

Algal Turf Scrubbing: Boon or Blip?

Author: Beardsley, Timothy M.

Source: BioScience, 61(6) : 423

Published By: American Institute of Biological Sciences

URL: <https://doi.org/10.1525/bio.2011.61.6.1>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

PUBLISHER

Richard T. O'Grady

EDITOR IN CHIEF

Timothy M. Beardsley

MANAGING EDITOR

James M. Verdier

BOOK REVIEW EDITOR

PEER REVIEW / PRODUCTION COORDINATION

Jennifer A. Williams

MANUSCRIPT EDITOR

Nathan N. True

Editors: Eye on Education: Cathy Lundmark (educationoffice@aibs.org); Feature articles: Cathy Lundmark (features@aibs.org); Washington Watch: Robert E. Gropp (publicpolicy@aibs.org).

Editorial Board: Agriculture: Sonny Ramaswamy; Animal Behavior: Janice Moore; Animal Development: Paula Mabee; Botany: Kathleen Donohue; Cell Biology: Randy Wayne; Ecology: Scott Collins, Daniel Simberloff; Ecotoxicology: Judith S. Weis; Education: Charlene D'Avanzo; Environmental Microbiology: Rita R. Colwell; Environmental Policy: Gordon Brown, J. Michael Scott; Evolutionary Biology: James Mallet; Genetics and Evolution: Martin Tracey; History and Philosophy: Richard M. Burian; Human Biology: David L. Evans; Invertebrate Biology: Kirk Fitzhugh; Landscape Ecology: Monica Turner; Mammalogy: David M. Leslie Jr.; Microbiology: Edna S. Kaneshiro; Molecular Biology: David Hillis; Molecular Evolution and Genomics: David Rand; Neurobiology: Cole Gilbert; Plant Development: Cynthia S. Jones; Policy Forum: Eric A. Fischer; Population Biology: Ben Pierce; Professional Biologist: Jean Wyld; Remote Sensing and Computation: Geoffrey M. Henebery; Statistics: Kent E. Holsinger; Vertebrate Biology: Harvey B. Lillywhite.

BioScience (ISSN 0006-3568; e-ISSN 1525-3244) is published 12 times a year by the American Institute of Biological Sciences, 1900 Campus Commons Dr., Suite 200, Reston, VA 20191, in collaboration with the University of California Press. Periodicals postage paid at Berkeley, CA, and additional mailing offices. **POSTMASTER:** Send address changes to *BioScience*, University of California Press, Journals and Digital Publishing, 2000 Center Street, Suite 303, Berkeley, CA 94704-1223, or e-mail customerservice@ucpressjournals.com.

Membership and subscription: Individual members, go to www.aibs.org/aibs-membership/index.html for benefits and services, membership rates, and back issue claims. Subscription renewal month is shown in the four-digit year-month code in the upper right corner of the mailing label.

Institutional subscribers, go to www.ucpressjournals.com or e-mail customerservice@ucpressjournals.com. Out-of-print issues and volumes are available from Periodicals Service Company, 11 Main Street, Germantown, NY 12526-5635; telephone: 518-537-4700; fax: 518-537-5899; Web site: www.periodicals.com.

Advertising: For information about display and online advertisements and deadlines, e-mail adsales@ucpressjournals.com. For information about classified placements and deadlines, contact Jennifer A. Williams, AIBS (jwilliams@aibs.org).

Copying and permissions notice: Authorization to copy article content beyond fair use (as specified in sections 107 and 108 of the US Copyright Law) for internal or personal use, or the internal or personal use of specific clients, is granted by the Regents of the University of California on behalf of AIBS for libraries and other users, provided that they are registered with and pay the specified fee through the Copyright Clearance Center (CCC), www.copyright.com. To reach the CCC's Customer Service Department, call 978-750-8400 or e-mail info@copyright.com. For permission to distribute electronically, republish, resell, or repurpose material, and to purchase article offprints, use the CCC's Rightslink service on JSTOR at <http://www.jstor.org/r/ucal/bio>. Submit all other permissions and licensing inquiries through the University of California Press's Rights and Permissions Web site, www.ucpressjournals.com/reprintInfo.asp, or e-mail journalspermissions@ucpress.edu.

Abstracting and indexing: For complete abstracting and indexing information, please visit www.ucpressjournals.com.

© 2011 American Institute of Biological Sciences. All rights reserved. Printed at Allen Press, Inc.

BioScience®

Organisms from Molecules to the Environment
American Institute of Biological Sciences

Algal Turf Scrubbing: Boon or Blip?

An article in this issue by Walter H. Adey and colleagues, which begins on p. 434, provides a fascinating look at the early stages in the commercial development of a potentially important biotechnology: algal turf scrubbing. These pulsed-flow systems are now being built and operated on a hectare scale in Florida to extract nutrients from streams, canals, and lakes polluted by agricultural runoff. Not only can algal turf scrubbers efficiently produce a nitrogen- and phosphorus-rich fertilizer, they restore oxygen levels in polluted waters. The algae generated, which are washed off screens weekly, can also be used to produce biofuel: The authors favor a fermentation process that produces alcohols rather than extraction of oils from the diatoms that largely populate the devices. A potentially higher-value product is omega-3 fatty acids for use as nutraceuticals.

The interest lies, of course, in the fact that cleaning wastewater and agricultural runoff contaminated with nitrogen and phosphorus is an immediate need in many places where natural waters are polluted, and a system that can use sunlight as a source of energy to do so is bound to reflect a gleam in an entrepreneur's eye. Add to this the concerns about global supplies of phosphorus for use in fertilizer and about the long-term availability of oil, and the technology starts to look like a green's dream. Some types can even operate in open water, thus minimizing the loss of agricultural land.

The market will render its judgment on algal turf scrubbing over time, but Adey and his colleagues' article does bring into sharp focus the difference between what is economically viable given current hidden subsidies and what might be environmentally desirable. The authors are careful to stress that algal turf scrubbing is not likely to ever be profitable just as a way of making fuel. Although more productive than terrestrial crops, algae, like the corn now used in vast quantities to produce ethanol, are expensive to cultivate, harvest, process, and convert into usable energy. Such barriers place immense difficulties in the way of all attempts to develop alternatives to oil, as was usefully explained by Charles A. S. Hall, Stephen Balogh, and David J. R. Murphy in a 2009 *Energies* article (doi:10.3390/en20100025). In the particular case of algae cultivated for biofuel, scale-up costs have not always been adequately accounted for, and there is disagreement over the economic potential.

The near-term fate of algal turf scrubbing seems likely to depend much more on whether the value in nutrient removal can be realized and applied to the cost of building and running the units. As long as the ecological damage caused by agricultural and domestic fertilizer runoff typically carries little or no economic cost for its originators, it will be hard for algal turf scrubbing to gain a foothold beyond some special sites. If enlightened policy were to impose a predictable cost on such pollution, however, algal turf scrubbers might indeed become a common sight, and waters might be cleaner and more productive—with the fuel and fertilizer byproducts as a bonus. Whether the technology can become a long-term boon, however, is still unclear.

TIMOTHY M. BEARDSLEY
Editor in Chief

doi:10.1525/bio.2011.61.6.1