Predicting potential invasive species in Bulgaria using GIS – key study on aquatic turtles

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The European continent bears an extremely poorly represented aquatic turtle fauna, especially compared to hotspots of turtle diversity such as the SE North American and East Asian regions, mainly caused by specific paleoclimatic oscillations during the Pleistocene. The long term isolation of European species made them more negatively susceptible to competitive interactions with non-native species. The present study introduces a forecasting system for determining the potential species and respective areas in Bulgaria prone to the establishment of invasive, non-native aquatic turtles by assessing their ability to adapt to local conditions, specifically climate and habitats. The core of this system is based on predictive GIS models of the potential distribution of a number of species occurring in similar geographical conditions that potentially or in practice could get established in the European Union and in particular in Bulgaria. Two approaches were combined. In the first type as a model species was chosen the European pond turtle (*Emys orbicularis*) because of the wide distribution of this species: most of Europe, as well as northwest Africa and western Asia. The present day spatial model of the real distribution of this species was extrapolated to a worldwide scale. From the regions covered by this model a set of potentially invasive species was extracted.

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The second type uses the reverse approach, in which the geographic range of 13 potentially invasive species popular in the pet trade were extrapolated and those falling within the area of interest were selected. Such approaches are applicable both to a small and large scale areas. The full list could be further reduced by considering additional various specific environmental parameters and habitat requirement of the species. To successfully accomplish conservation goals after determining the list of the invasive species a set of species specific measures have to be implemented, including stricter border control, importing bans, improved tracking of specimens in commercial networks, control of already sold or possessed specimens in a centralized database.

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