Improving the Quality of Environmental Monitoring

Environmental monitoring is one of the key activities of ecological conservation management. But scientists argue that it will unlikely meet its objectives if sponsoring bodies and practitioners do not pay more attention on planning and maintaining monitoring programmes with sufficiently high scientific standards.

On both national and regional scales, environmental monitoring is crucial to understand the state, trends, effects, and processes in the environment. In the context of ecological conservation management, the monitoring programmes have three main objectives:

• to inform the conservationists about changes in ecosystem structure and functioning,
• to measure the success of management actions, and
• to detect the effects of perturbations and disturbances.

In fact, since the 1990s, environmental monitoring has become one of the main conservation activities which lead to a steep increase in the number of monitoring programmes. However, a recent scientific paper puts in question the effectiveness of monitoring projects suggesting that many of the latter seem unlikely to meet their objectives.

The authors of the paper, Scottish scientists who reviewed a large number of publications on the subject, argue that many programmes lack detail of goal and hypothesis formulation, survey design, data quality and statistical power at the beginning. Such inadequate projects may have several negative implications for environmental management; they may not be able to detect ecologically significant changes and may have to be repeated later to higher standards with added costs.

The authors argue that there are several reasons for poor quality monitoring. Firstly, the choice of methods is often constrained by financial issues, thus qualitative methods are preferably used even when quantitative methods would be far more adequate.

Secondly, when quantitative methods are used, the power of statistical tests (i.e. information about the degree of accuracy and precision of the test) is very often neglected in the programme design stage. Consequently, many practitioners use low power tests which increase the probability of the misinterpretation of the collected data.

Generally this leads to the erroneous assumption that a given perturbation had no particular consequences on a studied ecosystem when in fact the system has deviated well beyond the acceptable limits.

While focusing their attention to statistical power analysis, the authors also summarised key criteria and recommendations for good monitoring. They emphasized the importance of:

• developing well-formed hypothesis focused on the process of the change that is possibly taking place,
• choosing the indicators that closely reflect the process of the change,
• conducting experimental work in association with the monitoring to provide and calibrate a model of changes,
• selecting suitable control sites and sites for valid replication, and
• insisting on peer-review and statistical review of monitoring proposals.

Overall, the authors highlight that it is the responsibility of the sponsoring bodies to secure long-term commitment and funding and to allocate adequate funds and time to carry out monitoring with sufficiently high standards.

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