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**ECOSYSTEM - MONITORING IN CONSERVATION MANAGEMENT
SELECTED RESULTS OF AN INTERNATIONAL SURVEY OF 152
NATIONAL PARKS**

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Abstract: This international survey examines, analyses and compares the problems, objectives and strategies of national parks (joint study by the Austrian Federal Environmental Agency and the Institute for Applied Ecology).

The study deals with special aspects of planning, setting up and managing national parks and it based on 152 replies recieved from parks of all continents. Ecosystem monitoring is percieved as being of particular interest as an instrument for natural process research and for the practical management of nature conservation work.

Developments in monitoring systems are well advanced. Most parks have set up (72%) or are planning (24%) permanent observation of selected species, habitats and ecosystems. But the systems vary greatly in terms of objectives, basic structure and methodology. Examples are given to illustrate theses differences.

The results of the international survey show that unified approaches and methods for ecosystem monitoring are called for which need to be defined by an international body of experts. This requirement should also be seen against the background of another of the survey's findings: namely that 97% of the national parks the replied would welcome more international cooperation, especially in scientific field.

Introduction: General Approach

It ist said, that economists and ecologists do not get on together too well. But both sciences have a similar field of research: They have to understand and manage systems that are:

- complex,
- dynamic and
- unpredictable.

Economists have developed different intruments to deal with these systems. Some of these tools - amongst them monitoring - can be or have been adapted for ecological matters.

Monitoring is a tool to reduce complexity, understand dynamics and improve predictibility.

Anticipating a summary of the results it can be said that monitoring has therefore become very popular in ecological basic research and practical conservation matters.

Questionnaire: Intention, Structure and Replies

Dealing with national park planning and national park management means usually dealing with international standards, international criterions and international demands.

The intention of the questionnaire was to describe and analyse different solutions to realize these standards. The questionnaire focused on different aspects of protected area management:

- Historical development of the park (initiative, conflicts, duration of installation...)
- Protection (instruments, subjects, conservation management...)
- Ecosystem monitoring (state of monitoring, subject of monitoring, methodology...)
- Administration (staffmembers, budget, financing, number and regulation of visitors...)
- Problems (kind of problem...)
- International contacts (membership, cooperation, interests to increase cooperation...)
- Historical land-use (kind, intensity, area, time...)
- Recent land-use (kind, intensity, area, time...)
- Conflicts between land-use and intentions of conservation
- Strategies in dealing with these conflicts
- Participation and cooperation between land-users and administration

The response to the questionnaire was remarkable (Fig. 1). 152 national parks - amongst them Aggtelek National Park - answered and formed the basis for statistical analyses.

The results are going to be published by the Austrian Federal Environmental Agency within the next month (Jungmeier, 1966). The results concerning ecosystem monitoring are being presented in this lecture.

Monitoring: State of Development

Almost each national park has already established or is planning to install a monitoring system (Fig. 2). Only 4% of the answering parks do not intend to do so. It can be shown that monitoring systems in European national parks are more well developed than outside Europe.

Of course these results also show the importance of strictly protected areas for long-term ecological research.

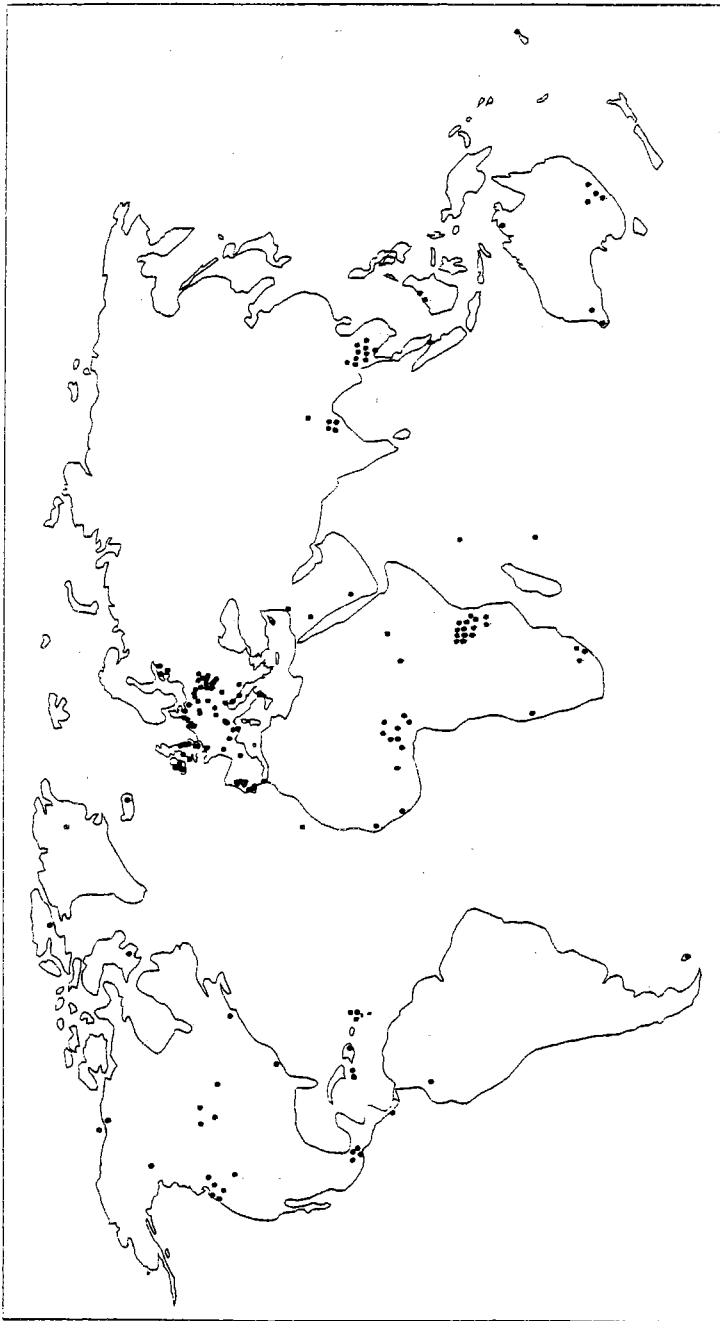


Fig. 1. National Parks answered to the questionnaire (●)

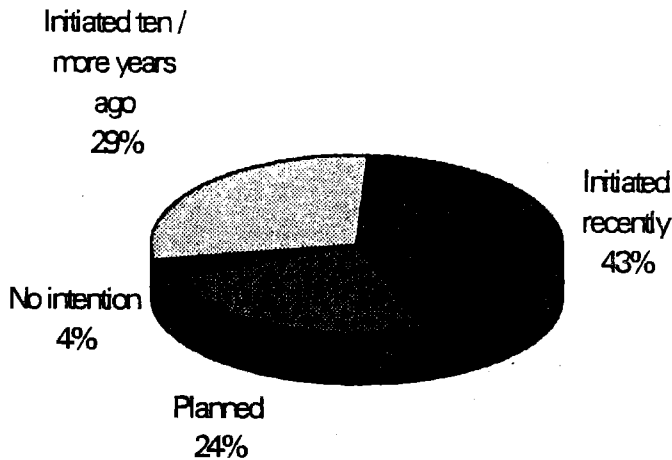


Fig. 2. National Parks: State of monitoring

Monitoring: Subjects and methods

There is wide range of different subjects and methodologies named by the national park authorities. In order of their importance they are:

- Special species. The survey of species mostly deals with target species of the national park (usually big mammals and birds) sometimes with problem species. Population dynamics, development, abundance and migration are being monitored by counting, marking or trapping species.
- Communities. The survey of communities is mostly vegetation based, sometimes zoological aspects are "added". Quality and composition of the communities is regularly monitored by customary methodological sets (vegetation relevé, transects, species inventory, ...).
- Landscape. They survey of large scale developments in landscapes is mostly practiced by remote sensing and fix point photography.
- Special aspects. Natural features (caves, water bodies, glaciers, ...), environmental measurements (water quality, soil, pollution), special problems (e.g. pressure by visitors) are being monitored by a great variety of methods.

In general the different "levels" of monitoring are not connected to each other. In detail the variety of approaches and methods applied does not allow any comparison of results. There is no "WorldWideWeb" for monitoring in national parks!

Conservation Management: Subjects

In protected areas three general types of management are required:

- Administration (visitors, information, public relation, ...)
- Planning and regulation of land-use (agriculture, forestry, hunting, ...)
- Conservation management in a literal sense (see below)

The monitoring systems in the parks are mostly in close relation to different matters of conservation management. In order of their importance the national parks named the following types of measures:

- Regulation of species (promote target species or control problem species, e.g. aggressive neophytes)
- Conservation of certain states of succession (preserve meadows, heaths, ...)
- "Simulation" of natural ecosystem factors (fire management, replacement of big predators)
- Correction of human impacts on ecosystems
- (Re-)development of natural states of ecosystems

To prove the success and efficiency of the measures different and often very specific methods of monitoring are applied.

Conclusions and prospects

Finally the following conclusions can be drawn from the results and some suggestions can be made.

1. Monitoring is an important instrument in ecological basic research, especially to understand and analyse complex dynamic systems.
2. monitoring is an important instrument in practical conservation management.

Three targets can be made:

- Controlling of the chosen management - system, especially concerning efficiency (expenditure/results), target reaching and references
 - Planning, evaluation and improvement of measures and programs
 - Documentation of success. Nature conservation has (and in future even more!) to prove its success to public and policy.
3. Monitoring - systems are therefore well established in national parks.
 4. There are many different approaches and standards for monitoring in protected areas.

5. The development of unified set of methods is necessary. This should be defined by an international body of experts. A modular system would be appropriate to both guarantee the compatibility and focus on the specific problems of each national park or ecosystem. The basic module is suggested to consist of three levels:
- Large scale landscape monitoring (remote sensing and statistical data)
 - Monitoring on community level (mainly vegetation based)
 - Monitoring of special species.

The discussion about the unified methods should not be a big problem, since the interest in international contacts and cooperation is extremely high. 97% of the answering national parks replied that there was a high interest in increasing international cooperation! Most national parks would emphasize especially on improving the cooperation in scientific field. (Fig. 3).

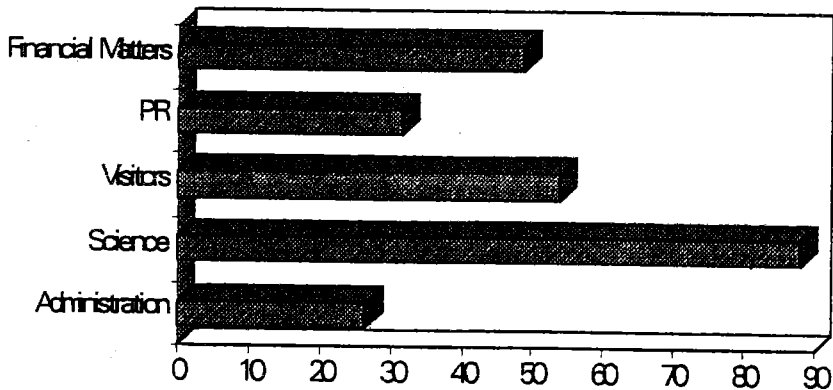


Fig. 3. National Parks: Interest to increase International Cooperation

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