

Science
[Prev](#) | [Table of Contents](#) | [Next](#)

www.sciencemag.org
Science 27 July 2001:
 Vol. 293 no. 5530 pp. 657–660
 DOI: 10.1126/science.293.5530.657

• VIEWPOINT

Ecological Forecasts: An Emerging Imperative

James S. Clark^{1,2}, Steven R. Carpenter², Mary Barber³, Scott Collins⁴, Andy Dobson⁵, Jonathan A. Foley⁶, David M. Lodge⁷, Mercedes Pascual⁸, Roger Pielke Jr.⁹, William Pizer¹⁰, Cathy Pringle¹¹, Walter V. Reid¹², Kenneth A. Rose¹³, Osvaldo Sala¹⁴, William H. Schlesinger¹⁵, Diana H. Wall¹⁶, David Wear¹⁷

[-] Author Affiliations

- ¹ Department of Biology, Duke University, Durham, NC 27708 USA.
- ² University of Wisconsin Center for Limnology, Madison, WI 53706, USA.
- ³ Ecological Society of America, 1707 H Street NW, Suite 400, Washington, DC 20006, USA.
- ⁴ Division of Biology, Kansas State University, Manhattan, KS 66506, USA.
- ⁵ Department of Ecology and Evolutionary Biology, Princeton University, Princeton, NJ 08544, USA.
- ⁶ Center for Sustainability and the Global Environment, University of Wisconsin, Madison, WI 53706, USA.
- ⁷ Department of Biological Sciences, University of Notre Dame, Notre Dame, IN 46556, USA.
- ⁸ Department of Ecology and Evolutionary Biology, University of Michigan, Ann Arbor, MI 48109, USA.
- ⁹ Environmental and Societal Impacts Group/National Center for Atmospheric Research, 3250 Mitchell Lane, Boulder, CO 80301, USA.
- ¹⁰ Resources for the Future, 1616 P Street NW, Washington, DC 20036, USA.
- ¹¹ Department of Ecology, University of Georgia, Athens, GA 30602, USA.
- ¹² Millennium Ecosystem Assessment, 731 North 79th Street, Seattle, WA 98103, USA.
- ¹³ Coastal Fisheries Institute and Department of Oceanography and Coastal Sciences, Louisiana State University, Baton Rouge, LA 70803, USA.
- ¹⁴ Department of Ecology, Faculty of Agronomy-IFEVA, University of Buenos Aires-CONICET, Buenos Aires 1417, Argentina.
- ¹⁵ Nicholas School of Environment and Earth Sciences, Duke University, Durham, NC 27708, USA.
- ¹⁶ Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, CO 80523, USA.
- ¹⁷ United States Department of Agriculture Forest Service, Post Office Box 12254, Research Triangle Park, NC 27709, USA.

ABSTRACT

Planning and decision-making can be improved by access to reliable forecasts of ecosystem state, ecosystem services, and natural capital. Availability of new data sets, together with progress in computation and statistics, will increase our ability to forecast ecosystem change. An agenda that would lead toward a capacity to produce, evaluate, and communicate forecasts of critical ecosystem services requires a process that engages scientists and decision-makers. Interdisciplinary linkages are necessary because of the climate and societal controls on ecosystems, the feedbacks involving social change, and the decision-making relevance of forecasts.

✉* To whom correspondence should be addressed. E-mail: jimclark@duke.edu

[Read the Full Text](#)

THIS ARTICLE HAS BEEN CITED BY OTHER ARTICLES:

Forecasting Avian Responses to Elwha River Restoration

Ecological Rest. 1 March 2013: 31–45.

[Abstract](#) [Full Text \(PDF\)](#)

Disentangling effects of uncertainties on population projections: climate change impact on an epixylic bryophyte

Proc R Soc B 7 August 2012: 3098–3105.

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#)

Reassessment of the 2010–2011 Haiti cholera outbreak and rainfall-driven multiseason projections

Proc. Natl. Acad. Sci. USA 24 April 2012: 6602–6607.

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#)

Modelling ecological systems in a changing world

Phil Trans R Soc B 19 January 2012: 181–190.

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#)

Predictive ecology: systems approaches

Phil Trans R Soc B 19 January 2012: 163–169.

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#)

A large-scale forest fragmentation experiment: the Stability of Altered Forest Ecosystems Project

Phil Trans R Soc B 27 November 2011: 3292–3302.

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#)

Uncertainty analysis of forest carbon sink forecast with varying measurement errors: a data assimilation approach

J Plant Ecol 1 September 2011: 178–191.

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#)

Adaptation and habitat selection in the eco-evolutionary process

Proc R Soc B 22 August 2011: 2401–2411.

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#)

Potential impacts of climate change on Northeast Pacific marine foodwebs and fisheries

ICES J. Mar. Sci. 1 July 2011: 1217–1229.

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#)

Ecological forecasting under climate change: the case of Baltic cod

Proc R Soc B 22 July 2010: 2121–2130.

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#)

On spatially explicit models of cholera epidemics

J R Soc Interface 6 February 2010: 321–333.

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#)

Highly Variable Spread Rates in Replicated Biological Invasions: Fundamental Limits to Predictability

Science 18 September 2009: 1536–1539.

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#)

Preventing the collapse of the Baltic cod stock through an ecosystem-based management approach

Proc. Natl. Acad. Sci. USA 25 August 2009: 14722–14727.

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#)

Scaling rules for the final decline to extinction

Proc R Soc B 7 April 2009: 1361–1367.

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#)

From cells to coastlines: how can we use physiology to forecast the impacts of climate change?

J. Exp. Biol. 15 March 2009: 753–760.

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#)

Projected distributions of novel and disappearing climates by 2100 AD

Proc. Natl. Acad. Sci. USA 3 April 2007: 5738–5742.

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#)

Profile of Stephen R. Carpenter

Proc. Natl. Acad. Sci. USA 19 July 2005: 9999–10001.

[Full Text](#) [Full Text \(PDF\)](#)

The success of animal invaders

Proc. Natl. Acad. Sci. USA 17 May 2005: 7055–7056.

[Full Text](#) [Full Text \(PDF\)](#)

A framework for ecosystem impacts assessment using an indicator approach

ICES J. Mar. Sci. 1 January 2005: 592–597.

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#)

Challenges of Modeling Ocean Basin Ecosystems

Science 4 June 2004: 1463–1466.

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#)

PREDICTING TRIATOMA DIMIDIATA ABUNDANCE AND INFECTION RATE: A RISK MAP FOR NATURAL TRANSMISSION OF CHAGAS DISEASE IN THE YUCATAN PENINSULA OF MEXICO

Am J Trop Med Hyg 1 May 2004: 514–519.

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#)

Bioavailability of organic matter in a highly disturbed estuary: The role of detrital and algal resources

Proc. Natl. Acad. Sci. USA 11 June 2002: 8101–8105.

[Abstract](#) [Full Text](#) [Full Text \(PDF\)](#)