
The effects of climate change and the collapse of the shrimp fishery on fish communities' diversity and functions in a tropical context: the case of the continental shelf off French Guiana

Vincent Vallée¹, Ilan Perez^{*1}, Maria Ching Villanueva², and Fabian Blanchard¹

¹Ifremer – Cayenne, French Guiana

²Ifremer – Ifremer, Brest – Plouzané, France

Abstract

For more than two decades, describing and understanding the spatio-temporal dynamics of fish communities has been subject to increasing attention from scientists and fisheries managers. Such dynamics are crucial for ecosystem functioning and productivity which provide goods and ecosystem services. Most of the works based on fishing and climate change effects on fish communities' ecology and functions are focused mainly on temperate and boreal ecosystems. There is a lack of information concerning the adaptation capacity of the fish communities to warmer waters in tropical regions. Our study is based on datasets from surveys conducted from 1993 to 2017 using a bottom shrimp trawl between 10 and 60m depth in a tropical continental shelf (French Guiana) which is characterized by a significant increasing of SST and a declining fishing pressure (shrimp fishery by bottom trawl). We firstly compared the functional richness of the fish communities to values obtained from a null model that enabled us to identify the relative importance of the assembly rules (niche filtering hypothesis versus limiting similarity hypothesis) using a trait-based approach. Then we analyzed the ground fish communities' spatio-temporal structure and functional diversity. Subtropical species occurring at the upper limit of their thermal range are disfavored with warming waters provoking potential changes in the fish communities' structure. Moreover, individual observed sizes were larger in the recent years probably due to the decrease of the fishing pressure. The consequences of such alterations are discussed.

*Speaker