

Alternative Management Paradigms

**And their ability to respond
to changes**

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What makes you think forestry is sustainable?

- Definition?
- Time and space?
 - (not going there)

What is a “paradigm” anyway?

In *The Structure of Scientific Revolutions*, Thomas Kuhn describes a paradigm as:

a set of beliefs, theories, or a world view
that is unquestioningly accepted and has
become established as "truth."

First approach:

Don't worry about it

- **Coppice (English)**
- **Equal strips (German)**

Second approach:

(Non-declining) evenflow

- **Sustainability vs stability**
- **Non-declining cash flow**
- **“Socially irresponsible”**

Third approach:

Maximizing single objective with constraints

- **Maximize NPV**
 - Faustman
 - Dowdle
- **LP programming**

Fourth approach:

Balancing multiple objectives

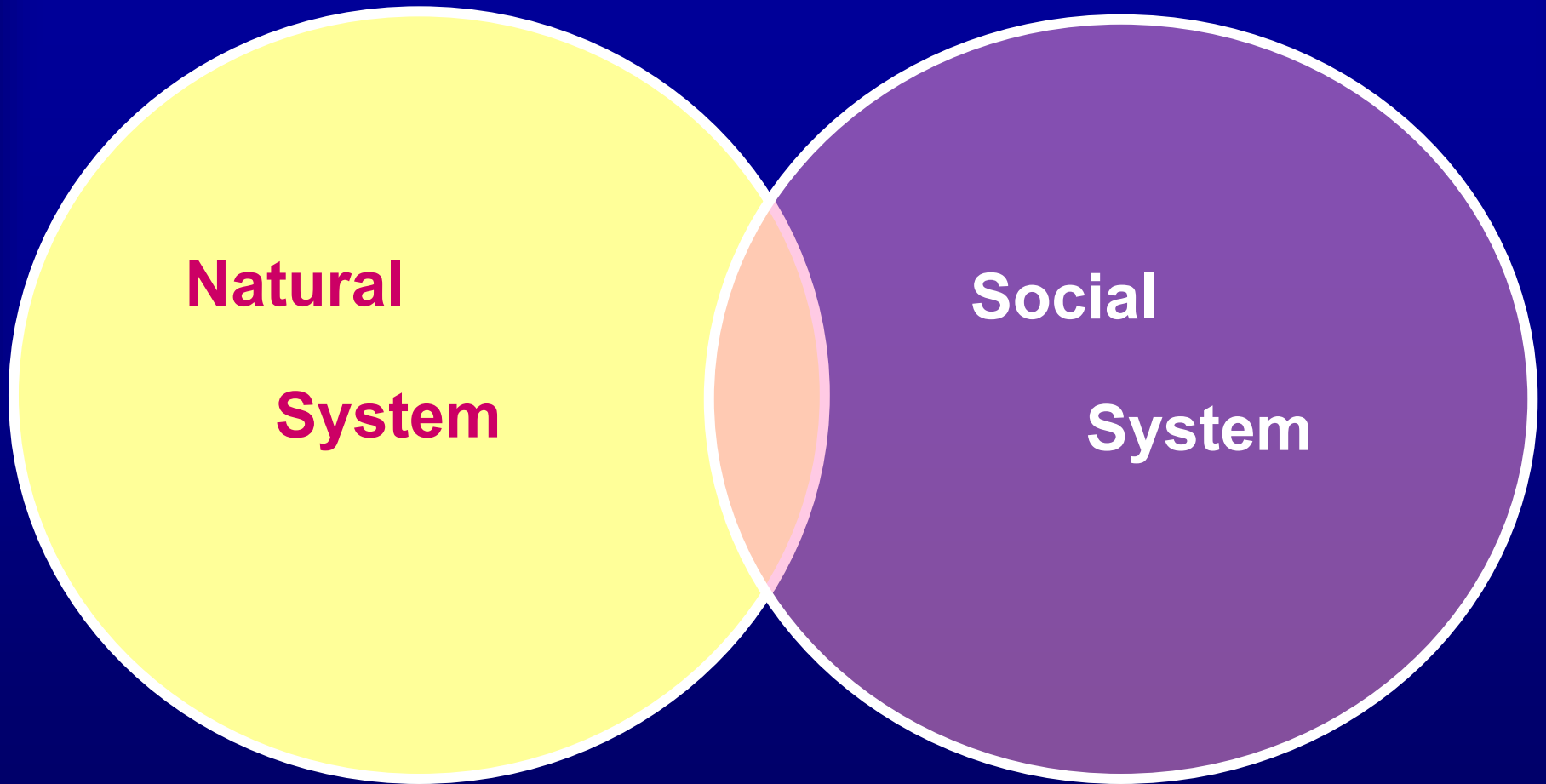
- **How?**
- **Weighting?**
- **“Fuzzy sets”**

Fifth approach:

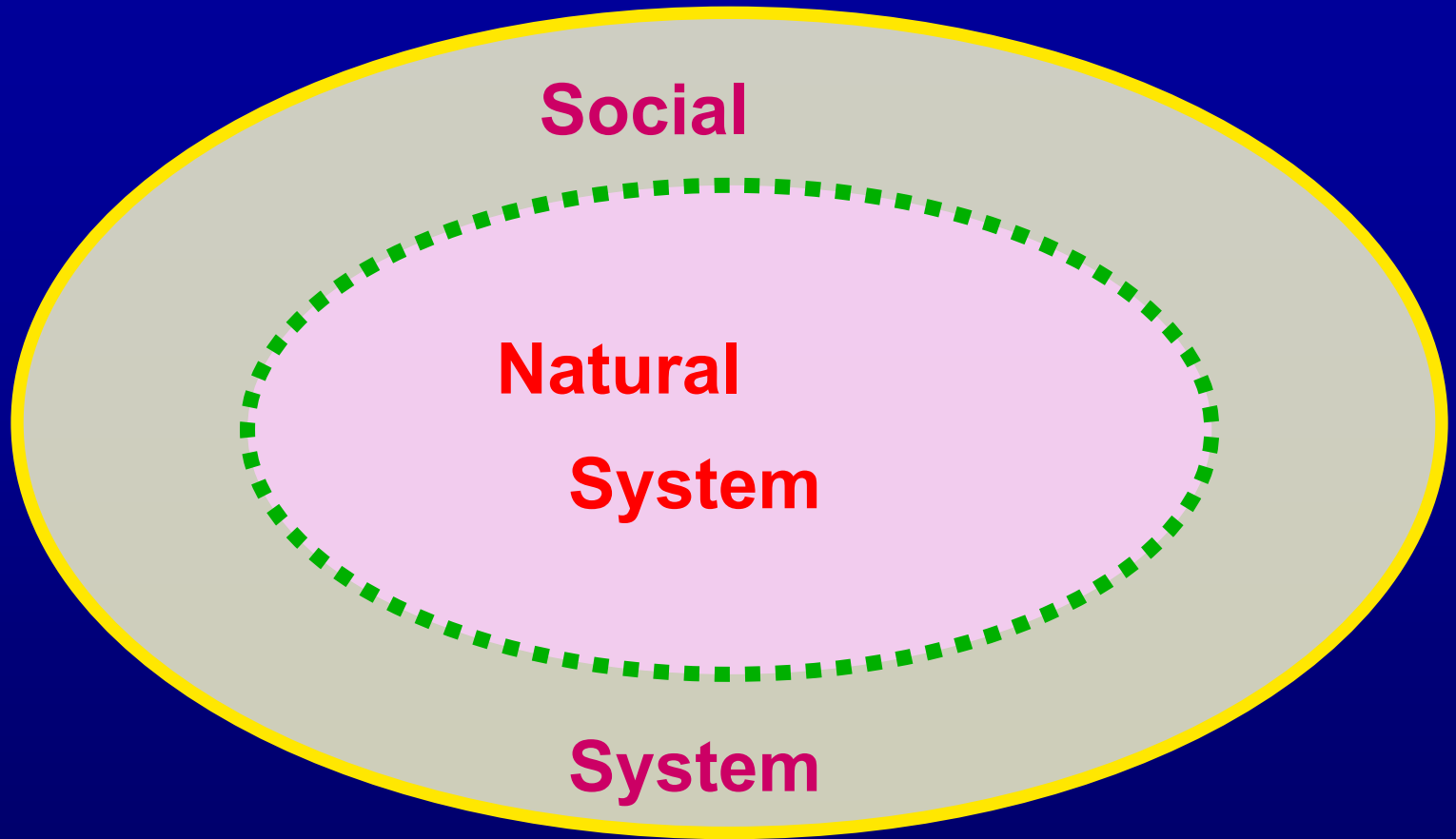
Ecosystem management

- Systems approach
- Linkages
- Concept of the “whole”

“Traditional” view



Vogt *et al*



Pre-settlement (1700)



1740



1830



1850



1910



1915



1930



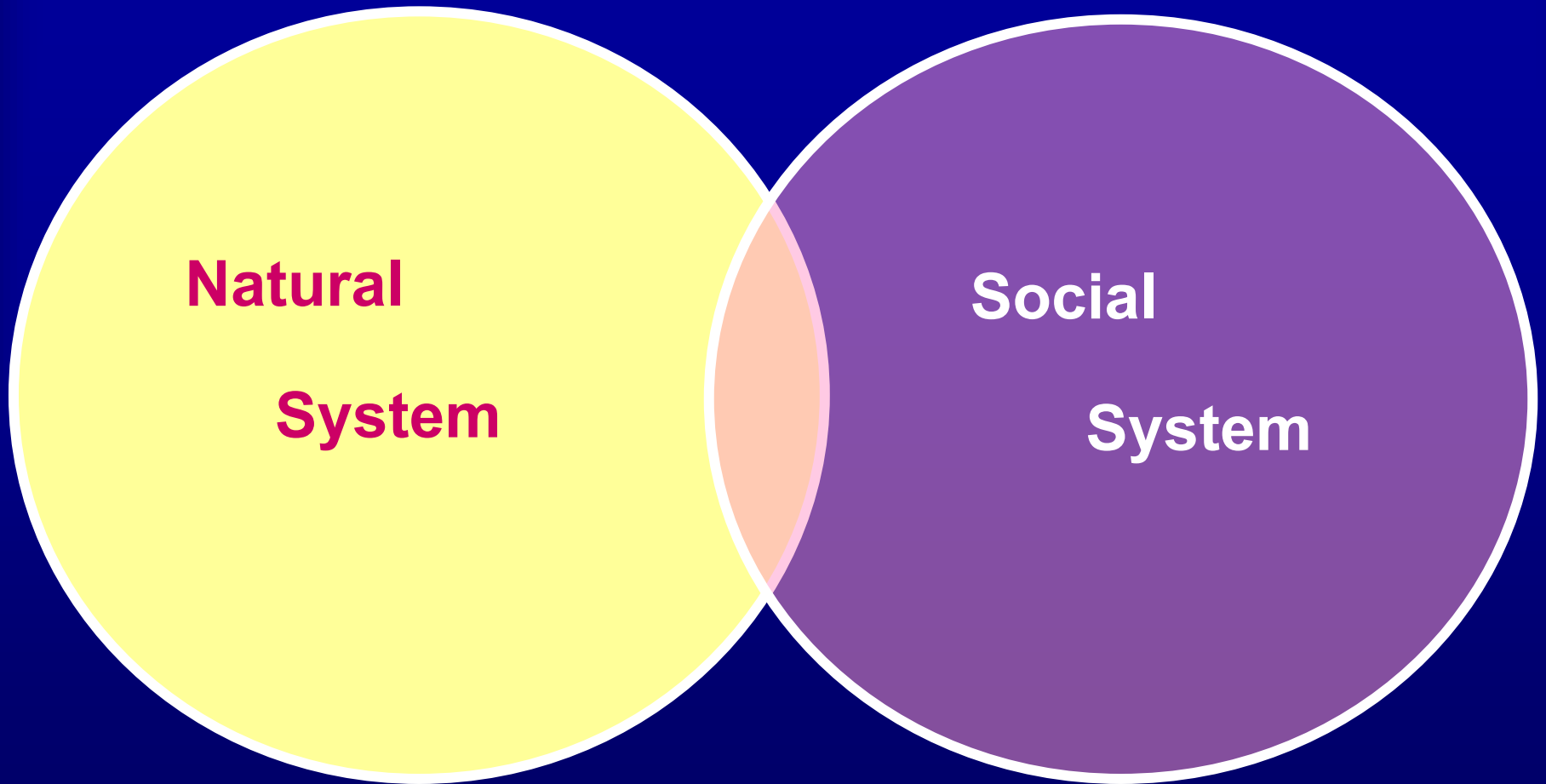
Today (2000)



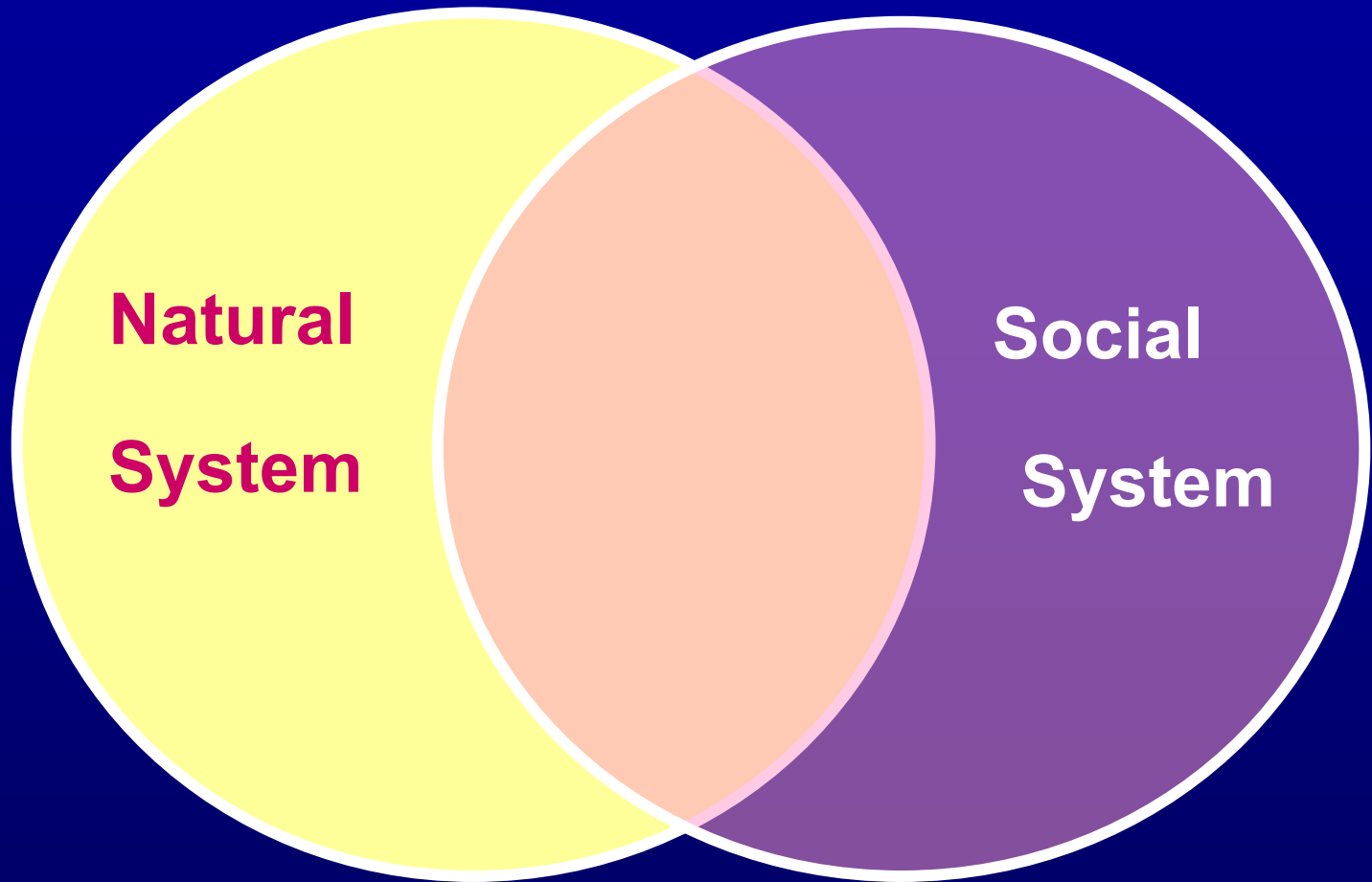
Triad (zoning)

- **Variation of “don’t worry about it”**
- **Natural range of variability**

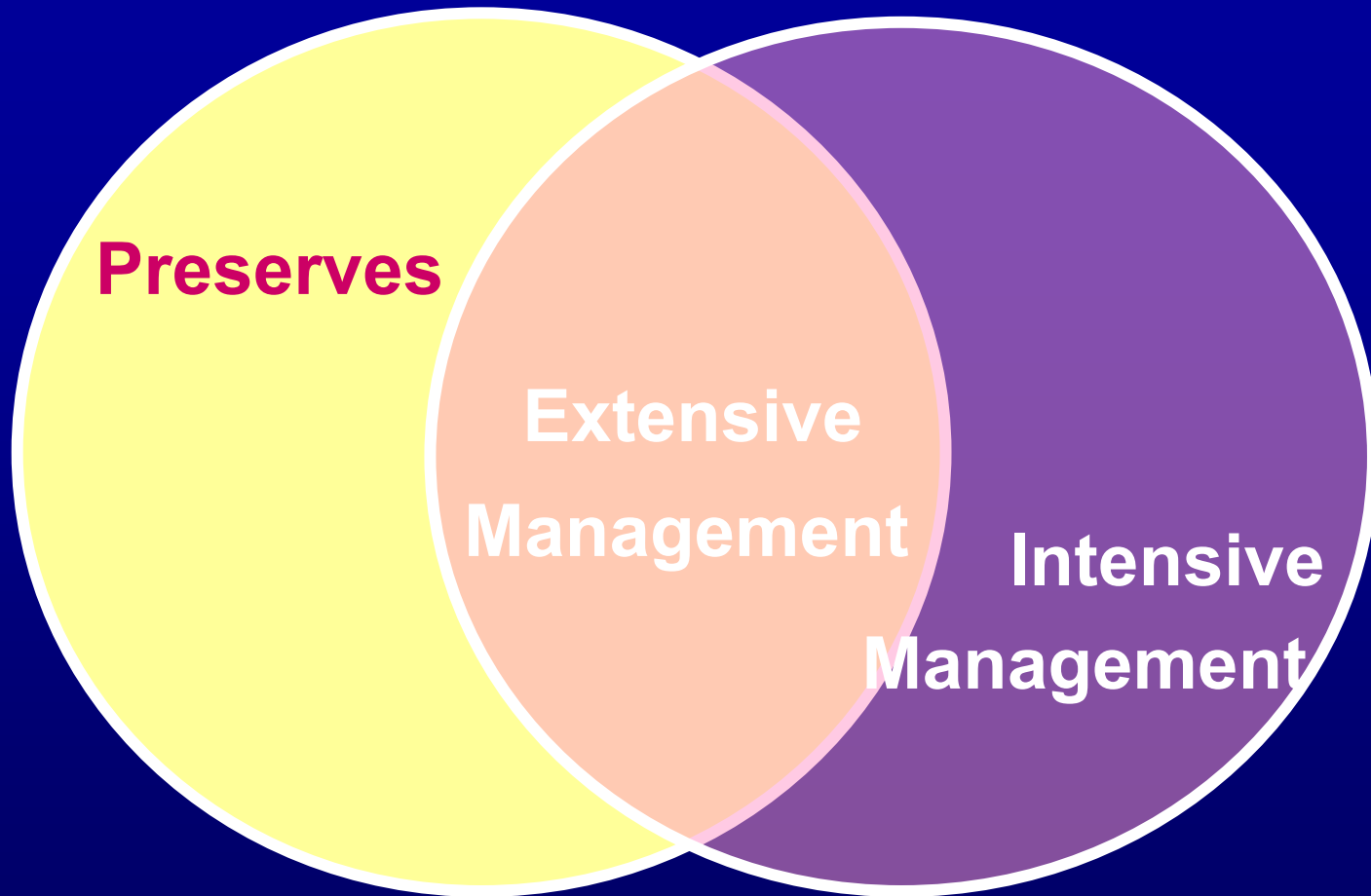
Looks similar to “Traditional” view



Looks similar to “Traditional” view



Triad (zoning)



Ecological restoration

- **Premise that we need to restore ecosystems to a “healthy” condition**
- **Functions have been lost and must be re-established**

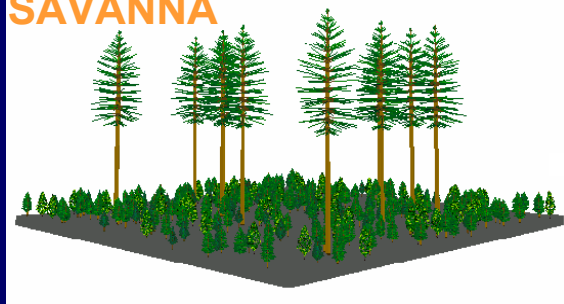
Ecosystem-based management

- **Ecosystem needs to be managed within a human society context**
- **Comparison with restoration is the question: Is biology the objective or the constraint?**

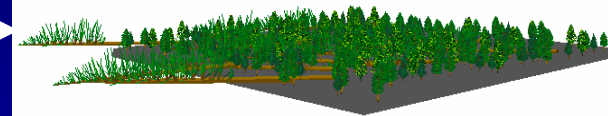
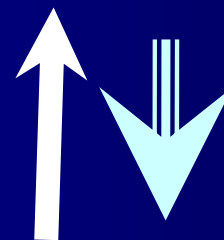
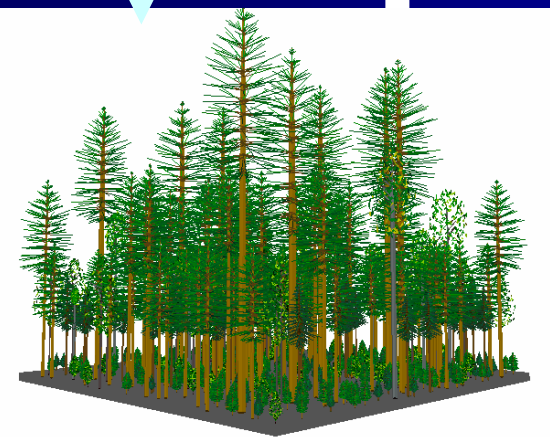
Regional equity

- **Landscape planning**
- **Ecosystem management**

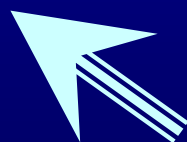
SAVANNA



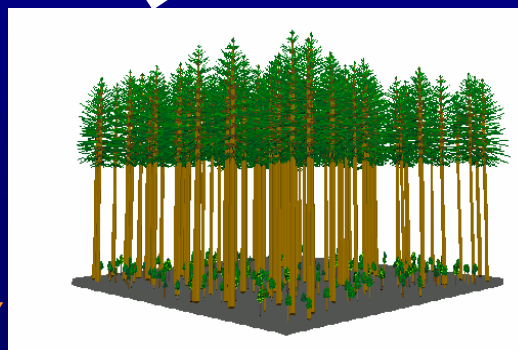
OPEN



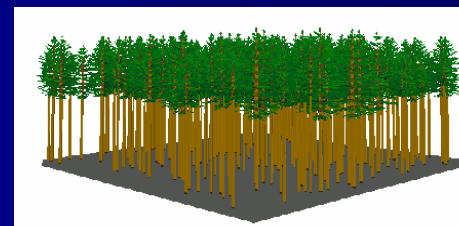
COMPLEX



UNDERSTORY



DENSE



Forest Area

Millions of Acres

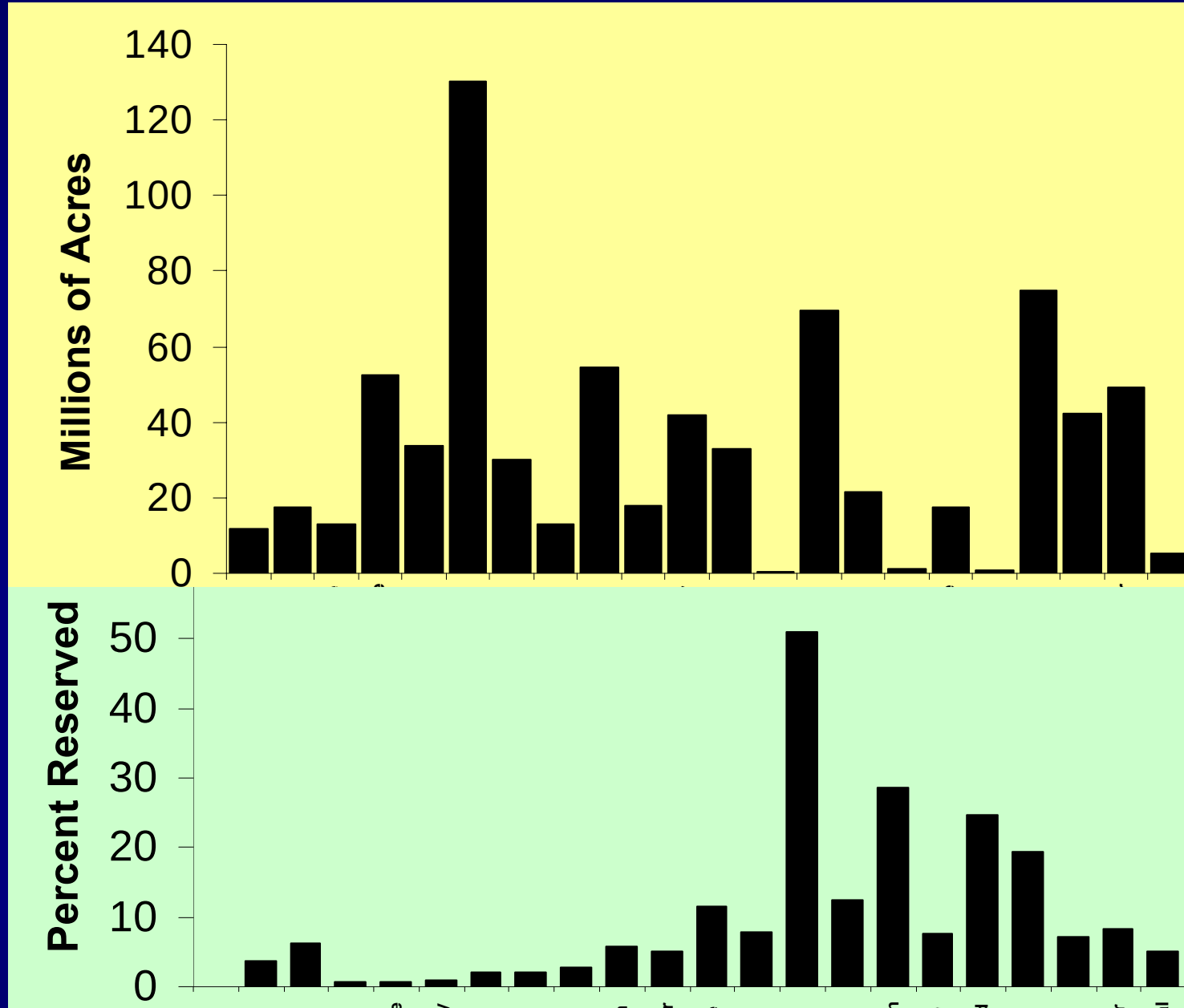
140
120
100
80
60
40
20
0

Percent in Reserves

Percent Reserved

50
40
30
20
10
0

Forest Community Types



Continuous planning

- **Germans**
- **Monetary policy**
- **Adaptive management?**

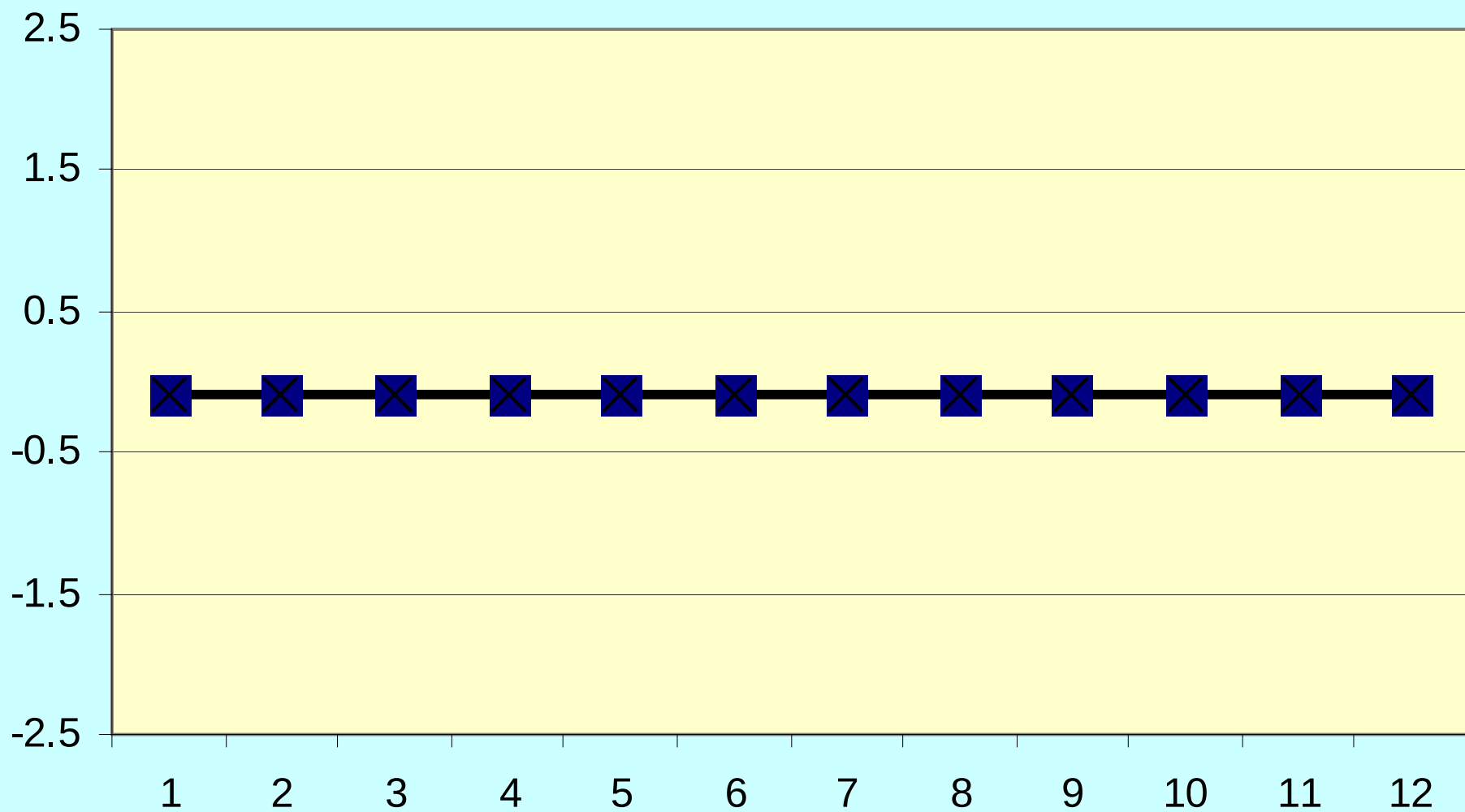
Chaos theory

- **Pattern bigger than the process**
- **Mandelbrot set**
- **Fractals**

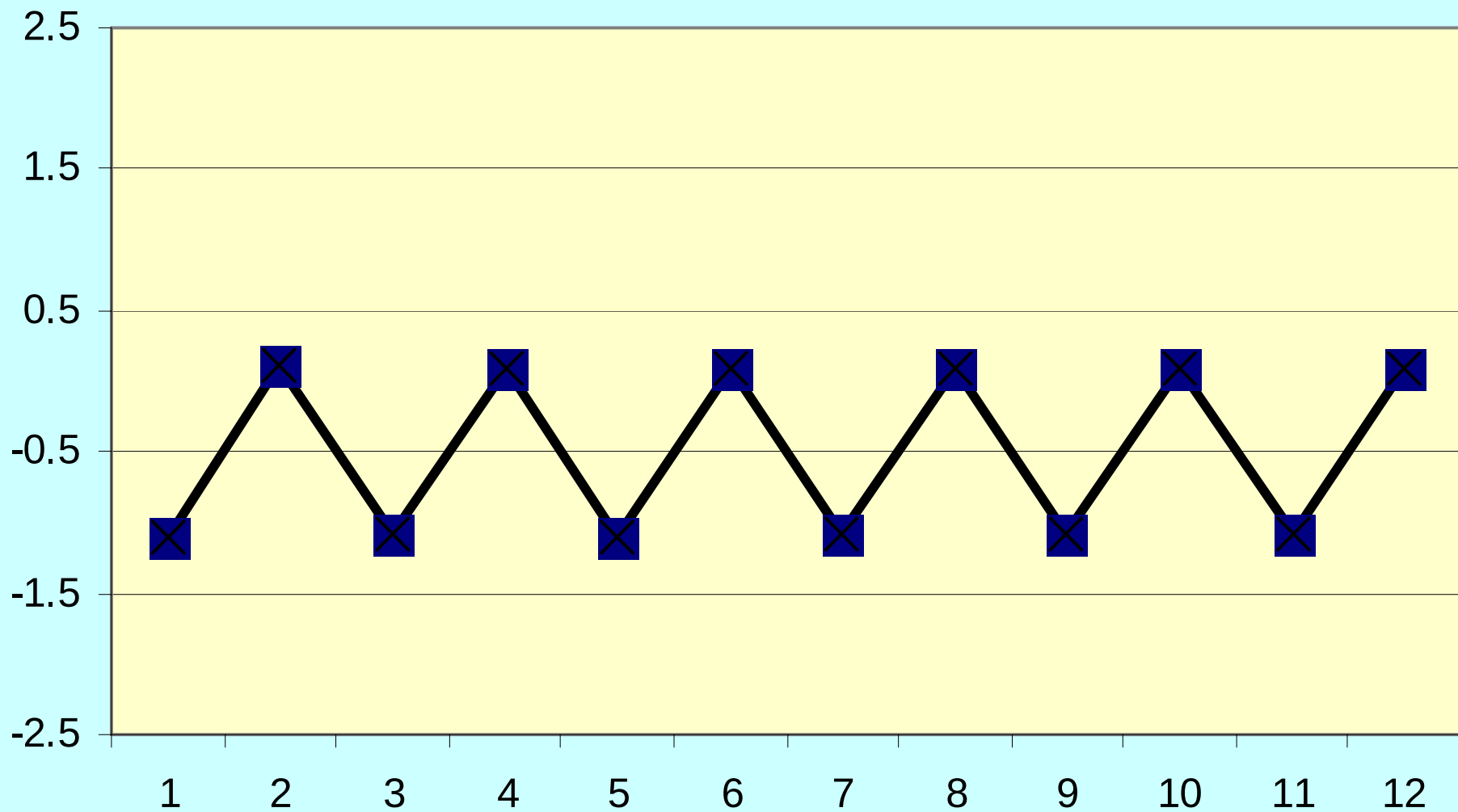
Mandelbrot set example

$$X_{(n+1)} = (X_n)^{(2+k)}$$

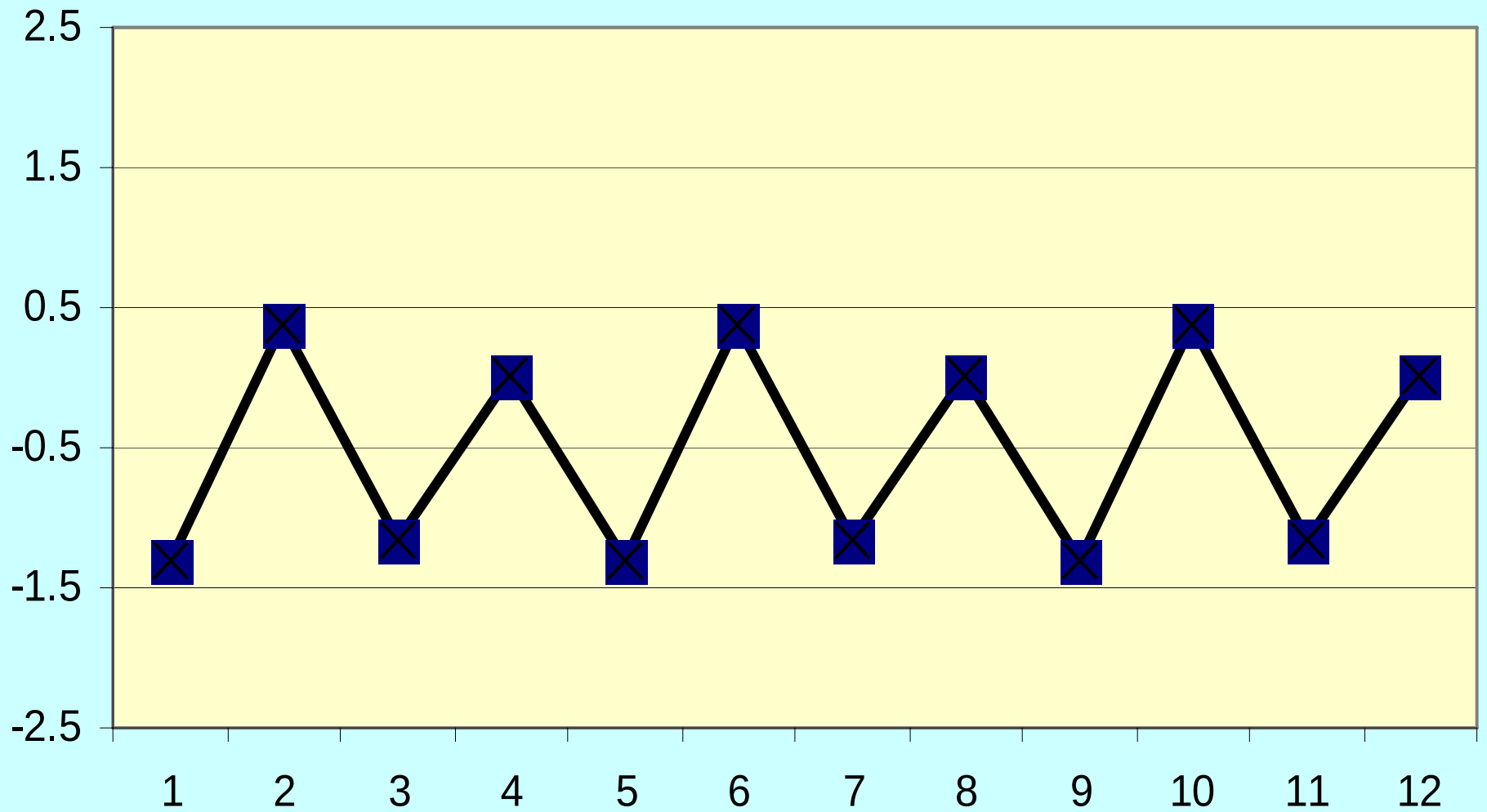
$K = -0.1$



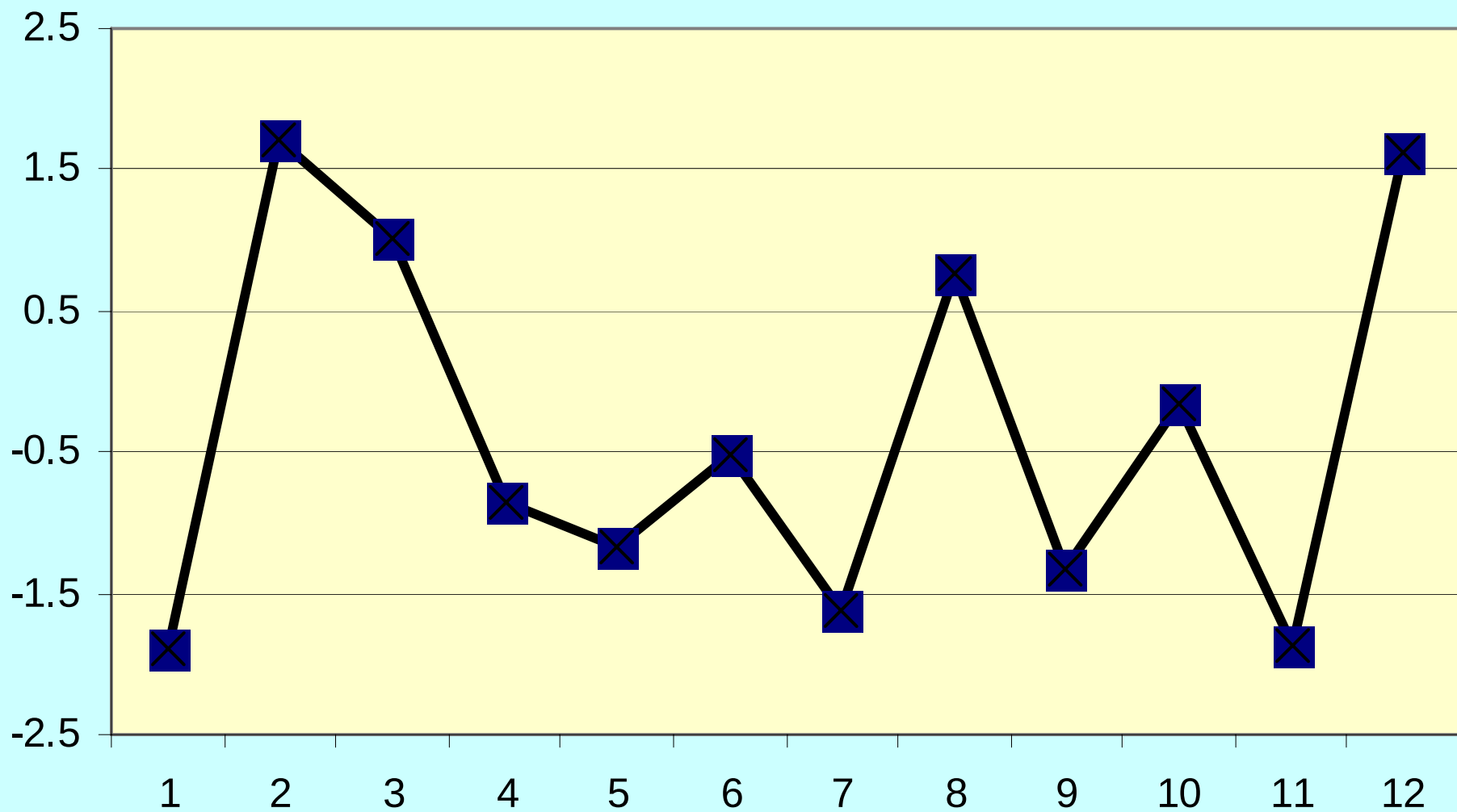
$$k = -1.1$$



$$k = -1.3$$



$$k = -1.9$$



Reductionist vs Systems

- **Eli Whitney**
- **John F. Kennedy**
- **All our “Science” training**

Stability vs Sustainability

- Sustainability $\neq$ Stability
- Attempts at creating stability reduces ability to respond to change
- Manage forests for resiliency not resistance

Conservation of Risk

- **Risk can't be eliminated**
- **Risk can only be transferred**

Increased uncertainty

- **The more we know – the less we know**

- **Example 1:**

The more we know about beetle lifecycle, the more we realize how little we know about weather patterns

- **Example 2:**

The more we understand about stand density and growth the more we realize how little we know about future price structures

So,

What is our current paradigm?

Ecosystem management

BUT:

How do we get to the alternatives?

- **Interdiscipline vs multidiscipline**
- **Think about system behaviour**
- **Don't argue values**

What will the future bring?

- **More data**
- **Emphasis on data management**
- **Better math**

What now?

- **I don't know what the future will bring?**
- **But if a paradigm shift is called for we must be willing to let go of the past**