

Probabilistic Ecological Risk Assessment for Thermal Discharges

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Abstract

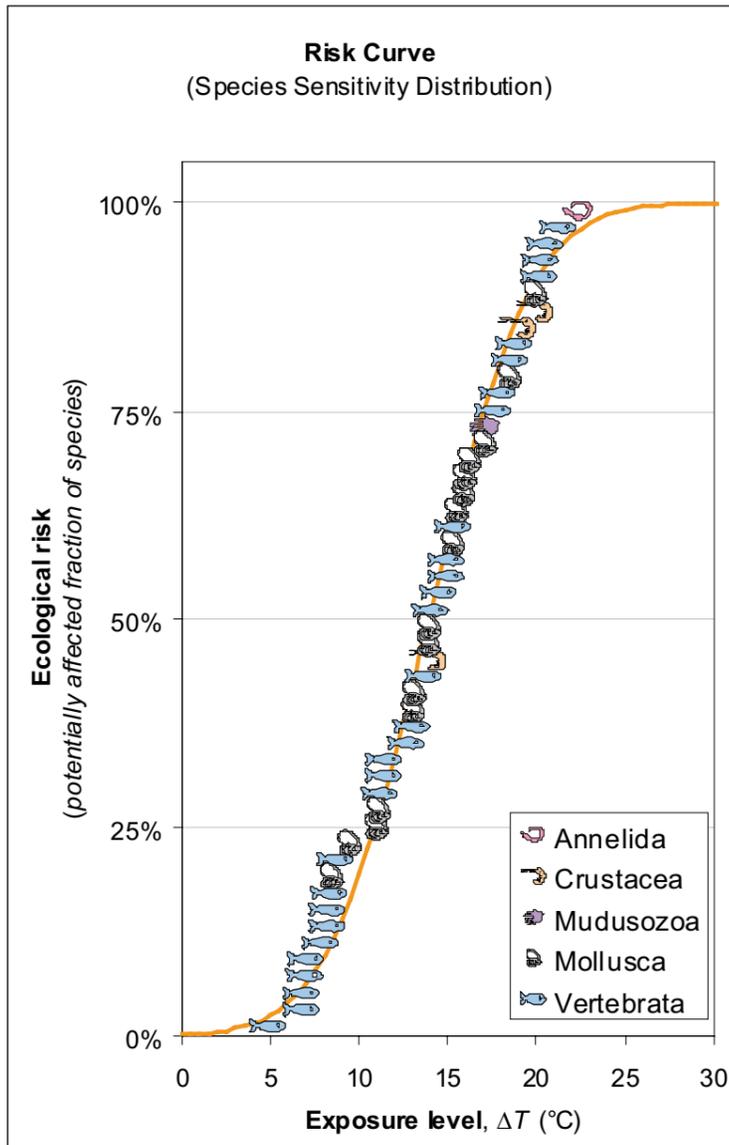
By making use of statistical information on species sensitivity towards temperature increases, impact of thermal discharges can be estimated more refined as the potentially affected fraction of species. This probabilistic approach originates from ecotoxicology and is recently proposed for the assessment of nontoxic stressors and potentially allows for integration of ecological risk originated from toxic and nontoxic stressors.

Methods

Sensitivity towards temperature increases was collected for 50 species (De Vries et al., 2008 and De Vries et al., 2009). From this data a so-called species sensitivity distribution (SSD) is constructed (Figure 1). This SSD can be used to translate exposure levels to ecological risk levels (Figure 1). The developed SSD approach quantifies ecological risk, resulting from thermal discharges as the potentially affected fraction of species. When additive interaction is assumed, the developed SSD can be integrated with SSDs of other stressors.

Introduction

Recent developments in water management policy demand a more integral approach to assess water quality. This is also true for thermal discharges. Currently, effects of such discharges are assessed for each stressor (e.g., thermal effects, oxygen depletion, chemical contamination) separately, generally by comparing the current status with a static 'safe' threshold. In the present study a probabilistic approach was used to quantify thermal effects, which potentially allows integration of risk of multiple stressors into a single indicator.



Probabilistic assessment

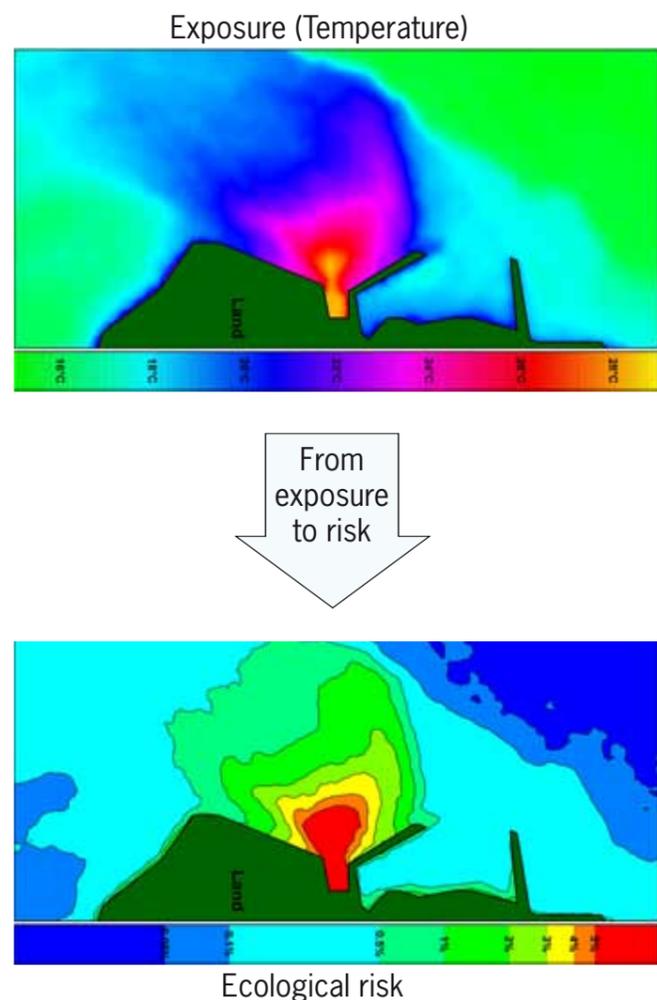


Figure 1
The statistical distribution of species sensitivity to temperature increases can be used to translate exposure levels to ecological risk