**Developments in the quantitative environmental impact assessment methods based on case study**

Viktor Sebestyén, Georgina Nagy, Anett Utasi,Tatjana Juzsakova, Ákos Rédey

1 Institute of Environmental Engineering, University of Pannonia, 10 Egyetem St., Veszprém, 8200 Hungary, sebestyenv@almos.uni-pannon.hu

Monitoring of the environmental status of Zirc (the capital of Bakony) is very important not only for the residents, but also in terms of tourism. Therefore, several times environmental impact assessment study has been carried out during the past few years. The measurement results were evaluated by the Battelle environmental evaluation system (EES), which has been widely used in the international practice and by the Integrated Approach of Environmental Impact and Risk Assessment (EIRA) method developed by Brindusa Robu from „Gheorghe Asachi” Technical University of Iasi.

The analysis and the evaluation are based on the imission concentrations of the studied environmental parameters of the environmental elements (surface water and ambient air) in years 2006, 2013 and 2015. Both quantitaive methods result in an index which characterizes the state of the environment. According to the result of the assessments it has been concluded that an improving environmental quality tendency can be observed in the state of the environment in the function of time based on both methods. However, it was determined as well that the results the above defined two quantitative environmental impact assessment methods showed significant quality differences in the state of the environment of Zirc city.

The main strengths and weaknesses of the two quantitative methods were identified on the basis of the outcome of the case study. Regarding the EES method it can be concluded that the method does not define a clear algorithm for the determination of the weights of the environmental elements and the limit values specified in regulations are not taken into consideration. Moreover, the definition of the quality of the environmental parameters is the task of the expert who carries out the analysis. Therefore the result heavily depends on the reviewer’s experience. However, the advantage of the EES is that in the case of the environmental parameters it applies priority weighting, moreover it takes into consideration the extreme values and also it is suitable for the comparison of the technological-, territorial-, etc. alternatives and it is easy to be used in international environment.

In the case of EIRA it can be given as a disadvantage that the method doen’t use weighting in the environmental parameters and also it is very sensitive for exceeding the imission limit values defined by the regulation, as well as it can hardly be used in international environment. In addition to these the advantage of the method is that it applies weighting regarding the examined environmental elements. The method is flexible moreover it is suitable for the comparison of the different project alternatives and its conclusion is clear. The qualitative differences which have been observed in the results of the processed case study are due to the above-mentioned disadvantages.

On the basis of the outcome of the study accomplished the following recommendations can be made regarding the developments in the quantitative environmental impact assessment method.

The relationships between the environmental quality and the environmental parameters are assessed on the basis of data bank of the National Environmental Protection Information System by studying the distribution of the imission concentrations. The frequency of the imission concentration distribution is assessed on the basis of the environmental parameter set. In this way the importance of the given environmental parameter can be validated with high reliability with increasing the objectiveness of the environmental impact assessment method. In the future the elaboration of a new holistic environmental assessment system is aimed at.