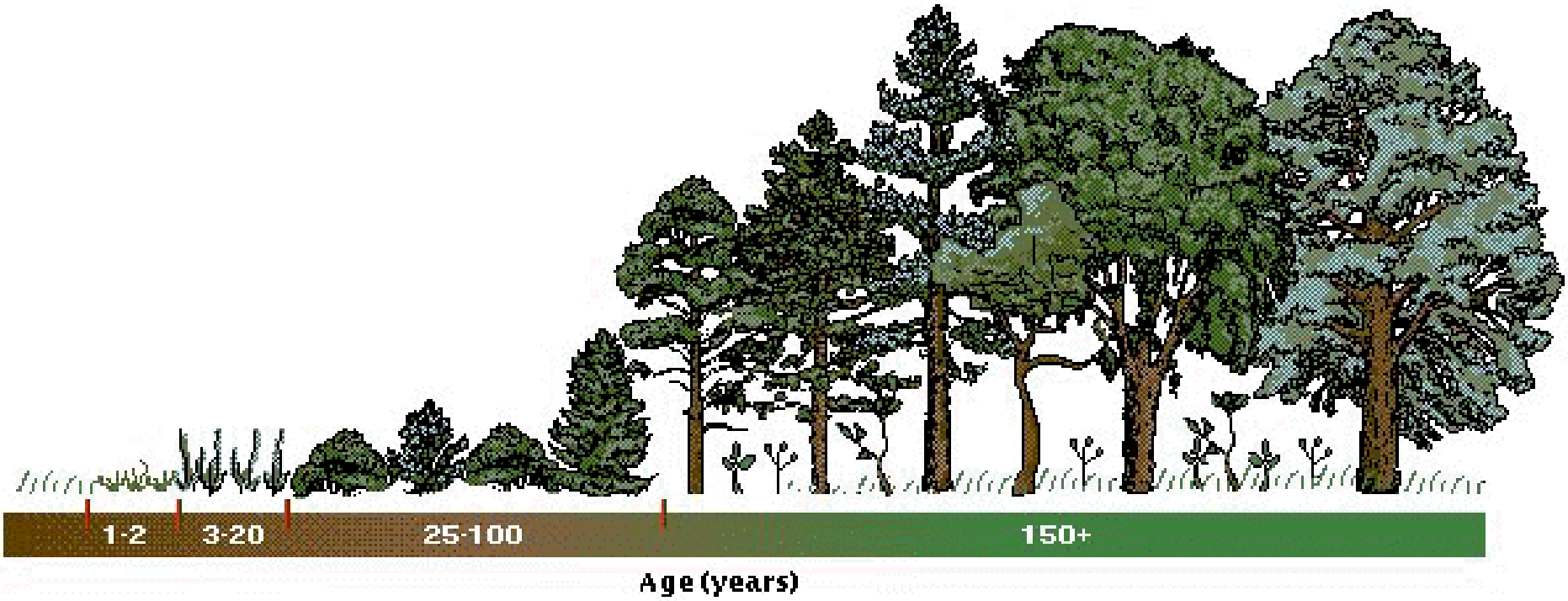
- $CO_2 + H_20$
- $6CO_2 + 12\ H_20 + \text{ENERGY} \rightarrow C_6H_{12}O_6 + 6O_2 + 6H_2O$




SCIENCE photo LIBRARY


Annual Plants
Perennial Plants and Grasses
Shrubs
Softwood Trees - Pines
Hardwood Trees
Time

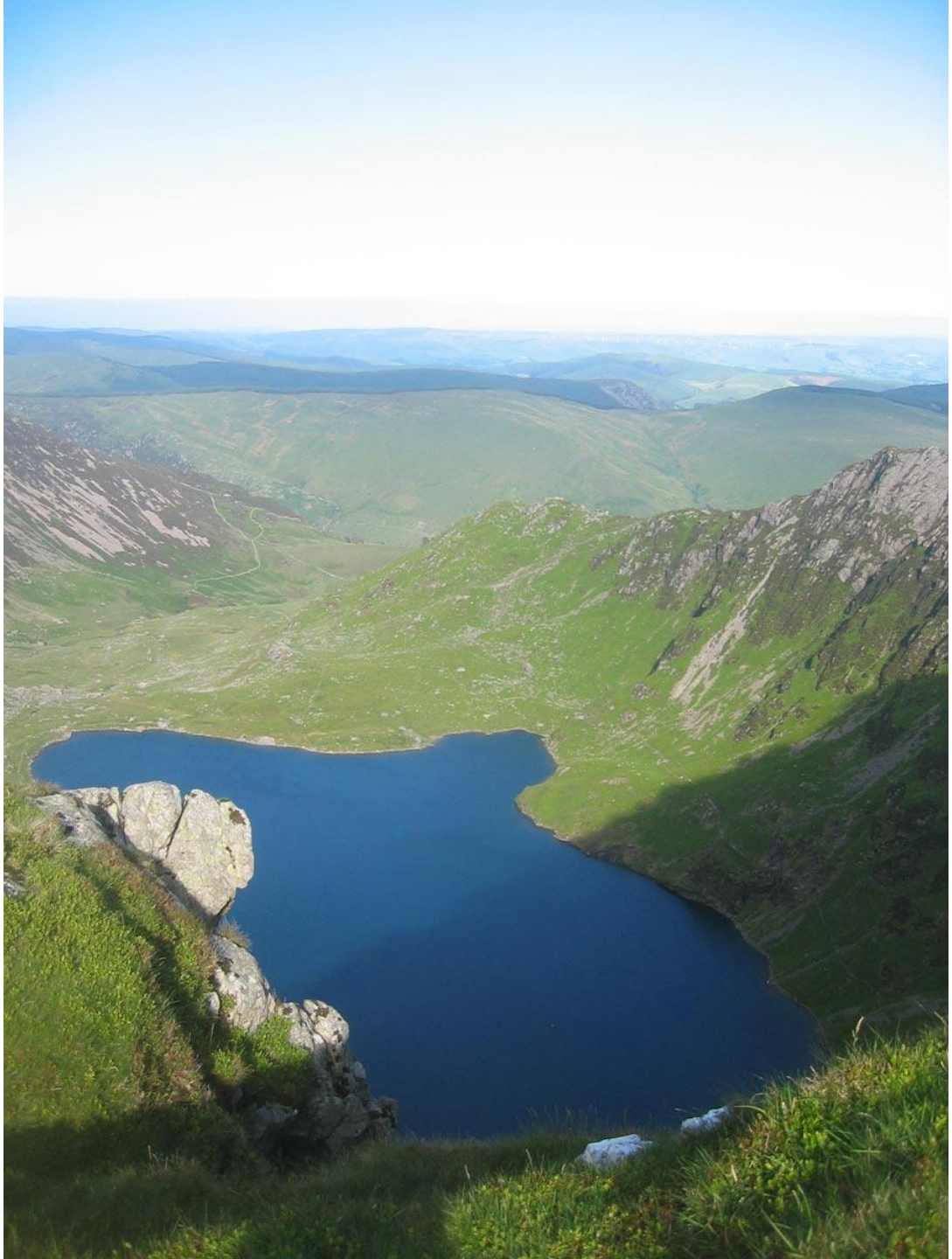
Time stacking



Evolution is ‘Survival of the most adaptive’

Specialism, not competition

- Succession: nature is irrepressible, no bare soil



Plants are communities – stacking, guilds.

Ecology is all about the interactions between things

Stacking, in Guerra's garden

Key principle

- **The yield of a system is theoretically unlimited** The only limit on the number of uses of a resource possible is the limit of information and imagination of designer.

Symbiosis
-complex, intimate mutually beneficial relationships

Key principle

- **Relative Location** Components placed in a system are viewed relatively, not in isolation. Functional Relationship between components.
- **Everything is connected to everything else** Recognize functional relationships between elements.

Key principle

- **Diversity** As a general rule, as sustainable systems mature they become increasingly diverse in both space and time.

- What is important is the complexity of the functional relationships that exist between elements not the number of elements.

Key principles

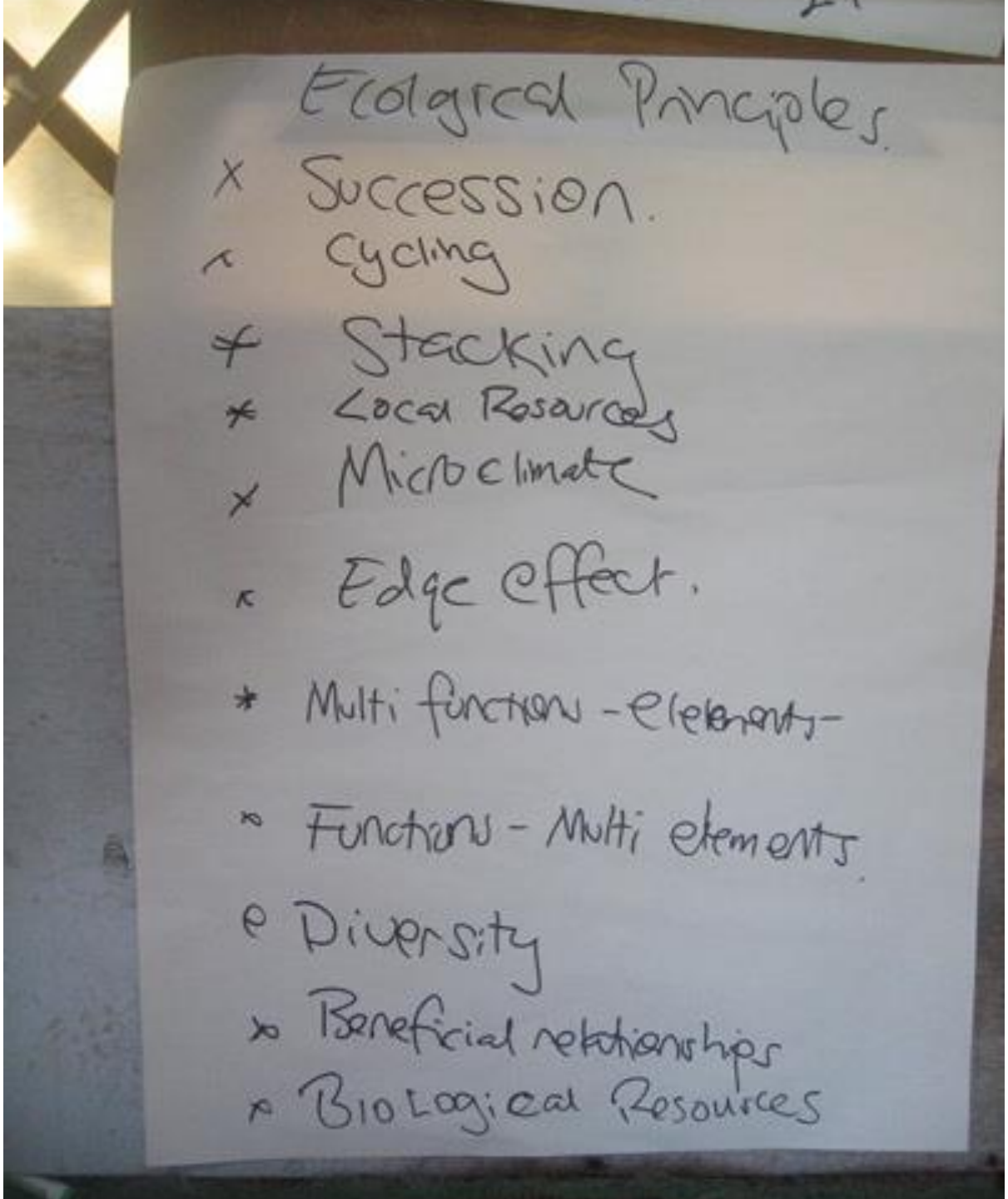
- Catch and store energy
- Use local resources
- Use natural resources
- Produce no waste

observations

- Succession
- Stacking
- Cycling
- Beneficial relationships
- Diversity
- Micro climate

- Multiple Functions and elements
- Local resources
- Biological resources

edge


Ecological Principles.
Succession.
Cycling
Stacking
Local Resources
Microclimate
Edge effect.
Multi function - elements -
Functions - Multi elements
Diversity
Beneficial relationships
Biological Resources

ethics

- The only ethical decision is to take responsibility for our own existence and that of our children
- Cooperation, not competition, is the very basis of future survival and of existing life systems
- Set limits to consumption

Some ecological design principles

- Multiple functions for elements
- Key functions supported by multiple elements
- Diversity
- Stacking
- Symbiosis – beneficial relationshsips
- No bare soil
- Edge effect
- No waste - cycling
- Local resources
- Biological resources

Permaculture design principles

- Re-summarized and presented by one of the co-originators of the Permaculture design concept.

A reunion of culture and nature

- Permaculture design principles can never be a substitute for practical experience and technical knowledge; however they may provide a framework for continuous evaluation of the site and situation specific solutions necessary to move beyond the limited successes of sustainable development to a reunion of culture and nature. *David Holmgren*

1 Observe and Interact

Beauty is in the eye of the beholder

2 Catch and Store Energy

Make hay while the sun shines

3 Obtain a Yield

You can't work on an empty stomach

4 Apply Self-regulation and Accept Feedback

The sins of the fathers are visited on the children unto the seventh generation

5 Use and Value Renewable Resources and Services

Let nature take it's course

6 Produce No Waste

A stitch in time saves nine

Waste not, want not

7 Design from Patterns to Details

Can't see the wood for the trees

8 Integrate Rather than Segregate

Many hands make light work

9 Use Small and Slow Solutions

The bigger they are, the harder they fall
Slow and steady wins the race

10 Use and Value Diversity

Don't put all your eggs in one basket

11 Use Edges and Value the Marginal

Don't think you are on the right track just because it is a well-beaten path

12 Creatively Use and Respond to Change

Vision is not seeing things as they are but as they will be