



大阪

inter-noise 2011

Osaka Japan September 4-7

Soundscape approach for the impact assessment of wind farms

Luigi Maffei¹, Tina Iachini², Seckin Basturk¹, Maria Di Gabriele¹ and Vincenzo Paolo Senese²

¹Built Environment Control Laboratory, Second University of Naples, Aversa (CE), 81031, Italy

²Laboratory of Cognitive Science and Immersive Virtual Reality, Second University of Naples, Caserta (CE), Italy

ABSTRACT

The noise impact assessment of wind turbines (WTs) is mainly based on the use of noise mapping tools and software which permit to compare predicted noise levels at the receivers with the noise limits levels fixed by national legislation. Despite the application of these procedures, WTs noise can be perceived as annoying by the population living close to the wind turbines. This is due mainly to the fact that, up to now, there are no specific dose-response curves for WTs' noise.

Moreover, the environments under the insertion of WTs are generally characterized by a natural soundscape and landscape. The presence of a new wind farm causes significant and complex changing which can be studied only through a multi-sensorial approach, that combines acoustics, visuals and emotional aspects. The use of Immersive Virtual Reality (IVR) represents a more ecological assessment method to determine the impact of wind turbine noise on the population and to provide a more complete and detailed analysis of the environmental impact of a new wind farm.

In this paper a study of an existing wind farm in Campania (Italy) is presented and the results of the application of the traditional and the IVR approach are compared.

Keywords: Soundscape, Virtual reality, Noise Impact Assessment

1. INTRODUCTION

Present approaches to evaluate the noise impact of wind turbines (WTs) are defined by national and international legislation that are commonly based on application of noise prediction models and the comparison between the noise levels and limit levels defined by the legislation [1][2][3]. Furthermore, national and regional regulations define minimum distances between wind turbines and dwellings in order to avoid annoyance and provide safety for the population living close to the wind turbines. It is however widely accepted that these conventional approaches fail in describing adequately wind turbine noise annoyance, because until now only not generalized dose-response curve has been modeled. However different studies are in progress enlarging the bases for the calculation of a generalized dose-response curve for WTs [4][5][6]. Other researches underline the influence of non acoustical factors (visibility, geographical distribution, color, movement, attitude towards green energy, the degree of involvement in the project and the economic benefits from wind turbine) [7] [8] on WTs noise impact assessment.

Wind farms are usually built in areas characterized by conserved natural values, like calmness, recreational activities, landscape scenery, natural soundscape. For this reason wind turbines cause a stronger intrusion on conserved natural soundscape and landscape which can modify the global judgement of people in terms of noise annoyance [9][10].

These multifaceted factors refer to the multisensory and interdependent nature of human perception. The multisensory integration can determine enhancement or depression of subjective response according to the spatial and temporal relationships of the stimuli as well as their physical parameters [11].

In order to achieve a more ecological assessment of soundscapes, several studies have investigated the contribution of sensory modalities [6][7][9][10][12][13], others have used realistic multisensory

¹ luigi.maffei@unina2.it

² santa.iachini@unina2.it