

Projecting impacts of rising water temperature on the distribution of seaweeds around Japan

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Using monthly mean sea surface temperature (SST) from 1950 to 2035 obtained by a high-resolution climate projection model (MIROC4h) and SST-based indices of the distribution of tropical-subtropical and temperate seaweeds (*Sargassum duplicatum* and *Ecklonia cava*, respectively), we evaluated the effects of SST rises on the potential distribution of the species in seas close to Japan. Estimated distributions from the 1950s to 2000s showed that the potential southern limit of the temperate seaweed shifted to higher latitudes due to rising water temperature-induced barren ground, while there was little change in the potential northern limit of them. In contrast, the tropical-subtropical seaweed *S. duplicatum* expanded their distribution polewards during the same period. Under the global warming scenario (RCP4.5), the potential distribution of *S. duplicatum* can replace the one of *E. cava* in coastal area of Kochi Prefecture by the 2010s. This replacement of the temperate seaweed species with the tropical-subtropical one could consequently change coastal productivity and food web structure, and therefore may affect ecosystem services around Japan.

Keywords: seaweed bed, global warming, climate model, *Ecklonia cava*, *Sargassum duplicatum*