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## Double whammy for important Baltic seaweed Environmental impacts must be considered in combination

**8 August 2016 / Kiel. Rising seawater temperatures and increased nutrient concentrations could lead to a decline of the bladder wrack in the Baltic Sea in the future, according to experiments conducted by marine scientists from Kiel and Rostock. The results show how important it is to examine the responses of organisms to a combination of environmental factors, the biologists point out in two current publications. Because forests function as a long-term nutrient storage in coastal waters and serve as a nursery for economically important fish species such as cod, their decline could have consequences for the economy and society.**

Wherever ecosystems rich in species develop on the rocky shores of the Baltic Sea, the bladder wrack *Fucus vesiculosus* has provided perfect groundwork. By colonizing pebbles and rocks, it creates habitats for many other species. Other algae grow on the seaweed to be grazed by snails, isopods and amphipods. Crustaceans, mussels and predatory fish as well as many smaller organisms that are important for the Baltic Sea ecosystem thrive in submarine *Fucus* forests. *Fucus vesiculosus* is one of the main producers of organic matter in the Baltic and plays a crucial role for its biodiversity and biogeochemical cycles. These functions could be lost due to a series of reactions triggered by climate change.

According to a study conducted by marine biologists of GEOMAR Helmholtz Centre for Ocean Research Kiel and Rostock University within the German research network BIOACID (Biological Impacts of Ocean Acidification), eutrophication – that is already known for its negative effects – and rising seawater temperatures could lead to a decline of the bladder wrack in the Baltic Sea. “It is important to consider the effects of a combination of global and local environmental factors on entire ecosystems”, Dr. Franziska Julie Werner stresses. The post-doctoral researcher in marine ecology at GEOMAR is main author of two studies published in the magazines *Limnology and Oceanography* and *Oecologia*. “Our results also illustrate how important it is to promote a successful eutrophication management in the Baltic Sea – a factor which, unlike rising global temperatures, could be achieved by national commitment.”

For the two experiments, bladder wrack from the Kiel Fjord and smaller species of algae living on it as well as grazers like isopods, amphipods and periwinkles were introduced into the Kiel benthocosms – twelve experimental tanks, each holding a water volume of one and a half cubic meters. A flow-through system continuously pumped fjord water into the benthocosms, which ensured that the basic conditions inside the tanks corresponded to the environmental conditions of the Kiel Fjord. For the first study, the seawater temperature and carbon dioxide concentrations (CO<sub>2</sub>) in half of the tanks were raised according to future climate change predictions for the Baltic Sea region. Divided into four seasonal phases, the experiment ran



reduced by about one half under warmed conditions compared to that of *Fucus*, which was kept under present conditions. The second experiment confirmed these observations. If nutrients were added, the biomass of *Fucus* even decreased b