

The relevance of agri-environmental indicators for biodiversity protection in Slovakia

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Executive summary

Agricultural production in Slovakia still persists as a main force that significantly shapes rural country. However agriculture also belongs among the main resorts that cause deterioration of the environment in these areas and the loss of biodiversity.

Agri-environmental indicators are the main tools for monitoring and evaluation of the impact of agriculture on the environment. In the Slovak Republic exist and are used 2 main sets of agri-environmental indicators within 2 different policies – agricultural policy and policy of nature protection. The use of these sets is not overlapping, but also not influencing each other. The agri-environmental indicators used by the Slovak Ministry of Agriculture are aimed at monitoring and evaluation of effectiveness of agri-environmental programmes. Since their full realisation in Slovakia in 2004, certain benefits for biodiversity protection and landscape character maintenance were achieved, but there is still large space for improvement. Agri-environmental programmes contribute to maintenance of agriculture mainly in less favoured areas and thus help to decrease the rate of abandonment. The main deterioration of the environment and the loss of biodiversity however occur in lowland regions where dominate conventional farms and agri-environmental support is of low interest among agricultural subjects. The Slovak Environmental Agency coordinated by the Slovak Ministry of Environment developed a set of agri-environmental indicators according to indicators used on the international level and with regard to national particularities. Agri-environmental indicators are used for elaboration of indicator reports and reports on the state of environment in Slovakia.

In both sets of agri-environmental indicators biodiversity of wild species is evaluated only by indicator Population trends of farmland birds. The indicator is widely accepted and used also in many European countries, organisations and agencies (European Environmental Agency, Organisation for Economic Co-operation and Development, etc.). In conditions of Slovakia this indicator does not sufficiently express the state of biodiversity for several reasons. Usable data for indicator evaluation are in Slovakia available since 2005 because of missing counts from 2002 to 2004, therefore it is not possible to evaluate long-time series of farmland birds. Moreover, not all regions are in Slovakia covered by monitoring sites mainly due to lack of voluntaries with required skills.

The aim of this paper is to analyse the use and effectiveness of agri-environmental indicators with relation to biodiversity protection. We do this first of all by analysing the use of indicators in agri-environmental programmes and the Slovak Environmental Agency; second, we focus in more detail on indicators related to biodiversity. Overall, the effectiveness of both sets of indicators used in Slovakia for monitoring and evaluation of biodiversity is rather small due to deficiency of appropriate indicators mainly for wild fauna and flora, and also missing data and the ways of indicators monitoring and evaluation. In the time of rapid biodiversity loss the need to develop other indicators that should express the state of biodiversity in more appropriate manner is very desirable.

Introduction

Several authoritative reports such as Growing Within Limits (Netherlands Environmental Assessment Agency, 2009), Millennium Ecosystem Assessment (2005) confirm that global biodiversity remains under severe threat. The European Commission in its Communication (COM 2010 4 final) also stress, that “the status of many ecosystems is reaching or has already reached the point of no return and the loss of biodiversity beyond certain limits would have far-reaching consequences for the very functioning of the planet”.

The agri-environmental policies represent one of the European Union and national efforts to stop biodiversity decline and environment deterioration caused by agricultural production. In Slovakia agri-environmental policy is oriented to direct payments and agri-environmental programmes (AEP) that were for the first time introduced by the pre-accession SAPARD programme in 2000, followed by 2 rural development programmes (RDP). The evaluation of AEPs is based on agri-environmental indicators defined by the European Commission.

At international level the integrated evaluation of the impact of agriculture to the environment is carried out mainly by organisations such as the European Environmental Agency (EEA), the European Statistical Office (EUROSTAT) or the Organisation for Economic Co-operation and Development (OECD). The first drafts of agri-environmental indicators were prepared by the OECD since 1990. Later on, the European Commission issued two communications related to integration of environmental issues into agricultural policy and development of agri-environmental indicators; COM (2000) 20 final, which defined a set of 32 agri-environmental indicators, and COM (2001) 144 final, which identified 35 indicators with potential data sources and described further work.

Operationalisation of indicators identified in COM(2001) 144 final and evaluation of integration of environmental issues into the Common agricultural policy, were the main aims of the IRENA project - Indicator Reporting on the Integration of Environmental Concerns into Agricultural Policy (European Environmental Agency, 2005), in which agri-environmental indicators were developed and compiled according to the D-P-S-I-R model. From 35 agri-environmental indicators 3 were related to biodiversity (Population trends of farmland birds, Impact on habitats and biodiversity, Genetic diversity).

In the Commission Communication COM (2006) 508 final, the Commission adopted a list of 28 agri-environmental indicators, 26 of which were based on IRENA indicators and additional 2 covering new agri-environmental issues were introduced (Risk of pollution by phosphorus and Pesticide risk). From 28 indicators, 2 are directly linked to biodiversity (Population trends of farmland birds, Genetic diversity).

The OECD (2008) examines performance across the OECD countries in terms of environmental themes (e.g. soil, water, air, biodiversity), and also the environmental trends for each of the OECD member countries. All together, 37 indicators are used, 7 of them are related to genetic diversity and 2 to wild species diversity (Wild species that use agricultural land as primary habitat, Population of selected group of breeding bird species, that are dependent on agricultural land for nesting or breeding).

The EUROSTAT (2009) published Agricultural statistics, where also 6 agri-environmental indicators were evaluated on the base of 28 indicators defined in COM (2006) 508 final. Indicators of biodiversity were not included. Data were aggregated at country level, regardless of regional differences and different farm categories.

The biodiversity of agricultural landscape is mainly evaluated by two groups of indicators. The first is aimed at genetic diversity of agricultural crops and breeds, the second focus on wild species diversity. Further will be discussed agri-environmental indicators used in Slovakia with focus to the second group of biodiversity indicators aimed at diversity of wild species.

Methods

Analysis and evaluation of the use of agri-environmental indicators relevant for biodiversity was carried out on the base of following:

- Document analysis
- Stakeholders' questionnaires
- Personal interviews

Document analysis were focused on agri-environmental policy and the use of 2 sets of agri-environmental indicators in the Slovak Republic (agri-environmental programmes and Slovak Environmental Agency), and in more detail on agri-environmental indicators related to biodiversity. Moreover, papers dealing with impact of agri-environmental measures on biodiversity were also analysed.

The evaluation of the use and influence of agri-environmental indicators on agri-environmental policy was complemented by semi-structured questionnaires and personal interviews with key stakeholders. The basic structure of the questionnaire was following:

- The use of agri-environmental indicators by stakeholders (4 questions)
- The creation of agri-environmental indicators (5 questions)
- The use of agri-environmental indicators in policy process (6 questions)
- The use of agri-environmental indicators in practice (7 questions)

Semi-structured questionnaire research on agri-environmental indicators was carried out in April 2009, and interviews from July 2009 till February 2010. A total of 19 respondents participated in the questionnaire research, 12 of them were scientists and university teachers, 3 were policy makers and local representatives, 1 expert of the state professional organisation and 3 representatives of NGOs. These stakeholders consisted of 12 men and 7 women and they were representatives of different types of organisations (producers, users of indicators) and different levels such as governmental (member of parliament), regional (representatives of higher territorial units) and local level (majors, NGO). This research can be influenced by the fact, that awareness in the area of agri-environmental indicators is in many cases low and there is also problem to find stakeholders willing to participate in such research.

The aim of the interviews was to consult, verify and fill in the information from document analysis and questionnaire research, and also to gain the opinions of key stakeholders on given problematic. The personal interviews were made with 7 respondents from following institutions:

- Slovak parliament, committee for environment and agriculture
- Educational organisations (Slovak Technical University Zvolen, University of Nitra)
- Ministry of Agriculture
- Research organisation (Slovak Academy of Science)
- NGO (SOS/Bird Life Slovakia)
- Professional organisation of the Ministry of Environment (Research Institute of Agricultural and Food Economics)

These organisations represent basic organisations in Slovakia that are devoting to creation, monitoring and evaluation of agri-environmental indicators.

Results and discussion

Use of agri-environmental indicators in Slovakia

The first application of agri-environmental measures was in Slovakia carried out through the **Special Access Programme for Agriculture and Rural Development** (SAPARD) and Measure 6 - *Agricultural production methods aimed at protection of environment and landscape*. It was important especially for institutional building and getting experience with preparation and operation of such programmes after the accession of the SR into the EU. But the practical impact of the programme for biodiversity protection was small, because only 10 agricultural subjects from 4 pilot areas applied for this measure (SAPARD Agency, 2005). Monitoring indicators were defined for all other measures except this agri-environmental measure. The mid-term evaluation was carried out on the base of evaluation questions developed by the European Commission (European Commission, 2001). Because the agri-environmental measure was in Slovakia implemented after mid-term evaluation (due to delay from both the EU and Slovak institutions responsible for the SAPARD programme), it was together with next 4 later implemented measures not evaluated (Agrotec SpA, 2004). Ex-post evaluation was also carried out on the base of common evaluation questions and indicators developed by the European Commission (2001). In total, 6 indicators were used: 2 aimed at protection of natural resources, 2 were developed for evaluation of practical experience of agri-environmental implementation on farm level and last 2 focused on evaluation of integration of environmental issues into rural development policy at national level. Data for mid-term and ex-post evaluation were not collected during the programme, but were gained mainly from questionnaires sent by post, or personal interviews with beneficiaries at the end of the programme (Ministry of Agriculture, 2005).

The full application of AEPs in Slovakia started after the accession of the Slovak Republic into the EU in 2004 through the **Rural Development Plan SR 2004-2006** (Ministry of Agriculture, 2004). The ex-ante evaluation of the RDP revealed that the quantification of goals was aimed only at fulfilment of operational goal of agri-environmental measure specified by 2 types of indicators; the number of projects determined by dividing of allocated budget by average cost of the project, and relevant area that will be reached in programming period. This quantification was evaluated as insufficient and it was recommended to complete quantification of goals and evaluation of overall economic, environmental and social impacts of the plan (Ministry of Agriculture, 2005). During the programme, beneficiaries were obligated to submit annual monitoring reports with 2 types of indicators based on the size of the area and number of domestic animals under individual sub-measures (Agricultural Payment Agency, 2004). On the base of Council regulation No 141/2004, mid-term evaluation of the RDP 2004-2006 was not carried out in new accession countries due to short time of implementation of the programme. Ex-post evaluation was carried out according to the EC Guidelines on evaluation of RDP 2000-2006 and examined mainly the use of financial sources, efficiency of support and the impact of individual measures (Directorate General for Agriculture, 1999). In Slovakia, the ex-post evaluation was carried out mainly through the questionnaire research with beneficiaries. The existing studies (The Research Institute of Agricultural and Food Economic, 2008; Božík at al. 2008), monitoring reports and statistical information were used as a secondary source of information. In the ex-post evaluation 2 types

of indicators were used based on the size of the area and number of projects under particular measure. From 9 agri-environmental sub-measures only 5 fulfilled the goals (1 partially), 2 were not effective due to low involvement of agricultural subjects, and 3 were not possible to evaluate due to lack of data, it can be concluded, that agri-environmental measure of the RDP 2004-2006 in Slovakia was only partially effective.

On the contrary of the previous AEP, common monitoring agri-environmental indicators were defined in the main document of the **Rural Development Programme SR 2007-2013** (Ministry of Agriculture, 2007). According to recommendations of evaluators of ex-ante evaluation and also the EU guidelines (Directorate General for Agriculture and Rural Development, 2006) the common indicators, which are obligatory for all member states need to be complemented by additional indicators specific to the programmes, which take into account the full range of objectives and sub objectives at programme level, and also national priorities. In Slovakia these additional indicators were not defined. Common indicators related to biodiversity are represented by 2 indicators (Change in biodiversity decline, Contribution to biodiversity increase in areas of NATURA 2000).

The Slovak Environmental Agency coordinated by the Ministry of Environment deals with assessment and evaluation of impact of 6 economically significant sectors (including the agriculture) to the environment. On the base of indicators developed by the EEA, OECD, EUROSTAT and the United Nations Organisation (UNO), and after the evaluation of possibilities to assess and evaluate indicators in the conditions of Slovakia, there was created a set of aggregated and individual agri-environmental indicators according to the D-P-S-I-R model. Altogether 46 agri-environmental indicators are evaluated. Biodiversity of wild species is evaluated by indicator Biodiversity of agricultural landscape that is based on the relative index of population trends of selected bird species (Slovak Environmental Agency, 2008). The results from evaluation are used for elaborating indicator reports and reports on the state of environment in Slovakia, which are further submitted to the Ministry of Environment, the Ministry of Agriculture, and the EEA.

In Slovakia, only several studies concerning the impact of agri-environmental policy on biodiversity have been carried out so far. Sláviková et al (2008) and Špulerová (2008) reported positive impact of AEP on landscape diversity and biodiversity, and Kopecká (2008) and Halada (2008) discussed also some drawbacks of the programmes Among them belong not clear definition of concept of some measures, and following problems with their realisation in practice. Instead of looking for possibilities of redefining sub-measures that were not successful in the previous AEP (the sub-measures Non-forest woody vegetation and Water and wetland biotopes protection), they were in the current AEP cancelled without replacement, although both types of biotopes are very important from biodiversity protection point of view.

From questionnaire research and personal interviews resulted, that a main problem in the area of agri-environmental policy is mainly low environmental awareness of farmers and the whole society that is one of the reasons of continuing deterioration of the environment and decline of biodiversity. Stakeholders also negatively perceived continuing fight between economic effectiveness and environmental goals often resulting in ineffective application of financial tools, big gap between proposers (EU) and users (farmers), complicated rules and insufficient realisation of new knowledge and planned use of indicators in practice.

Interviewees and stakeholders also pointed out the insufficient number of agri-environmental indicators for practical evaluation of the impact of agriculture to the environment. They perceived existing indicators as not very effective. According to them are missing mainly indicators of biodiversity and nature components.

The relevance of agri-environmental indicators for biodiversity

Biodiversity is a very complex term including genetic, species and ecosystem diversity. Many species are still unknown for science, and many linkages among organisms are not well understood. It is clear, that such a multifaceted term as the biodiversity is, can not be fully expressed by any of the known method. The attention is thus put on the monitoring of representative species (birds, butterflies, etc.), on the base of which the overall state of biodiversity can be estimated. The biodiversity of wild species is in Slovakia monitored and evaluated only by 1 indicator aimed at diversity of farmland birds as shown in table 1 (the indicator Contribution to biodiversity increase in areas of NATURA 2000 is also aimed at biodiversity, but it is only evaluated on the base of supported area under the AEP).

Table 1: Indicators related to biodiversity used at international and national level

| Organisation/No of agri-environmental indicators | | Biodiversity of wild species |
|--|--|---|
| OECD (2008) - 37 indicators | | Wild species that use agricultural land as primary habitat Population of selected groups of breeding bird species, that are dependent on agricultural land for nesting or breeding |
| EU | European Commission (COM (2006) 508 final - 28 indicators) | Population trends of farmland birds |
| | EEA (IRENA - 35 indicators) | Population trends of farmland birds Impact on habitats and biodiversity |
| SR | Ministry of Agriculture (RDP 2007-2013 - 12 indicators) | Change in biodiversity decline (Relative index of population trends of selected bird species) Contribution to biodiversity increase (NATURA 2000) |
| | Environmental Agency SR - 46 indicators | Biodiversity of agricultural landscape (Relative index of population trends of selected bird species) |

Sources: Slovak Environmental Agency (2008), Ministry of Agriculture (2007), EEA (2005), European Commission (2006), OECD (2008)

In many countries and organisations currently preferred agricultural landscape biodiversity indicator is based on population trends of common farmland birds. The significance of this indicator increases not only for evaluation of trends of individual birds species, but also because it is used for evaluation of effectiveness of agri-environmental policy.

The data on birds' species counting are in Slovakia available since 1982, but owing to missing counts from 2002 to 2004, the data can not be used for long-term trends analysis (Kropil, 1994). Current programme for counting of common birds species is based on the use of point transects method. Since 2005 till now the counting was carried out on 70 transects and 1 400 spots. These data were used for evaluation of short-term trends of birds' abundance in Slovakia. Transects covered almost all except of 2 regions (Horný Zemplín, Horehronie) and were regularly distributed in agricultural and forest landscape. The predominant trend of increasing abundance of forest birds can be related to abandonment of agricultural landscape. Overall, the abundance of species of open landscape was declining except of the species *Sylvia communis*. From 16 species with declining abundance, 5 were species of agricultural landscape. This can be related to intensive agriculture. Insufficient covering of the area of Slovakia by transects and short time of monitoring are the main reasons, for which uncertain trends were determined for most of evaluated trends (Slabeyová at al, 2009).

Both, the Slovak Ministry of Agriculture and the Slovak Ministry of Environment use the indicator Population trends of farmland birds for monitoring of biodiversity of agricultural

landscape. For this purpose, as of the above words, this indicator is not very appropriate. The birds monitoring in Slovakia does not have such tradition, as in some of the west European countries. Besides the high time demands and the need of professionals for monitoring, this indicator is suitable for documenting the state of biodiversity on national, possibly regional level. For evaluation of effectiveness of agri-environmental policy arise the need to local monitoring on farm level. Only then the real impact of management of individual agricultural subjects under the agri-environmental support on biodiversity can be expressed in a responsible manner. The same restrictions should emerge from monitoring of other animals or plants species.

Besides the identification of problems in agri-environmental policy and agri-environmental indicators, the questionnaires and personal interviews were also aimed at defining the stakeholders' proposals for better use of agri-environmental indicators in practice. They were as follows:

- Support and coordination of educational activities and increase of environmental awareness mainly of farmers and decision makers
- Creation and application of agri-environmental indicators with legislative and institutional support
- The need to create a communication system aimed at effective agri-environmental measures created by government, and NGOs as representatives of stakeholders on local level
- The need to create composite indicators for biodiversity monitoring that should be based on the state of biotopes

As can be seen from above mentioned, stakeholders perceive deficiency of indicators for biodiversity monitoring. The indicator Population trends of farmland birds is defined as only indicator for biodiversity monitoring. This indicator is quite new in Slovakia, it is represented only in currently ongoing RDP 2007-2013 and it is also evaluated by the Slovak Environmental Agency however, only as a descriptive indicator due to lack of data. Biodiversity indicator based of the area supported under AEPs (indicator Contribution to biodiversity increase based on the supported areas of NATURA 2000) is not sufficient for biodiversity monitoring and evaluation. It is more appropriate to be used in general as informative indicators, because biodiversity is only estimated on the base of area of supported land, rather than evaluation based on real biodiversity data for specific agricultural subject.

It has been argued that the current decline in farmland biodiversity results mainly from a loss of habitat diversity at multiple spatial and temporal scales (Benton et al. 2003). Vice versa, the state of biotopes, which depends on the intensity of management, can well express the state of biodiversity. The main reasons for continuing decrease of biodiversity in agricultural landscape during the last 30 years are mainly intensification of agriculture, abandonment of agricultural landscape and climate changes (Schindler, 2009; Spitzer, 2009). Many valuable habitats in Europe are maintained by extensive farming and a wide range of wild species rely on this forms of management. The focus of biodiversity monitoring thus should be put on developing the indicator expressing the state of biotopes composed from data most influencing the biodiversity decline, which should be applicable also at the local level.

Conclusion

Agri-environmental indicators are main tools for evaluation of the impact of agriculture to environment. They have been developed on international level and then translated into the Slovak policies (Ministry of Agriculture and Ministry of Environment). Overall, the effectiveness of both sets of indicators for evaluation of biodiversity is rather small mainly because of lack of appropriate indicators, and missing data for their evaluation. One of the reasons of low effectiveness of agri-environmental policy for biodiversity protection is insufficient utilisation of agri-environmental indicators.

A deficiency of agri-environmental policy is that the control of biodiversity of wild species is ensured only by the indicator Population trends of farmland birds. Moreover, this indicator in Slovakia can not be used for long time trends analysis because of missing counts, and because of data are not available for all regions in Slovakia.

Besides indicator Population trends of farmland birds no other indicator directly related to biodiversity of wild species is used and therefore it can be concluded that the impact of agri-environmental policy to biodiversity in Slovakia is almost unknown.

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