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OPINION

by Prof. Dr. Rosen Todorov Tsonev

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on the PhD thesis of Silvia Peteva Dyulgerova - regular PhD student at the Department of Community Ecology and Conservation Biology of the Institute of Biodiversity and Ecosystem Research - BAS, on the topic: „Effect of land abandonment and agricultural intensification on bird communities in model areas in Bulgaria", for the award of the formation and scientific degree "Doctor"

Scientific speciality: ecology and ecosystem conservation.

Sylvia Peteva Dyulgerova graduated from the Master's program in Ecology in 2012. She is enrolled as a full-time PhD student in "Ecology and Ecosystem Conservation" at IBER-BAS, Department of Community Ecology and Conservation Biology. The supervisor of the PhD thesis is Prof. Dr. Valko Biserkov. The topic of the PhD thesis with which Sylvia Dyulgerova is credited is " Effect of land abandonment and agricultural intensification on bird communities in model areas in Bulgaria". Her scientific interests are mainly related to the biological features and ecology of birds, their habitat preferences, etc. However, as it could be onserved, her participation in various projects including land cover and land use assessment of different municipalities and districts in Bulgaria, inventory of avifauna in other countries of the Balkan Peninsula, etc., show a broad biological and ecological erudition.

Sylvia Dyulgerova's PhD thesis work is an original and thorough study of the relationship between the landscape changes and succession of woody and shrub vegetation in the abandoned grasslands and meadows and the diversity of birds with different ecological habitat requirements. For the purposes of this thesis, a vast amount of field data was collected from two model areas in north-central and southeastern Bulgaria. From 221 sample sites, representing circles with a radius of 150 m and a 100 m minimum distance between the edges of two adjacent sites, observations of the bird species inhabiting them were made with repeatability. These bird species were divided according to their ecological requirements to different habitats. According to the percentage cover of tree and shrub vegetation in the

sample plots, these habitats were determined to belong to 3 categories: VS1>60%, VS2: 60-90%, V S3>90%. The birds themselves were defined according to their ecological preferences into generalists (with broad ecological adaptability), those associated with open habitats, and with forest habitats. The information collected in the field was skillfully interpreted and analyzed by applying various software products such as CANOCO 4.5 program, STATISTICA 7.0, etc. The results thus obtained are demonstrated with a large number of figures including ordination diagrams, tables, etc.

The results of the analyses of the data collected in the field show that the species richness and diversity of birds decreased in parallel with the increase in the cover of woody and shrub vegetation, while no significant difference in the total abundance of birds (number of individuals) was observed. These changes are mainly associated with specialised species inhabiting open habitats, where species diversity and abundance decrease with the succession towards tree and shrub cover. This negative trend also affects the conservation significant bird species (SPEC species), which are also declining. The thesis also set a second task - to establish the relationships between the percentage cover of arable land in agroecosystems (influence of the agricultural intensification) and the characteristics of the bird communities inhabiting them. The summary results of work on this task indicate that intensively farmed fields predictably support lower species diversity and abundance of birds. An optimal ratio of grassland, cropland, and a low percentage of woody and shrub vegetation increases bird diversity in agricultural lands. This thesis is the first attempt to apply landscape indices (PLAND, TE, SHAPE_MN and NDCA) to analyse habitat changes affecting ornithological communities. 21 landscape indices were analysed at the landscape class level, and a selection of 4 indices describing each landscape class type, uncorrelated with each other, was made, demonstrating once again their dependence on bird habitat.

The PhD thesis is the first of its kind in Bulgaria, therefore it is distinguished by originality and has not only fundamental scientific but also pragmatic significance. The identified patterns are important for revealing the causes of negative trends and threats to bird populations resulting from the practices applied in agricultural land management, but also the lack of such practices. According to the conclusions of the work, actions and measures can be envisaged to reduce the negative impacts on different bird species when developing management plans for protected areas and protected zones, as well as when developing action plans for specific priority species.

The thesis is of course not without some weaknesses and shortcomings, which can be the subject of critical remarks and clarifying questions. For example, it refers throughout to

abandoned agricultural land, which in places gives the impression that this also includes land varied in its permanent use, including agricultural field, perennial crops, orchards, vineyards, etc. Of course, after a brief acquaintance with the objectives, methodology, etc., it becomes clear that these lands are pastures and meadows. But this should have been specified in the title of the work. I also recommend using the more established scientific term “ornithocoenoses” instead of “bird communities”. In my general opinion, the terms habitats and landscapes are often confused in the work. In a landscape represented by grassland, small patches of arable land and strips or patches of shrubs and trees there are several habitats, so it is a complex habitat. For a highly mobile group such as the birds there is no problem to occupy several habitats, with only their breeding habitat being conservative. In this regard, there are some discrepancies in the work even when associating the same species with a given habitat. For example, *Upupa epops* and *Streptopelia turtur* in one table are defined as associated with forest habitats, in another table they are defined as generalists, which is more correct. The same is true for *Emberiza melanocephala*, which is listed in one place in the thesis as associated with shrub habitats, in another. as characteristic of arable areas, which is more correct. In my view it was methodologically unsound to set the lower limit of tree and shrub cover on grassland at 60%. I believe that in the presence of 25-30% cover we can still speak of a mosaic grassland, and above this limit it is already more of a complex community and even already represents the beginning of fomation of forest or shrub coenoses. The optimal cover of trees and shrubs in mosaic grassland communities for birds and other animal species is between 20 and 30%, which is clear from the reports of the project "Restoration and sustainable management of Imperial Eagle foraging habitats in key Natura 2000 sites in Bulgaria" (LIFE14 NAT/BG/001119), implemented by BSPB in the period 2015-2020. It would also be interesting to draw some initial conclusions, specifically for Sakar, where a variety of agricultural crops are cultivated, albeit in the absence of sufficient representative material, which of these can be considered as the most suitable habitats for birds associated with open land?

The remarks made, of course, do not diminish the value of Silvia Dyulgerova's work, but should only lead to its refinement. As a general conclusion about the dissertation of the doctoral student, whom I know also as her lecturer at the Faculty of Biology, in view of the significance of the results, conclusions and scientific contributions of the thesis, the new and original scientific information collected, I recommend the scientific jury to support the award of the scientific and educational degree "Doctor" to doctoral student Silvia Peteva Dyulgerova.

21.03. 2025 **Prepared by:**

/Prof. Dr. Rosen Tsonev/