EVALUATION OF LAND USE IN CONSERVATION AREAS CONNECTED WITH RUNNING WATER SYSTEMS

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Abstract

The designation of nature conservation areas on running water systems can in future be subjected to a decision-making process that is objective, value-free and based on parameters (critical levels). The choice of an appropriate decision making procedure makes it possible to perform a consistent and comparative analysis even though many different features from different disciplines need to be investigated.

Recent natural phenomena in running water systems have shown that only all-inclusive plans can produce a solution acceptable to everyone involved.

In future it will be essential, above all, to work out forward-looking plans for utilization and development which not only maintain the ecological functioning of rivers, but actually improve it.

Key words

revitalization, restoration around running water systems, flooding areas, riverine forests, utility analysis, analytic hierarchy process

Introduction

Environmental planning increasingly faces challenges as a result of growing demands in relation to the environment and greater public involvement. Discussion therefore plays a part in the establishment of goals for individual projects, and in planning the actions resulting from these goals. Those involved in the practical side complain particularly of the lack of a comprehensible and convincing basis for evaluation and for the identification of objectives. This clearly indicates that the planning process lacks a central guiding principle by which critical parameters can be identified.

Interventions in and around running water systems, such as restoration, revitalization, building of dykes to include and exclude areas, creation of riverine forests and flooding areas, often take place without any overall plan. BUSSE (1994) remarked that decisions are often made against a background of topical political concerns.

Recent natural phenomena in running water systems (the catastrophic flooding on the Elbe in Germany in 2002) have shown that only all-inclusive plans can produce a solution acceptable to everyone involved. In future it will be essential, above all, to work out forward-looking plans for utilization and development which not only maintain the ecological functioning of rivers, but actually improve it. This requires comprehensive knowledge about both the varied natural interactions between the river, its flood plains and its catchment area, and those that have been altered by human intervention.

Example: the situation on the middle Elbe

Around the mid-section of the Elbe in the German state of Saxony-Anhalt, a varied landscape has survived over time. The landscape is in a constant and dynamic state of change, influenced by human activities. Major problems on the Elbe are erosion of the river bed in some sections of the river, the fact that the designation of the Elbe as a waterway means that no new backwaters can be formed and existing successions disappear, and the lack of riverine forest in extensive sections of the floodplain. All these problems are parts of processes that lead, in the long term, to the limitation or disappearance of the structures typical of floodplains. For many years the great rivers of Europe were looked upon only as water transport routes for shipping. Ecological aspects were not considered.

There is therefore a need for a comprehensive approach. This would encompass not only the identification of areas for revitalization but also the use of measures, radical where necessary, to increase the ecological value of already valuable areas. It would also allow economic factors to be taken into account.

Possible methods

The situation as described above means that, in order to be able to carry out a restoration or revitalization, it is necessary to find a hierarchy for decision making that includes and compares all possible parameters. At the present state of knowledge there are two procedures available for this purpose: Utility Analysis and the Analytic Hierarchy Process (AHP). The Analytic Hierarchy Process is a process by which complex decisions can be structured so that a systematic, optimal and rationally comprehensible decision can be reached (MEIXNER/HAAS 2002). It is "hierarchic" because the criteria upon which the solution of the problem is based are always incorporated into a hierarchical structure. These criteria are described as features, attributes etc. as required. The AHP is "analytic" because of its ability to analyse a problem comprehensively in all its dependencies. It is a "process" because it dictates the course of events by which decisions are structured and analysed. This course of events always remains the same, making the AHP in repeated use into an easily used decision making tool that is similar to a routine procedure. This procedure can be applied in the present example to achieve a decision.

Decision making and parameters

Many parameters must be taken into account for a comprehensive view of a running water system. They may be of ecological or economic origin. Parameters can be use-oriented and simultaneously have a political background. There are, equally, parameters that are clearly related to hydraulic engineering (utilization of the running water system and securing the surrounding areas against floods).

A few ground-rules must first be formulated for following the basic course of the Analytic Hierarchy Process. The starting point for considering how to structure and solve the problem is always an overall goal. Sub-goals can be derived from it. These are then referred to as attributes or features. To reach the goals, measures (alternatives) are selected. An important feature of the AHP is that both quantitative and qualitative information can be incorporated into the decision making process.

For example, if we apply this procedure to the Elbe river system already mentioned the overall goal could be taken as the creation of riverine forests and the restoration of backwaters. Subgoals in the area of ecology would then include: moving beavers into new sections of the Elbe; planting appropriate trees to form new riverine forests; increasing the size and diversity of the fish population by creating running water from what, prior to revitalization, was standing water.

The creation of additional riverine forest, and the associated building of dykes to exclude further low-lying river bank areas, produces additional retention or flooding areas. These can be brought into use when levels of flood water in the river system are high, helping to minimize high economic costs resulting from severe or extreme flooding. Damage to public and private buildings could similarly be prevented.

In this example the model would then be taken through the Analytic Hierarchy Process (AHP) and would reach a decision that had an objective and constructive basis. This process could be applied in the designation of a conservation area on a running water system to ensure comprehensive consideration. Political interests, like other non-competent interests, would then no longer play a part in the designation process.

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