

2.1. PRINCIPLES AND METHODOLOGY OF INTEGRATED CATEGORISATION OF WATER BODIES AND WETLANDS DEMONSTRATED ON BACKWATERS

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2.1.1. INTRODUCTION

From all natural systems perhaps water bodies and wetlands have been lost or degraded to the most serious extent due to human impacts. River regulations, drainage of marshes, fens and bogs caused not only extinction of number of plant and animal species, but also resulted in major transformation of landscape structure and feature on vast areas. Therefore particular attention has to be paid to those wetlands have been escaped from destruction, with special regard to backwaters being of outstanding natural, landscape and economical values.

In spite of differing according to their transformation and use, backwaters bear joint features of their genesis and ecological relationship. Their vulnerability is dependent on the status of their natural systems, preservation of which determines the possibility of their maintenance. Through undertaking an inventory they may be ranked from backwaters representing highest nature conservation value (so called sanctuary-like backwaters) to those backwaters, of which wildlife has almost completely destroyed (economical use or wastewater recipient). Difficulty and complexity of their preservation and maintenance may be ranked in the same sequence.

Due to different genesis (e.g. different age, shape, length, depth of bed), backwaters exhibit different stages of ecological succession resulting in filling up, or even there may exist different successional stages within a single wetland area. Ranging from backwaters with deep and open water to backwaters staying in later stages of succession (wet meadow, marshy meadow, fen or gallery woodland like backwaters), all types may be of appropriate quality in compliance with the given successional stage and thus valuable. Effective state estimation of backwaters using traditional water chemical and biotic indices is very difficult, sometimes even impossible. Backwaters having completely different character on synbiological grounds, may be qualified as equally valuable. Attributes, like a backwater is characterised by alkaline water or eutrophic status (and many more besides could be taken as an example) does not mean inevitably one being of higher value than other.

2.1.2. METHODS AND RESULTS

2.1.2.1. Survey

Survey of a biotope, and so of a backwater, is practically done by the expert, who has appropriate field experience, while observing the site (almost automatically, based on physiognomy) and without conducting any special sampling or sample analysis. Such a simple survey is usually founded on species diversity of a studied taxa, with special regard

to presence or absence of characteristic and unique species. Often, knowledge of a given taxa is not even used in the first phase of survey. In this case, decision is taken considering the general scenery, feature of the area. Contrary to evident appearance, decision is not at all subjective. In the course of conducting a survey on the area, expert considers completeness of natural spatial connections and landscape features of the object, characteristics of natural communities (e.g. mosaic structure, zonation), completeness of littoral communities (as ecotons, natural buffer zones). Opinion formed of the values of the area may be influenced by presence of protected or strictly protected plant and animal species, which are easy to observe and possibly even landscape atmosphere aspects.

As the overview in the preceding suggests, it is not so easy to measure or quantify those attributes referred to above. Nature conservation and ecology have tried to determine nature conservation value and degree of being endangered for species of flora and fauna of a region (continent, country, region). Categories of supraindividual organisation, especially biocoenosis and holocoenosis have received more and more attention from nature conservation in recent years, regarded as values which should be protected. Among their components, from synbiological point of view, these are mainly the characteristic physiognomy of plant communities and their mosaic complexes which determine the feature of our natural landscapes. Visual survey outlined above focuses practically on these supraindividual systems. Survey and estimation of them require profound and broad knowledge and excellent field experience as well. We are convinced, that state (species richness, diversity, naturalness, degree of degradation) of these supraindividual units will increasingly become one of the most important factors of state estimation in the future.

In the next phase of visual survey, threatening factors are taken into consideration, like size and isolation of the area, possibilities of water supply, ratio of different use and utilisation forms, distance from intensive agriculture lands. It is easy to evaluate morphological feature, shape (loop, crescent), location (within or outside embankments) of the backwater to be surveyed. These information in most cases serve precise separation within the different categories, and sometimes they are not used at all.

| Utilisation categories | |
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| I. Nature conservation priority | protected (on international level, on country level, on local level) |
| | not protected, but has to be protected on some level |
| <i>If the backwater does not meet criteria of category I., procedure has to be continued with category II. (wise use).</i> | |
| II. Wise use | nature area (enjoys some protection by law) |
| | sound use (traditional fisheries, reed and reedmace harvesting) |
| <i>If the backwater does not meet criteria of category II., procedure has to be continued with category III. (economical utilisation).</i> | |
| III. Economical utilisation | water storage (emergency reservoir, water reservoir) |
| | water take-off for agriculture (irrigation) |
| | industry (cooling water) |
| | recreation (tourism, water sports, intensive angling) |
| | intensive fishery, fish production |
| | poultry farming (duck, goose) |
| | wastewater storage |

Visual survey is one of the most simple state estimation form, thus requires appropriate knowledge of natural communities connected to backwaters and native community species. Most important community types to be investigated are hydrophytes,

reeds and long-stand dicotyledones dominated associations, meadows and woodlands fringing backwaters (soft and hardwooded woodlands). Besides knowledge of communities and species, orientation of communities, their spatial pattern (zonation, mosaic structure) and ratio between different habitats (open water, hydrophytes and marsh vegetation) are important. Visual survey, as the first phase of state estimation, is appropriate tool for separating the main use categories. Advantage and essential feature of the method is, that the first phase focuses on the wildlife, the most vulnerable element of the system to be qualified. Separation of main categories (I. nature conservation priority, II. wise use, III. economical use) is based on dominancy and determinant importance of use forms. This first, rough separation may be refined by obtaining some simple additional data.

The following phase of survey is continued on the field, serving for more precise separation, differentiation. The necessary macroscopic data collection (e.g. for the sake of estimating species diversity, state of buffer zones, landuse forms, distance from agriculture, industry and residential areas and how they affect the object), may be completed with the registration of some typical baseline data (e.g. water depth, extension, volume). These information are usually available from registers at municipalities, land offices, water management offices, environmental authorities and nature conservation authorities.

From the point of view of the procedure of survey, it is always the natural status which has to receive high-priority. The role of the real utilisation forms should be taken into consideration depending on state of nature. For example in the case of a so called "sanctuary-like backwater", which is also used for angling, the more vulnerable value, the natural richness should receive priority. While the run-off water or wastewater storage or fish-pond function of a backwater is relatively easy to restore, comprehensive rehabilitation of its natural systems is almost impossible.

Practical implementation of survey

- 1, If the backwater is protected by any of the national legislative protection categories (protected by law on national or on local level or is under designation of being protected), or if stays under protection of international conventions (e.g. Ramsar Convention), it has to be classified without any further investigation into category I.
- 2, If the backwater meets at least three of the following criteria (independently from one another), it has to be regarded as an object of nature conservation priority (category I.).

Main attributes of category I. (nature conservation):

- holds valuable (endemic, relic) species and communities,
- home to species and/or communities/associations threatened with extinction,
- holds natural or near-natural species assemblage and associations,
- the object is considered free from degradation,
- at least on 50 % of the full length of the bed the three dominant zones (open water, hydrophytes, reeds/long-stand dicotyledones dominated plant associations) occur in original development,
- littoral zone is fringed at full length with natural or near-natural plant communities/associations,
- can be regarded as fundamental part of a green corridor (e.g. river valley, floodplain).

(Recently in the Hungarian practice a special group of backwaters of outstanding natural and landscape values has been formulated, so called "sanctuary-like backwaters". The "sanctuary-like backwaters" may be regarded as a special case of category I. A given backwater may be included in this category, if it meets the majority of the above mentioned criteria and besides represents highest value of biological diversity and landscape feature of the ecological type it belongs to.)

Having the necessary skill, given backwater simply can be ranked into category I., based on visual evaluation and without conducting any particular survey on plant associations or on fauna. (More precise classification within this category is provided by adopting the assessment procedure outlined hereinafter.)

- 3, If, on the basis of the visual survey the backwater meets only one or two from criteria listed above, it may be required to undertake at least three investigations on flora, on plant associations and on fauna during growing season. Suggested timing: early May, mid-June, early August.
- 4, If, on the basis of the visual survey the backwater does not meet the criteria of point 2. and biotic investigations carried out as set in point 3. also do not suggest to rank it into category I., the survey has to be continued at category II. This rigorous process of survey has to be followed, even if it is obvious already at the first look on the area, that the backwater belongs to category III.
- 5, As the next step, it has to be examined that the backwater meets or does not the criteria of being ranked into category II.

Main attributes of category II. (wise use):

- natural zonation is incomplete, but it has survived on at least 50 % of the area,
 - the object is characterised by common, but native species and/or communities/associations,
 - the area is degraded only in small part and in a small degree,
 - landscape values of the object demand some protection (e.g. stage for ecotourism),
 - the area is influenced by human activity to some extent, but it is characterised by traditional use forms (e.g. reed and/or reedmace harvesting, traditional fishing),
 - littoral edge is partly built in or used for agriculture, but edge communities occupy 50% of the littoral edge,
 - maximum 50 % of the object is used for recreation and recreation activities and maintenance of natural values are harmonised.
- 6, If the backwater meets at least three of the criteria stated above, it has to be ranked into category II. In this case it is very likely, that irreversible degradation processes did not take place yet, and after implementing adequate rehabilitation actions the backwater may be ranked even into category II. (More precise classification within this category is provided by adopting the assessment procedure outlined hereinafter.)

- 7, If it does not meet at least three criteria from those set for category II., the object should be ranked into category III. These objects are degraded, their natural systems are for the most part destroyed, they may be characterised by predominance of human impact. Damages in most cases are irreversible under natural conditions, which means that their restoration requires full reconstruction, that is a slow process with uncertain result, in addition requires lot of expend (mainly money and care).

2.1.2.2. Assessment

The second phase of integrated categorisation is assessment. This phase of the procedure requires particular field investigations, moreover, for some factors appropriate sampling and laboratory processing. It has emerged through our broad preliminary studies, that this task would not be practical to be performed universally, basically for reasonable restriction of range of investigations. It would be yet more advisable, to handle together water body types or those water body groups related in certain respect (e.g. genesis, use). Proposal for backwaters is completed already (Dévai *et al.* 1999). This allows assessment according to 44 attributes. Attributes were selected with the aim at allowing a comprehensive representation of the state of the backwater and the terrestrial surroundings affecting it, from both biotic and abiotic sides, even considering major positive and negative human influences.

2.1.2.3. Qualification

As the third phase of integrated categorisation, we think it essential to carry out a qualification procedure which is objective, therefore independent of human judgement. This procedure has to be conducted mainly on those objects, which later may be used as basis for comparison (etalon) in some important respects (e.g. water body type, management or use form type). Theoretical grounds of ecological qualification was previously elaborated (Dévai 1994) and also a comprehensive qualification procedure for backwaters was conducted and interpreted (Dévai *et al.* 1999). Qualification procedure always starts with the classification of water bodies, as all those attributes refer to the wetland type, which will be used later as indicative indices suitable for comprehensive qualification. Two main groups of these indices are distinguished. One of them is the group of so called static attributes, which characterise the object and the wildlife it holds for a longer period of time or at least for one growing season. Dynamic attributes, the other main group of attributes, are varying to some extent in time, sometimes significantly. The qualification system operates with basic data, state-characteristics and indicative indices. Actual values (observed or measured) are handled as basic data. It requires the first level of abstraction to determine state-characteristics, which mean a conversion into a quality category according to a code list established relying upon the whole range of potential concrete values. Requiring next level of abstraction, based on the indicative indices and with regard to state attributes the global environmental quality state over at least one growing season can be estimated, with the help of a comprehensive code list consisting of all alternatives.

2.1.3. DISCUSSION

In the course of considering theoretical and practical issues of integrated categorisation, we became more and more aware of the essential importance of analysing two main aspects concerning any matter related to the extremely divergent and complicatedly interlinked issues of preservation and conservation and use and utilisation. These aspects are area dependence and target dependence. Failing a properly detailed preliminary assessment of them, nor finding the appropriate solutions, nor the harmonisation of interest can be expected.

Area dependence is in most cases clear and definite. Target dependence is basically a question of conception, which has to be determined according to general aspects in the beginning. Within an area of significant size and diverse geomorphology a range of use and utilisation forms may exist, with strongly varying character and intensity of impacts on it. It is impossible and at the same time senseless to assess them beforehand and to be prepared for all possibilities. The only effective solution in the course of careful designing of preparatory works is to elaborate a program, that could be used as basis for rapid designing of further investigations adopted to actual objectives, which could be successfully implemented and their comparative analysis can also be executed successfully. Necessary consequence of all these, that the preliminary proposal should meet the criteria of being comprehensive enough (but not inexecutable) and appropriately (practically) detailed, in order to provide suitable information for the varied, sometimes basically differing later approaches.

Related to target dependence, both generally and concretely, it has basic importance from ecological aspect to analyse those functions, which may be raised in connection with use and utilisation of the area. Concerning this issue, relationship of different utilisation forms has inevitably to be discussed in ecological approach, if only because prevention.

From the point of view of ecologists, principle of complex utilisation is very much open to criticism and according to experiences gained of late decades, it is even perfectly unacceptable. Adopting this principle is mainly cloaks irresponsibility and is the father of uninhibitedness. That is to say, complex utilisation is mostly mentioned, if explicit priority order is not set, because it is not wanted to be established or it is impossible to establish. If such an order does not exist, all user may well feel so, he is entitled to enforce his rights to the highest degree. And this usually results the object will not be suitable for performing any function after a while, because it has been drastically and irreversibly deteriorated. We have to avoid this approach in the future and the practice based on it by all means, particularly in the case of sites and objects of outstanding natural values.

In this respect ecologists think, that before selecting among the main utilisation forms (e.g. nature conservation, water management, power generation, shipping, irrigation, public welfare), careful consideration and comprehensive function analysis have to be carried out, and for each site only one function has to receive absolute high-priority. Though multy function utilisation according to the main functions is not excluded in this case, but absolutely clear and explicit priority order of rank always has to be set up and strict and consistent observance of them has to be ensured. Theoretically and also practically it is possible to perform simultaneously various partial functions within the main use categories (e.g. ecotourism within public welfare, water sports within recreation). But if so, the often completely different interests should be prioritised and harmonised. For the sake of the

success of this aspects, it is advisable to term this utilisation form integrated (harmonised) utilisation and not complex (combined) utilisation.

We publish our proposal in the hope of constructive dialogue of representatives of various professions, founded on scientific arguments, will result in providing suitable conditions for starting a new chapter in water management, particularly in the case of the river valleys playing key role in many respects, in which also wetlands will obtain the place and role their significance deserves.

2.1.4. SUMMARY

Effective state estimation of backwaters using traditional water chemical and biotic indices is very difficult, sometimes even impossible. Three phase of integrated categorisation of backwaters will be discussed in this paper, more detailed about survey. As the first phase of integrated categorisation, visual survey is appropriate tool for separating the main use categories. Visual survey focuses on supraindividual systems. Advantage and essential feature of the method is that the first phase focuses on the wildlife, the most vulnerable element of the system to be estimated. Separation of main categories (I. nature conservation priority, II. wise use, III. economical use) is based on dominance and determinant importance of use forms. The second phase of integrated categorisation is assessment. This phase of the procedure requires particular field investigations, moreover, for some factors appropriate sampling and laboratory processing. As the third phase of integrated categorisation, an ecological qualification procedure has to be carried out, which is objective, therefore independent of human judgement.

Finally we will discuss some aspects of preservation and utilisation of backwaters. Before selecting among the main utilisation forms of a backwater, careful consideration and comprehensive function analysis have to be carried out, and for each site only one function has to receive absolute high-priority. The often completely different interests should be prioritised and harmonised. It is advisable to term this utilisation form integrated (harmonised) utilisation and not complex (combined) utilisation.

2.1.5. REFERENCES

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