

Chapter (not refereed)

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5 Exceedances of Acidity and Nutrient Nitrogen Critical Loads

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Regionalising the Areas of Exceedance defined by a Critical Loads Function (CLF)

A CLF for an ecosystem simply defines protection and exceedance for all ratios of sulphur and nitrogen deposition in relation to acidity and nutrient nitrogen critical loads. However, when the load is exceeded it is possible to relate exceedance to excess sulphur, nitrogen, or both, by examination of the relative deposition loads of sulphur and nitrogen. In this exercise we have defined a number of regions, described by the CLF parameters, which help indicate reduction strategies for sulphur and nitrogen deposition.

The Regions of Exceedance

Figure 1 shows seven regions for a CLF. They may be summarised as follows:

- 7 Area of protection - critical loads not exceeded.
- 6 Area of "options" - either sulphur or nitrogen reductions can offer protection.
- 5 Area where nitrogen deposition should be reduced - reduction of sulphur gives no benefits.
- 4 Area where nitrogen is a major contributor to exceedance - nitrogen must be reduced to provide the possibility of options.
- 3 Area where sulphur and nitrogen are major contributors to exceedance - both must be reduced before there are options.
- 2 Area where sulphur is a major contributor to exceedance - sulphur must be reduced to provide the possibility of options.
- 1 Area where sulphur deposition should be reduced - reduction of nitrogen gives no benefits.

Mapping the Regions of Exceedance using Critical Loads and Deposition Data

Maps have been drawn for Great Britain using data provided by the Critical Loads Advisory Group (CLAG) which show the geographical distribution of different exceedance regions. They highlight the relative importance of sulphur and nitrogen controls for both current deposition levels and for those anticipated under the UNECE sulphur protocol in 2005 and 2010. For these maps:

- (i) acidity critical loads were calculated using a modified mass balance equation;
- (ii) nutrient nitrogen critical loads were estimated with the steady state equation;
- (iii) nitrogen deposition was based upon current deposition measurements;
- (iv) current sulphur deposition was based upon measurements;
- (v) future sulphur deposition was modelled using a UK dispersion model HARM 7.2

Conclusions

Using current (1989-91) deposition data it is evident that large parts of Britain require reductions in both sulphur and nitrogen emissions or nitrogen emissions alone before any increase in protection will occur. With the predicted decreases in sulphur emissions and deposition, areas where nitrogen is a major contributor to exceedance appear over much of the country. These maps show that nitrogen emissions must be reduced to prevent exceedance and in some areas further reduction of sulphur would give no additional benefits.

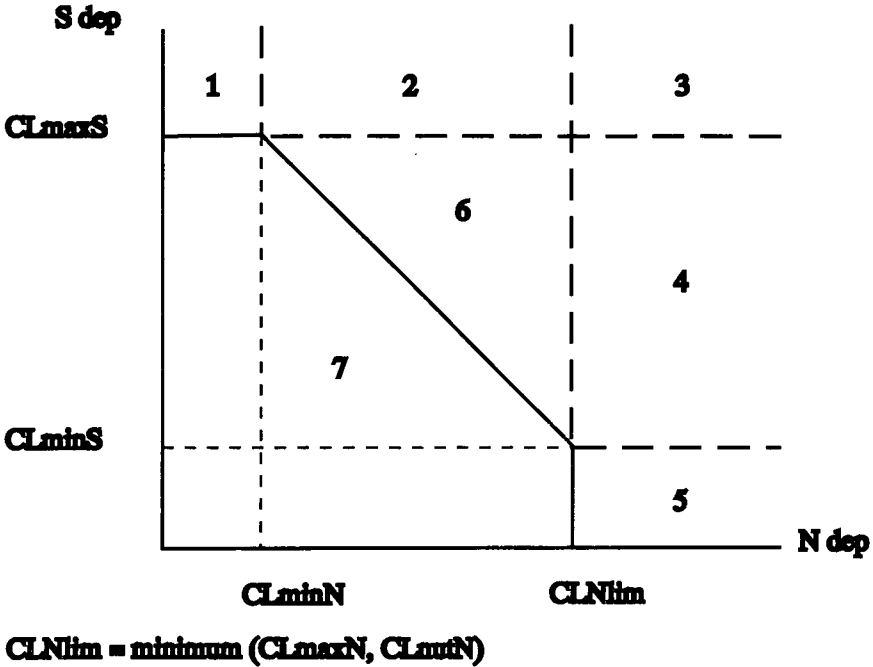


Figure 1 Regions of exceedance defined by a Critical Loads Function (CLF).