

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



▣ Volumes and Issues ▣ Contents of Issue 5

Hydrol. Earth Syst. Sci., 7, 755-766, 2003

www.hydrol-earth-syst-sci.net/7/755/2003/

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

The contribution of soil structural degradation to catchment flooding: a preliminary investigation of the 2000 floods in England and Wales

I. P. Holman¹, J. M. Hollis², M. E. Bramley³, and T. R. E. Thompson²

¹Institute of Water and Environment, Cranfield University, Silsoe, Bedford, MK45 4DT, UK

²National Soil Resources Institute, Cranfield University, Silsoe, Bedford, MK45 4DT, UK

³Environment Agency, Head Office, Aztec West, Almondsbury, Bristol, BS32 4UD, UK

Email for corresponding author: i.holman@cranfield.ac.uk

Abstract. During the autumn of 2000, England and Wales experienced the wettest conditions for over 270 years, causing significant flooding. The exceptional combination of a wet spring and autumn provided the potential for soil structural degradation. Soils prone to structural degradation under five common lowland cropping systems (autumn-sown crops, late-harvested crops, field vegetables, orchards and sheep fattening and livestock rearing systems) were examined within four catchments that experienced serious flooding. Soil structural degradation of the soil surface, within the topsoil or at the topsoil/subsoil junction, was widespread in all five cropping systems, under a wide range of soil types and in all four catchments. Extrapolation to the catchment scale suggests that soil structural degradation may have occurred on approximately 40% of the Severn, 30–35 % of the Yorkshire Ouse and Uck catchments and 20% of the Bourne catchment. Soil structural conditions were linked via hydrological soil group, soil condition and antecedent rainfall conditions to SCS Curve Numbers to evaluate the volume of enhanced runoff in each catchment. Such a response at the catchment-scale is only likely during years when prolonged wet weather and the timing of cultivation practices lead to widespread soil structural degradation. Nevertheless, an holistic catchment-wide approach to managing the interactions between agricultural land use and hydrology, allowing appropriate runoff (and consequent flooding) to be controlled at source, rather than within the floodplain or the river channel, should be highlighted in catchment flood management plans.

Keywords: flooding, soil structure, land management, Curve Number, runoff, agriculture

▣ [Final Revised Paper](#) (PDF, 685 KB)

Citation: Holman, I. P., Hollis, J. M., Bramley, M. E., and Thompson, T. R. E.: The contribution of soil structural degradation to catchment flooding: a preliminary investigation of the 2000 floods in England and Wales, Hydrol. Earth Syst. Sci., 7, 755-766, 2003. ▣ [Bibtex](#) ▣ [EndNote](#) [Reference](#)

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

