

# Water Resource Associates

*A network of consultants in hydraulics, hydrology, groundwater & environmental issues*

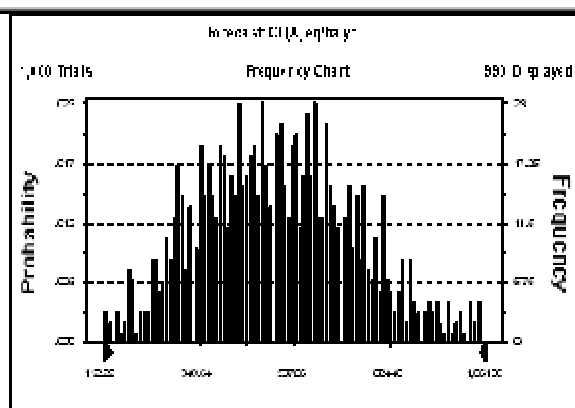
**Project title:** Uncertainty Analysis of Critical Load Models

**Summary:** The uncertainty of Critical Load Models used for assessing Trans Boundary Pollution Controls .

<b>Client:</b> Environment Agency	<b>Financed by:</b> Environment Agency
<b>Period of assignment:</b> 2001-2002	<b>Location:</b> United Kingdom
<b>Project Value:</b> £35 000	<b>WRA services:</b> £7 500

## Background:

The EA is concerned about the use of Critical Load Models to set pollution targets for aquatic and terrestrial ecosystems. There is considerable uncertainty associated with the CL Models and the drivers for these such as atmospheric pollution models and basic data on key chemical processes and deposition rates. The project was therefore set up to assess the sources of uncertainty and errors likely to occur when using Critical load models.



**Frequency Distribution of Critical Loads for Acidity**



**Sensitive uplands with low critical loads**

## Scope of work by Water Resource Associates Ltd

The Critical Loads Model provides a chemical mass balance of the inputs and outputs for any ecosystem. It is used as part of the Transboundary Pollution Control UN/ECE protocols to set national guidelines for atmospheric pollution control. The project was funded by the EA to assess uncertainty in Critical Load Models. It was decided to study a coniferous forested site near Liphook in Hampshire (Lat 51° 04' N.; Long. 0° 47' W.; OS Grid Reference 485700, 129900). This was a research site with a lot of site-specific, measured information. The Critical loads Model was set up and a detailed Monte Carlo analysis performed using the software package Crystal Ball (Decisioneering UK Ltd) which operates as an add-on to Microsoft Excel. Crystal Ball runs very fast and is thus ideal for investigating the effects of different Monte Carlo parameters and techniques. A comprehensive analysis of uncertainty was undertaken. It was shown that that uncertainty limits would be wider for parameters derived from national datasets rather than measurements at research sites.

## Results

See Environment Agency report for details:

Abbott, J., Hayman, G., Vincent, K., Metcalfe, S., Dore, T., Skeffington, R. A., Whitehead, P. G., Whyatt, D., Passant, N., and Woodfield, M. (2003) Uncertainty in acid deposition modelling and critical load assessments R&D Technical Report TR4-083(5)/1, Environment Agency (England and Wales), Bristol, UK.

Project Number 000081

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