THE INFLUENCE OF AGRI – ENVIRONMENTAL MEASURES AND INDICATORS ON THE DEVELOPMENT OF SLOVAK AGRICULTURE SUSTAINABILITY

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Abstract*. The individual components of the environment are significantly influenced by agricultural activities carried out in the agricultural landscape. The objective of this study was to evaluate the selected agri-environmental indicators, such as the use of fertilizers, the use of chemicals, and the consumption of water in agriculture. Measures of Axis 2 of the Rural Development Programme of the Slovak Republic for the period of 2007-2013 helped to mitigate the negative impact of agricultural practices and activities on the selected individual components of the environment and landscape. The study is focused on the selected measures of the Axis 2: agro-environmental NATURA 2000 payments on agricultural land and animal welfare payments. The most important measure, agri-environmental payment is divided into three groups of the sub measures: environmentally friendly practices, soil conservation measures and conservation of biodiversity. The purpose of the implementation of such measures is to contribute to the improvement of the quality of the environment, for example to improve the biodiversity, soil quality and animal welfare, etc. The most widely used measure; agri-environmental payment also aims to maintain the ecosystem, species and genetic diversity by maintaining the prescribed methods of land management. Especially activities within the area-related measures have contributed to improvement of the quality of agricultural land and water by limitation of fertilizers and pesticides use. Most of the selected measures contributed to the better adaptation of agriculture to climate change and emission of GHG. Agri-environment payments play a prominent role in supporting the sustainable development of rural areas and in responding to society´s increasing demands for environmental services. They encourage farmers and land managers to serve society by introducing or continuing to apply agricultural practices that contribute to climate change mitigation and adaptation and that are compatible with the protection and improvement of the environment, the landscape and its features, natural resources, and the soil and genetic diversity.*

Key words: *Rural Development Programme, NATURA 2000, Agri-environmental payments, evaluation*

INTRODUCTION

Agricultural land creates functionally the most spread type of rural cultural landscape. It is significantly influenced by human activities; its structure depends on the intensity of use. Plant communities are the fundamental condition for the existence of agriculture. Features of the rural landscapes differ to high extent from the urban landscape of large agglomeriorations and industrial parks, therefore rural landscape can be attractive for human population (LACKO-BARTOŠOVÁ et al., 2005). At the level of knowledge related to production processes and behaviour of nature, a number of measures, weather in production, organisational, legislative, political or related to property rights, and nature protection are proposed and implemented (VOLTR et al., 2011).

There are very large differences in the natural fertility of soil in the Slovakia, which is reflected in the conditions and results of agricultural production. Applied economic instruments compensate the mentioned differences. These are applied also in order to maintain the

population in regions and sustainability of ecological stability of agricultural land (BUDAY, VILČEK, 2013).

The Rural Development Programme is the programming document for funding from European Agricultural Fund for Rural Development (EAFRD). The priorities of the Rural Development Programme of SR 2007-2013 (RDP SR 2007-2013) include support of modernization, innovation and effectiveness of agricultural, food and forestry holdings, maintenance and protection of environmental values of the landscape, heritage conservation, creating jobs opportunities, increasing the skills of the rural population and improve the quality of life in rural areas. It is necessary to prevent water pollution and land degradation for improving the environment and landscape by appropriate management practices and preventive measures for improving the ecological stability of the country, preventing the loss of habitats of wild fauna and flora and rare habitats (RDP SR 2007-2013, MARD SR, 2014; www.apa.sk).

Axis 2 of the RDP SR 2007-2013 (MARD SR, 2014, www.mpsr.sk) aims to improve the environment and the landscape in order to create the multifunctional agricultural and forestry systems with positive impact on the environment, nature and landscape. The support is aimed to diversify the plant and animal species, to improve water quality, the quality of agricultural and forest land and to mitigate the effects of climate change.

The support for the NATURA 2000 and payments linked to the Directive 2000/60/EC provides farmers to overcome the disadvantages in the areas in the 4^{th} and 5^{th} level of protection in which there is a ban of chemicals and fertilizers application as well as, the placement of sheepfolds, buildings or other equipment for protection of animals is also not allowed. The support for specific methods of management in the areas of NATURA 2000 should contribute to sustainable development to protect the natural environment and landscape, especially biodiversity and areas with high natural value.

The aim of this contribution was to evaluate the selected agri – environmental indicators and measures with the impact on sustainable agriculture development in the Slovak Republic.

MATERIAL AND METHODS

The basis for evaluation of the selected measures of Rural Development Programme for the Slovak Republic 2007-2013 on the development of agri-environmental indicators were Green Reports for 2012 and 2013 (Ministry of Agriculture and Rural Development of SR - MARD- SR) which are prepared annually by the National Agricultural and Food Centre – Research institute of Agricultural and Food Economics – NAFC-RIAFE.

The data were obtained from the Central Controlling and Testing Institute in Agriculture (CCTIA), the Statistical Office of the Slovak Republic (SO SR) and the Slovak Hydrometeorological Institute (SHMI). For evaluation of vulnerable areas there were used: Government Regulation no. 617/2004 laying down the sensitive areas and vulnerable areas, Council Directive no 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources, the map of the vulnerable areas in Slovakia from NAFC – Soil Science and Conservation Research Institute (NAFC-SSCRI), www.podnemapy.sk.

For further analysis were selected measures of the Axis 2 of the RDP SR 2007-2013, namely: Payments within NATURA 2000, and measure 2.1.3 (code 214) Agri-environmental payments (AEP, AEM).

The information and data necessary for the achievement of the objectives were from the Agricultural Payment Agency (APA), the Annual Progress Report on the RDP SR 2007-2013 for 2013 (NAFC-RIAFE, Euroconsulting Ltd., 2014) and the Rural Development Programme of SR 2007-2013 (MARD SR, 2014, www.mpsr.sk). The Annual progress reports

on the RDP SR 2007-2013 periodically evaluate progress in implementing of the RDP SR 2007-2013 and they are prepared annually (under Council Regulation (EC) no. 1698/2005 as amended).

The methods of selection, analysis, synthesis, comparison and deduction were used in the contribution. There were performed mathematical-statistical data analysis, time series analysis and numeric calculations.

RESULTS AND DISCUSSION

For the protection of water resources in agricultural areas, measures implemented within vulnerable areas are of particular interest. Vulnerable areas are agriculturally utilised areas from which rainwaters flow into surface waters or underground waters, with nitrate concentration higher than 50mg.l^{-1} or the concentration can be exceeded in the near future. Contamination of underground and surface waters by nitrate and other pollutants is caused mainly by intensive farming and animal housing facilities. Vulnerable areas are defined in Government Regulation no. 617/2004 laying down the sensitive areas and vulnerable areas.

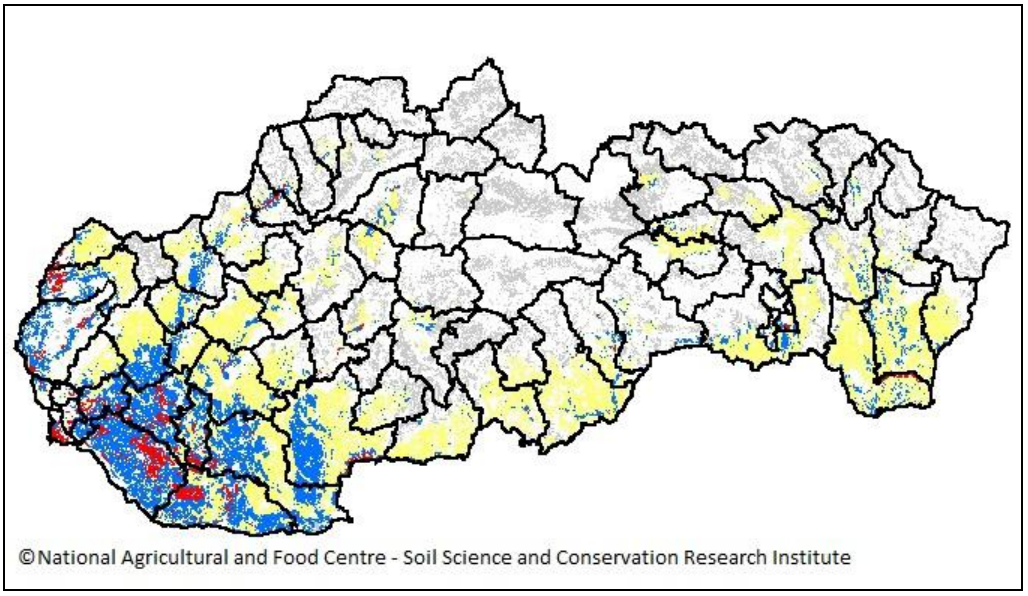

Figure 1: Vulnerable areas in Slovakia (Source: National Strategic Plan for Rural Development for the programming period 2007-2013 (MARD SR), www.podnemapy.sk – NAFC- SSCRI)

Legend

Vulnerable areas

- production blocks with the lowest level of management restrictions
- production blocks with moderate management restrictions
- production blocks with the highest level of management restrictions
- not included

In recent years, there was a decreased trend in the content of nitrates in underground and surface waters in Slovakia. Measures of Axis 2 of the RDP SR 2007-2013 (especially AEM, which includes schemes of integrated protection of plants, grassing, anti-erosion

measures and organic agriculture) also contributed to this trend, in particular by the fact that less fertilisers and pesticides are used in supported areas, which contributes to the lower transfer of contaminants.

NATURA 2000 sites – European Network of Protected Areas in Slovakia

These areas occupy 29.6 % of the total area of the Slovak Republic compared to 12 % of EU average. Out of total utilized agricultural land (UAA), NATURA 2000 sites occupy 16% and 46.5 % of forest area of SR. NATURA 2000 sites consist of two types:

a) SR has 41 "Special Protection Areas" (SPA; Protected birds areas) on the total area of 1282811 ha which represents 26.16 % of the SR territory. The area of the declared SPA is 365102 ha on agricultural land, that means 28.4 % share of the total agricultural land area of SPA in the SR (to 1st January 2013, State Nature Protection of the SR).

b) The second category consists of NATURA 2000 sites "Special Areas of Conservation" (SAC; Areas of European Importance). After the update in 2011, there are 473 registered, on a total area of 584353 hectares, and represents 11.9% of the SR territory. Out of the total area of SAC, the share of the agricultural land represents 10% with the area of 58640 ha (State Nature Protection of the SR). (State of the Environment Report of the SR 2011, 2013, Ministry of Environment of the Slovak Republic, Slovak Environment Agency, 2012, 2014, www.enviroportal.sk).

Several measures under Axis 2 of the RDP have been implemented in SAC areas.

Evaluation of the Measure "NATURA 2000 and payments linked to Directive 2000/60/ EC" (code 213)

The aim of this measure is to assist farmers in addressing the specific constraints resulting from the implementation of the NATURA 2000 and the Framework Directive on Water Policy (RDP SR 2007-2013, MARD SR, 2014).

In cumulative terms: 20 agricultural enterprises were supported in the NATURA 2000 areas with the total area of 350.26 hectares from the beginning of the measure implementation until the end of 2013 (15 in mountain areas, 4 in other disadvantaged areas and one outside Less Favoured Areas).

Table 1

State of the Common EU monitoring indicators of output and result – Measure 213

Level	Indicator	Aim 2007 – 2013	State to 31th December 2013
Output	Number of supported enterprises in the NATURA 2000	20	20
	Supported agricultural land in the NATURA 2000 areas (4th and 5th degree of protection)	500 ha	350.26
Result	The area with successful farming on the land contributing to: – biodiversity – water quality – soil quality – mitigation of climate change – prevention to marginalization and land abandonment	500 ha	350.26

Source: APA; Annual Progress Report of the RDP SR 2007-2013 for 2013 (NAFC-RIAFE, EuroConsulting Ltd., 2014)

Areas under the Directive 2000/60/EC or mixed areas within the measure were not supported.

At the end of 2013 cumulative amount of payments under the Measure 213 represented 127036.1 EUR.

Evaluation of the Measure "Agri-environment payments" (code 214)

The aim of this measure is to implement agricultural production methods compatible with the protection and improvement of the environment, landscape, natural resources, which are beyond the relevant mandatory standards (RDP SR 2007-2013, MARD SR, 2014).

Regarding the cumulative implementation of the measure, the details of the paid support under the specific schemes (sub-measures) – AEP (214) are shown in the following table for the whole period of the implementation.

Table 2

Implementation of the Measure 214 by sub-measures - cumulative (to the end of 2013)

Type of commitment (classification according to monitoring table of APA - Measure 214)	Number of supported enterprises	Total supported area (ha)	Physical supported area (ha)	Total public expenditures (ths. EUR)	
				Existing commitments	New commitments
Organic farming	296	152 687.99	148 987.53	63 176	115
Integrated production	203	13 476.24	12 337.92	29 793	5
Reducing and better management of fertilizers - basic scheme	243	117 727.45	116 253.06	31 338	46
Maintaining soil quality = grassing of arable land and protection against erosion	20	24 739.56	3 696.79	16 997	52
Maintaining of landscape appearance and HNV farmland, including the conservation of historical features = grassland habitats	182	71 556.64	36 119.25	18 184	8
Preservation of natural environment favourable to biodiversity = bird habitats protection	123	43 974.83	42 437.02	14 218	18
Preservation of local endangered breeds / breeding of endangered species	182	-	-	1 919	0
TOTAL	**1 249**	**424 162.71**	**359 831.57**	**175 625**	**244**

Source: Section of direct payments, APA; Annual Progress Report on the RDP SR 2007-2013 for 2013 (NAFC-RIAFE, EuroConsulting Ltd., 2014). Legend: HNV – High Nature Value.

APA monitoring table under the measure AEP indicates the number of supported enterprises at the level of 1249. This is the sum of all supported enterprises for all support schemes of AEP on farmland and applicants in the scheme – breeding and preservation of endangered species. It is the unique number of supported enterprises after examination of overlaping in some of the participating enterprises at the same time participating in the land schemes and schemes for breeding endangered species.

At the end of 2013, the total area supported under the Measure was 424162.71 ha and physical area was 359831.57 ha. From the beginning of the RDP SR 2007-2013 implementation there were supported 4917.9 LU of endangered species (breeds of cattle, horses, sheep, goats).

One of the most significant AEP sub-measure is also organic farming. According to the cumulative data of the APA to the 31st December 2013, there were supported under the

sub-measure of organic farming 296 enterprises. The total supported area represented 152687.99 ha and physical area 148987.53 ha.

CONCLUSIONS

Agri-environment payments play a prominent role in supporting the sustainable development of rural areas and in responding to society's increasing demands for environmental services. They encourage farmers and land managers to serve society by introducing or continuing to apply agricultural practices that contribute to climate change mitigation and adaption and that are compatible with the protection and improvement of the environment, the landscape and its features, natural resources, and the soil and genetic diversity.

Measure Natura 2000 aiming to enhance biodiversity was implemented on a small area. Therefore, it was not possible to evaluate the significant positive impact on reducing biodiversity. Its implementation was focused on the permanent grasslands whereas it contributed to water erosion decrease, soil organic matter increase. Prohibition of the chemicals and fertilizers use in these areas reduces the risk of transportation of hazardous substances into groundwater. Due to the implementation of measures in a small area, it did not have a significant impact on mitigating the climate change.

Implementation of the Measure AEP contributed to maintaining and protecting genetic resources by supporting farmers of the endangered animal species. The measure contributed to maintaining the ecosystem, species and genetic diversity through compliance with the prescribed methods of land management. Restricting the use of chemicals, AEM contributed to spread of food-supply for birds and thus to increase of their frequency. The AEP sub-measures limiting or excluding the use of fertilizers and pesticides contributed to improve water quality, the quality of agricultural land and to reduce the production of greenhouse gases. The AEP sub-measures on the implementation of the erosion control measures contributed to the farmland improvement and also to the stabilization and increase of the soil organic matter content. One of the most important AEP sub-measure was also organic farming.

Mentioned measures will continue in the next programming period 2014 - 2020. The following related independent measures under the RDP SR 2014-2020 have been also approved: Agri-environment-climate measure, Organic farming, Payments under Natura 2000, under the Water Framework Directive, and Animal Welfare.

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