

# Journal of Environmental Accounting and Management

---

## Editors

### **Zhifeng Yang**

School of Environment  
Beijing Normal University  
Beijing 100875, China  
Fax: +86 10 58800397  
Email: zfyang@bnu.edu.cn

### **Sergio Ulgiati**

Department of Science and Technology  
Parthenope University of Napoli  
Centro Direzionale, Isola C4. 80143 Napoli, Italy  
Fax: +39 081 547 6515  
Email: sergio.ulgiati@uniparthenope.it

## Subject Editors

### **Biagio Giannetti** (*Cleaner Production*)

Paulista University  
Laboratório de Produção e Meio Ambiente (LaProMA)  
Sao Paulo, Brazil  
Email: biafgian@unip.br

### **Antonino Marvuglia** (*Computational Sustainability*)

Luxembourg Institute of Science and Technology (LIST)  
ERIN - Environmental Research & Innovation Department  
5 avenue des hauts fourneaux  
L-4362 Esch sur Alzette - Luxembourg  
Email: antonino.marvuglia@list.lu

### **Marco Raugei** (*Renewable Energies/Life Cycle Assessment*)

Dept of Mechanical Engineering and Mathematical Sciences,  
Oxford Brookes University  
Wheatley, UK  
Email: marco.raugei@brookes.ac.uk

### **Andrea Genovese** (*Circular Economy Management & Policy*)

Logistics and Supply Chain Management Research Centre  
Management School, The University of Sheffield  
Room B.063, Conduit Road, Sheffield S10 1FL, UK.  
E-mail: a.genovese@shef.ac.uk

### **Olga Kordas** (*Urban Systems/Smart Cities*)

Department of Sustainable development, Environmental science and Engineering  
KTH Royal Institute of Technology  
Teknikringen 34, S - 100 44 Stockholm, Sweden  
Email: olga.kordas@abe.kth.se

### **Feni Agostinho** (*Emergy/Exergy/Ecological Footprint*)

Universidade Paulista (UNIP)  
Programa de Pós-Graduação em Engenharia de Produção  
Laboratório de Produção e Meio Ambiente (LAPROMA)  
Rua Dr. Bacelar, 1212, CEP 04026-002, São Paulo, Brasil  
Email: feniagostinho@gmail.com

## Associate Editors

### **Mark T. Brown**

Department of Environmental Engineering Sciences  
University of Florida.  
Gainesville, FL, USA  
Fax: 352-392-3624  
Email: mtb@ufl.edu

### **Hans Schnitzer**

Institute for Process Engineering  
Graz University of Technology  
Graz, Austria  
Fax: 43(0)316-873/7469  
Email: hans.schnitzer@tugraz.at

### **Walter A. Pengue**

Universidad Nacional de General Sarmiento  
Gepama Fadu UBA  
Buenos Aires, Argentina  
Emails: wapengue@ungs.edu.ar

## Editorial Board

### **Salvatore Arico**

Division of Ecological Sciences  
UNESCO, Paris, France  
Fax: 33 1 4568 5804  
Email: S.Arico@unesco.org

### **Daniel E. Campbell**

United States Environmental Protection Agency  
Wakefield, RI, USA  
Fax: 401-783-3945  
Email: Campbell.Dan@epamail.epa.gov

### **Brian D. Fath**

Department of Biological Sciences  
Towson University  
Towson, MD 21252, USA  
Fax: 410-704-2405  
Email: bfath@towson.edu

### **Bhavik Bakshi**

Department of Chemical Engineering  
The Ohio State University  
Columbus Ohio 43210, USA  
Fax: (614)292-3769  
Email: bakshi.2@osu.edu

### **Guoqian Chen**

Dept. of Mechanics and Engineering Science  
Peking University  
Beijing, China  
Email: gqchen@pku.edu.cn

### **Matthias Finkbeiner**

Department of Sustainable Engineering Technical  
University Berlin, Germany  
Fax +49 (0)30 314-21720  
Email: matthias.finkbeiner@tu-berlin.de

### **Enrico Benetto**

Luxembourg Institute of Science and Technology  
ERIN - Environmental Research & Innovation  
Department  
41, rue du Brill, L-4422 Belvaux  
Email: enrico.benetto@list.lu

### **Francesco Cherubini**

Dept. of Energy and Process Engineering  
Norwegian Univ. of Science and Technology  
Trondheim, Norway  
Email: francesco.cherubini@ntnu.no

### **Pier Paolo Franzese**

Department of Science and Technology  
Parthenope University of Napoli  
Centro Direzionale, Isola C4. 80143 Napoli, Italy  
Email: pierpaolo.franzese@uniparthenope.it

### **Federico M. Butera**

Dept. of Building & Environment Science &  
Technology (BEST)  
Politecnico di Milano, Milano, Italy  
Fax: 02-2399-5151  
Email: federico.butera@polimi.it

### **Liang Dong**

Institute of Environmental Sciences  
Leiden University  
P.O. Box 9518  
2333 RA Leiden, the Netherlands  
Email: l.dong@cml.leidenuniv.nl

### **Helmut Haberl**

Institute of Social Ecology  
Alpen Adria Universität  
Vienna, Austria  
Email: helmut.haberl@uni-klu.ac.at

*Continued on the back materials*

# **Journal of Environmental Accounting and Management**

Volume 5, Issue 3, September 2017

Editors  
Zhifeng Yang  
Sergio Ulgiati



L&H Scientific Publishing, LLC, USA

## **Publication Information**

*Journal of Environmental Accounting and Management* (ISSN 2325-6192 (print), eISSN 2325-6206 (online), CN 10-1358/X) is published quarterly (March, June, September, and December) by L & H Scientific Publishing, LLC, P.O. Box 99, Glen Carbon, IL62034, USA. Subscription prices are available upon request from the publisher or from this journal website. Subscriptions are accepted on a prepaid basis only and entered on a calendar year basis. Issues are sent by standard mail (Surface in North America, air delivery outside North America). Priority rates are available upon request. Claims for missing issues should be made within six months of the date of dispatch.

## **Changes of Address**

Send address changes to L&H Scientific Publishing, LLC, P.O. Box 99, Glen Carbon, IL62034, USA. Changes of address must be received at L&H Scientific Publishing eight weeks before they are effective.

## **Authors Inquiries**

For inquiries relative to the submission including electronic submission where available, please visit journal website or contact journal Editors-in-Chief.

## **Advertising Information**

If you are interested in advertising or other commercial opportunities, please email via [lhscientificpublishing@gmail.com](mailto:lhscientificpublishing@gmail.com) and your enquiry will be handled as soon as possible.

## **© 2017 L&H Scientific Publishing, LLC. All rights reserved**

L&H Scientific Publishing, LLC requires the authors to sign a Journal Copyright Transfer Agreement for all articles published in L&H Scientific. The Copyright Transfer Agreement is an agreement under which the author retains copyright in the work but grants L & H Scientific Publishing LLC the sole and exclusive right and license to publish the full legal term of copyright.

Authors are responsible for obtaining permission from copyright holders for reproducing any illustrations, tables, figures or lengthy quotations published somewhere previously.

For authorization to photocopy materials for internal or personal use under those circumstances not falling within the fair use provisions of Copyright Act, requests for reprints and translations should be addressed to the permission office of L&H Scientific publishing, LLC via [lhscientificpublishing@gmail.com](mailto:lhscientificpublishing@gmail.com) or call: +1-618-402-2267. Permission of the Publisher and payment of a fee are required for all other photocopying, including multiple or systematic copying, copying for advertising or promotional purposes, resale, and forms of document delivery. Special rates are available for educational institutions to make photocopies for non-profit educational classroom use.

Subscribers may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions. Permission of the publisher is required for resale or distribution outside the institution.

Permission of the Publisher is required to store or use electronically any materials contained in this journal, including any entire or partial article, please contact the publisher for advice. Otherwise, no part of this publication can be reproduced, stored in a retrieval systems or transmitted in any form or by means, electronic, mechanical, photocopying, recording or without prior written permission of the Publisher.

## **Disclaimer**

The authors, editors and publisher will not accept any legal responsibility for any errors or omissions that may be made in this publication. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Printed in USA on acid-free paper.

## **Aims and Scope**

The peer-reviewed journal publishes original research results in the field of environmental and ecological science with focus on applications to the sustainable management of natural, human-dominated, and man-made ecosystems. The aim of the journal is to provide a place for a rapid exchange of new ideas and concepts for scientists and engineers in the fields of environmental accounting, human and systems ecology, and environmental management. Manuscripts on environmental accounting and managements are solicited, including: mathematical modeling; computational and management techniques in environmental, ecological, energy and information science; environmental technology and engineering; human managed ecosystems such as agricultural, urban, coastal, riparian, and wetland ecosystems. Topics of interest include, but not limited to:

- Environmental and ecological economics, environmental accounting, environmental impact assessment, ecosystem service assessment, energy and resource use, social factors and management.
- Modeling in environmental conservation and restoration, eco-hydrology and water resources management, ecological process and pattern, climate change effects, environmental engineering and technology.
- Planning and management in human dimension-institutions and patterns for socio-economic systems, industrial ecology, ecological informatics, landscape design, and urban planning.
- Environmental policy, legislation, and innovations with environmental and strategic impact assessment, project appraisal and auditing, and environmental protection.

No length limitations for contributions are set, but only concisely written manuscripts are considered for publication. Brief papers can be published on the basis of Technical Notes. Discussions of previous published papers are welcome.

## **Peer Review**

*Journal of Environmental Accounting and Management* adopts the traditional blind-review policy in which the reviewers' names are concealed for submission author(s). Each submitted manuscript is reviewed by at least two expert referees in the related research field.

## **Manuscript Submission Guidelines**

For manuscript submission, authors can send their manuscripts to one of the Editors-in-Chief. Manuscript preparation should follow the sample papers and journal manuscript templates (word file or Latex files), which can be found on the journal website at <https://lhscientificpublishing.com/Journals/JEAM-Default.aspx>

## **Proofs and Electronic Offprints**

Authors will receive a PDF proof of their articles and, on publication, electronic offprints of the article.

## **Open Access**

After manuscripts acceptance, author(s) have a right to request the accepted manuscripts published by L&H Scientific publishing with open access, and the author(s) have a responsibility to paying the open access publication fee with US\$60 per page. The copyright is still held by the Publisher. Without any request of the open access publication, the accepted manuscripts are assumed to be published traditionally.

*Continued from insider front cover*

**Gordon Huang**

Dept. of Environmental Systems Eng.  
University of Regina  
Regina, Saskatchewan, Canada  
Fax: (306) 585-4855,  
Email: gordon.huang@uregina.ca

**Shu-Li Huang**

Graduate Institute of Urban Planning, National  
Taipei University, Taiwan  
Fax: 886 (2) 8671-8801,  
Email: shuli@mail.ntpu.edu.tw

**Wesley W. Ingwersen**

Sustainable Technology Division  
National Risk Management Research  
Laboratory, US EPA  
Cincinnati, OH 45268, USA  
Email: Ingwersen.Wesley@epamail.epa.gov

**Christine Jasch**

Vienna Institute for Environmental Management  
and Economics, IÖW  
Rechte Wienzeile 19/10  
A-1040 Vienna, AUSTRIA  
Email: jasch.christine@ioew.at

**Christer Jonasson**

Department of Earth Sciences  
Uppsala University  
Sweden  
Fax: +46 920 22 84 11  
Email: christer.jonasson@ans.polar.se

**Dan L. Johnson**

Department of Geography  
University of Lethbridge  
Alberta, Canada  
Fax: (403) 332-4039  
Email: dan.johnson@uleth.ca

**Sven Erik Jørgensen**

Institute A, Environmental Chemistry  
Copenhagen University  
Copenhagen, Denmark  
Fax: +45 35305968  
Email: msjapan@hotmail.com

**Noam Lior**

Dept. of Mech. Eng. & Applied Mech.  
University of Pennsylvania  
Philadelphia, PA 19104, USA  
Fax: +1-215 573 6334  
Email: lior@seas.upenn.edu

**Editorial Assistants**

**Gengyuan Liu**

School of Environment  
Beijing Normal University  
Beijing, China  
Email: liugengyuan@bnu.edu.cn

**Hongfang Lu**

South China Botanical Garden  
Chinese Academy of Science  
Guangzhou, China  
Fax: 020-37084273  
Email: luhf@srbg.ac.cn

**David Maradan**

Department of Economics  
University of Geneva  
Genève, Switzerland  
Fax: (+4122) 705-8293  
Email: maradan@ecosys.com

**Paolo Masoni**

The LCA and Ecodesign Laboratory  
ENEA  
via Martiri di Monte Sole, 4  
40129 Bologna, Italy  
Email: paolo.masoni@enea.it

**Antonio Messineo**

Department of Engineering and Architecture  
University of Enna Kore  
Enna, Italy  
Fax: +39 0935 536391  
Email: antonio.messineo@unikore.it

**Andrzej Nienartowicz**

Institute of Ecology and Protection of the  
Environment  
Nicolaus Copernicus University  
Torun, Poland  
Email: anienart@umk.pl

**Enrique Ortega**

School of Food Engineering, the State University of  
Campinas  
Campinas, São Paulo, Brazil  
Fax: +55 19 3521 4027  
Email: ortega@fea.unicamp.br

**B. Sudhakara Reddy**

Indira Gandhi Institute of Development  
Research  
Goregaon, Mumbai, INDIA  
Fax: 022 2840 2752  
Email: sreddy@igidr.ac.in

**Joseph A. Tainter**

Department of Environment and Society  
Utah State University  
Logan, UT 84322, USA  
Email: Joseph.Tainter@usu.edu

**David R. Tilley**

Dept. of Environmental Science and Tech.  
University of Maryland,  
College Park, MD 20742, USA  
Fax: (301) 405-8027  
Email: dtalley@umd.edu

**Alicia Valero**

Department of Mechanical Engineering  
University of Zaragoza  
Zaragoza, SPAIN  
Fax: +34 976 732 078  
Email: aliciavd@unizar.es

**Cecilia M. Villas Bôas de Almeida**

Dept. of Production Engineering  
Paulista University  
Rua Doutor Bacelar 1212  
Sao Paulo 04026-002, Brazil  
Email: cmvbag@unip.br

**Mathis Wackernagel**

Global Footprint Network  
312 Clay Street, Suite 300  
Oakland, CA 94607-3510, USA  
Email: mathis@footprintnetwork.org

**Maochao Yan**

Institute of Geographical Science and Natural  
Resource Research  
China Agricultural University  
Beijing 100094, China  
Email: yanmc@igsnrr.ac.cn

**Maciej Zalewski**

Department of Applied Ecology  
University of Lodz  
Poland  
Fax: (+48) 42 665 58 19  
Email: m.zalewski@erce.unesco.lodz.pl

**Xiaoling Zhang**

Department of Public Policy  
City University of Hong Kong  
Hong Kong, China  
Fax: (+852) 3442-0413  
Email: xiaoling.zhang@cityu.edu.hk

**Silvio Viglia**

Department of Science and Technology  
Parthenope University of Napoli  
Centro Direzionale, Isola C4. 80143 Napoli, Italy  
Email: silvio.viglia@uniparthenope.it