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Correlation study of indicators on landscape visual impact evaluation in on-shore wind farm

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With the prosperity of wind industry, more spaces are occupied by wind farms, inevitably bringing various environmental impacts. Among them, the landscape visual impact is of great public attention, which influences the acceptance rate of wind energy at local level and the project approval process. But the landscape visual impact is too subjective to assess without sufficient theoretical foundation and standards for evaluation, which causes opacity and ambiguity in planning process and legal disputes. This paper combines visual perception theories, wind energy technologies and landscape planning knowledge as theoretical foundation, proposes an indicator set for landscape visual impact evaluation: distance, height of turbine, number of turbine, rotation speed , landscape types, cultural heritage value and recreational function. Relationship of each indicator with landscape visual quality is analyzed by statistical methods and their comprehensive correlations are calculated in Matlab. The conclusion is a formula describing the landscape visual impact with indicators and their correlation coefficient. This formula definitely explains which indicators are positively related to the landscape visual impact, and the correlation between indicators that can provide technical reference for decision-making in wind farm planning. This paper takes Zhongying Wind Farm of Ningbo City in China as a case study. It consists of 18 wind turbines with the total height of 80 meters. 193 residents were questioned by means of a questionnaire attached with a brief introduction of the wind farm project and concept of landscape visual impact. The results show that the indicators of distance, height of turbine and landscape type are obviously positive, followed by indicators of number of turbine, recreational function, rotation speed and cultural heritage value. This evaluation formula can quantitatively assess the landscape visual impact and provide accurate indicator set for landscape visual quality evaluation in a specific area.

Figure: Relationship of Landscape Visual Impact and Wind Energy

Figure: Information processing mechanism of landscape visual perception

Biography

Jinjin Guan is pursuing her PhD in the Geography Institute at Ruhr University, Bochum, Germany. Her research program is "On-shore Wind Farm Planning and Landscape Protection", which aims to research the evaluation method for landscape visual impact in wind farm planning. She has set up a quantitative, modular evaluation model based on visual perception theories and landscape planning knowledge. This evaluation model can definitely evaluate the magnitude of landscape visual impact and provide scientific, quantitative guideline for decision-making in wind farm planning. She has landscape planning working experiences in Tongji Urban Planning and Research Institute in Shanghai before PhD program.

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