

Workshop 2 – On the role of scientific research for nature restoration practices in European coastal and estuarine habitats

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Introductory statements (for full-text articles see *Proceedings*)

1. Are coastal dune management actions for biodiversity restoration and conservation underpinned by internationally published scientific research? (*Bonte & Hoffmann*)
The authors stated that: (1) the internationally published research, focussing on coastal dunes and their management, is limited; (2) many studies focus on local questions and are therefore difficult to generalize; (3) scientific research should focus on deteriorating processes and aim at generalizations.
2. Donkeys as mobile links for plant seed dispersal in coastal dune ecosystems (*Couvreur et al.*)
As demonstrated by the author, this type of rather specialized research can directly or indirectly contribute to nature management; adding up results of this kind of research can help nature management decisions significantly.
3. Towards integrated monitoring along ecological gradients: the example of the IJzermonding (*Hoffmann et al.*)
Emphasizing several problems of a scientifically sound monitoring approach, the author stressed the need for clear-cut initial management goals, monitoring method standardization, data integration, and the persistent interaction between monitoring and nature management fine-tuning in function of goals.
4. Monitoring Bryophyte and Lichen dynamics in sand dunes (*Rozé & Jun*)
The authors demonstrated that integrating biological data at a more generic level, in this case of functional groups, helps to understand succession processes in dune ecosystems, and, hence, helps to underpin nature management measures.

5. Cascading effects of atmospheric nitrogen deposition on coastal dunes along the Baltic Sea (*Esselink*)

In this presentation the importance of first identifying the real causes (processes) – that determine changing patterns – before taking management decisions, was stressed. The example was given of the impact of atmospheric nitrogen deposition, being largely responsible for graminoid dominance in dunes areas along the Baltic Sea coast.

Major questions/provocative statements

Based on the introductory communications, two major questions were derived:

- What is the role of scientific research in management planning and how can it contribute most effectively and efficiently? This question was looked at from the manager's and from the researcher's point of view.
- How scientific should monitoring be?

Discussion/answers to questions

These major questions were discussed, using several statements. The first question, and its statements, was discussed during the workshop, and afterwards through e-mail comments. Since the second question could not be treated during the workshop, the comments were collected through e-mail. A summary of the discussion is presented. For each statement the main comments are briefly described. For the second question also the number of e-mail correspondents per statement is given. A conclusion per statement, agreeing with the majority of comments, is formulated.

1. What is the role of scientific research in nature management planning and how can it contribute most effectively and efficiently?

From the manager's perspective

Statement/discussion

Evidence-based conservation planning is urgently needed and should replace 'trial-and-error' approaches as much as possible.

- Trial-and-error approaches are acceptable, but should always be reported upon, allowing practitioners and scientists to learn from it.
- Managers should be given time to report on their experiences, preferably in written form.
- Workshops and meetings between managers and scientists should contribute to further improvement of coastal and estuarine nature management.

Conclusion

Both evidence-based and experience-based approaches are valuable, but for the latter more rigorous reporting is needed.

Statement/discussion

An integrated, constantly updated database and meta-analysis of all scientific research that is available at any level (from the international up to the local report level) would be a strong tool to underpin management planning.

- All available and forthcoming information should be collected in a database. The database should include scientific (academic and non-academic) as well as day-to-day experience of site managers.
- The information in the database should not only be consultable as such, but also interpreted, analyzed and reviewed and prepared to answer questions of management planners and site managers.
- The database should be readily consultable and relevant to site managers, authorities and scientists, whether at the local, the regional, the national or the European scale.
- The knowledge centre should include an (inter)active helpdesk structure to which management questions can be asked.
- Input for research planning is a vital assignment of the knowledge centre, anticipating on the expectations on forthcoming management problems.
- Given the importance of coastal and estuarine management for nature as well as economic and safety reasons, and given the large diversity of coastal regions in Europe, this knowledge centre would preferably be staffed by a permanent group of scientists, data analysts, communication specialists and technical personnel.
- It should be taken into consideration to implement a knowledge centre on nature management in general, but coastal and estuarine management are so specific, that a knowledge centre entirely focussing on those ecosystems is justified.
- Issues of centralized *versus* decentralized structure, final authority and control of the database system were not dealt with during the workshop, but were mentioned in e-mail reactions, with a clear preference for a centralized structure.
- If a permanently staffed knowledge centre would not be reachable on short notice, an on-line, regularly updated handbook on coastal and estuarine management and monitoring could be an alternative.

Conclusion

To achieve the ambitious goal of an integrated, constantly updated database and meta-analysis, a professional, permanently staffed knowledge centre would be the best approach.

From the researcher's perspective

Statement/discussion

Academic research should concentrate on changing processes within the ecosystem and the effects of these changes on ecosystem patterns.

- Long term global processes, such as climate change or atmospheric pollution need special and urgent attention. We need to understand the effects to integrate knowledge into management.
- Early anticipation on forthcoming management questions by scientists and research planners is necessary.

Conclusion

This statement was generally accepted.

Statement/discussion

Academic research should be aiming at generally applicable conclusions, enabling all nature managers to underpin their management, also those working at the local scale.

- This does not exclude local scientific research, but an integrated higher scale level would allow more generic conclusions.
- To solve local problems – scientifically sound, but not necessarily academic – local research will always remain necessary.
- Vital to validate research is the distinction of relevant and objective references.
- Research networking, combining sites that are representative for Europe's eleven biogeographical coastal regions, should be promoted; this does not contradict with the remaining need of local research.

Conclusion

Integrated higher scale scientific research and its networking is vital, though does not exclude local research to solve local questions.

2. How scientific should monitoring be?

This question was answered with a strong plea for scientifically sound monitoring, using clearly defined goals and standardized methods with repeatability and maximum avoidance of faults introduced by the use of different successive observers. A total of 11 respondents participated in the e-mail communication, not necessarily responding to all statements though. Conclusions on monitoring clearly hold for other ecosystems than the coastal and estuarine environment as well.

Statement/discussion

The conclusiveness of monitoring strongly depends on clearly defined goals; hence, these need to be exact and measurable

- It is important that the same standards will be used to define habitat goals by all management planners involved.
- Essential for effective monitoring is a transparent problem definition ('what'), the choice of measuring method ('how'), and with what standards the monitoring results should be compared with ('what is the reference').
- Before management measurements are taken, scientists should be involved in their planning.

Conclusion

The statement was accepted in general by all respondents.

Statement/discussion

Management goals should be formulated, using predefined standards

- It was added that standards should keep the possibility to take unexpected developments into consideration and enable fine-tuning at the local level.
- Standards for primary goals could be helpful. Interdisciplinary stakeholders (practice, research, administration) should work out a set of these. Depending on the complexity of the ecosystem, it may be necessary and advisable to restrict the number of primary goals.

Conclusion

The statement was accepted by the majority of respondents.

Statement/discussion

The level of accuracy of habitat definitions as given in the Habitat Directive is too low to allow valuable pre-definition management goal standards at the European, national, regional and local scale.

- It is necessary to formulate a set of sub-habitats, based on far more accurate habitat definitions than presently available.
- In the case of national, regional or local subdivisions, these should hierarchically fit within the European habitat types.
- One respondent states that habitat typology should be differentiated for each country, making it appropriate for the management goals and local conditions; in the end it should fit within the EU habitat types.

Conclusion

The statement was not unanimously accepted. Generally a need was expressed for more detailed definitions of habitat types at a lower resolution level, but always within the general definitions of the EU habitat types.

Statement/discussion

Management goals should be solely based on biodiversity criteria. Biodiversity criteria should primarily be at the species and population level, not or only secondary on derived variables (such as plant community, landscape structure, benthic community,...)

- Biodiversity, with all its aspects, is indeed the primary target for management. According to the Convention on Biological Diversity, ‘biological diversity’ means the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.
- As is described in the definition of biodiversity, management goals should include the specificity of the habitat type, the local or regional locality under consideration and, e.g. geomorphology.
- Management goals should also include variables at the process level.
- The realization of (a)biotic conditions (pattern and process parameters) and ecological processes is a goal within the biodiversity target.
- Although biodiversity is the primary goal for management, the multifunctional character of coastal areas cannot be neglected (e.g. recreation, safety, environmental functions,...)
- Species communities, landscape structure can be very useful goals, representing habitat function for the desired species.

Conclusion

The statement was not accepted. The importance to also include process criteria was stressed. Biodiversity criteria should not only include the species and population level. Higher resolution levels, such as community, landscape structure, and also abiotic variables remain equally important.

Statement/discussion

Local monitoring initiatives should be valid at a higher (ecosystem, regional, national, European) level too.

- Monitoring should enable conclusions on local biodiversity and management, but also contribute to the knowledge on management effectiveness and the biodiversity status at a higher resolution level.
- Input of the knowledge centre as suggested under major question 1, should substantially help to realize this task.
- Problems might arise if site managers are not concerned with a resolution level that goes beyond their local situation. This stresses the necessity of dialogue with managers and need for training and education.

Conclusion

The statement was generally accepted with some additional remarks.

Statement/discussion

Monitoring should employ standardized methods to come to generalized conclusions, not only valid at the local scale, and to enable repeated surveys that can be compared with neither technical nor observational bias.

- All respondents point at the importance of standardized methods.
- Transparency in the methodology is vital for monitoring on the long run and simplifies the transfer from monitor group to planner and from one monitoring group to the next.
- It is positive to use standardized methods to compare the results, but it is necessary to have some low cost methods, particularly technical equipment. It should be possible to vary the methods considering the habitat type peculiarities or specific questions. It is already helpful to give general recommendations on the methods that can be used.
- Technical standardization is more easily accomplished than observational standardization; sampling should be as observer independent as possible.
- Scientists should normally interpret their results with wise use and should describe the results in such a way that administration and site managers do not misunderstand the results.

Conclusion

The statement was accepted by all respondents with some additional remarks. The need for sound, feasible and standardized methods was generally accepted.

Statement/discussion

Habitat quality would best be measured using indicator species.

- The evaluation of habitat quality highly depends on habitat type; also important is the completeness of taxonomic, functional groups.
- It is important that the indicator species list is sufficiently long; red list species and target species alone are insufficient; preferably indicator species groups across various phyla and complementing habitat requirements should be used.
- The use of indicator species should be combined with direct measurements of structure, physical and chemical variables, geomorphology, etc.
- In some cases, indicator species are a good and low cost alternative. Nonetheless, this does not always exclude the need for detailed ecosystem studies.

Conclusion

Most respondents do not agree with the statement unequivocally, indicating that direct measurements are considered to remain necessary.

Statement/discussion

Habitat quality estimation within a certain region can validly be derived from a representative sample of all sites of the habitat under consideration (not all sites need to be monitored).

- Given the financial and practical limitations, it is better to monitor a representative sample of all habitat types in a scientifically sound way, than cover all localities within a region, using a more superficial method.
- This would be possible at the national level, but site managers primarily have responsibility for their 'own' area; therefore monitoring should be done at the local scale as well.
- This depends on the parameter that is used for describing the habitat quality.

Conclusion

Respondents did not unequivocally agree on this statement; it can therefore not be accepted as such.

Statement/discussion

(Abiotic) conditions should be truly measured instead of estimated through indicator species

- Abiotic variables can be measured in a multitude of ways (e.g. temperature: maxima, minima, mean, daily, etc.); it is not always known though, which one is relevant for a particular species and species may respond differently. This is a strong argument, in favour of using variables that integrate (a)biotic conditions, e.g. the use of indicator species.
- As long as the indicative value of indicator species is sound, it is not necessary to measure an often large (indefinite) package of abiotic variables. It remains nonetheless interesting to register the true abiotic conditions, because the presence or absence of (indicator) species is not always univocally related to abiotic conditions.
- It is important to remain having measurements of abiotic conditions; good criteria are described for the selection of indicator species, however in some situations few species correspond to all these criteria, e.g. some potential indicator species are not sensitive enough or there is a time-lag in their response.
- For many habitats there are still no or few well known indicator species.

Conclusion

Most respondents are in favour of a combination of true measurements and the use of indicator species.

Statement/discussion

A multi-species approach is a valid alternative for area-covering and all-biodiversity-monitoring

- It might be so in some habitat types and regions if it is evidence-based; however, we are not yet able to distinguish multi-species groups for all habitats that need to be monitored; a lot of research is still necessary.
- It should rather be considered as an additional investigation.

Conclusion

The respondents consider a multi-species approach of added value, but not as a single, area-covering and all-biodiversity-monitoring alternative.

Statement/discussion

The multi-species alternative should also cover less popular phyla and functional groups, such as difficult to recognize bryophytes, fungi, detritivores,...

- It should always be preferred to have good indicators, not just easily recognizable or popular ones.
- The statement can be agreed upon, only if these species groups are relevant for management; if not, monitoring risks to become a research goal on its own instead of a tool to help management planning.
- This needs special training of managers.
- A balance between cost and information value remains necessary.
- Often these phyla and functional groups are important for the habitat, and should thus also be covered; it should always be avoided that only one or a few groups are investigated without paying attention to the rest of the ecosystem.

Conclusion

Most respondents agree on this statement, when feasibility is taken into consideration.

Statement/discussion

Monitoring is an everlasting process that should be installed in a permanent way, urging for long-term funding.

- Monitoring should always be as cost-effective as possible; as such it should not be allowed to become a purpose on its own instead of a tool to improve nature management.
- It is an important challenge to construct a monitoring programme that is realistic financially; funding of everlasting or even long-term monitoring is virtually impossible to find.
- Site managers should be convinced that the evaluation of the management is as much of an ongoing process as the management itself, thus underpinning the importance of long term monitoring; also monitoring can be improved during the everlasting process

of management fine-tuning and monitoring; monitoring initiatives on the short term remain valuable as well.

- A maintained interaction between management and monitoring would be magnificent; important is that the studies and the results of one area are coordinated by one institute or administration; also important is that scientists, administrations and managers work more together; this can be achieved through the earlier discussed permanent knowledge centre for (coastal and estuarine) nature management.

Conclusion

Researchers almost unequivocally agree on this statement, most practitioners additionally point at the high cost of monitoring initiatives.

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