# Benthic community structure and responses to global warming in the Prince Gustav Channel, Antarctica

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The debate concerning climate change has been a central subject matter since the early '90s, and its consequences are strictly related to the sustainable development goals. Variation in environmental parameters are of crucial importance in particular for the 13th – Climate Action - and 14th – Life below water – goals, since it deeply impacts both human and animal life. Climate is rapidly mutating, and anthropogenic influence to such development is unquestionably significant. Evidences of climate change are distinctly visible in a variety of environmental networks, with marine ecosystems being the most affected. Environmental factors as temperature and pH are critical elements in determining species habitats and dynamics, hence it is not surprising that many organisms are facing profound modification of their life cycle events in response to climate change. Polar species represent an extremely sensitive group of organisms as they live in a very pristine ecosystem, and their survival is severely threatened by climate change. The Antarctic continent has always been studied in order to better understand the relation between human-induced climate changes and ice melting, and in this context the Antarctic peninsula represents the most impacted region on earth. It is indeed experiencing rates of atmosphere warming greater than the global mean and the -9 °C isotherm has moved southwards, determining a loss of 28 000 km2 of ice shelves since 1960. Disintegration of ice shelves and glacier retreat events are closely associated to variation in community structures at different trophic levels of the Antarctic food web.

The study of community response to climate changes is of particular interest when investigating the possible trophic cascade, hence alterations of diverse organisms and their dynamics in relation to the environment they inhabit. Benthic fauna is especially useful to investigate how indirect and direct anthropogenic influence is able to affect and re-shape the ecological dynamics of species considerably distant from humans. Climate change has a negative effect on benthic interactions, although some organisms may actually be capable of adapting to specific altered conditions, therefore a growing interest is rising towards these fascinating communities, and particularly with respect to the phylum of Nematoda. Nematodes are unquestionably the most abundant metazoans populating the seafloor sediments and it is largely verified that they are good bio-indicators of environmental conditions in several diverse ecosystems, from shallow to deep waters, and from undisturbed to scoured sediments. For these reasons, the following study will focus on nematodes abundance and biodiversity.

The samples will be used to investigate three distinct research hypotheses. First of all, major changes in sediment conditions and community assemblages of associated meiofauna will be studied to assess the influence of different ice condition in historical and present times. Indeed, glacier impact, hydrological dynamics and surface productivity are supposed to play an important function in determining the community structure in three contiguous deep basins along Prince Gustav Channel. Secondly, the benthic diversity of PGC deep basins will be investigated in order to confirm its similarity to populations inhabiting the adjacent shelf rather

than to the bathyal fauna of the Weddell Sea. Finally, evident differences in benthic communities are supposed to occur comparing the shallower, most likely impacted areas of Duse Bay with deeper protected basins. These are also expected to act as carbon sink, thus providing more nutrients to benthic assemblages and suggesting the presence of abundant populations.

The study represents the first analysis of biodiversity in this area, and it would provide more information about the impact of global warming on Antarctic dynamics.

Keywords: Sustainable development goals; Climate change; Ice melting; Antarctica; Benthos; Nematodes