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6 Critical Loads for Nutrient Nitrogen for Soil-Vegetation Systems.

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Introduction

Members of the UK Critical Loads Advisory Group (CLAG) have calculated critical loads for nutrient nitrogen to produce maps for Great Britain. The results of three methods, based upon the conclusions from the Lokeberg workshop are described below. Two of these methods use the empirical approach and the other the steady state equation ("mass balance") for nitrogen saturation.

Empirical Approach using Species Distribution Data

The CLAG vegetation sub-group have identified plant species indicative of the vegetation types described at the Lökeberg workshop. The occurrence of these vegetation types have been defined by the National Vegetation Classification (NVC) species lists and species distribution maps from the Biological Records Centre (BRC). For each vegetation type, where the number of species recorded was above a selected minimum value, the appropriate critical load was applied. Since ranges of critical loads were agreed at Lökeberg, separate maps showing the lower, upper and mid-range value for that vegetation can be produced.

For national data, maps for individual vegetation types were combined by selecting the lowest critical load value for a grid square. Three combined maps were generated, one for each set of range values. These maps show significant differences resulting from the choice of the upper, lower or mid-range critical loads.

Empirical Approach using the ITE Land Cover Map

The ITE land cover map, derived from Landsat satellite imagery, identifies several types of natural and semi-natural vegetation. Studies at ITE Bangor have related these classes to nine of the vegetation types identified at the Lökeberg workshop. A map showing the critical load values for areas where natural vegetation predominates was originally produced for Wales. A national map has extended this to the include the rest of Great Britain. Again, the choice of critical load value from the ranges given in the Lökeberg table has a significant effect upon the final map.

Modelled Critical Loads for Nutrient Nitrogen

The steady state equation reported at the Lökeberg workshop has been used for calculating critical loads for nitrogen by the CLAG soils sub-group. Appropriate default values for the various nitrogen processes have been applied to produce data for three vegetation types. Maps have been produced for grassland, heathland and woodland, assuming that each vegetation type covers the whole country. Using the ITE land cover map to identify the presence of these vegetation types in

different parts of the country and applying the appropriate critical load values, a national map has been generated.

Conclusions

The empirical maps generated using the ITE land cover map to identify areas of natural vegetation are less sensitive (i.e. higher critical loads) than those using NVC and BRC data to define the Lokeberg vegetation types. This is probably due to the latter maps being based upon the most sensitive vegetation type within an area whereas the former are based upon dominant land cover. For both sets of maps a marked change in sensitivity to nitrogen deposition results from the choice of value from the ranges listed at Lökeberg. It is important to choose an appropriate value in order to obtain a reliable critical loads map.
The national map produced using the mass balance approach tends to identify low critical loads for vegetation which is not harvested (e.g. acid grassland). Consequently it is more similar to the empirical map derived from NVC and BRC data with the minimum value of the Lokeberg ranges mapped.

The maps generated were based on the critical load values and methods reported at the Lökeberg workshop held in April 1992. All are likely to be revised following the discussions at the Grange workshop.