

## RESEARCH INTERESTS

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- **Primary:** Fisheries Economics, Environmental and Resource Economics, Bioeconomics
- **Secondary:** Differential Games, Optimal Control, Dynamical Systems, Microeconomics

## CURRENT POSITION

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### PhD Candidate in Economics

October 2021 – Present

Aix-Marseille School of Economics, Marseille, France

*Dissertation: Essays on Fishery Management*

Advisors: Prof. Agnes Tomini, Prof. Hubert Stahn

## EDUCATION

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### Magistère Big Data Science, Economist Engineer

September 2019 – June 2021

Aix-Marseille School of Economics, Marseille, France

Graduated with Honors

### Master 2 in Empirical and Theoretical Economics

September 2020 – June 2021

Aix-Marseille School of Economics, Marseille, France

*Master Thesis: The Bio-Economics of Interacting Species*

Graduated with Honors

### Bachelor of Science in Economics & Industrial Organization

September 2016 – April 2019

University of Tours, Tours, France

Graduated with Honors

## PUBLICATIONS

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Bataille, G. (2024). An explicit solution to harvesting behaviors in a predator-prey system. *Natural Resource Modeling*, e12408.

## WORKING PAPERS

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### Partial Considerations of a Predator-Prey Ecosystem

with H. Stahn and A. Tomini

Submitted to *Resource and Energy Economics* —

*Abstract:* This study presents new insights into the exploitation of a predator-prey ecosystem. It examines the emergence of biological externalities when agents specialize in harvesting specific fish types and only partially consider the dynamic of the ecosystem. We contrast this regime with the socially optimal outcomes. Specifically, private agents overestimate the conservation value of the targeted species and limit their fishing effort. This induces predator overpopulation and the depletion of the prey stock. This global under-fishing persists even given agents' strategic interactions among themselves when targeting the same fish. Finally, we propose a species-specific instrument to regulate the two main inefficiencies: strategic and biological externalities.

### International Fisheries Agreements: Endogenous Exits, Shapley Values, and Moratorium Fishing Policy

with B. Zou

Submitted to *Games and Economic Behavior* —

*Abstract:* Motivated by recent examples, this study proposes a dynamic multistage optimal control problem to explain the instability of International Fishery Agreements (IFAs). We model two heterogeneous countries

that exploit shared fishery resources, and investigate the conditions that lead to a shift from cooperation to competition. We assume that countries differ in their time preferences, initially behave as if the coalition will last indefinitely, use fixed sharing rules during cooperation, and adopt Markovian strategies after withdrawal. Our findings reveal that, for any sharing rule, coalitions of heterogeneous players always break down in finite time. We use the dynamic Shapley Value to decompose the coalition's aggregate worth over time, thereby eliminating the incentive to leave the agreement. Additionally, we show that a fishing moratorium policy accelerates the recovery of near-extinct fish stocks; however, fishing should resume under a cooperative regime once sustainable levels are achieved.

## Welfare Effects of Prey-Refuge in Fisheries (JMP)

*Abstract:* In this paper, I use a tractable predator-prey model with endogenous harvesting to assess the impact of a prey refuge on fishery performance. Using a two-stage game framework, where the prey-refuge consistently protects a portion of the environment from predators, this paper investigates: (i) how fishers modify their behavior in the presence of a prey-refuge and (ii) the conditions under which the prey-refuge enhances the social welfare. The results show that reducing the intensity of species interactions via the prey-refuge diminishes fishing pressure on both prey and predator populations. Interestingly, although full prey protection maximizes the payoff from prey harvesting, it does not necessarily minimize the predator's fishing payoff. Necessary and sufficient conditions for the existence of positive cooperative surplus are provided. Numerical examples reveal that the overall efficiency of the fishery, influenced by the prey-refuge, is highly contingent on fishers' willingness to wait for its benefits (i.e., the discount factor). Specifically, when fishers are sufficiently patient, the prey-refuge improves social welfare. Finally, prey refuge implementation can also occur when transfers are not allowed, or when fishers coordinate their fishing strategy. This paper contributes to the fishery management literature by proposing an alternative approach that can promote efficiency through indirect incentives.

## WORK IN PROGRESS

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- **Cross-ownership in Common-Property Natural Resource Oligopoly: The Role of Pollution Externalities** with Miao Dai

## AWARDS

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**Best Student Presentation Award** 2023  
World Conference on Natural Resource Modeling (WCNRM)  
Paper: *Welfare Effects of Prey-Refuge in Fisheries (ex title: Bargaining Around the Prey-Refuge)*

## RESEARCH VISITS

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- **Autonomous University of Barcelona** 2024
- **University of Luxembourg** 2023

## CONFERENCES AND SEMINARS

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### 2024

- Mathematics for Bio-Economics and Sustainability of Fisheries
- European Meeting on Game Theory (SING 19)
- Environmental Economics: A Focus on Natural Resources
- 3rd Workshop on Dynamic Games and Applications
- AMSE 5th Summer School in Environment and Discounting
- Mediterranean Game Theory Symposium

### 2023

- European Association of Environmental and Resource Economists (EAERE)
- CEE-M PhD Seminar
- World Conference on Natural Resource Modeling (WCNRM)

### 2022

- Association of Southern European Economic Theorists (ASSET)
- French Association of Environmental and Resource Economists (FAERE)
- World Conference on Natural Resource Modeling (WCNRM)

## TEACHING EXPERIENCE

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### Teaching Assistant

2022 – Present

Aix-Marseille School of Economics, Marseille, France

*Microeconomics, Mathematics & Environmental Economics*

## TECHNICAL AND LANGUAGE SKILLS

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**Programming Languages:** R, SAS, STATA, PYTHON, VBA, Matlab

**Markup Languages:** LATEX, R Markdown, HTML

**Databases:** SQL

**Office Software:** MS Office, LibreOffice

**Languages:** English (Fluent), French (Native), Spanish (Basic)