9

Lichens as ecological indicators to track atmospheric changes: future challenges

Cristina Branquinho, Paula Matos and Pedro Pinho

Things we know

1 Metrics for measuring lichen diversity
2 Standardised methods to sample lichen diversity
3 Spatial models obtained from lichen diversity metrics with high spatial resolution
4 Knowledge of the ecological response of lichen diversity to single pollutants
5 An understanding of the integrated responses of lichens to spatial and temporal atmospheric changes

Knowledge gaps

6 Comparative studies using lichen diversity in different regions around the world
7 Data on lichen functional diversity
8 An international lichen-trait database
9 Disentangle the effects of multiple pollutants on lichen diversity
10 A definition of lichen thresholds and their inclusion in environmental legislation

Introduction

Lichens as ecological indicators

Ecological indicators of atmospheric changes can be used as surrogates to describe the effects of atmospheric changes on ecosystem structure and functioning in a simplified, but nonetheless representative, manner. They can also be applied to evaluate the effects of human activities on ecosystem structure and functioning (Box 9.1). This information can then be communicated to environmental stakeholders, including government institutions responsible for creating and implementing environmental legislation.

Among the criteria for the selection of ecological indicators of atmospheric changes is a lack of influence of other environment factors, such as soil and/or water. Most vascular plants, for example, are affected by soil proprieties. Epiphytes, which grow non-parasiti-