A fast environmental impact assessment method for the evaluation of road construction effects on amphibian communities

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Abstract: During the coming decade 22.000 km motorway is planned to be built in Europe. As in many cases there is not enough time for a detailed survey there is a growing need for fast and effective herpetological impact assessment methods. In April, 1992 the Toad Action Group was contracted to make an environmental impact assessment on the planned M3 motorway. Our aim was to produce an easy to handle report for decision- makers. Data were transferred into a score system. We took only three parameters, the species and individual number of amphibians and the distance between the breeding sites and the planned route into consideration, which resulted in an eight point system. Other parameters recorded (e.g. habitat characteristics) were only indirectly involved in the evaluation with the exception of the presence of other protected species. Altogether 43 possible breeding sites were found and investigated. 40 of them were threatened to a greater or a lesser extent by the would-be construction along the 120 km long route. In cases when the water body belonged to the most threatened category the alteration of the route was recommended. When they were ranked 2 or 3 the building of toad tunnels and fences was proposed. In case of 4, 5 and 6 it was recommended that material should be exploited and transported and material depots should be selected carefully. The system worked well in the case study as the categories seemed to be "digestible" for decision-makers. Three of the four suggested route alterations were accepted by the planners of the M3 motorway. As very often environmental impact assessments are to be made in a relatively short amount of time there is a need for a similarly fast reptile survey as well.

Key words: amphibians, environmental impact assessment, road planning, the effects of motorways, toads

INTRODUCTION

During the coming decade a 12.000 km motorway network is planned for Western Europe (BOWERS, 1993) and 10.000 km for Central and Eastern Europe. The longest will be the Southern Motorway,running from Lisbon to Kiev (Figure 1).

Roads that are not carefully enough planned and / or constructed considerably burden local plant and animal communities through their direct effects and genetic isolation (REH,1989).

Figure 1: The route of Southern Motorway.

Among vertebrates amphibians are the most susceptible to the direct effect, nine out of ten vertebrates killed on roads were from that class in a recent Hungarian survey (FENYVES, 1989). Environmental impact assessment, which has become obligatory at large constructions in Hungary nowadays (86/1993 (VI.4) Korm. rendelet), can be an important tool to lower the pressure caused by roads. However in many cases there is not enough time to carry out detailed surveys. This factor underlines the importance of fast and effective herpetological impact assessments as a necessary tool to avoid e.g. *Vipera ursinii* site destruction, which happened in Hungary last year.

In April, 1992 the Toad Action Group was contracted to make an environmental impact assessment with the Hungarian Ministry for the Environment on the planned M3 motorway.

Our aim was to produce an easy-to-handle report for decision-makers.

SITE AND METHOD

The M3 motorway runs 120 kms from Gyongyos to Polgar in the eastern part of Hungary (Figure 2). It is mainly a lowland area with intensive agricultural use, but there are valuable wetlands with a number of protected species there, especially along the Tisza river

Figure 2: Map of the M3 Motorway.

and large fish ponds with extensive reed belts.

In the survey we used a modified data sheet from our previous investigation along the M0 ringroad (Table 1) (PUKY & KECSKES, 1992). Because of a very limited amount of time (six weeks after the breeding season of terrestrial amphibians) we could mainly focus only on (possible) breeding sites.

01. Serial number:
02. Location (km):
03. Name:
04. Distance from the road:
05. Side:
06. Water type:
07. Water surface:
08. The estimated area of reed belt:
09. Ratio of areas with 30-50 cm of water cover:
10.Water depth: (max): (average):
11. The ratio of forested areas around the water:
12. List and estimated number of amphibians:
13. Other protected species:
14. Other remarks:
15. Rank (1-8):

Table 1: Data sheet of the M3 Motorway.

Data were transferred into a score system. We took only three parameters, the species and individual number of amphibians and the distance between the breeding sites and the planned route into consideration, which resulted in an eight point system (Table 2). The number of amphibians were divided into groups according to the genetical requirements for a healthy population.

Other parameters recorded (e.g. habitat characteristics) were only indirectly involved in the evaluation with the exception of the presence of protected species other than amphibians.

N° of amphibians	threat for the site	score
more than 200	high	1
51-200	high	2
1-50	high	3
more than 200	medium	4
51-200	medium	5
1-50	medium	6
any	no	7
none	any	8

Table 2: The score system of the environmental impact assessment.

RESULTS

Altogether 43 possible breeding sites were found and investigated. 40 of them were threatened to a greater or a lesser extent by the would-be construction along the 120 km long route. The frequency of the different categories can be seen in Figure 3. In cases when the water body belonged to the first category the alteration of the route was recommended. When they were ranked 2. or 3. the building of toad tunnels and fences was proposed. In case of 4., 5. and 6.it was recommended that material should be exploited and transported and material depots should be selected carefully so as not to destroy the aquatic habitat of amphibians. It was necessary to note whether the construction itself could also cause serious damage in neighbouring habitats.

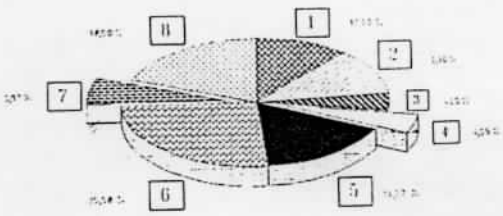

Figure 3: Frequency of differents categories (1-8) along the M3 Motorway.

Continuous consultation with environmental experts is also needed during the process. The creation of new artificial ponds was an option but was not suggested because of the lack of time for a more detailed investigation. These may also be suitable solutions for other cases.

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