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Agricultural landscapes development and its subsequent impact in terms of common agricultural policy – the case of South Western planning region in Bulgaria

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Abstract

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The purpose of the current study is to analyze the impact of Common Agricultural Policy (CAP) implementation in Southwestern planning region (SWPR) in the Republic of Bulgaria (BG). The analysis showed two opposite tendencies: decreasing of agricultural holdings number and increasing ofutilized agricultural area (UAA) per holding, whichisa clear indicator of land consolidation and UAA concentration in fewer agricultural holdings. Although results indicateddelay in this trend for Blagoevgrad District, this is a prerequisite foranextensive livestock production which allowsthe conservation and maintenance of pastures and meadows, henceimprovingthe provided ecosystem services and supporting biodiversity conservation.

Keywords: utilized agricultural area; ecological balance; grassland habitats; biodiversity conservation
Abbreviations: BG – Republic of Bulgaria; BPS – basic payment scheme; BMQAEC – Bulgarian monitoring questionnaire for agricultural and economic conjuncture; CAP – Common Agricultural Policy; EU – European Union; MAFF – Ministry of Agriculture, Food and Forestry; SAPS – single area payment scheme; SWPR – South Western planning region; UAA – utilized agricultural area

Inroduction

The accession of BG to the EUin 2007 made the CAP of the EU a decisive factor for the Bulgarian agriculture development. The years after the accession are the period of adaptation of the Bulgarian agriculture to the new conditions and requirements of the common European market. Not with standing the difficulties and challenges, the implemented policies helped for its sustainable development and increasing of its competitiveness, mainly due to the incoming financial resources from the EU budget under the CAP.

On the other hand, BG's commitments regarding the environment, and in particular NATURA 2000, require conservation of biological diversity, which is often directly related to agriculture and animal husbandry policies. Gussev & Tzonev (2017) point out that according to data of the Ministry of Agriculture and Food (2016), grasslands (pastures, meadows, pastures and meadows in thecroplands, mosaics of shrubs and grasslands, etc.) occupy 1744143.5 ha or 15.6% of BG. In total, grassland habitats, the vast majority of which are agricultural lands, occupy approximately less than 1/5 of the country's area. However, in this area is concentrated a huge part of the biodiversity. It is because

very small part of the animals and even fewer plants found in open spaces, have rediscovered croplands as secondary substitute for their destroyed habitats.

The Ministry of Agriculture, Food and Forestry (MAFF) reports positive results in the agriculture since the introduction of the CAP in the first programming period (2007-2013), mainly related to the restoration of farmers‘ interest in agricultural practice, development of abandonedagricultural lands, restructuring of farms, improving the competitiveness of Bulgarian agriculture, farm modernization and many others (Tzonev& Gussev, 2017; MAFF, 2010a).

In the last programming period (2014 – 2020), the EU promotes the deployment of its „green growth“ potential, including in agriculture. Like EU farmers, the farmers in BGare controlling by the so-called CAP “environmentalization” rules, which aim to ensure that agriculture is sustainable and contributes to EU efforts to fight climate change and the reduction of soil biodiversity and quality. The introduction of the requirements of Regulation (EC) № 1307/20013 in the CAP, has involved system of payments for the achievement of objectives, and in addition to the basic paymentscheme (BPS) or single area paymentscheme (SAPS). Therefore, each farm will receive a payment per hectare for adherence to certain agricultural practices that have a beneficial effect on climate and the environment.

The three envisaged measures are:

- crop diversification, with the minimum number of cultivated crops determined by the area of cultivated land;
- maintenance of existing permanent grasslands;
- establishing of eco-friendly areas that correspond to at least 5% of the arable land of the farm: land boundaries, hedges, trees, fallow land, topographic features, biotopes, buffer zones, nitrogen-fixing crops, etc.

The purpose of the study is to analyze the impact of changes in agriculture as a result of CAP implementation in BG, and interpreting these changes in terms of biodiversity conservation, soil protection and climate change mitigation. This has been doing in one of the main planning regions in BG- South Western. The main thesis of the study is that changes in the structure of agricultural land increase their competitiveness, and land use is conjunctural in accordance with the subsidy policy, and both trends conflict with the protection of biodiversity and the environment condition.

Material and Methods

Official sources of information from the following sorces were used for the survey:

– National Statistical Institute (see https://www.nsi.bg/);
– MAFF (2003; 2005; 2007; 2010, 2010a);
– State Fund for Agriculture (see http://www.dfz.bg/);
– Agricultural Accounting Information System (see: https://www.mzh.government.bg
/bg/statistika-i-analizi/sistema-za-zemedelska-schetovodna-informaciya/sistemata/;
– Bulgarian Monitoring Questionnaire for Agricultural and Economic Conjuncture (BMQAEC, 2018).

They are systematized, individual indicators are calculated, their dynamics is monitored, and they are all graphically and tabularly presented.

Results and Discussion

Description of South Western planning region

South Western planning region (SWPR) was used as a model object of the study (Figure 1).

Fig. 1. South Western planning region (SWPR)
Source: agrozona.bg

The SWPR is situated in the southwestern part of BG- with an area of 20306.4 sq. km, which represents 18.3% of the country‘s territory and is the second largest among the planning regions in BG(MRDPW, 2005).

The SWPR consists of 5 administrative districts – Blagoevgrad, Kyustendil, Pernik, Sofia and Sofia (capital), which include a total of 52 municipalities. The relief of SWPR is various – mainly mountainous, combined with lowlands. Here are situated the highest mountains in BG- Rila, Pirin, the western parts of the Rhodopes, as well as Osogovska, Maleshevska, Vitosha, part of StaraplaninaMts. According to its geographical location, the SWPR falls within the temperate continental sub-region of the European-Continental climate zone. The watersheds of Struma, Mesta and

Iskar rivers are located on the territory of the SWRP. These river basins have the largest annual volume of runoffin the country.A total of 21887.4 ha of irrigation systems were built in the planning region, of which 17274 ha are located along Iskar River, 4012.8 ha along Struma River and 600.6haalong Mesta River.In SWPR is characterized with the distribution of Chromic cambisols, Vertisols, Cambisols, Umbrosols, Lertosols,Umbrosols and Gleysols. These soil types are essential for the development of agricultural production on the territory of the SWPR, where 13.2% of the agricultural land and 13.3% of the utilized agricultural area in the country are concentrated (Drenovski et al., 2002).

The complex of climatic, geological and hydrological conditions in the SWPR defines its unique flora and fauna and the biodiversity richness.Different categories of protected areas and NATURA 2000 sites are widely represented in the area. Within these territories, a wide variety of unique for BG and Europe ecosystems, rare and endangered plant and animal species, as well as rock phenomena, caves, gorges and beautiful sand formations are preserved (Botev et al., 1986, 1988; Georgiev et al., 2004).

Structure and dynamics of agricultural holdings in SWPR

The accession of BG to the EU and the introduction of the CAP in the country have led to a decrease in croplands (including permanent crops for more than 5 years), and this trend is well outlined at both national and regional level. (MAFF, 2003; 2005; 2007; 2010a) (Figure 2).

In 2016 the number of farms with uncultivated land in the country and SWPR decreased by about 13 times, and the areas of abandoned land by about two (BG) and seven

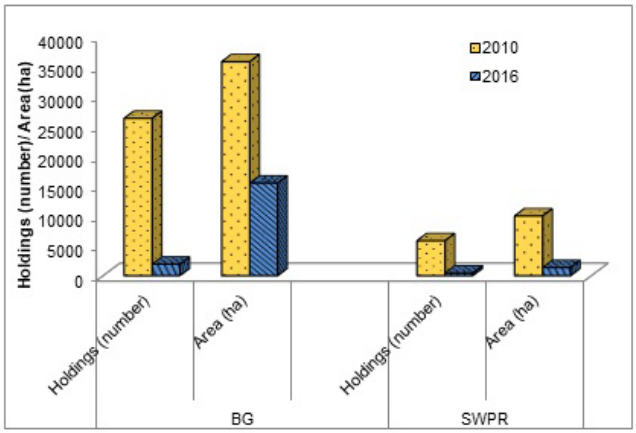

Fig. 2. Uncultivated agricultural land represented by number of agricultural holdings and total area (ha)

(SWPR) times compared to 2010. Much more intensive for the studied period is the development of abandonedlands in the SWRP compared to the average rate of utilization of these lands in the country. This is one of the most important effects of EU membership and the CAP implementation.It is interesting to note that in 2010 about 50% of the holdingswith UAA and 73% of the uncultivated area in SWPR are located in Blagoevgrad district (Figure 3).

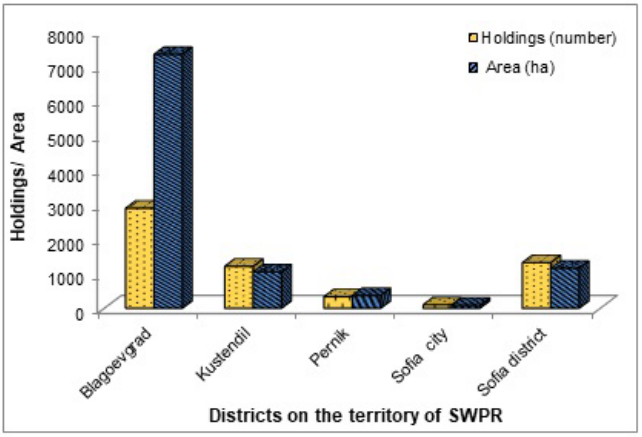

Fig. 3. Uncultivated land (number of agricultural holdings and area) in 2010 by districts within the SWPR

The decrease of uncultivated land in the SWPR has led to an increase in the utilized agricultural area (UAA) area in the districts. Since 2005, there has been a steady upward trend in the area of UAA, and in 2016 it is about 2 times larger than in 2003 (Figure 4). At the same time, this means reducing of grasslands, most of which are pastures and meadows, including those with semi-natural origin. A large part of them are also natural habitats included in Annex 1 of the Biodiversity Act (Kavrakova et al., 2009) and are protected underNATURA2000 network. Such natural habitats on the territory of SWPR are: 6110* Rupicolous calcareous or basophilic grasslands of the *Alysso-Sedion albi*.; 62A0 Eastern sub-Mediterranean dry grasslands; 62D0 Oro-Moesian acidophilous grasslands; 5130 *Juniperus communis* formations on heaths or calcareous grasslands; 5210 Arborescent matoral with *Juniperus* spp.; 6210 Seminatural dry grassland and scrubland facies on calcareous substrates (*Festuco-Brometalia*)(important orchid sites); 6220* Pseudo-steppe with grasses and annuals of the *Thero-Brachypodietea*; 6230* Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe); 6510 Lowland hay meadows; 6520 Mountain hay meadows (see: http://natura2000.moew.government.bg/Home/Natura2000ProtectedSites). In addition, many animal

species like insects, reptiles, birds and mammals, have also connected directly and indirectly to these habitats (Gussev et al., 2016). Therefore, an increase in UAA may adversely affect the conservation of these species.

In parallel with the UAA increase, the number of agricultural holdings in the SWPR is decreasing and in 2016 they represent about 43% of the average number of registered holdings in the period before BG accession to the EU (2003 and 2005). The two opposite tendencies of decreasing agricultural holdings and increasing UAA are a clear indicator of land consolidation and UAA concentration in fewer agricultural holdings. This tendency is most clearly demonstrated by taking into account the size of UAA (ha) per agricultural holding (Figure 5).

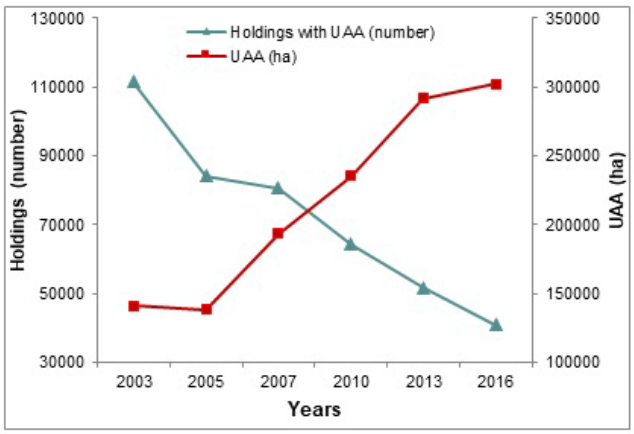

Fig. 4. Dynamics in the number of agricultural holdings and the UAA on the territory of SWPR in the period 2003 – 2016

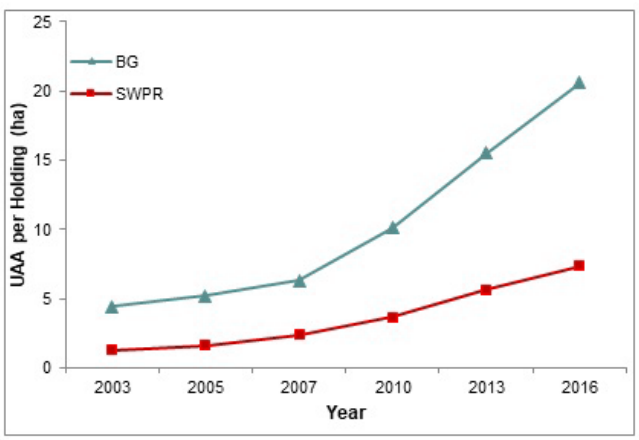

Fig. 5. Dynamics of the UAA size for agricultural holdings on the territory of BG and the SWPR in the period 2003 – 2016

An aggregation of agricultural holdings takes place in both BG and SWPR, but a slight slowdown is registered for SWPR compared to the average rate for the country. In 2010 the agricultural holdings in Blagoevgrad District are with the lowest average UAA (1.54 ha), followed by Kyustendil District (3.39 ha), Sofia District (6.54 ha), Pernik District (11.48 ha) and Sofia city (12.59 ha) (MAFF, 2007). The above mentioned data clearly distinguished by size of agricultural holdings the districtswith mountainous (Blagoevgrad and Kyustendil) from those with plain(Sofia – city and Sofia District) relief. These data suggest that the restructuring of farms proceedswith different speeds in different areas of SWPR, leading to differences in productivity and market competitiveness.

The analysis showed strong fragmentation of the UAA in Blagoevgrad District, strong dominance of individuals as owners of farms and very poor processes of association of landowners, the creation of cooperatives or companies under the Commercial Law. This may also explain the delay in the land consolidation process, which has a negative impact on the possibilities for farms´ modernization and the adoption of modern methods for agricultural production.A confirmation of these conclusions is the fact that the Blagoevgrad Districtis one of the two in the country where there are no farms providing areas to third parties for personal use (cultivation). On the other hand, smaller farms retain a greater diversity of the landscape, which favors the conservation of a more natural landscape and are more favorable to preserving biodiversity. Large areas, especially planted with monocultures, are risky for crop production and maintenance of the natural gene pool, insofar as they significantly alter the landscape and habitat conditions of the associated animal species.According to Gussev & Tzonev (2017) natural landscapes have been greatly altered by the centuries of human activity. Such types of landscapes are the agricultural (the type of land use is taken into account in the classification), including grassland habitats (natural and semi-natural, pastures and meadows, etc.). Their current ecological status is closely related to soil and climatic conditions, ownership patterns, size and configuration of the lands, the system of use and, most of all, applied agricultural technology, etc.

Increasing the size of croplands planted with homogenous crops is often accompanied by the removal of boundaries between properties and plots that are different by size stripes (boundary strips) of grass, shrub or woody vegetation (hedges, windproof, snowproof andbank protection belts), bulk terraces or dikes, stone fences, walls, constructions, etc. Despite identifying agricultural land, protecting soil from erosion and sheltering farm animals, this practice is also deeply eco-friendly – these elements represent micro-

ecological niches (habitats) and an „ecological buffer" for different groups of living organisms (insects, birds, rodents) that maintains the viability of their populations in an environment of agricultural activity (Jaskulski & Jaskulska, 2012). The grass strips (boundary strips, belts) that are undestroyed and maintained with minimal grass stand are shelters for dozens of species of conservation importance, including many protected species, listed in Annex 1 of The Habitats Directive, etc.

Hence, the consolidation of agricultural holdings has negative consequences on the biodiversity. The extent and magnitude of this negative impact are not well understood also due to the rapid dynamics of the occurring processes.

Providing habitats for valuable biodiversity species is one of the most important ecosystem servicesofagro-ecosystems. Studies conducted to assess the ability of agro-ecosystems to provide different types of ecosystem services (supportive, regulatory and cultural) outside the food ecosystem services group have unequivocally evaluated the higher value of these services in SWPR in comparison with other planning regions in the country (MAFF, 2010b). Territorially, there are differences in the size of the UAA for a holding, even within the boundaries of the same district. For example, in Blagoevgrad District, the municipalities located in the Razlog valley (Bansko and Razlog) have an average UAA for an agricultural holding of 7.46 ha, the municipalities along Struma River (Blagoevgrad, Simitli, Kresna, Strumyani, Sandanski and Petrich) – 1.48 ha, and those from the high parts of the Rila-Rhodope Massif (Yakoruda, Belitsa, Gotse Delchev, Garmen, Hadzhidimovo and Satovcha) – 0.99 ha (MAFF, 2007). The reason is the degree of preservation of rural character and animal husbandry, the smaller size of agricultural holdings are in the municipalities with larger rural population and relatively well preserved livestock as family farms and backyards type. The latter has a positive impact on biodiversity insofar as extensive grazing of animals maintains the structure of the grasslands and meadows (Gussev et al., 2016) used by the animals and preserves them as habitats of plants and animals, including those of conservation importance, included in the Annexes of the Biodiversity Act.

Structure of the UAA

In 2018 the UAA in SWPR has a total area of 593040 ha, of which 215662 ha are located in Sofia District, 136191 ha in Blagoevgrad District, 106300 ha in Pernik District, 93497 ha in Kyustendil District and 41389 ha in Sofia city. In the UAA structure for the region, the largest share is permanent grasslands (63%), followed by croplands (33%) (Figure 6a). The area of permanent crops (orchards and vineyards) in UAA is 3%, and of family gardens – less than 1%.

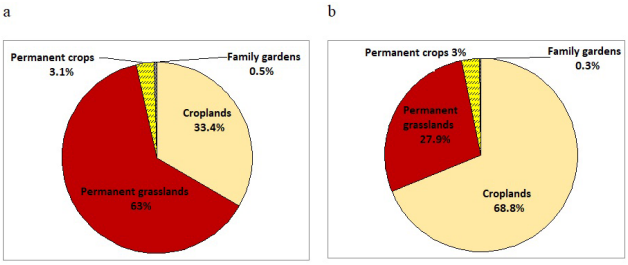

Fig. 6. Structure of UAA (%) in SWPR (a) and BG (b)

The SWPR differs significantly by the UAA structure compared to the national average (Figure 6b). The relative share of croplands (69%) in BG is significantly higher than that of the permanent grasslands (28%). This disproportion is further exacerbated at the district level – for example in Blagoevgrad District the croplands in 2018 represent only 18% and the relative area of permanent grasslands in UAA is 76%. Pasture maintenance is a preferred strategy for animal nutrition, especially in organic livestock. Grasslands, on the other hand, have high carbon sequest ration potential (MAFF, 2016) and their maintenance could be a way of optimizing atmospheric carbon capture (Smith et al., 2007; Rice et al., 2001). Global carbon capture potential through improved pasture management practices is estimated at 0.22 t C per ha annually (Liebig et al., 2005) or the total carbon capture potential in the world will be 1.4 Gt per year, equivalent to about 25% of annual GHG emissions from agriculture (MAFF, 2016; Watson et al., 2000). The areas with permanent crops are also important for the uptake of atmospheric carbon and the mitigation of global climate change (Lal, 2004). On average for SWPR, the relative share of permanent crops in UAA is 3% (comparable to the share of permanent crops at a national level), and Kyustendil (7%) and Blagoevgrad (6%) districts have a share above the regional average.

Taking into account the higher percentage of permanent grasslands and permanent crops, it can be assumed that the objectives of greening agriculture in the Blagoevgrad District are more feasible than other areas in the SWPR. The smaller size of farms with protected natural environment also contributes to this objective.

According to Gussev & Tzonev (2017) grassland communities in BG are not only a source of feed for livestock, but also very important for maintaining the ecological balance in nature. They are a significant habitat for many plant and animal species that participate in the food webs in na-

ture and maintain this equilibrium in adjacent croplands. There are bred insectivorous mammals and birds, which limit the calamities of different insects – pests on crops. Not only farm animals but also wild animals, including game species, and honey bees are feeding in meadows and pastures. Grasslands create soil humus; regulate the level of air and water reserves in the surface soil layer. And the last but not least – meadows and pastures also have aesthetic value. The works dedicated to the life of the shepherds have shaped a whole „pastoral" genre in art. From an economic point of view, grasslands are a major source of grass protein feed – the annual amount of crude protein received is about 200 000 tonnes, and therefore play an important role in the countryfeed balance for animals. Meadow hay and natural grazing are of great importance for the feeding of livestock. Hay is a complete, easily digestible, rich in vitamins and minerals forage with low cost feed. Therefore, the large percentage of permanent grasslands in the SWPR is essential for the conservation of rich biodiversity at a national level.

Use of agriculturalland

Croplandsare often a source of food and shelter for wild animals. Cultivated crops have an effect on the integrity of food chains and the sustainability of interspecies relationships in natural ecosystems. Grain and cereal (56% of the area of arable land) and oilseed (31%) crops are mainly cultivated in BG and the share of the areas sown with these crops in 2010 and 2018 remains almost unchanged. In 2010, 34% of the croplands in BG was occupied by industrial crops, but in 2018 their share decreased to only 2%. Areas with cereals and oilseeds are also predominant in the SWPR, but there is a significant decrease in the share of cereals and an increase in the share of oilseeds in 2018 compared to 2010. The differences between 2018 and 2010 in the share of areas with different types of crops in the country, SWPR and districts in SWPR are shown on Figure 7.

There has been a decrease in the relative share of areas sown with cereals and industrial crops, and an increase in those sown with oilseeds. The areas with cereals are dominated mainly by wheat and corn for grain. From the industrial crops in Blagoevgrad District, tobacco areas dominate and other industrial crops in the other districts. Oilseed crops are mostly from sunflower fields. Among the areas with vegetables, those sown with potatoes comprise the largest part and their share in the croplands of Blagoevgrad region in 2018 represents 13%. The relative share of the area with potatoes in 2018 for BG and SWPR is 4% and 6%, respectively. Another trend is that the fallow land in 2018 in the plain part of the region (Sofia-city, Sofia District and Pernik District) is decreasing slightly, while the area in Kyustendil and Blagoevgrad District is increasing. For example, in Kyustendil District, the fallow land was 12% of the arable land in 2010, and in 2018 it was 29%. In 2018, in Blagoevgrad District, the fallow land accounts for 30% of the total arable land, and in other areas of SWPR, it represents between 3 – 20%.

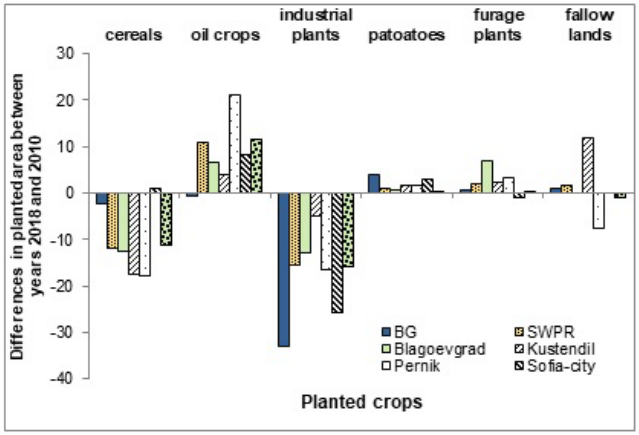

Fig. 7. Difference in percentage of areas between 2018 and 2010 sown with different crops in BG, SWPR, and districts in SWPR

In general, the type of arable land and cultivated crops do not have a significant impact on the conservation of specific representatives of flora and fauna. More important in this case is the presence of organic farming and extensive livestock farming. The reduction of agrochemical methods for agricultural land treatment has a more visible impact on the elements of the environment and in particular on biodiversity (EEA, 2015a; EEA, 2015b). At the same time, there is no accurate statistics on the number of farms practicing organic farming and, moreover, there are no specific studies on their impact on the flora and fauna in these areas. In all cases, however, permanent crops, especially those with extensive tillage, create more diverse conditions for biodiversity. Fallow lands also has a visible positive effect, contributing to the conservation of soil humus (Don& Schumacher, 2011), soil moisture (Cheng & Liu, 2014) and creating a dormant period for the reproduction and restoration of populations of agro-ecosystem-related plants and animals (Jaskulski & Jaskulska, 2012).

Conclusion

The SWPR does not differ significantly by the main trends in agriculture and animal husbandry at a national level, especially arising from the implementation of the Eu-

ropean agricultural policies in BG after the country‘s accession to the EU. At the same time, there are some trends that, overall, could make it more favorable to the conservation of biodiversity than other regions in the country. Blagoevgrad District particularly distinguishes in this regard, where is the highest share of permanent grassland, agricultural parcels are smaller, and the areas sown with cereals does not increase as most are large areas with monocultures. As a whole, this characteristic of the district is a prerequisitefor a relatively high level of extensive livestock production, which allows the conservation and maintenance of pastures and meadows with all their consequences and improvement of the ecosystem services provided.

Acknowledgements

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