Wind energy and multi-criteria analysis in making decisions on the location of wind farms in the Poland

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Abstract

The paper presents a discussion of different methods of multi-criteria analysis and different rules of proceeding that have to be taken into account for making decision about location of a wind farm in the Poland with particular regard to the field research carried out in the Krynki and Szudziałowo communes in the north-eastern part. In the study six multi-criteria analysis were discussed taking into account the main criteria on which they are based: utility functions (MAUT, AHP, DEMATEL), relationships outranking (ELECTRE, PROMETHEE) and decision support (Bord ranking methods). The problems with making decision on localisation of 15 wind turbines (Fig. 1) were analysed taking into account the 9 criteria having essential effect on realisation of a given investment: 1) the presence of natural environment elements under legal protection, including nature reserves, protected landscape and monuments of nature, 2) evaluation of wind energy resources, 3) difference in the altitude of the terrain of turbine possible location, 4) terrain roughness, 5) No risk of floods or flooding, 6) technological infrastructure and communication possibilities, 7) culture and landscape valours, 8) results of a year-long ornithological monitoring, 9) results of a year-long chiropterological monitoring. Taking into account of 9 criteria that should be met by the localisation of 15 wind turbines in, the main three criteria (C3, C8, C9) were found to differentiate localisation of 8 wind turbines (T-6–T-13), according to two variants (I and II) of their localisation. Criterion 3 (stimulant) and criterion 8-9 (destimulant) in the Borda method proved that from among the two variants considered the more suitable localisation of wind turbines is second variant W II than first variant W I. Variant W II had a higher altitude of the terrain (C3) and less risk of impact on birds (C8) and bats species (C9) than variant W I.

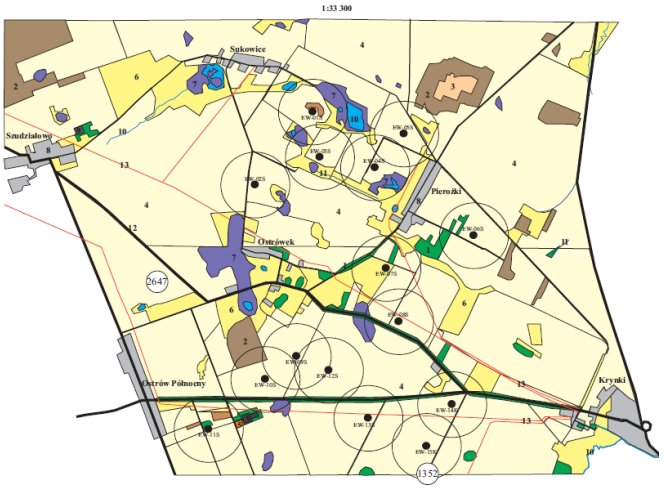


Figure 1: Planned localisation of 15 wind turbines in the NE Poland

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Biography

Grażyna Łaska has her expertise in evaluation of the impact of planned investments on the environment. She is an expert of botany for Nature 2000 European ecological network in the aspect of sustainable development. She is Vice-Chairwoman of Polish Botanical Society (2016-2019). Grażyna Łaska has been scientific university coordinator of the American-Polish Project called "IRES: U.S. - Poland Student Research Experience to Study Plant Species Interactions in the Unique Ecosystem of the Bialowieza virgin Forest" .

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Notes/Comments: