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Projecting invasive species using remote sensing and spatial explicit models

An evaluation of the current and previous *Rosa rugosa* growth on Kieler Ort, Germany, with the aim to predict the rose coverage in future, under consideration of environmental factors.

Kieler Ort, a rather isolated island in the southwest Baltic Sea is representing a unique environment which is protected for its landscape, nature, flora and fauna and serves as a bird sanctuary. *Rosa rugosa*, as one of the most invasive non-native plant species along northern Europe's coastline, was noted on the island and is therefore endangering the islands unique biotope.

The previous and current extent of *Rosa rugosa* was retrieved from aerial images for the years 1994, 2000, 2007 and 2016. The 2016 outcome was validated by collecting ground truth data. A *Rosa rugosa* coverage of 10.6% was identified for 2016. An analysis of elevation, aspect and wind in relation to the *Rosa rugosa* locations on Kieler Ort showed an aversion to low, near sea level elevations. A *Rosa rugosa* preference of eastern-facing slopes was observed, which corresponded to wind protect aspects on the island. The *Rosa rugosa* coverage of the 4 years had been analyzed by comparing two adjacent years (3 periods). The overall area increase of *Rosa rugosa* had been estimated to 11.5% per annum. For the future prediction a cellular automata, as spatial explicit model, has been implemented; and predicted a *Rosa rugosa* coverage on Kieler Ort of 30.3% in 2036.

Keywords: Physical Geography, Ecosystem Analysis, *Rosa rugosa*, invasive species, aerial images, growth rate, modeling, cellular automata.