

How do ecosystems change over time?
What are the causes of these changes?

2.6.5 Describe the **concept and processes of succession in a named habitat**

<http://www.youtube.com/watch?v=sRXbeEZzfdI>

Secondary succession...

helps clarify the concept of secondary succession but lacks theory
...nevertheless, it's entertaining and mildly funny!

Key words

- Primary succession
- Secondary succession
- Zonation
- Habitat
- species
- Seral (sere) stages
- Pioneer community
- Community
- Population
- 'r' species
- 'K' species
- Climax community

- **Community:**

the *population* of all *species* in an area and this includes insects, birds and mammals as well as plants.

- *What is a population?...*

- *What is a specie?...*

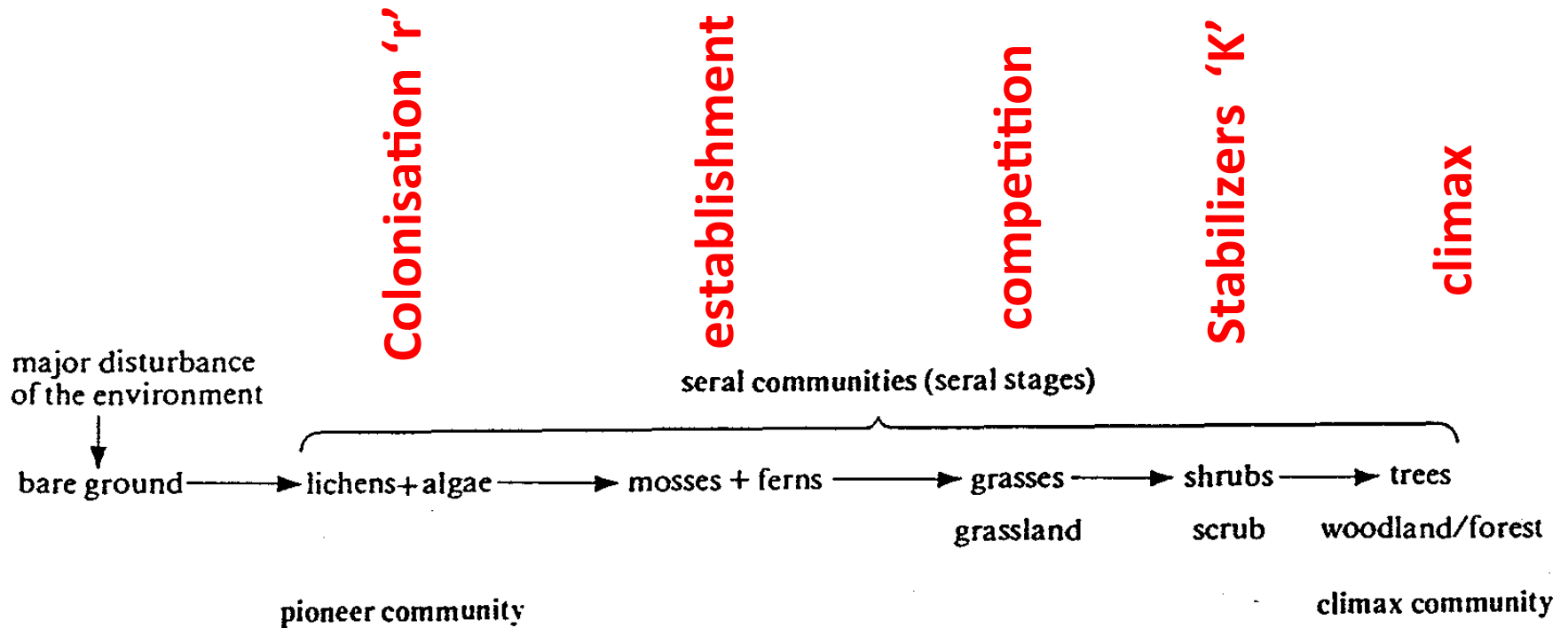
Misconception:

succession and zonation are the same

- Succession: the *changes* in species composition of an area over *time* (temporal); communities of plants and animals *change* the environment in which they are living.
- Zonation: the *variation* of species or communities over a particular *area* (*spatial*)

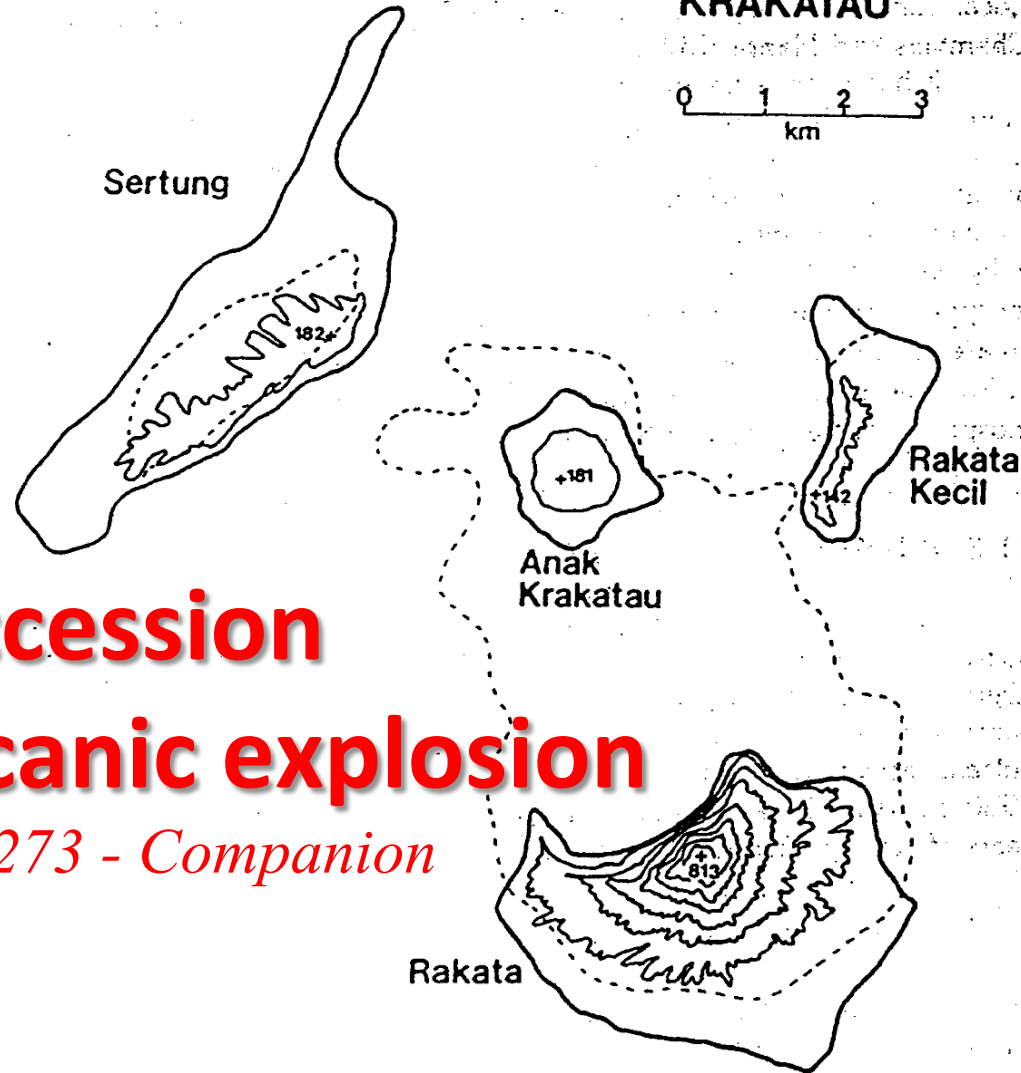
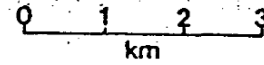
- Succession changes occur in stages called *seres*, starting from a *pioneer community* until it reaches a *climax community* when the species composition stop changing
- Succession can be *primary* or *secondary*

Typical Seres of Primary Succession



**2.6.5 Describe the concept and
processes of succession
in a named habitat**

KRAKATAU



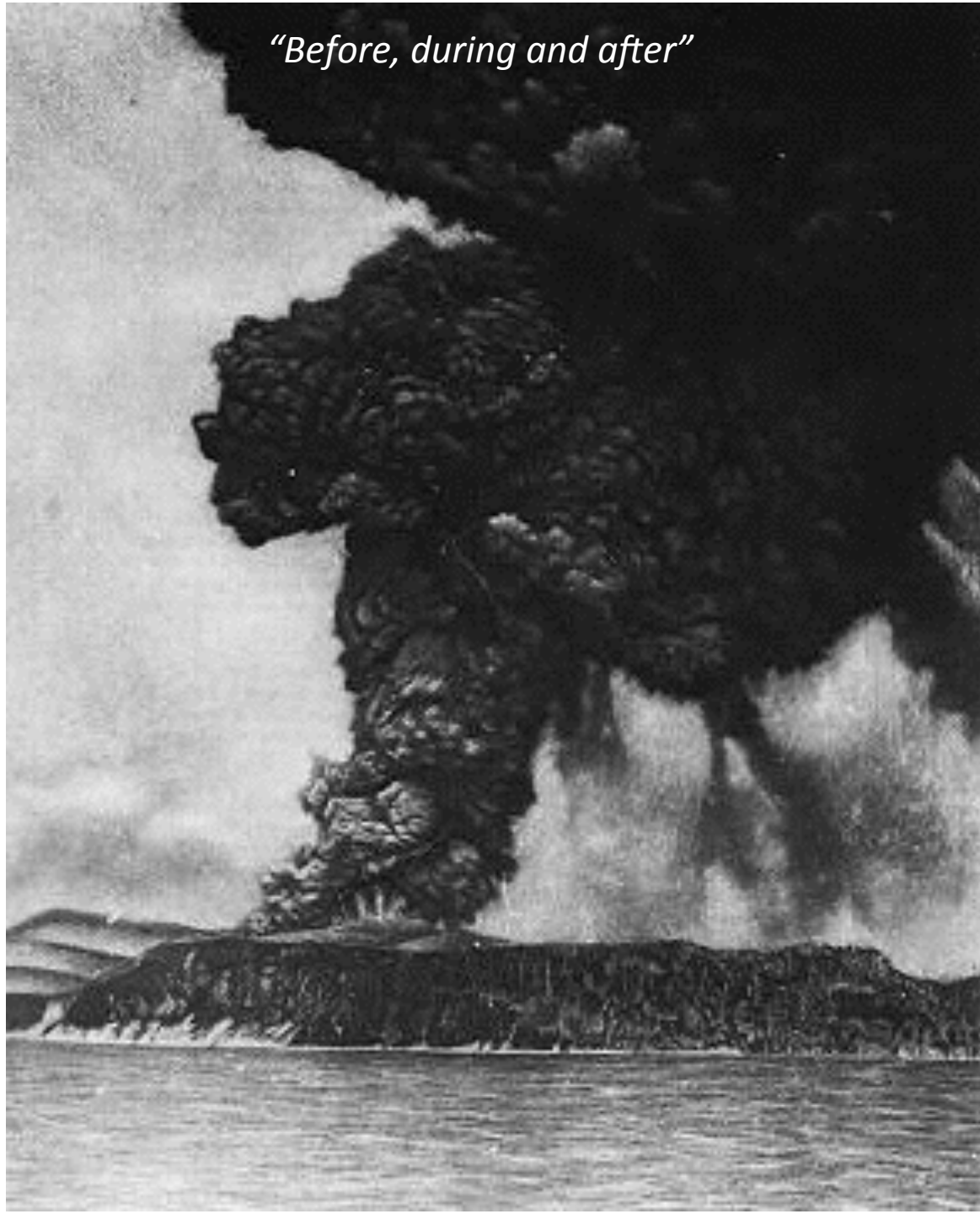
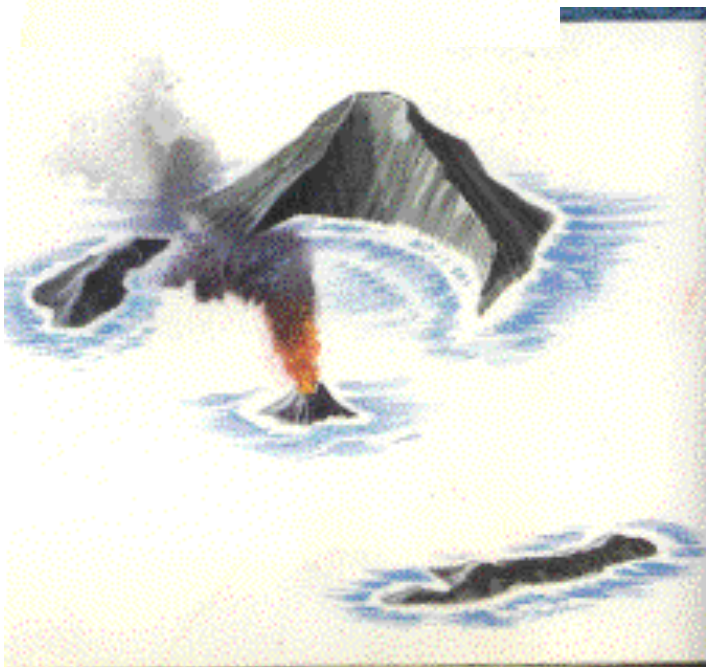
Succession after a volcanic explosion

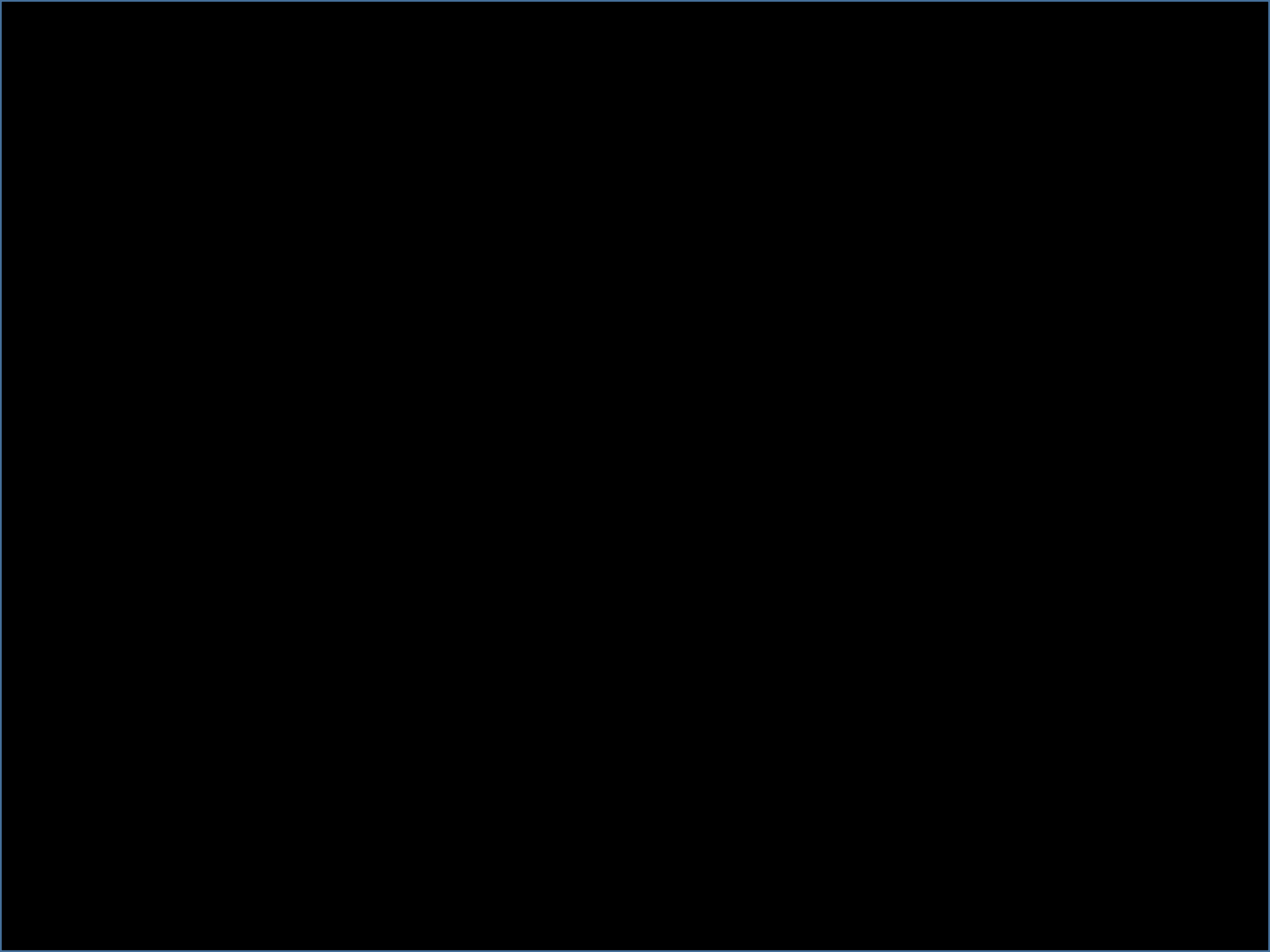
refer to p.273 - Companion

The Krakatau Islands showing contours every 100 m and (dotted line) the coastlines in 1883. (After Richards [112]).

In 1883 a major eruption occurred in the island volcano of Krakatoa (*Krakatau*)

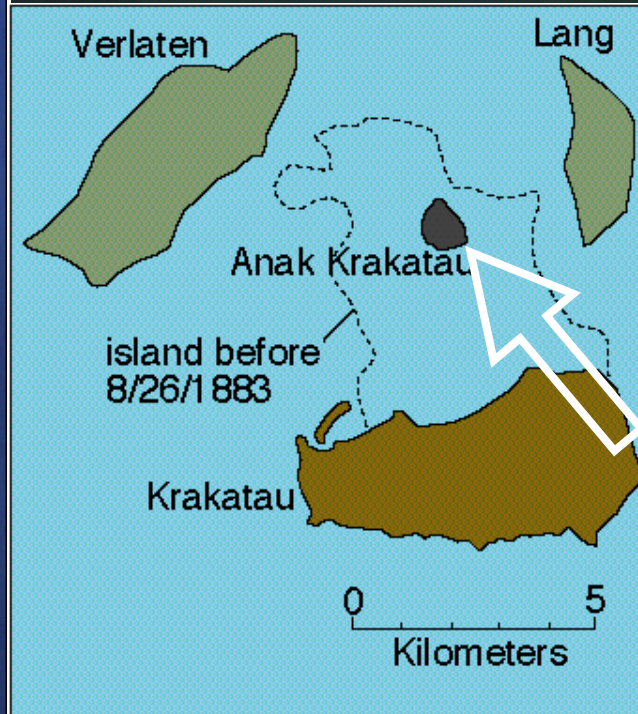
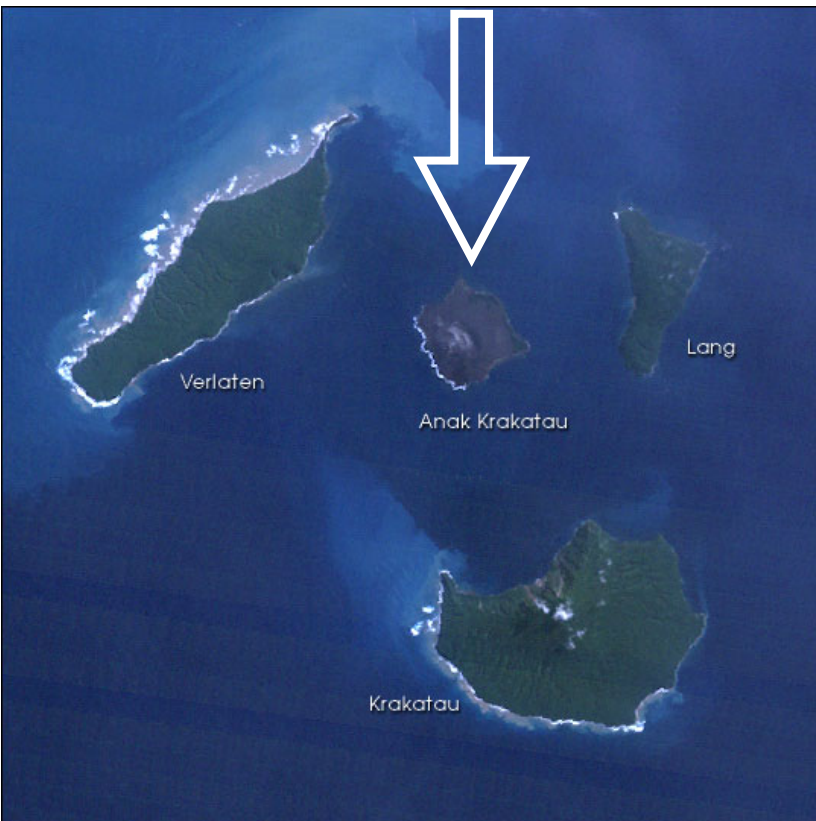








***Eruptions continued,
and a new island,
Anak Krakatau,
appeared in the centre
of the old caldera***

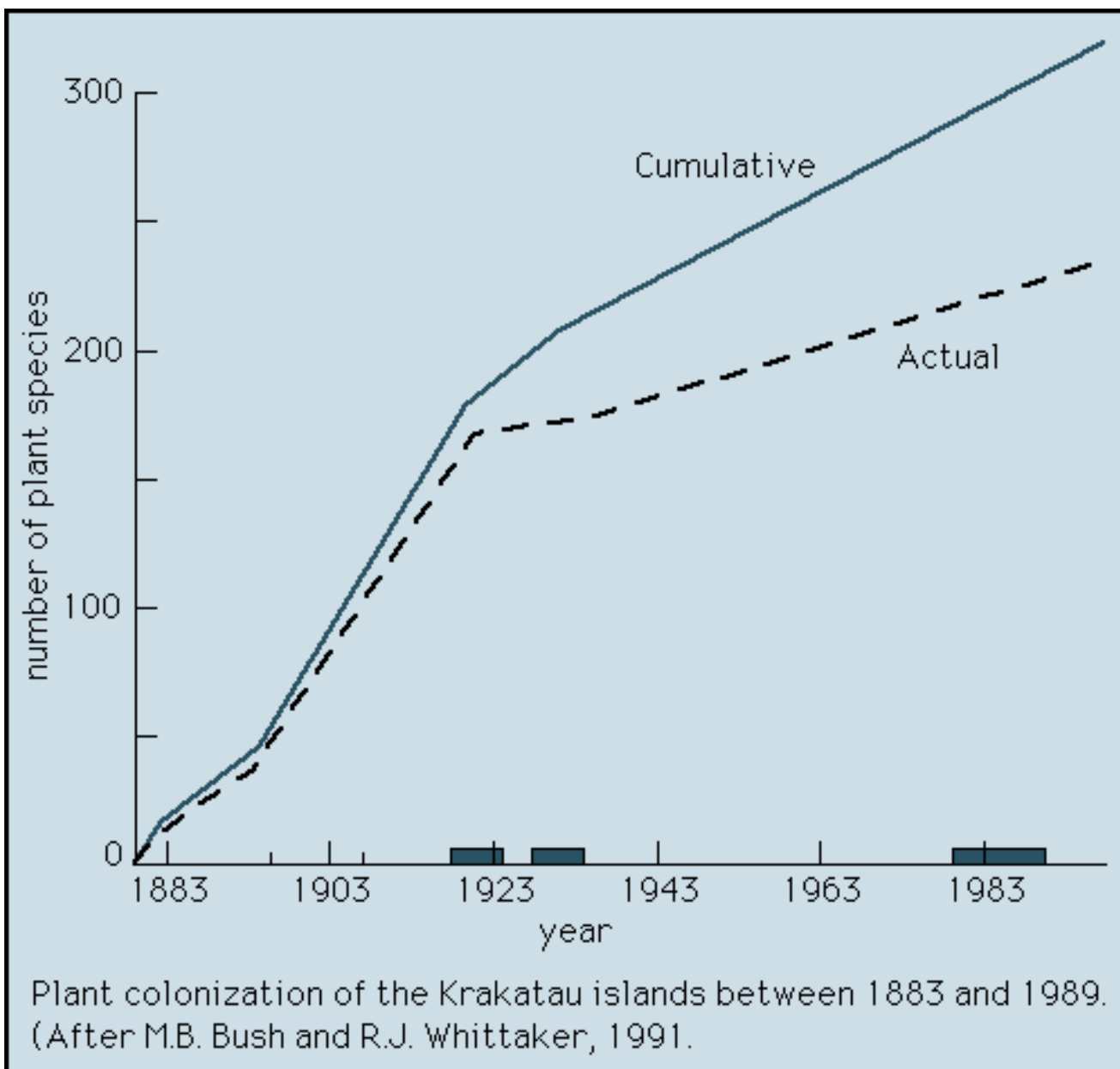


From Simkin and Fiske, 1983

*Life soon began to appear on the new,
sterile land*



Colonisation on Krakatoa, 1883- 1983



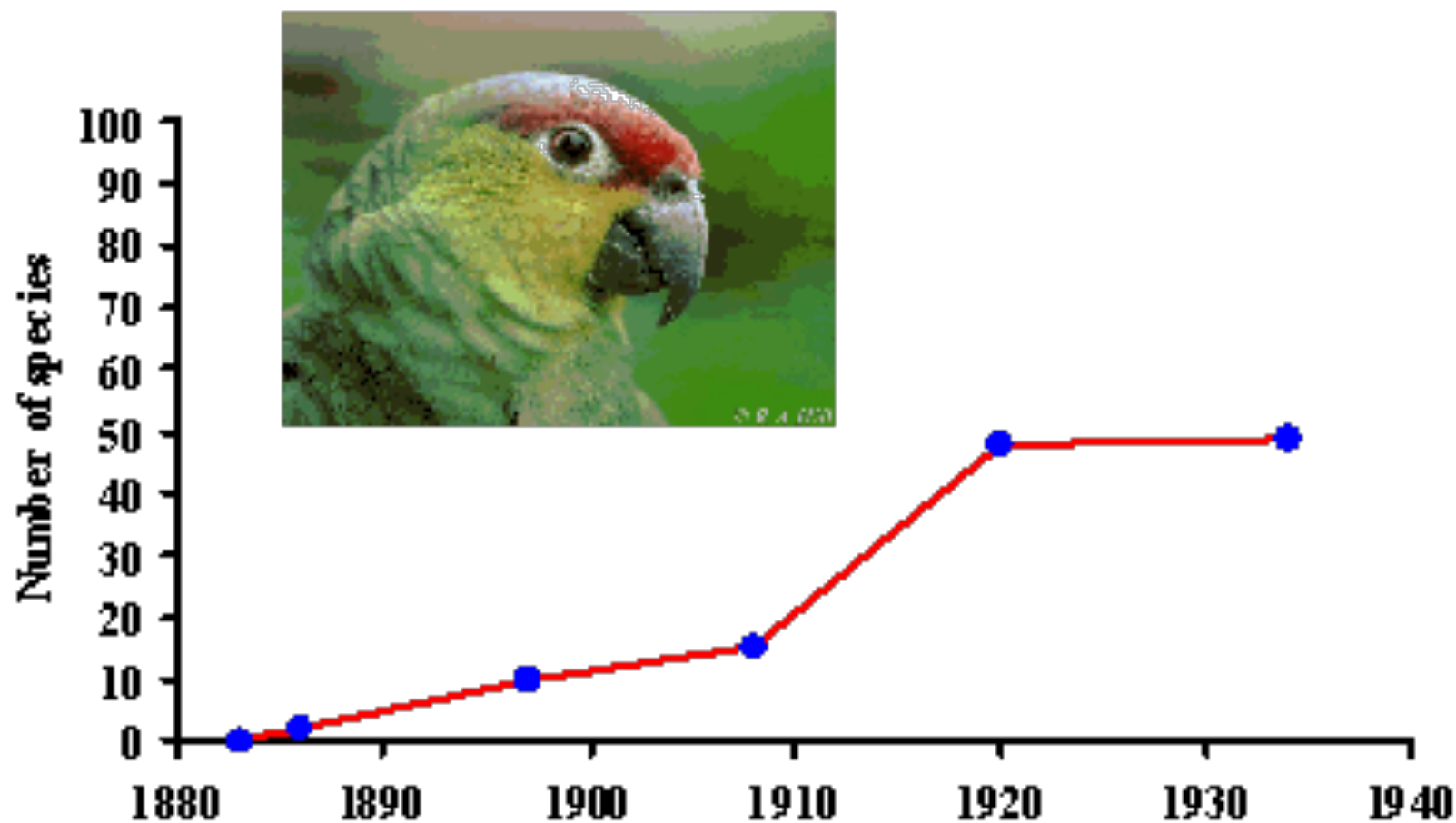
August 1883	Eruption
June 1886	6 spp Cyanobacteria
	11 spp Ferns
1897	Tall grass savanna
1919	Scattered Trees
1931	Macaranga-Ficus Woodland
1980	Second Growth Rainforest

Question:

Would r or K strategists be more common amongst the early colonnisers?

Why?

Recolonisation by land birds



Eruptions have continued, and localised re-colonisation continues to occur



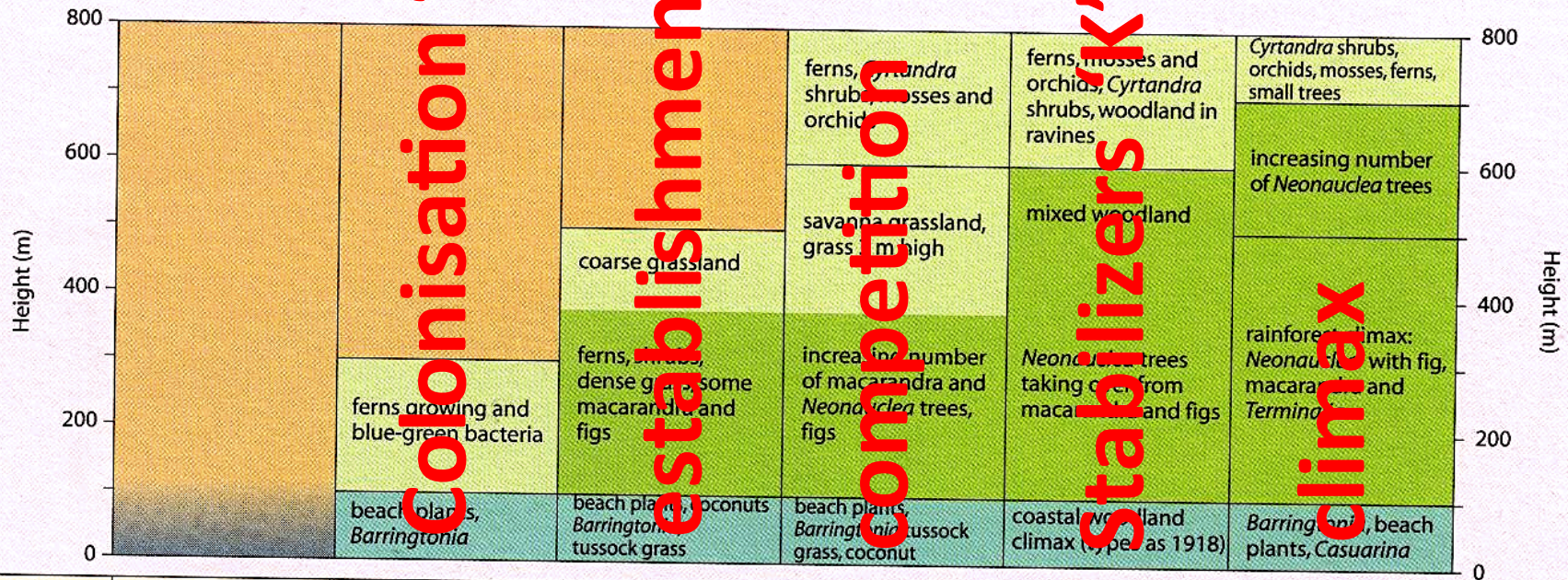
- Krakatau is an example of a lithosere - the colonization of bare rocky ground leads to a woodland
- (as opposed to a hydrosere –where vegetation fills a lake and develops into a forest ...)

Krakatau, Indonesia

Climate

Temperatures are high and constant. Most months average 28°C, giving a very low annual range. Rain is heavy, falling in convectional storms most afternoons throughout the year.

Note: The rainforest climax vegetation here does not contain as many species as the rainforests on surrounding islands.



Year	1883	1886	1908	1918	1933	1983	Year
Number of plant species	0	26	115	132	271	?	Number of plant species

Number of animal species

200

618
(in 1921)

795

**2.6.5 Describe the concept and
processes of succession
in a named habitat**

Guidelines to plan your answer

– A brief intro (few sentences)

- name, location, date of eruption – why Krakatoa is a good case study
- Embed definitions: succession, primary/secondary, lithosere, etc.

– Discuss changes in the structure over time (at each stage)

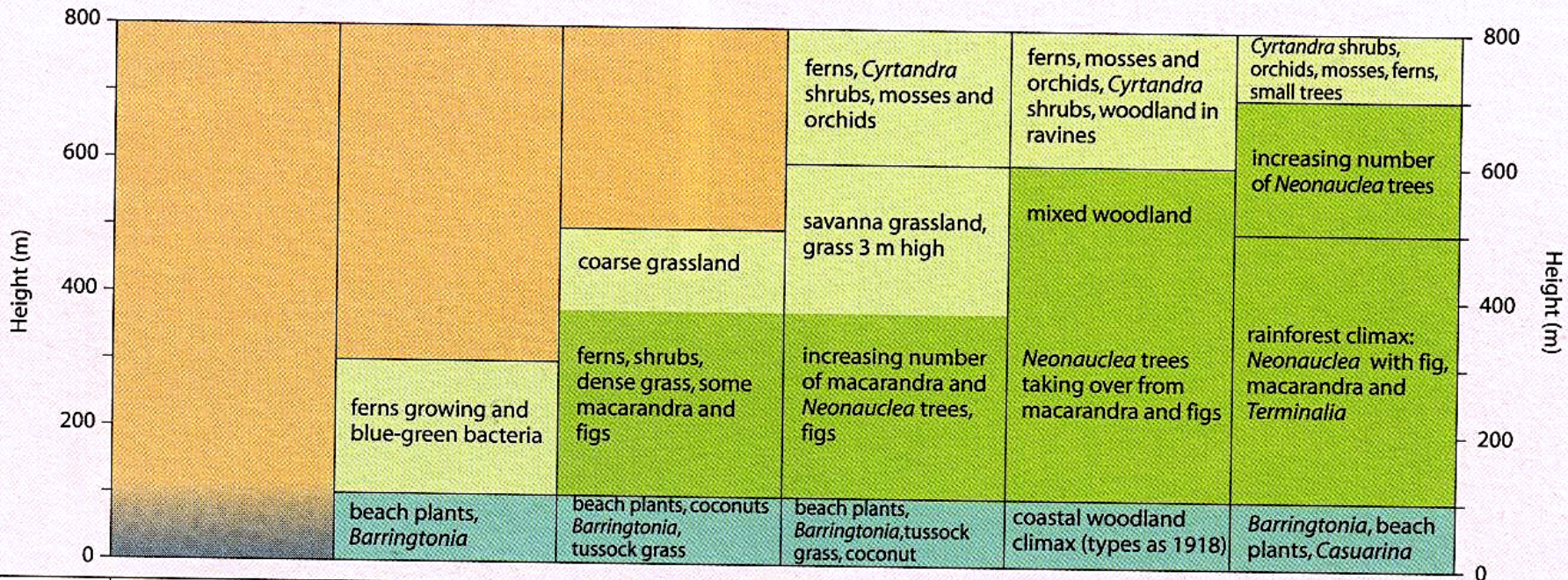
- Height of plants, ground layer, impact of light and other factors, interactions, etc.
- Use specie names (not just plants where possible)
- which species have gone, which have appeared, biomass, productivity, what happened to specie diversity, etc.
- Be specific to Krakatoa

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2.6.6 Explain the changes in energy flow, gross and net productivity, diversity and mineral cycling in different stages of succession.

Changes through the stages of succession...

1. Energy flow becomes (complex/simplified)
2. Gross Productivity (fall then rise/rise then fall)
3. Net Productivity (rise then fall/ fall then rise)
4. Diversity (increases then drops/drops then increases)
5. Mineral cycling (decreases/increases)

TASK: Turn to the person next to you - discuss and choose the correct answer for each pair of statements. *LIST REASONS* for each choice.

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2.6.7 Describe factors affecting the nature of climax communities

2.6.7 Factors Affecting Climax Communities

- Natural: climatic and edaphic (soil)...
 - have the greatest influence on the vegetation distribution
 - they can ‘arrest’ succession at a seral stage preventing it from reaching a climax community
 - e.g. Water logging
- Human:
 - land management practices by humans can also ‘arrest’
 - ex. Woodlands will not develop on a heavy sheep-grazed hillside... (*J. Rutherford, Course Companion p.272*)

How do ecosystems change over time?
What are the causes of these changes?

Krakatoa is the means by which we
are learning about how and why
ecosystems change over time