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FACTORIAL ASSESSMENT OF THE SUITABILITY OF INDUSTRIAL OPEN SPACES AND AIRFIELDS FOR HABITATION OF AVIFAUNA

Birds along with any other wildlife are extremely dependent on their habitats and bound to them. Amongst the constant competition, struggling search for breeding and feeding opportunities, raising offspring etc., fauna is always looking to expand its territorial coverage and find new sites to live and thrive. As a result, the state of surrounding territories is one of the most critical factors in ensuring ornithological safety of any industrial enterprise, including aviation ones. Airports, in particular, are planned and placed with careful consideration regarding the locations of avifaunal nesting, feeding, breeding and migration grounds. Moreover, there are strict regulations regarding vegetation and water bodies management, as well as nearby placement of any type of economic activity or another facilities, that may attract birds (e.g. it is forbidden for airports to be located in the vicinity of landfills with organic waste, water treatment facilities or significant agriculture objects, and vice versa). Yet with ever growing rates of urbanisation and steady occupation and repurposing of natural territories for human needs it is not always possible to adhere to all recommendations or implement optimal practices in reality. Additionally, it is worth noting that considering the complex system character of the natural environment and its components it is extremely difficult to efficiently account for all the factors and variables. As a result, there always remains some degree of uncertainty and risk associated with the presence of wildlife at or nearby industrial enterprises, and consequently – the need to take them into consideration for best possible control of functioning of facilities and management of the situations at or around them.

In the past we have developed the methodology for complex assessment of the suitability of leftover natural areas in urbanised environments for the sustaining of diverse populations of avifauna. [1] While it provides insight into the peculiarities of city forests, parks, cemeteries and embankments and can be used for planning their proper operation and administration, it is insufficient to perform the same tasks relative to industrial objects. Therefore we decided to improve upon the existing approach by including new factors, which allow us to take into account the specifics of enterprises and their surroundings. The main feature of most anthropogenic objects is their dynamics, that is, frequent changes in conditions in such areas, as well as the strong dependence of these conditions on human support and control. Also, industrial facilities and, in particular, airports, can create intentional or unintentional dangers for the

presence of wildlife, which will reduce the level of its attractiveness and hence the risk. As such, we added the following factors to expand the assessment methodology:

I – Factors associated with dangers from staying in the considered area:

- I1 – Unintentional natural and artificial hazards created or aggravated during anthropogenic activity on the site, e.g. selective accumulation of predatory organisms, risk of emergency or dangerous situations (with marks from 0 to -3);

- I2 – Intentional hazards, to increase risk perception (incl. lethal control), as part of management strategies, population control, pest control, etc. (rated from 0 to -7).

We combined those factors with a previously established approach to receive a viable generalized picture of the attractiveness of industrial facilities or areas for avifauna. As a test object Kyiv International Airport (Zhuliany) was chosen. To account for the changeability of the enterprise and different modes of operation and ornithological management, we performed assessment was performed for three different scenarios: (1) optimal, with maximum possible ornithological control, i.e. greatest reduction of attractiveness and elimination of birds' presence; (2) critical, with the absence of ornithological and partially other types of management that may affect the presence of birds; (3) normal or averaged, with constant management constrained by limitations imposed by everyday financial, technical, human factors etc.

The results of the assessment show that in the optimal scenario the overall mark of the airport is 6, which is dramatically lower than even the most urbanised city parks, which fully corresponds to the general idea about industrial zones. In the critical scenario the attractiveness rate is 41, which corresponds to the same values of big and relatively undisturbed green city areas, such as botanical gardens, Trukhaniv Isle or Bald mountain. It is worth noting that this is exactly the situation that developed on the territory of the airport starting from 2020, under the conditions of the COVID-19 pandemic and the war of the Russian Federation on the territory of Ukraine, when control and supervision in the airport area was reduced or absent. Still such extremes are rather exceptions. Thus, under the normal operation, the airport's mark is 24, which aligns with big yet moderately urbanized or cultivated parks or other attractive industrial facilities (such as Bortnychi aeration station).

Thus, by conducting a factorial assessment of attractiveness of industrial areas to birds, we obtain a generalised understanding of ornithological risk and a first approximation of its main components, which can potentially be useful for administrative purposes. Further improvement of the methodology is also possible in case of consideration and inclusion of such factors as synanthropization and adaptation mechanisms and opportunities presented by artificial environments.

References

1. Radomska, M. M., Horobtsov, I. V., & Mushta, M. A. (2019). The assessment of the Kyiv urban ecotopes comfort as a birds' habitat. *Scientific Bulletin of UNFU*, 29(8), 74-78.

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