Laura Warman

The University of New South Wales

7th One-day postgraduate course on Current Ecology and Evolution

ELSEVIER

Catastrophic regime shifts in ecosystems: linking theory to observation

Marten Scheffer[1] and Stephen R. Carpenter[2]

[1]Department of Aquatic Ecology and Water Quality Management, Wageningen University, PO Box 8080, 6700 DD Wageningen, The Netherlands
[2]Center for Limnology, University of Wisconsin, 680 North Park Street, Madison, WI 53706, USA

648 Review TRENDS in Ecology and Evolution Vol.18 No.12 December 2003

Catastrophic regime shifts in ecosystems: linking theory to observation

Marten Scheffer[1] and Stephen R. Carpenter[2]

[1]Department of Aquatic Ecology and Water Quality Management, Wageningen University, PO Box 8080, 6700 DD Wageningen, The Netherlands
[2]Center for Limnology, University of Wisconsin, 680 North Park Street, Madison, WI 53706, USA

- Admits and addresses the complexity inherent to many ecosystems

- Explains complex ideas simply, without trivializing them

- Kinder, gentler and engaging introduction to intimidating jargon/topics

Catastrophic regime shifts in ecosystems: linking theory to observation

"Ecosystems are obviously never stable in the sense that they do not change"

Catastrophic regime shifts in ecosystems: linking theory to observation

"Ecosystems are obviously never stable in the sense that they do not change"

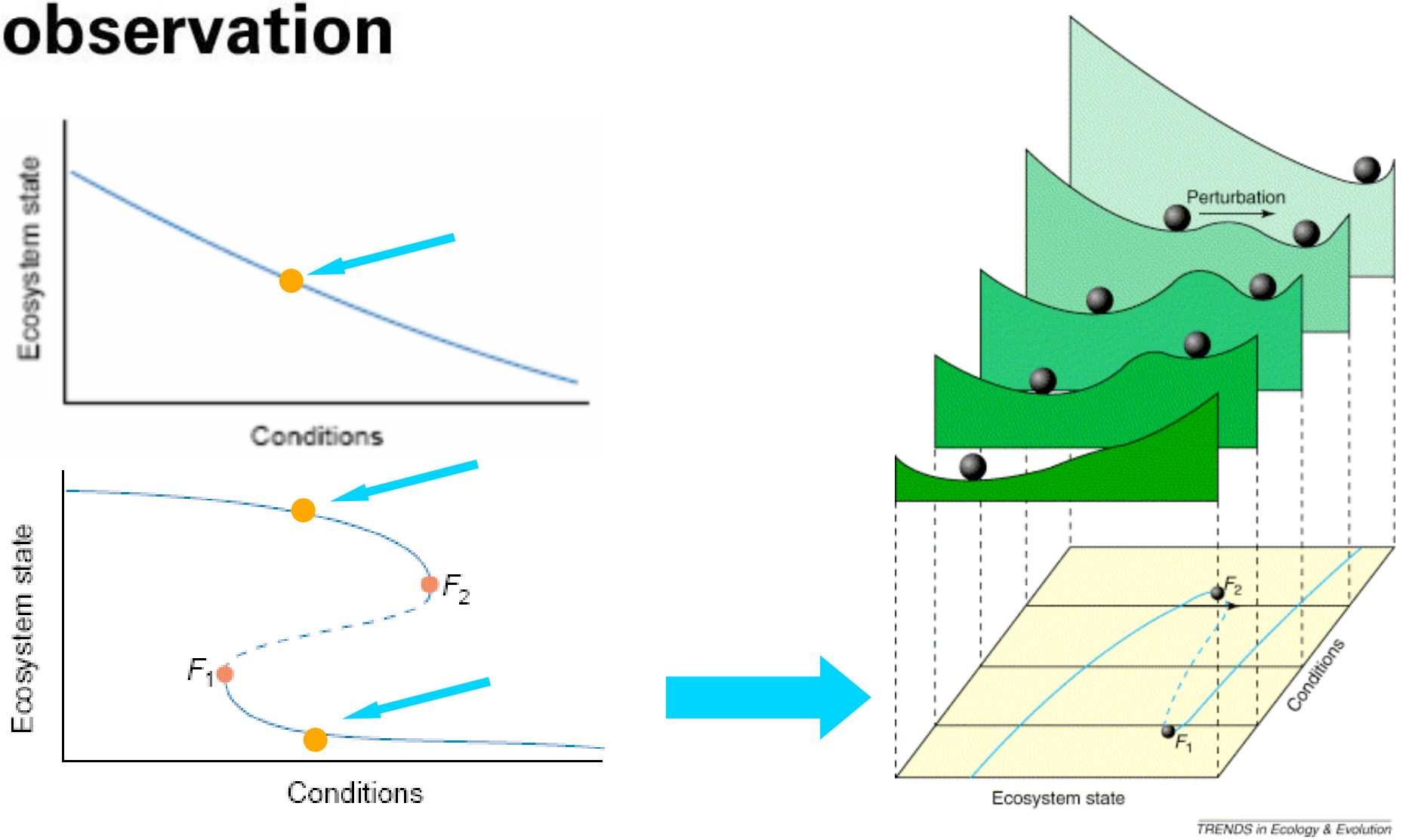
- Big external impacts don't always mean big changes in nature

- Change can come from within or without the ecosystem

- Big change can come from tiny incremental variation

  - 'The straw that broke the camel's back' – Catastrophic bifurcations

Catastrophic regime shifts in ecosystems: linking theory to observation



Catastrophic regime shifts in ecosystems: linking theory to observation

- Multiple causality is the rule in regime shifts

Catastrophic regime shifts in ecosystems: linking theory to observation

- Multiple causality is the rule in regime shifts
- Patterns depend on spatial scale
- Time scales matter as well!
    - Ecosystem processes / variables can have different time-frames

Catastrophic regime shifts in ecosystems: linking theory to observation

- Multiple causality is the rule in regime shifts
- Patterns depend on spatial scale
- Time scales matter as well!
    - Ecosystem processes / variables can have different time-frames
- Hints from field data and experimental evidence

Catastrophic regime shifts in ecosystems: linking theory to observation

- Big new field, new understanding

- We barely even know how to look for what we are looking for

- You NEED to think big – bring together (seemingly) disparate ideas

The importance of stupidity in scientific research

Martin A. Schwartz

Department of Microbiology, UVA Health System, University of Virginia, Charlottesville, VA 22908, USA

e-mail: maschwartz@virginia.edu

Accepted 9 April 2008
Journal of Cell Science 121, 1771 Published by The Company of Biologists 2008
doi:10.1242/jcs.033340

The importance of stupidity in scientific research

Martin A. Schwartz
Department of Microbiology, UVA Health System, University of Virginia, Charlottesville, VA 22908, USA
e-mail: maschwartz@virginia.edu

Accepted 9 April 2008
Journal of Cell Science 121, 1771 Published by The Company of Biologists 2008
doi:10.1242/jcs.033340

"…sometime the next day, it hit me. Science makes me feel stupid too. It's just that I've gotten used to it… I wouldn't know what to do without that feeling. I even think it's supposed to be this way"

The importance of stupidity in scientific research

Martin A. Schwartz
Department of Microbiology, UVA Health System, University of Virginia, Charlottesville, VA 22908, USA
e-mail: maschwartz@virginia.edu

Accepted 9 April 2008
Journal of Cell Science 121, 1771 Published by The Company of Biologists 2008
doi:10.1242/jcs.033340

"…sometime the next day, it hit me. Science makes me feel stupid too. It's just that I've gotten used to it… I wouldn't know what to do without that feeling. I even think it's supposed to be this way"

- Science in high-school and before, vs. a PhD project of one's very own

  ->Not only do you not know if your answer is correct, you don't know if the question is the right question

- Science as "an immersion into the unknown" and feeling "productively stupid"

The importance of stupidity in scientific research

Martin A. Schwartz
Department of Microbiology, UVA Health System, University of Virginia, Charlottesville, VA 22908, USA
e-mail: maschwartz@virginia.edu

Accepted 9 April 2008
Journal of Cell Science 121, 1771 Published by The Company of Biologists 2008
doi:10.1242/jcs.033340

"One of the beautiful things about science is that it allows us to bumble along, getting it wrong time after time, and feel perfectly fine as long as we learn something each time"

The importance of stupidity in scientific research

Martin A. Schwartz
Department of Microbiology, UVA Health System, University of Virginia, Charlottesville, VA 22908, USA
e-mail: maschwartz@virginia.edu

Accepted 9 April 2008
Journal of Cell Science 121, 1771 Published by The Company of Biologists 2008
doi:10.1242/jcs.033340

-So….

- a PhD is only partly about the questions you ask…

- the daily job of being a scientist

-it's important to get things wrong, it teaches you about the questions you ask

The importance of stupidity in scientific research

Martin A. Schwartz
Department of Microbiology, UVA Health System, University of Virginia, Charlottesville, VA 22908, USA
e-mail: maschwartz@virginia.edu

Accepted 9 April 2008
Journal of Cell Science 121, 1771 Published by The Company of Biologists 2008
doi:10.1242/jcs.033340

-So….

- a PhD is only partly about the questions you ask…

- the daily job of being a scientist

-it's important to get things wrong, it teaches you about the questions you ask

The importance of a community and not getting stuck within your own head

The end

Thanks!

Catastrophic regime shifts in ecosystems: linking theory to observation