

Complementary information on 'Life in the Antarctic between stresses and opportunities'

To give additional information on the topic and views from other authors, the following two papers have been summarized accordingly. Since the focus lies on marine organisms, terrestrial topics from the papers have been neglected.

'Antarctic environmental change and biological responses' (2019)

Authors: Peter Convey, Lloyd S. Peck

Environmental change in the form of altered sea ice conditions, increased temperature and ocean acidification are expected to have the biggest impact on the Antarctic ecosystem. Reduced coverage by coastal glaciers and ice shelves lead to an increase in phytoplankton productivity and more sequestered carbon which slows warming. On the other side, the negative consequences of decreasing sea ice include an altered distribution as well as lower numbers of krill which impacts the whole food web. Benthic species are affected locally by more iceberg activity that destroys their communities. Increases in temperature pose a threat since, according to many laboratory studies, Antarctic marine species are very vulnerable to environmental warming and have physiological limitations to cope with it. The research on ocean acidification indicates that some species could adapt well, while others will face problems when exposed to lower pH values.

The threats represented by non-native species are supposedly bigger and immediate than those by climate change. The harsh conditions of the Antarctic previously limited the settling of invasive species and there are no recorded marine non-native species yet. But warming and increasing human traffic favour the introduction of invasive species. Other disturbances by research stations and tourists occur as well, they happen mostly on the terrestrial area and are not well monitored so far. Additional research and possible consequences need to be assessed since human activity in the Antarctic is on the rise.

'Invasive non-native species likely to threaten biodiversity and ecosystems in the Antarctic Peninsula region' (2019)

Authors: Kevin A. Hughes et al.

This paper focuses on the Antarctic Peninsula region (APR) which has the highest risk for invasive species since it's (1) closest to another continent, (2) has least extreme climatic conditions, (3) deals with most human activities and (4) the temperature rose most compared to other Antarctic areas. Plus, all the 14 recorded non-native (terrestrial) species on Antarctica are found in the APR and already clearly state

how vulnerable this region is to invasion. The introduced new species can either be brought to the APR by boat or aircraft as well as from other regions of the Antarctic continent, where 26 distinct biogeographic regions have been identified in total.

The method to identify the invasive non-native species, which are most likely to threaten biodiversity and ecosystems in the following 10 years, consisted of scores for arrival, establishment and biodiversity impact. As a result, 13 species were identified to present the highest risk, out of which eight were marine invertebrates, one marine algae, two terrestrial invertebrates and two vascular plants. The vast majority of high risk invasive species were identified in the marine ecosystem, with the high potential introduction pathway of ship hulls and less by ballast tanks.

Three of the high-risk invaders were mussels, which are known to travel on ship hulls in the Southern Ocean and for being non-native invaders globally.

