

Home

Online Library HESS

- Recent Final Revised Papers
- Volumes and Issues**
- Special Issues
- Library Search
- Title and Author Search

Online Library HESSD

Alerts & RSS Feeds

General Information

Submission

Review

Production

Subscription

Comment on a Paper

Impact  
Factor  
2.270

ISI  
indexed



[Volumes and Issues](#) [Contents of Issue 4](#) [Special Issue](#)

Hydrol. Earth Syst. Sci., 7, 609-617, 2003  
www.hydrol-earth-syst-sci.net/7/609/2003/

© Author(s) 2003. This work is licensed  
under a Creative Commons License.

## Assessing emission reduction targets with dynamic models: deriving target load functions for use in integrated assessment

A. Jenkins<sup>1</sup>, B. J. Cosby<sup>2</sup>, R. C. Ferrier<sup>3</sup>, T. Larssen<sup>4</sup>, and M. Posch<sup>5</sup>

<sup>1</sup>CEH, Wallingford, Oxfordshire, OX10 8BB, UK

<sup>2</sup>Department of Environmental Sciences, University of Virginia, Charlottesville, VA 22903, USA

<sup>3</sup>Macaulay Institute, Aberdeen, Scotland AB15 8QH, UK

<sup>4</sup>Norwegian Institute for Water Research, Box 173, N-0411 Oslo, Norway

<sup>5</sup>Coordination Center for Effects/RIVM, Box 1, NL-3720 BA Bilthoven, The Netherlands

**Abstract.** International agreements to reduce the emission of acidifying sulphur (S) and nitrogen (N) compounds have been negotiated on the basis of an understanding of the link between acidification related changes in soil and surface water chemistry and terrestrial and aquatic biota. The quantification of this link is incorporated within the concept of critical loads. Critical loads are calculated using steady state models and give no indication of the time within which acidified ecosystems might be expected to recover. Dynamic models provide an opportunity to assess the timescale of recovery and can go further to provide outputs which can be used in future emission reduction strategies. In this respect, the Target Load Function (TLF) is proposed as a means of assessing the deposition load necessary to restore a damaged ecosystem to some pre-defined acceptable state by a certain time in the future. A target load represents the deposition of S and N in a defined year (implementation year) for which the critical limit is achieved in a defined time (target year). A TLF is constructed using an appropriate dynamic model to determine the value of a chemical criterion at a given point in time given a temporal pattern of S and N deposition loads. A TLF requires information regarding: (i) the chemical criterion required to protect the chosen biological receptor (i.e. the critical limit); (ii) the year in which the critical limit is required to be achieved; and (iii) time pattern of future emission reductions. In addition, the TLF can be assessed for whole regions to incorporate the effect of these three essentially ecosystem management decisions.

**Keywords:** emission reduction, critical load, target load, dynamic model, recovery time

[Final Revised Paper](#) (PDF, 564 KB)

Citation: Jenkins, A., Cosby, B. J., Ferrier, R. C., Larssen, T., and Posch, M.: Assessing emission reduction targets with dynamic models: deriving target load functions for use in integrated assessment, Hydrol. Earth Syst. Sci., 7, 609-617, 2003. [Bibtex](#) [EndNote](#) [Reference Manager](#)

Search HESS

Library Search

Author Search

News

- New Service Charges
- Financial Support for Authors
- ISI Impact Factor: 2.270

Recent Papers

01 | HESSD, 12 Mar 2009:  
Distributed modeling of land surface water and energy budgets in the inland Heihe river basin of China

02 | HESSD, 12 Mar 2009:  
Comparison of six algorithms to determine the soil thermal diffusivity at a site in the Loess Plateau of China

03 | HESS, 11 Mar 2009:  
Large-scale lysimeter site St. Arnold, Germany: analysis of 40 years of precipitation, leachate and evapotranspiration

