Story telling and complex adaptive systems

Jon Lovett, University of Leeds

Deryn Rees-Jones, University of Liverpool

Overview

- Institutions, myths, dogmas and prejudices

- Complex systems in an uncertain world

- Story telling as a way of adapting to uncertainty

- Stories tell us who and how we are in the world

Institutions - definition

"Institutions are the humanly devised constraints that structure human interaction. They are made up of formal constraints (rules, laws, constitutions), informal constraints (norms of behavior, conventions, and self imposed codes of conduct), and their enforcement characteristics." North, 1993 Nobel Lecture

- Incentive structure of a society
- Political and economic institutions - > determinant of economic performance

Institutions, myths, dogmas and prejudices

"History demonstrates that ideas, ideologies, myths, dogmas, and prejudices matter...

As tribes evolved in different physical environments they developed different languages and, with different experiences, different mental models to explain the world around them.

The languages and mental models formed the informal constraints that defined the institutional framework of the tribe and were passed down inter-generationally as customs, taboos, and myths that provide cultural continuity."

North, 1993 Nobel Lecture

Correlation, causation... and dynamics

"You are clever man, friend John; you reason well, and your wit is bold; but you are too prejudiced.

You do not let your eyes see nor your ears hear, and that which is outside your daily life is not of account to you.

Do you not think that there are things which you cannot understand, and yet which are; that some people see things that others cannot?

But there are things old and new which must not be contemplate by men's eyes, because they know - or think they know - some things which other men have told them.
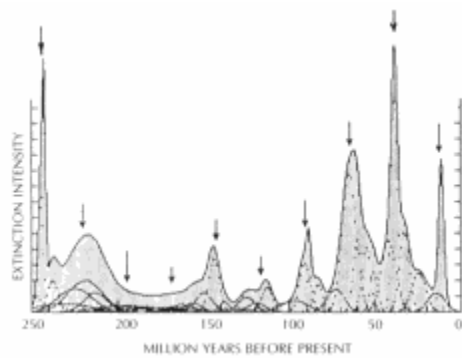
Ah, it is the fault of our science that it wants to explain all; and if it explain not, then it says there is nothing to explain."

Bram Stoker "Dracula" 1897. Professor Van Helsing (who is Dutch, hence the idiosyncratic grammar) discussing the remarkable case of the Bloofer Lady on Hampstead Heath and how this might be related to the strange death of Lucy Westenra.
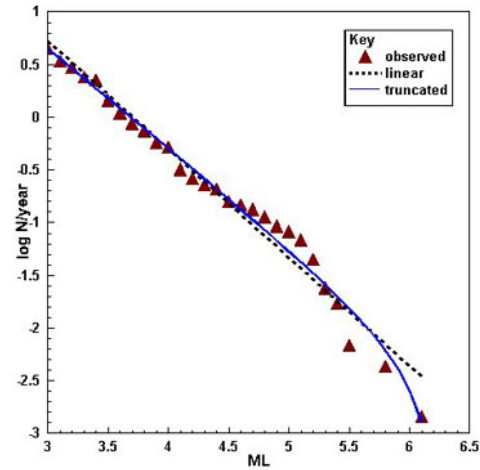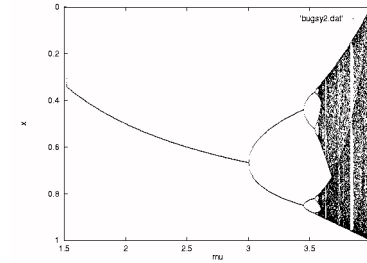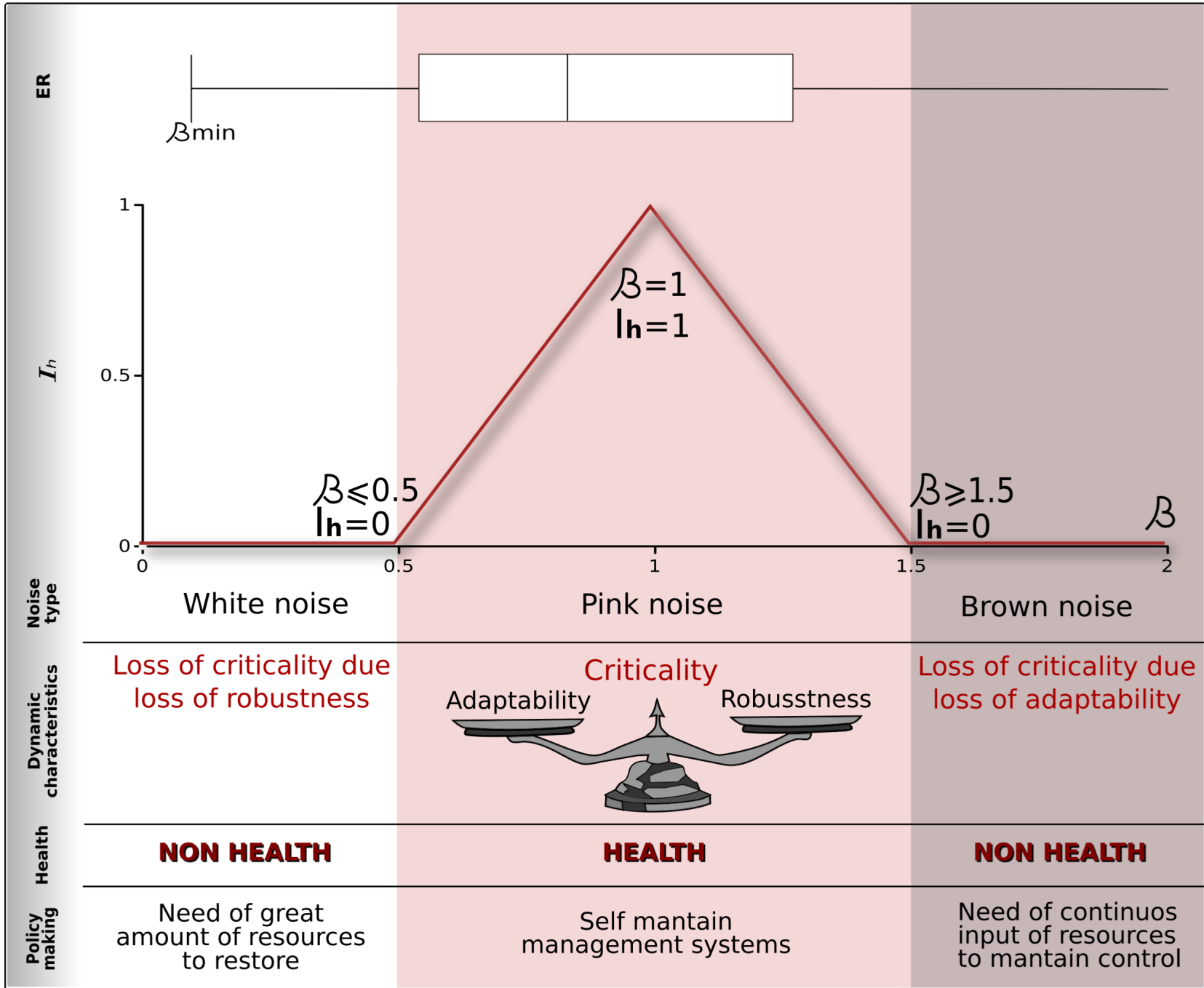
Scale-free internal dynamics
1/f power spectra
Chaos
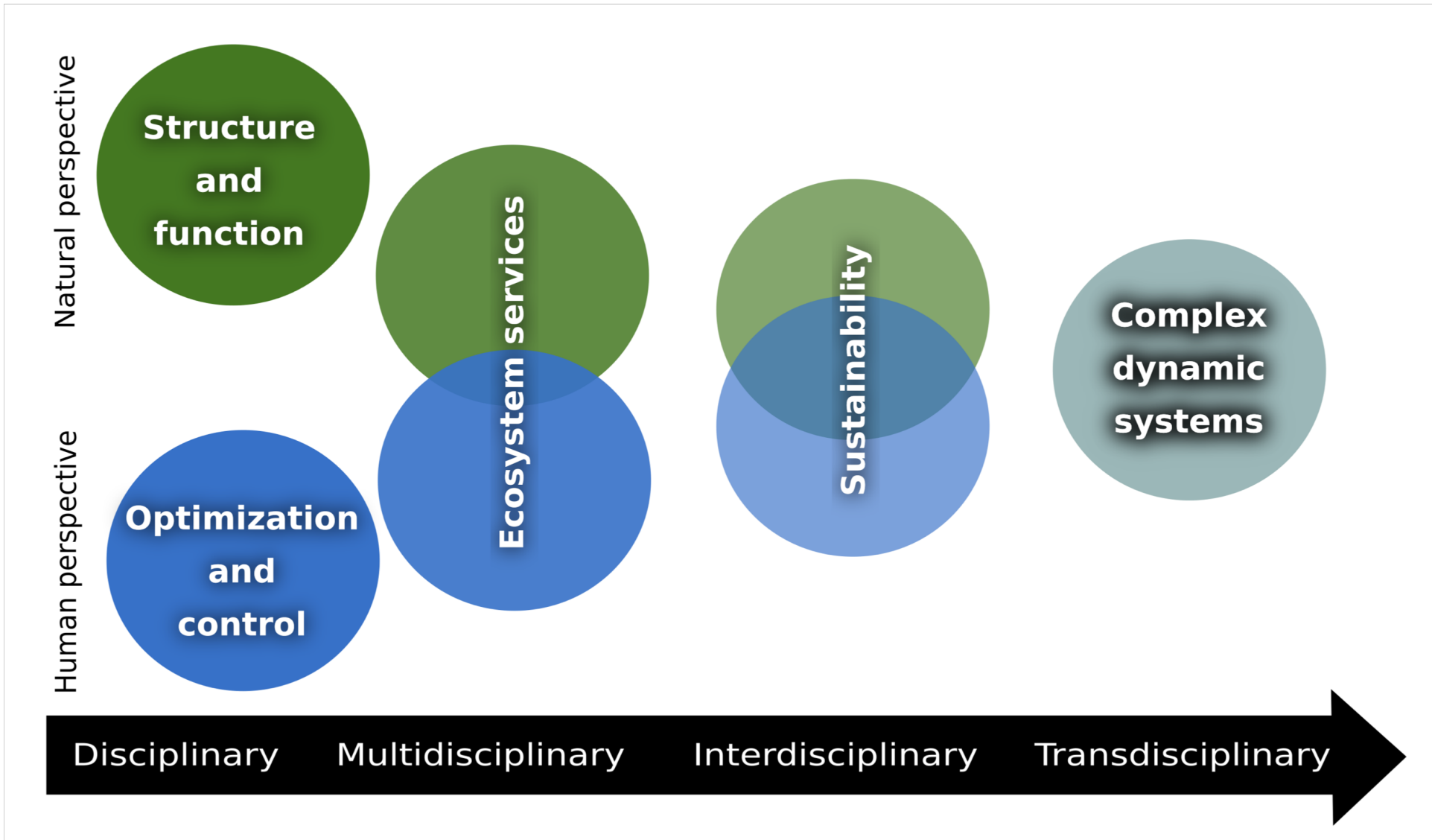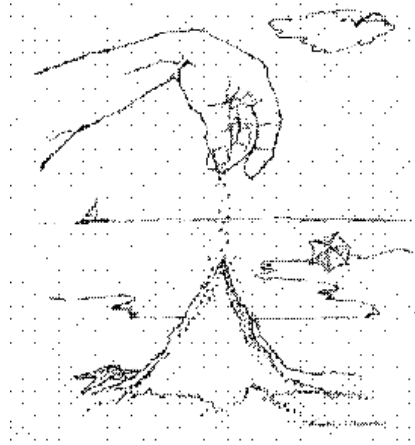
Sandpile

Extinction Patterns

Earthquake
Magnitude
Frequency

Chaotic patterns

Grains of rice

	White noise	Pink noise	Brown noise
ER	$\mathcal{B}min$		
I_h	$\mathcal{B}{\leqslant}0.5$ $I_h=0$	$\mathcal{B}=1$ $I_h=1$	$\mathcal{B}{\geqslant}1.5$ $I_h=0$ $\mathcal{B}$
Noise type	White noise	Pink noise	Brown noise
Dynamic characteristics	Loss of criticality due loss of robustness	Criticality — Adaptability / Robusstness	Loss of criticality due loss of adaptability
Health	NON HEALTH	HEALTH	NON HEALTH
Policy making	Need of great amount of resources to restore	Self mantain management systems	Need of continuos input of resources to mantain control

Florida_Everglades_Shark_River_Slough_Long_Hydroperiod_Marsh_H_2010
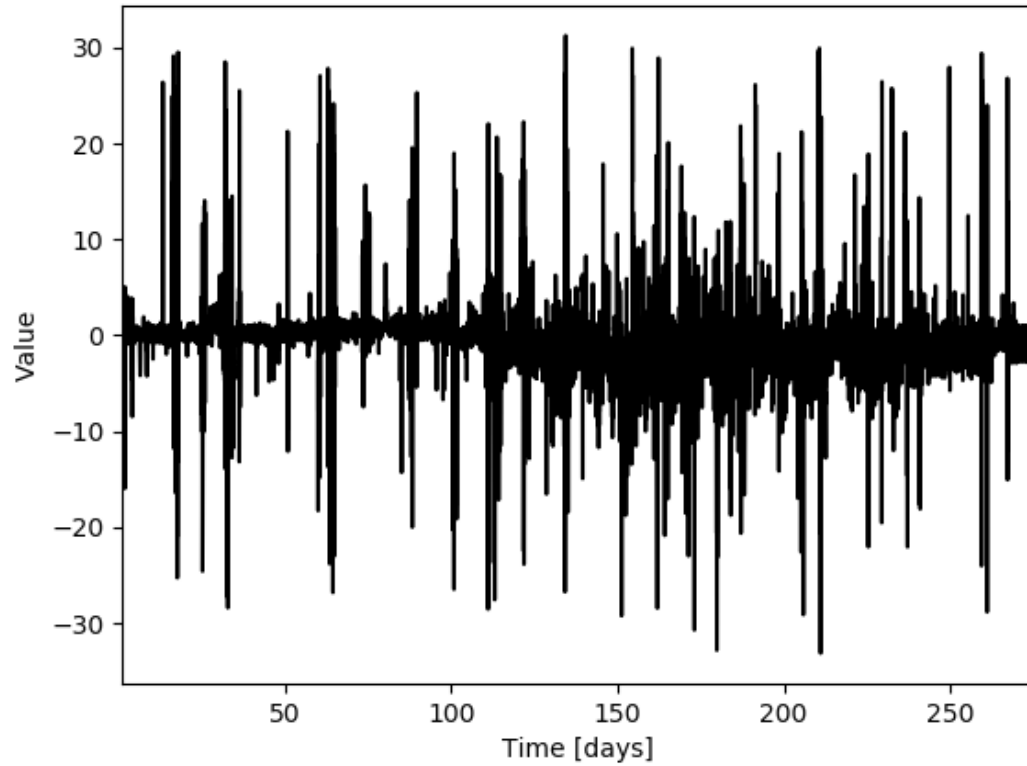
Ecosystem dynamics
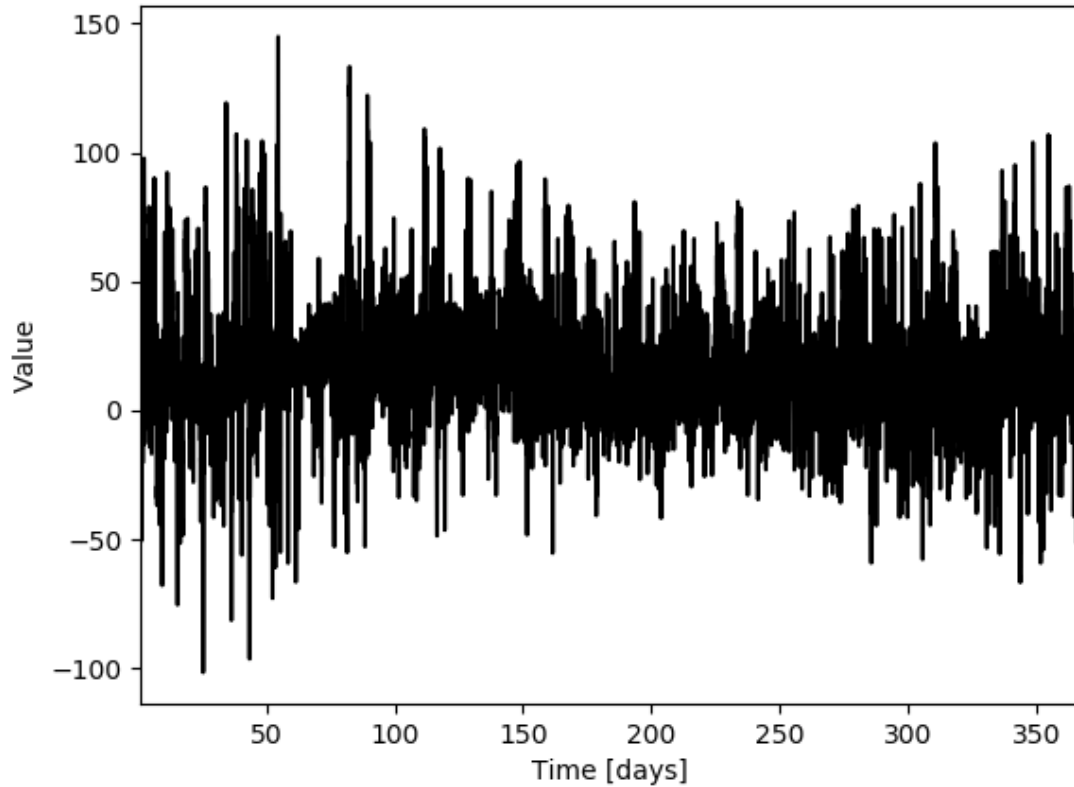
Ameriflux data. Measures matter and energy
fluxes e.g. CO2 interchange, Ecosystem
Respiration, NEE, Enthalpy exchange, etc.
H is for Entalpy (system heat exchange)
Pink Noise
Slope 0.92

A0= 2.231523e+07
fc= 1.897970e+00
beta1= 0.5921980   A0= 1.033940e+07
beta2= 1.2233444   beta= 0.9233123
r2= 0.2358   r2= 0.3304
AIC= 5910.1231   AIC= 4748.4991
BIC= 5945.5060   BIC= 4769.7302   F-test p-value= nan
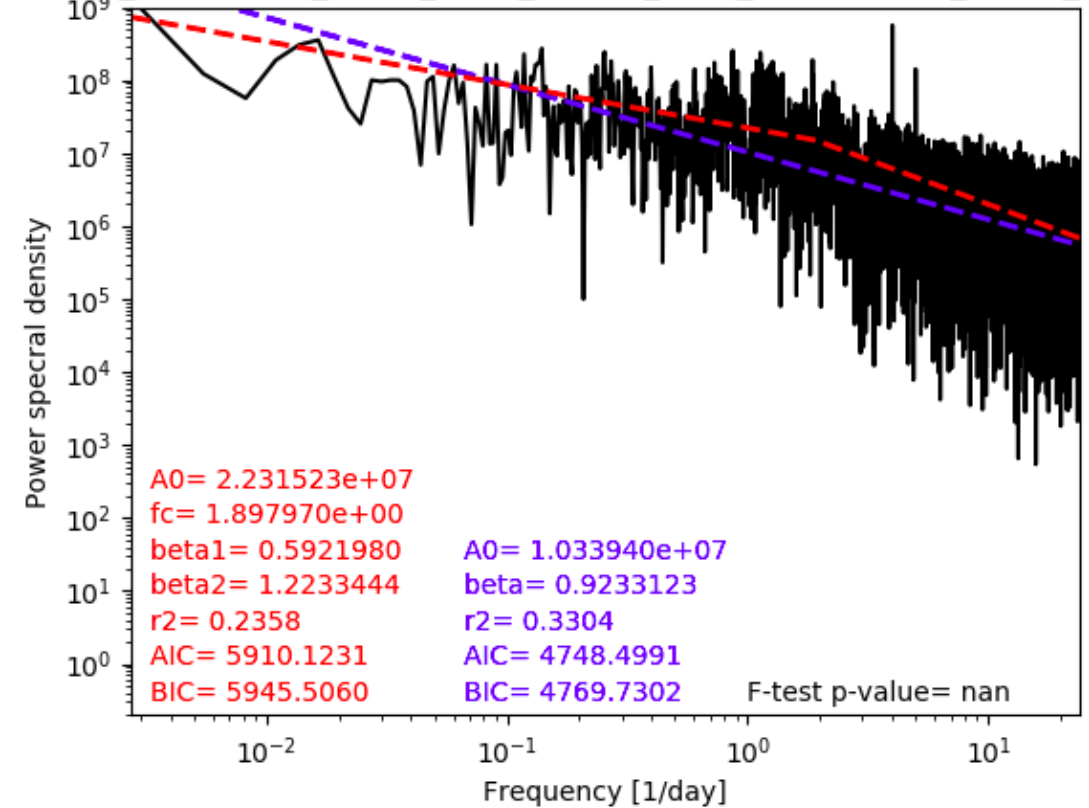
Walnut_River_FC_2004

Ecosystem dynamics

Carbon flux.
White noise.
Slope 0.37.

A0= 4.973760e+00
fc= 1.156293e-02
beta1= 2.8729640
beta2= 0.3802579
r2= -0.1330
AIC= 4886.4091
BIC= 4920.3513

A0= 1.761361e+05
beta= 0.3696103
r2= 0.0732
AIC= 3562.8412
BIC= 3583.2084

F-test p-value= nan
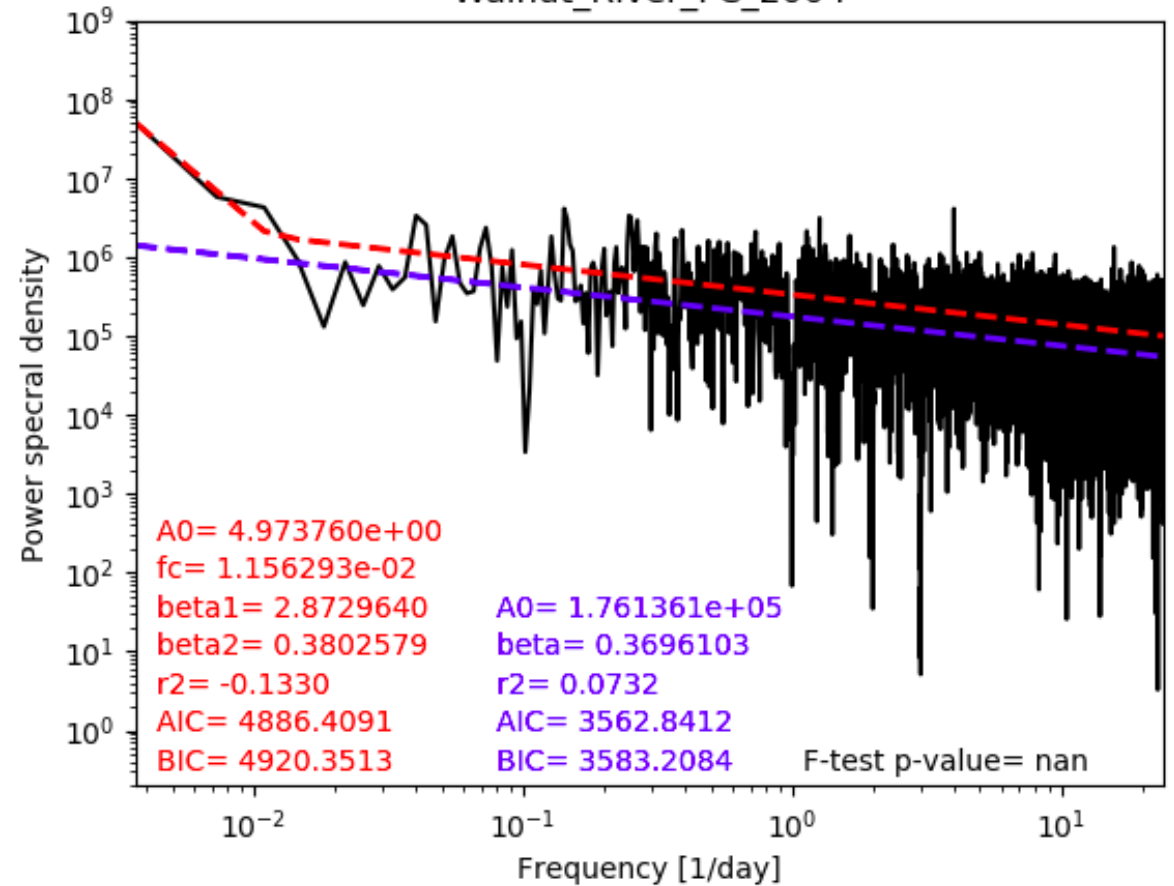
Landscape and regional dynamics

http://earthobservatory.nasa.gov/Study/Desertification/
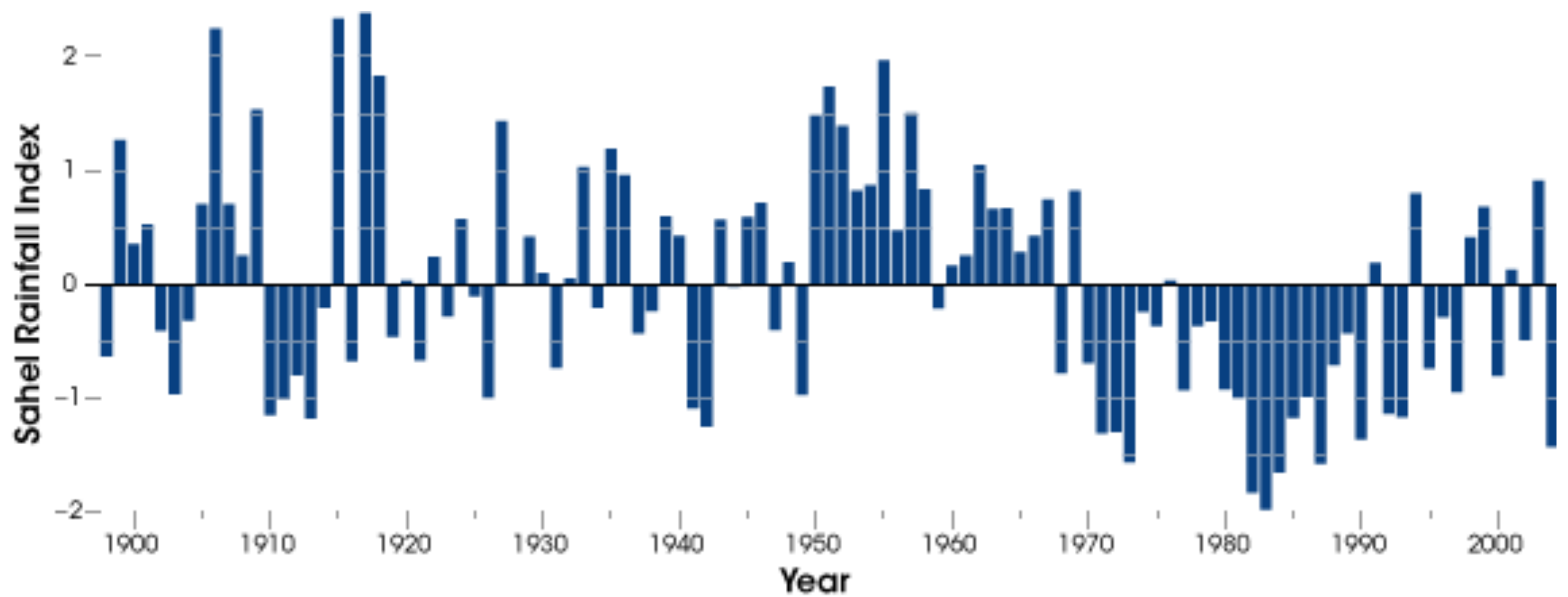
Back to Basics: Relationships with Nature

- Hunter gatherers
- Giving spirit of nature
- Sharing

- Farmers
- Controlling spirits of ancestors
- Property rights

- Economics of reciprocity
- Rigidity of quantification

Mullah Mathematics

"One and one is not always two. Let us take an example. A pair of she goats may be two. But if you have two billy goats, then one and one may be one. Or if there is a he goat and a she goat, then one and one may be many. It all depends on circumstances and context."

"Why should we plant, when there are so many mongongos in the world?"

/Xashe, a !Kung man from Mahopa

"Let's sit face to face and pluck them iteratively all over together, in sets of one"

Preference of event quantification over entity quantification in Jaminjung. Conveying information about processes and configurations rather than quantities of individuals. Eva Schultze-Berndt, University of Manchester

"One, two, three, many"

Quantification is dependent on context

Risk in unpredictable environments

"The family camped in the wadi, and the whole family was washed away and drowned, together with all the camels; except for one woman and her son, who had slept the night in a cave over-looking the wadi. She saw it all and was able to tell the tale"

Abdullah, Southern Oman

Paul Ricoeur - narrative theory

- Heterogeneous concepts form a composite discourse from which new meanings are created
- Mimesis1 - pre-narrative structure of understanding and experience
- Mimesis2 - configuration of the field of action, narrative of emplotment
- Mimesis3 - reconfiguration of the field of action, integration of the narrative into actual lived experience
- Cyclical interpretive process

Stories

- Maria Tartar: Fairy tales are narratives that 'oblige us to react, make judgments' and which 'move us always away from cultural silences.'

- Stories are unstable and culturally transposed.

- Stories tell us who and how we are in the world.

- Stories operate in a moving and transpositional space between silence and the hypothetical.

- Their capacity for holding us as we listen is one which demands we sit with what is not known.

- Ricoeur: 'Telling a story is deploying an imaginary space for thought experiments in which moral judgment operates in a hypothetical mode.

Poetry

- Poetry has rich roots in storytelling, in repeating patterns, mnemonics, epithets.
- The lyric is a space in which the drive towards its end / resolution of meaning is endlessly refracted back into its form.
- Narrative poetry takes on the authority of the voice that tells it.
- It does so in an obviously fragmented way.
- A poem's narrative offers a more overdetermined provisionality and fragmentariness.
- Holds complex neuronal ways of thinking that allow foreground connections between brain, body and world.

Conclusion

- Institutional economics - importance of informal institutions in determining the incentive and behavioural structures of society

- Complex systems - the way nature works, uncertain and unpredictable

- Stories and poems - tell us who and how we are in the world, identity and context, place for holding complex and possible, predict the unpredictable and future unknowns

- Reconfiguration - create new adaptive narratives through juxaposition