

# CLIMATIC AND HYDROLOGICAL CHANGES AT THE NORTH COAST OF RIO DE JANEIRO (BRAZIL) AS PERCEIVED BY THE FAMILY FISHERMEN

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## Changements climatiques et hydrologiques de la côte nord de Rio de Janeiro (Brésil) tels que perçus par les pêcheurs artisanaux

**Mots-clés :** écosystème lagunaire, pêcheurs artisanaux, changement climatique, perception

**Keywords:** lagoon ecosystem, artisanal fishermen, climate change, perception

### Introduction

The transformations of our environment resulting from anthropogenic climate change are increasingly present in people's lives, whether they are in urban or rural areas. They are drawing the attention of experts, civil society public authorities and even the market. They become central to the debates and challenges to be faced today and over the coming decades (O'Brien & Leichenko, 2000). More and more climate studies point out alarming levels of temperature or precipitation, extremes being observed in different parts of the world, with increasing frequency (Begum *et al.*, 2022; Shaffril *et al.*, 2017). Extreme climatic phenomena such as heat and cold waves, drought periods, recurrent storms or frequent flooding end up changing the structures of environments and biotope linked with them, which affect consequently, directly and indirectly, the populations depending on them (Marengo & Valverde, 2007; Seixas *et al.*, 2014). Specific groups of population like fishermen or farmers, through their dependency relationship with the surrounding natural environment, have aptitude to observe the climatic phenomena and adapt their way of subsistence.

The research presented here, focus therefore on artisanal fishermen from the municipalities of the coastal area of the North of Rio de Janeiro, population considering water as a productive input, depending on its abundance and quality. The aim is to understand how these artisanal fishermen perceive the climate change in their working environment, based on their experience and their capacity to adapt their daily lives and their ability to provide subsistence for their families. Some of the working hypothesis are the corroboration of the hydrological changes related with meteorological data measured, the existence of individual adaptation strategies and the correlation between understanding of climate change and the capacity of adaptation.

### 1. Methodology

In order to understand the perception, the individual interpretation of observed environmental data, we analysed observations collected through interviews and focus group with artisanal fishermen in the coastal region between Guanabara Bay (Rio de Janeiro) and delta of river Paraíba do Sul (Campos dos Goytacazes). This region includes coast as well two big lagoons systems, that of Lagoa de Araruama (approx. 150 km<sup>2</sup>) and that of Lagoa Feia (approx. 100 km<sup>2</sup>). The interviews use 10 short questions about rain, flood, fishing water quality and fish population. The interviews are applied directly or through Whatsapp spoken messages as a part of a PhD research project. The focus groups include other questions about social and working environment and are part of the Environmental Education Programme (PEA-Pescarte) (IBAMA, 2010). The PEA, ongoing since 2015, has as main objective the implementation of work and income generation projects together with family fishermen organisation of 10 municipalities in the Campos Basin (BC). The PEA is financed through environmental taxes of the Petrobras off shore activities and the program is technically supported by the State University of Northern Rio de Janeiro Darcy Ribeiro (UENF), located in Campos dos Goytacazes..

### 2. Preliminary results and discussion

The study focused on artisanal fishermen's interpretations of the perceived effects of climate change and how they have adapted to these changes, in their daily live, in the ways they work and earn income. Understanding how this adaptive capacity manifests itself in traditional communities, according to Souza Silva (2014), is not limited solely to changes in physical spaces, based on local ecological knowledge, but also extends to social, cultural and economic changes. In this sense, it means understanding how people produce practical answers to everyday

questions and mould themselves to changes in the environment and water quality, in a context of greater social vulnerability.

The words of first fishermen interviewed corroborate the findings of the literature and experts on the climate change. The perception, albeit simple, but attentive, of the effects of anthropogenic climate change appears in the speeches of most of the interviewees. As expected the excessive temperatures were a recurring theme, but were equally reported reduction of rainfall frequency (seen as a "blessing from nature"), but with increased rainfall intensities, causing more frequent flooding. These effects are accompanied by water pollution, whether from sewage or waste, and massive presence of algae and mud, producing bad water odour. The interviews reports also fish shortage, as well as drop in number of commercially important species, as the presence of smaller fish, leading to a reduction in fish volume to be sold. The changes in the environment, cited, have led to alternative fishing practices, as well as to search for an additional income activity to minimise the effects of the fishing volume reduction.

The presentation will give more detailed results of the collected data, its statistical treatment and possible policy implications.

## Conclusions

The text draws attention to the essentiality of water, in our case not for human consumption, but as working conditions and economic resource of subsistence. The first results allow to estimate the importance of this "factor of production" from the point of view of those who work and depend on the waters for their survival and that of their families. The collected data show a relatively accurate perception of the changing climatic phenomena like rainfall and their impact on the fish population. The climatic changes express themselves in the form of uncertainties of the working conditions and of the continuity of fishing activity. The interviewee's speeches corroborate findings from the literature (Begum *et al.*, 2022) pointing to an important negative effect of the climate change on social groups that depend on natural environment (water). The final result of these effects, as one fishermen said, is an important reduction of income, discouraging the artisanal fishing and inducing shift to more urban economical activities. The public policies should therefore limit artisanal fishing to the future environmental capacities and help the exceeding fishermen population with economical reconversion. The combination of environmental education and monitoring of human activities will contribute to both environmental restoration and the preservation of fish population, in order to guarantee the future of artisanal fishing in the region.

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