

Evaluation of natural habitats in Western Balkan range and in Pazardzhik-Plovdiv region in relation to sustainable agriculture

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Abstract: The paper presents results of a comparative study on the habitat diversity and its relationships with agriculture in two regions of Bulgaria – Western Balkan range and the Pazardzhik-Plovdiv region. Substantial part of the land in the two regions is within the protected NATURA 2000 zones. Therefore, both regions offer opportunities for development of sustainable agriculture combined with biodiversity conservation. Total 37 natural habitats of European significance (Council Directive 92/43/EEC) were identified in Western Balkan range and 14 habitats were recorded in Pazardzhik-Plovdiv region. All habitats were evaluated regarding the current and possible agricultural land use.

Key words: Natura 2000, biodiversity, agriculture, rural areas

Introduction

Agricultural landscape represents a mosaic of many elements. It is a complex assemblage of agricultural, semi-natural and rural areas (PIORR 2003). The trend of conversion of the semi-natural areas into agricultural fields, combined with other peculiarities of large-scale agriculture, including using of pesticides, possess a serious threat to the biodiversity in agricultural areas.

Biodiversity conservation in rural areas has been always a serious challenge. Agricultural activity often results in destruction of natural habitats close to crop fields, especially when no special measures were taken for their conservation and sustainable use. It can destroy the microhabitats in agricultural landscape, such as hedges, field margins, wetland and woodland spots – the so-called Green and Blue Infrastructure (GBI), promoting the species migration and providing habitats and shelters to many species (MULLER 2002, CAI & PETTENELLA 2013, MULLINS et al. 2015). Agricultural intensification has led to a widespread decline in farmland

biodiversity measured across many different taxa (BENTON et al. 2003). On the one hand, agriculture affects negatively biodiversity but on the other hand, it could provide novel ecotones and diverse mosaic of habitats (FEHÉR et al. 2014).

At European level, different approaches were studied and implemented in the pursuit of achieving sustainability and optimal balance between agricultural production and biodiversity conservation. These include agroforestry systems, agricultural green approaches, natural farming, all they directed towards conservation of biodiversity and natural habitats (ANONYMOUS 2014, BIANCHI et al. 2013).

BAUDRON & GILLER (2014) pointed out the necessity of effort for biodiversity conservation outside the protected areas, in “production landscapes”, like agricultural areas, and BENTON (2012) underlined that the measures and agri-environment schemes can have greater impact if implemented at larger scale, across landscapes.

Strengthening of biodiversity conservation measures in these territories is an increasing concern. To meet the challenge of maintaining biodiversity in agricultural areas, the international project BIOGEA was launched (<http://www.biogea-project.eu>). Main objective of the project is to study the impact of land use change on GBI and further, the impact of GBI on farmland biodiversity.

The objective of the present study was to make a preliminary evaluation of natural habitats in representative parts of two target areas of the project – Western Balkan range and Pazardzhik-Plovdiv region. The evaluation was done from the point of view of their conservation importance and use for agricultural purposes.

Material and Methods

The field survey covered representative parts of the two regions – Western Balkan range and Plovdiv-Pazardzhik region. Most of the Western Balkan range is represented by mountainous area, while Plovdiv-Pazardzhik region represents plain and hilly area, situated close to the northern slopes of Rhodopes. The scope of the areas is rather broadly defined, but the focus was mostly on the zones protected within the network NATURA 2000. The field survey included record of the current situation of land use, its intensity and habitat diversity. Also recording of types, quality and extent of ecologically valuable farmlands was performed. Plant species composition was determined in 1km transects in 20 case studies from each region. The case study areas were measured in a 3 km grid selected using the Create Fishnet tool with the optional Create Label Points box enabled. All habitats were evaluated regarding the current and possible agricultural land use. Habitats were identified based on phytosociological and landscape criteria, following the Handbook for identification of NATURA 2000 habitats in Bulgaria (KAVRAKOVA et al. 2009) and their relevant numbers are provided in brackets.

Three categories were introduced to evaluate the status of the habitats from the point of view of sustainable agriculture. Category 1 indicates that agricultural activities in the habitat are impossible, either because they will result in habitat destruction, or the territory of the habitat is not suitable for agricultural use. In most cases agricultural activities in these habitats are prohibited, according to the nature conservation status of the territory. Category 2 indicates that agricultural activities in the habitat are possible, but should be done in a sustainable way, considering all restrictions and recommendations for close-to-nature management practice. Category 3

indicates that the agricultural activities in the habitat could follow their traditional way, which has proven its sustainability over time.

Results

Substantial part of the land in the two regions is within protected NATURA 2000 zones – Western Balkan range and Predbalkan (BG0001040) and two zones in Plovdiv and Pazardzhik region – Besaparski hills (BG0000254) and Maritza River (BG0000578). Zone Western Balkan and Predbalkan covers much larger area and is, therefore, richer in habitat diversity. One more zone declared according to Habitats directive could be mentioned in the region – Bilernitzite (BG0000593). Several NATURA 2000 zones declared according to Birds Directive overlap to a large extent with the Habitat Directive zones. These are Berkovitzta (BG0002090), Ponor (BG0002005) and Western Balkan (BG0002002). Besides, there is an Important plant area (IPA) Western Balkan and two Important Bird Areas (IBA) – Western Balkan and Ponor.

A special attention in Plovdiv and Pazardzhik region deserves the NATURA 2000 zone “Besaparski Hills” (BG0000254 – Habitats Directive; BG0002057 Bird Directive). The zone was declared also IPA, Specially Protected Area (SPA) under the EU Birds Directive, and part of the territory is a proposed Site of Community Interest under EU Habitats Directive. Most of the territory of the Besaparski Hills includes bare land (although classified formally as forest fund), pastures, abandoned land, small pieces of broadleaved woodlands, and agricultural land, including vineyards.

Totally 42 habitats of European importance were identified in the two target regions – 37 in the Western Balkan and 14 in Pazardzhik-Plovdiv region (Table 1). There were nine habitats common to both regions. In Western Balkan there were three Freshwater habitats, three belonged to Temperate heath and scrub, one – to Sclerophyllous scrub, ten – to Natural and semi-natural grassland formations, two – to Raised bogs and mires and fens, five – to Rocky habitats and caves, and thirteen habitats were forests. Habitats were classified in three categories according to the opportunities they offer for agricultural activities (Table 1).

In Plovdiv-Pazardzhik region three habitats belonged to the group of Freshwater habitats, one – to Sclerophyllous scrub, five – to Natural and semi-natural grassland formations, and five – to the group of forest habitats.

Total 295 vascular plant species were identified

Table 1. Categorization of habitats according to the possibilities for agricultural activities

Habitat category	Habitat codes	
	Plovdiv – Pazardzhik region	Western Balkan region
1	3150, 3260, 3270, 6110, 6430, 91AA, 91E0, 91F0, 91M0, 92A0	3140, 3150, 3260, 4070, 6110, 6430, 7140, 7220, 8110, 8210, 8220, 8230, 8310, 9110, 9130, 9150, 9170, 9180, 91E0, 91H0, 91G0, 91M0, 91W0, 91Z0, 9410, 9530
2	5210	4060, 40A0, 5130, 6410
3	6210, 62A0, 6510	6210, 6230, 6240, 62A0, 62D0, 6510, 6520

Legend: Category 1 indicates habitats where agricultural activities are prohibited or impossible, category 2 indicates habitats where agricultural activity is possible only with considering the limitations resulting from the nature conservation status of the territory, and category 3 indicates habitats where agricultural activities could follow their traditional way (see Material and methods)

during the field survey in agricultural ecosystems in Plovdiv-Pazardzhik region and almost twice more (530) – in Western Balkan range.

Discussion

The habitat and species diversity in the two zones were illustrated by the existence of important areas for plants (IPA) and birds (IBA). IPA Western Balkan hosts at least 1650 species (VLADIMIROV et al. 2012), and Besaparski Hills – about 600 species of vascular plants (ANGELOVA et al. 2012).

The three Important Bird Areas in the regions of interest – Western Balkan, Ponor and Besaparski Hills – contain 160, 140 and 86 breeding bird species, respectively (NIKOLOV et al. 2007, SPIRIDONOV et al. 2007, DEMERDJIEV 2007). DYULGEROVA et al. (2015) showed that land abandonment caused negative effect on bird diversity, thus indirectly pointing out the role of sustainable agricultural activities.

Besaparski Hills was categorized and included into a cluster of High nature value farming, with the introduced new agricultural practices (PENEVA & KAZAKOVA-MATEVA 2015). The region was populated since the ancient time (FOL 1997) and the land was subjected to anthropogenic influence for at least several thousand years. Therefore, the recent biodiversity in the semi-natural and rural areas can be considered as a result of a long-term probably fluctuating and changing balance between the agricultural and other human activities, and natural ecosystems.

It should be pointed out that the present study is not a floristic survey of the entire regions, whose flora is much more diverse (ANGELOVA et al. 2012, VLADIMIROV et al. 2012), but only in the representative experimental plots. We believe the plant species composition will be richer at the end of the study.

In Western Balkan region 26 habitats were classified into category 1, meaning that no agricultural activities can be performed, or are possible here,

at least directly (Table 1). These habitats include all forest types, where agricultural activity in strict sense is not performed. However, the forests territories can be involved indirectly in some agricultural activities, for example, in bee keeping. Usually, bee farms are not situated in forest territories, but bees are not limited in visiting flowering plants growing in open areas and in forests. Also, collecting medicinal plants in the region, even though not a typical agricultural activity, does not exclude forest territories (SAVEV 2003).

In Pazardzhik-Plovdiv region ten habitats were considered incompatible with agricultural activity, and half of them were forests. Practically, all forest habitats in the two zones were listed in category 1.

Four habitats in Western Balkan region and one habitat in Plovdiv-Pazardzhik region were included in category 2. These were mostly scrub formations with one grassland formation representing wetland habitats. Agricultural activities in these formations are related mostly to livestock breeding and these activities do not pose a threat to habitats as long as the restrictions, limitations and rules are followed.

The third category includes seven habitats in the region Western Balkan and three habitats in Plovdiv-Pazardzhik region. With no exception, these were grassland formation and agricultural activities there are related almost exclusively to livestock breeding. As pointed out above, the traditional agriculture has proven its sustainability over time and should be continued. However, introducing new agricultural practices here must be done with caution and with considering all restrictions and limitations related to the status of territory.

Even though the results of this study are only preliminary ones, we can conclude that the two regions are characterized by high habitat diversity and examples of conserved nature and sustainable agricultural practices. More profound study on the GBI, on the processes, interactions and balance between

the agricultural activities and biodiversity conservation will contribute to the overall sustainability of agriculture in the target regions.

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