Species distribution models and wind farm developments

Scientific research on the effects of wind farms on wildlife has shown that these human-made structures can seriously threaten many sensitive bird and bat species, many of which are of conservation concern. Thus, models predicting collision risk with moving blades could represent a powerful tool for landscape planning. However, those predictive models, developed using available (i.e., past) information on mortality, are challenged by the fact that they should be helpful in anticipating mortality in different regions, even where factors contributing to that risk are distinct or change in magnitude.

Loew et al. (2012) accurately summarize some concerns on the suitability of predictive models assessing negative wind farm consequences on wildlife, while emphasizing the need for improving them by incorporating unexplored, potentially influential variables. However, a challenge in developing predictive models is to balance complexity, to understand underlying processes or mechanisms and imperfect information as well details of a particular system, with the simplifications necessary to maintain generality. Taking this into account, our models of griffon vulture mortality at wind farms in southern Spain (Carrete et al., 2012) included variables describing the importance of turbine location within the species distribution as well as wind farm-specific variables, considering two main points: (1) that the location and abundance of sensitive species are important determinants of collision risk, but (2) that wind farms, in their actual design, are dangerous to vultures, whatever their fine-scale distribution. In fact, if wind farms kill birds and bats, their effects on the long-term trends of population dynamics may be important for many species, particularly those long-lived (Carrete et al., 2009), independent of the ultimate causes of fatalities. This highlights the fact that, due to the current state of knowledge and applying the precautionary principle, the distribution and abundance of sensitive (or even threatened; Carrete et al., 2009, 2010) species should be used as the best biological guideline to assess wind farm location at large scales (Carrete et al., 2012) while continuing research to reduce the effect of turbine designs on animal mortality. Considering the usefulness of predictive models available, their optimal balance could be achieved by evaluating their ability to predict the risk of an event in areas that were not used for model development. In this sense, we encourage managers to apply our wind farm mortality model in other regions, to test its generality as a landscape guide for wind farm planning.

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